

2013 LIS

\$20.00

**LOUDSPEAKER
INDUSTRY
SOURCEBOOK**

- **COMPONENTS**
- **DESIGN SOFTWARE**
- **DRIVERS**
- **ENCLOSURES
& CABINETS**
- **FINISHED SYSTEMS**
- **HEADPHONES**
- **INTEGRATED AMPLIFIED
SPEAKER SOLUTIONS**
- **MEASUREMENT
MICROPHONES**
- **MICROSPEAKERS**
- **SPEAKER PARTS**
- **TEST EQUIPMENT**



Cover Sponsor

Speaker Test Solutions

Exel handheld instruments

The MR-PRO and XL2 instrument set offers an easy-to-use combination for reference measurements, performance verification and trouble shooting.

A few of the features for speakers:

MR-PRO

- Sine, Noise and swept/stepped signals
- Also measures impedance of connected device
- 70/100V power calculation & opt. protective adapter

XL2

- Both Acoustic and Audio measurements
- 1/1, 1/3 octave RTA (opt. 1/6 & 1/12)
- FFT spectrum analyzer
- THD+N, Level, Frequency
- Delay; Polarity; Scope mode



MR-PRO
Professional analog
audio signal generator



XL2
Hand Held audio
and acoustic analyzer

High performance production line testing



Proven PureSound™ technology

Reliably detects any audible defects with maximum hit rate. Parallel analysis of up to four channels.

Modular Analyzer architecture

Customize your speaker or mic test system by choosing the number of analysis channels, built in impedance & coil resistance measurements, switchers, MEMS mic interfaces, polar plots for mics, environmental sensors, etc.

Cost efficiency

Optimized system configuration limits your investments to the needs of your application only.

Maximum test speed

Very fast glide sweep technology measures all quality parameters from a single stimulus within a fraction of a second.

FX-Control software

Powerful and complete system control suite supports flexible GUI designs, built-in limits handling and sequenced measurements.



pure precision.



1,4", 1,5" and 2" Coaxial compression drivers

The patented design employs two concentric annular ring diaphragms providing dramatic improvement in dynamic response, clarity and transparency.

With two subsystems in one, each driver covers a smaller frequency range for increased power handling, high dynamic and extremely low distortion.

Innovative driver solutions

European finest quality drivers for professional and high-end loudspeaker applications

Worldwide largest manufacturer of premium compression drivers

Ultra low distortion cone drivers	Coaxial transducers	Annular diaphragm compression drivers	Planar wave drivers for line arrays	EUROPEAN HIGH QUALITY SPEAKERS	
				BMS Speakers GmbH Hannover – Germany www.bmsspeakers.com	

INDUSTRY REPORTS

By Peter Larsen (LOUDSOFT, Denmark)

By Christopher J. Struck (CJS Labs, United States)

By Sandy Gross (GoldenEar Technology, United States)

By Rob Nijman (HiFi.nl, The Netherlands)

18 Engineering Design Software

By Nora Wong and Maria Markowski (Menlo Scientific, United States)

By Nora Wong (Menlo Scientific,
United States)

By Mike Klasco (Menlo Scientific,
United States)

By Maria Markowski (Menlo Scientific,
United States)

43 CABLES & CONNECTORS

- Cables
- Connectors
- Wire Channel

Earphones
Headphones

- Baffles
- Finished Cabinets
- Sub-Assemblies
- Panels
- Materials
- Rigging

Enclosure Grilles
Enclosure Stuffing
Grille Assemblies
Hardware

Acoustic Analysis

- Box Design
- CAE or CAD
- Crossover Optimizer
- Network Design

Home
Pro
Car

- Amplifiers
- Digital Signal Processing
- High-Power Amplifier Modules
- Soundbars
- Subwoofer Plate Amps
- Wireless

- Adhesive Dispensers
- Conveyors
- Curing Ovens
- Lead Out Wire Termination
- Magnetizers/Demagnetizers
- Production Line Equipment
- Ultrasonic Assembly Equipment

- Consumer
- Field Mics
- Lab Instruments
- Measuring Mics
- Professional

Dynamic
ECM
MEMs

Cell Phone
Laptop
Tablet/MID

Acoustic Materials
Finished Goods

- Compression Drivers
- Full Range
- Horns
- Midrange
- Paging Horns

82 PASSIVE COMPONENTS, CROSSOVERS, & WIRING

Electronic Crossovers
Finished Passive Crossover
Networks
Passive Components
Wire & Wiring Harnesses

Adhesives & Glues
Cone Additives & Other
Treatments
Cone & Suspension Components

- Frames & Baskets
- Lead Out Wire
- Lead Out Wire Termination/
Crimps

Magnetic Assemblies
Voice Coil Components

- Accelerometers
- Anechoic Chambers
- Audio Analyzers
- Gaussmeters
- LCR Bridges
- MLS
- Multimeters
- Oscilloscopes
- Resistance Bridges
- Signal Generators
- Sine/Square Wave Oscillators
- Speaker Turntables
- Spectrum Analyzers
- Stroboscopes
- Test Mics
- Testing Cabinets
- Turns Counters

DEPARTMENTS

5 Supporting Companies
36 Company Compendium
106 Appendix
108 Address List



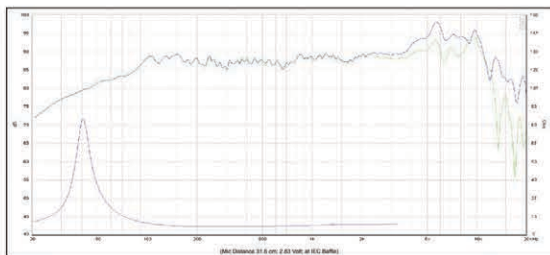
5" SB15MFC30-8

WHAT'S NEW



6" SB17MFC35-8

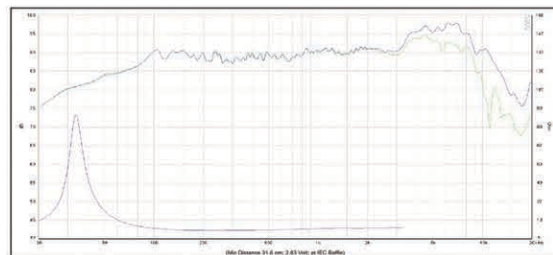
THE SPECS



Specs :

Nominal Impedance	8 Ω	Free air resonance, F _s	41 Hz
DC resistance, R _e	5.7 Ω	Sensitivity (2.83 V/1m)	87 dB
Voice coil inductance, L _e	0.14 mH	Mechanical Q-factor, Q _{ms}	5.5
Effective piston area, S _d	88 cm ²	Electrical Q-factor, Q _{es}	0.4
Voice coil diameter	30.5 mm	Total Q-factor, Q _{ts}	0.37
Voice coil height	15 mm	Moving mass incl.air, m _{md}	9 g
Air gap height	5 mm	Force factor, B _l	5.7 Tm
Linear coil travel (p-p)	10 mm	Equivalent volume, V _{as}	18.7 liters
Magnetic flux density	1.0 T	Compliance, C _{ms}	1.7 mm/N
Magnet weight	0.54 kg	Mechanical loss, R _m	0.4 kg/s
Net weight	1.47 kg	Rated power handling	50 watt

The parameter are measured on drive units that are broken in



Specs :

Nominal Impedance	8 Ω	Free air resonance, F _s	34 Hz
DC resistance, R _e	5.7 Ω	Sensitivity (2.83 V/1m)	88 dB
Voice coil inductance, L _e	0.15 mH	Mechanical Q-factor, Q _{ms}	5.5
Effective piston area, S _d	118 cm ²	Electrical Q-factor, Q _{es}	0.4
Voice coil diameter	35.5 mm	Total Q-factor, Q _{ts}	0.35
Voice coil height	16 mm	Moving mass incl.air, m _{md}	11.8 g
Air gap height	5 mm	Force factor, B _l	6.2 Tm
Linear coil travel (p-p)	11 mm	Equivalent volume, V _{as}	37.5 liters
Magnetic flux density	1.0 T	Compliance, C _{ms}	1.89 mm/N
Magnet weight	0.54 kg	Mechanical loss, R _m	0.5 kg/s
Net weight	1.56 kg	Rated power handling	60 watt

The parameter are measured on drive units that are broken in



Specs :

Nominal Impedance	6 Ω	Free air resonance, F _s	20 Hz
DC resistance, R _e	4.5 Ω	Sensitivity (2.83 V/1m)	86 dB
Voice coil inductance, L _e	3.0 mH	Mechanical Q-factor, Q _{ms}	4.5
Effective piston area, S _d	312 cm ²	Electrical Q-factor, Q _{es}	0.31
Voice coil diameter	75.5 mm	Total Q-factor, Q _{ts}	0.29
Voice coil height	28.5 mm	Moving mass incl.air, m _{md}	132 g
Air gap height	6 mm	Force factor, B _l	15.4 Tm
Linear coil travel (p-p)	22 mm	Equivalent volume, V _{as}	66 liters
Magnetic flux density	0.63 T	Compliance, C _{ms}	0.48 mm/N
Magnet weight	2.1 kg	Mechanical loss, R _m	3.7 kg/s
Net weight	5.38 kg	Rated power handling	200 watt

The parameter are measured on drive units that are broken in



Specs :

Nominal Impedance	6 Ω	Free air resonance, F _s	19 Hz
DC resistance, R _e	4.5 Ω	Sensitivity (2.83 V/1m)	88 dB
Voice coil inductance, L _e	3.0 mH	Mechanical Q-factor, Q _{ms}	5.0
Effective piston area, S _d	508 cm ²	Electrical Q-factor, Q _{es}	0.34
Voice coil diameter	75.5 mm	Total Q-factor, Q _{ts}	0.32
Voice coil height	28.5 mm	Moving mass incl.air, m _{md}	154 g
Air gap height	6 mm	Force factor, B _l	15.4 Tm
Linear coil travel (p-p)	22 mm	Equivalent volume, V _{as}	164 liters
Magnetic flux density	0.63 T	Compliance, C _{ms}	0.46 mm/N
Magnet weight	2.1 kg	Mechanical loss, R _m	3.7 kg/s
Net weight	5.85 kg	Rated power handling	200 watt

The parameter are measured on drive units that are broken in

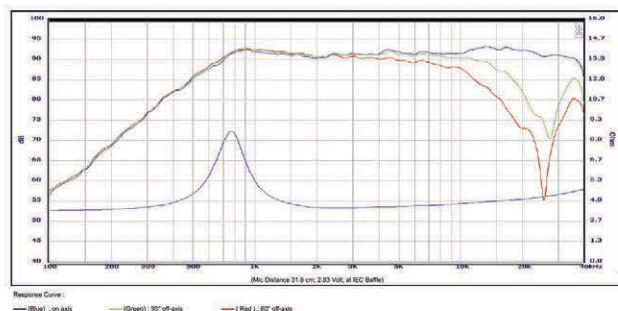
10" SB29SWNRX-S75-6
Drivers

12" SB34SWNRX-S75-6
Drivers

SB26STAC-C000-4 Drivers



- Cast aluminium faceplate
- Copper cap for reduced voice coil inductance and minimum phase shift
- Non-reflective rear chamber with optimized damping for improved dynamics
- Flow optimized vented pole piece for optimum coupling to rear chamber
- Fine weave soft fabric dome for smooth frequency response
- Saturation controlled motor system for low distortion
- CCAW voice coil for low moving mass
- Long life silver lead wires
- Low resonance frequency



For more information or to try Samples of any SB products please contact

david@sbacoustics.com

David A Stephens • Tel. +1 262.784.7852

THE TEAM

PUBLISHER:	Hugo Van haecke	CONTROLLER:	Emily Struzik
EDITORIAL COORDINATOR:	C. J. Abate	ART DIRECTOR:	KC Prescott
MANAGING EDITOR:	Mary Wilson	CUSTOMER SERVICE:	Debbie Lavoie
ASSOCIATE EDITOR:	Shannon Becker	ADVERTISING COORDINATOR:	Erica Fienman
ASSOCIATE PUBLISHER:	Shannon Barraclough	2013 CONTRIBUTORS:	Sandy Gross, Mike Klasco, Peter Larsen, Maria Markowski, Rob Nijman, Christopher Struck, Nora Wong

THE NETWORKS



OUR INTERNATIONAL TEAMS

	United Kingdom Wisse Hettinga +31 (0)46 4389428 w.hettinga@elektor.com		Spain Eduardo Corral +34 91 101 93 85 e.corral@elektor.es		India Sunil D. Malekar +91 9833168815 ts@elektor.in
	USA Hugo Vanhaeche +1 860-289-0800 h.vanhaeche@elektor.com		Italy Maurizio del Corso +39 2.66504755 m.delcorso@inware.it		Russia Nataliya Melnikova 8 10 7 (965) 395 33 36 nataliya-m-larionova@yandex.ru
	Germany Ferdinand te Walvaart +49 (0)241 88 909-0 f.tewalvaart@elektor.de		Sweden Wisse Hettinga +31 (0)46 4389428 w.hettinga@elektor.com		Turkey Zeynep Köksal +90 532 277 48 26 zköksal@beti.com.tr
	France Denis Meyer +31 (0)46 4389435 d.meyer@elektor.fr		Brazil João Martins +351214131600 joao.martins@editorialbolina.com		South Africa Johan Dijk +27 78 2330 694 / +31 6 109 31 926 J.Dijk@elektor.com
	Netherlands Harry Baggen +31 (0)46 4389429 h.baggen@elektor.nl		Portugal João Martins +351214131600 joao.martins@editorialbolina.com		China Cees Baay +86 (0)21 6445 2811 CeesBaay@gmail.com

2013

The Loudspeaker Industry Sourcebook is an annual publication by Segment LLC, Hugo Van haecke, publisher, at 111 Founders Plaza, Suite 300, East Hartford, CT 06108 USA. Postage paid at East Hartford.

Head Office:
Segment, LLC
111 Founders Plaza, Suite 300, East Hartford, CT 06108
Phone: (860) 289-0800

Fulfillment:
Loudspeaker Industry Sourcebook
P.O. Box 462256
Escondido, CA 92046
E-mail: voicecoil@pcspublink.com
Phone: (800) 269-6301, Internet: www.audioamateur.com,
Address Changes/Problems: voicecoil@pcspublink.com

US Advertising:
Strategic Media Marketing, Inc.
2 Main St.
Gloucester, MA 01930 USA
Phone: (978) 281-7708
Fax: (978) 281-7706
E-mail: peter@smmarketing.us
Advertising rates and terms available on request.

SUPPORTING COMPANIES

AAC- Applications Acoustiques de Composites www.aac.fr	89	Eckel Industries, Inc. www.eckel.ca	104	Maeden International, Ltd. www.maeden.com.tw	93
ACO Pacific, Inc. www.acopacific.com	103	Eighteen Sound www.eighteensound.com	67	Martin Sound Products www.martinsoundpro.com	80
Acoustics First Corp. www.acousticsfirst.com	51	Elektor www.elektor.com	19, 58, 63, 90, 97	Materion Electrofusion www.materion.com	92
ALMA International www.almainternational.org	12	Eminence Speaker, LLC www.eminence.com	C4	MenloEast www.menloscientific.com	52, 92
Anaview www.anaview.com	58	ETANI Electronics Co., Ltd. www.etani.co.jp/eng	53	Menlo Scientific, Ltd. www.menloscientific.com	15
Arizona Capacitors, LLC www.electrotechnik.com	87	ETI - Eichmann Technologies International www.eti-research.com.au	86	MISCO/Minneapolis Speaker Co. www.miscospeakers.com	47, 59, 79
Assistance Audio, Inc. www.assistanceaudio.com	72	EuroTec International PLC www.eurotec-intl.co.uk	79	Morel www.morelhifi.com	74
AUDAX www.audax.com	73	Exsonix Co., Ltd. www.exsonix.com.tw	87	Mundorf EB GMBH www.mundorf.com	69, 83
Audio Precision www.ap.com	101	FaitalPRO www.faitalpro.com	76	Nordson EFD www.nordson.com	C3
Audio Technology Engineering (ATE) www.p2ccone.com	45	Ferrotec Corp. www.ferrotec.com	91	NTI Americas, Inc. www.ntiam.com	C2
audioXpress www.audioamateur.com	23, 43, 55, 57	Fluid Metering, Inc. www.fmipump.com	90	One Magnet Electronic Co., Ltd. www.one-magnet.com	96
audioXpress www.audioamateur.com	60, 63, 94, 98, 99, 102	Globe Composites, Inc. www.globecomposites.com	47	Orca Design & Manufacturing Corp. www.orcadesign.com	70, 71
BeStar Technologies, Inc. www.bestartech.com	80	G.R.A.S. Sound & Vibration www.gras.dk	104	Parts Express www.parts-express.com	6
BESTON Technology Corp. www.ribbonspeaker.com.tw	80	Hernon Manufacturing, Inc. www.hernonmfg.com	88	PRV Audio www.prvaudio.com	80
BG Radia www.bgradia.com	72	Hisco www.precisionconverting.com	95	R&D Team Software Development www.randteam.de	54
BMS Speakers GmbH www.bmsspeakers.com	1	Huey Tung International Co., Ltd. www.hueytung.com.tw	79	RCF S.p.a. www.rcf.it	75
BSWA Technology Co., Ltd. www.bswa-tech.com	100	IJDATA www.ijdata.com	55	SB Acoustics www.sbacoustics.com	3
Celestion www.celestion.com	81	Jantzen Audio Denmark www.jantzen-audio.com	85	Solen Electronique, Inc. www.solen.ca	87
Consumer Electronics Association (CES) www.cesweb.org	35	JLI Electronics www.jlielectronics.com	64	Suzuki Kanshi (Thailand) Co., Ltd. www.skt-bobbin.com	97
Creative Sound Solutions www.creativesound.ca	80	Josephson Engineering, Inc. www.josephson.com	63	Tympany www.tympany.com	77
Dai-ichi Electronics Manufacturing Corp. www.daiichielectronics.com.ph	68	Klippel GmbH www.klippel.de	99	Warkwyn Associates, Inc. www.warkwyn.ca	44
Danville Signal Processing, Inc. www.danvillesignal.com	44	Kravchenko-Audio www.kravchenko-audio.com	44	Wavecor, Ltd. www.wavecor.com	72
DYNE Analytics www.dyneanalytics.com	54	Loudspeaker Components, LLC www.loudspeakercomponents.com	92	Zhuhai Hi-Vi Technology Co., Ltd. www.hivi.com	78
Earthworks, Inc. www.earthworksaudio.com	62	Loudspeaker University www.loudspeakeruniversity.com	48		

Not a supporting company yet?

Contact Peter Wostrel (peter@smmarketing.us), Phone (978) 281-7708, Fax (978) 281-7706
to reserve advertising space in the *Loudspeaker Industry Sourcebook* for 2014

Editorial Inquiries

Send editorial correspondence and manuscripts to:
Loudspeaker Industry Sourcebook, Editorial Dept.
111 Founders Plaza, Suite 300, East Hartford, CT 06108
E-mail: editorial@audioXpress.com

No responsibility is assumed for unsolicited manuscripts. Include a self-addressed envelope with return postage. The staff will not answer technical queries by telephone.

Legal Notice

The content in this publication is offered to readers for their personal use only. Any commercial use of such ideas or designs without prior written permission is an infringement of the copyright protection of the work of each contributing author.

Some companies did not complete a listing request, but their relevance in the loudspeaker industry should be noted. Segment, LLC is publishing these listings as a courtesy to contributors of the loudspeaker industry and is not responsible for any error or omissions to the directory listings/ company information.



2013 Loudspeaker Industry Sourcebook

About the Cover Sponsor

Over three decades ago, in 1975, Meir Mordechai founded Morel, inspired by his love of music and motivated by a dream—to create a loud-speaker that would capture the magic in music in the most natural way. His lifelong quest has resulted in successive generations of speakers and audio drivers that consistently set new standards for superb sound quality. The Morel brand (the name derived from Mordechai Electro-acoustics) has become an annual recipient of “Best of” awards for home and mobile sound reproduction.

Over the years, Morel has developed an enviable reputation for technological innovation and design excellence. Morel drivers, including tweeters, midrange, and woofers, are utilized in some of the most demanding, high-end products around the globe. Morel products and sound systems are sold in the home hi-fi, home theater, and mobile audio markets in more than 55 countries worldwide.

Producing loudspeakers that deliver that magical feeling requires more than just advanced technology or the latest industrial tools. To reach the zenith of the listening experience, the human touch is an

absolute necessity. Each Morel product is assembled by hand and extensively tested to ensure that it meets the highest standards. The personal knowledge and proprietary advancements, gained by Morel’s dedicated team over three decades of experimenting with sound, permeate all its products.

In-house design, R&D, and manufacturing all under one roof enable Morel to deliver unprecedented quality. Unlimited by design constraints and boosted by years of experience in making its own drive units, Morel can offer the latest acoustic technologies that provide a lifetime of musical enjoyment for our customers.

Morel’s latest innovation is the new Titanium Series. The new range consists of woofers and tweeters that incorporate titanium formers and aluminum voice coils to provide unique combinations of technical parameters that translate into ease of cabinet design and the highest quality of musical performance.

—Morel, Ltd.

Cover photo courtesy of Morel

ADVERTISEMENT



ADVERTISEMENT

absolute necessity. Each Morel product is assembled by hand and extensively tested to ensure that it meets the highest standards. The personal knowledge and proprietary advancements, gained by Morel's dedicated team over three decades of experimenting with sound, permeate all its products.

In-house design, R&D, and manufacturing all under one roof enable Morel to deliver unprecedented quality. Unlimited by design constraints and boosted by years of experience in making its own drive units, Morel can offer the latest acoustic technologies that provide a lifetime of musical enjoyment for our customers.

Morel's latest innovation is the new Titanium Series. The new range consists of woofers and tweeters that incorporate titanium formers and aluminum voice coils to provide unique combinations of technical parameters that translate into ease of cabinet design and the highest quality of musical performance.

Cover photo courtesy of Morel



Simulating and Optimizing Microspeaker Drivers

By Peter Larsen (LOUDSOFT, Denmark)

High-quality, hi-fi loudspeakers used to be large square boxes filled with large woofers, midranges, and tweeters. In contrast, today's loudspeakers are small, portable, and widely used with smartphones.

These small devices require much smaller speaker drivers. However, when the driver size is reduced, a much higher demand is put on these transducers with regard to cone displacement and input power.

The smaller cone area dictates a lower sound pressure level (SPL), which, in reality, cannot be compensated by increased cone or voice coil displacement. In addition, the microspeakers used in smartphones and many other portable devices must be thin, which further limits their output.

Considering these microdrivers are developed from tiny, inexpensive speakers originally intended for toys, we begin to understand the challenges of designing and optimizing these microdrivers and systems for high power and maximum SPL.

Micro Loudspeaker System Design

You can use the FINEBox nonlinear, high-power box design software for hi-fi, pro audio, and micro loudspeakers to design and optimize a microspeaker system's acoustic loading/box volume and tuning. Micro loudspeaker drivers can be designed in FINEMotor and FINECone programs.

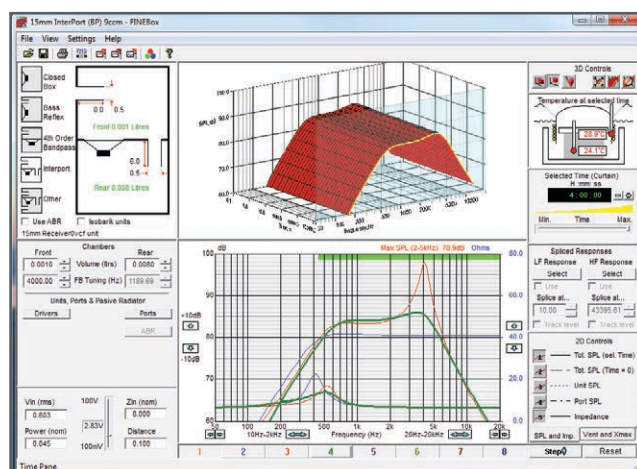


Figure 2: The FINEBox screen indicates the 15-mm microspeaker in a closed-box volume (blue line), band pass (red line), and damped InterPort (green line).

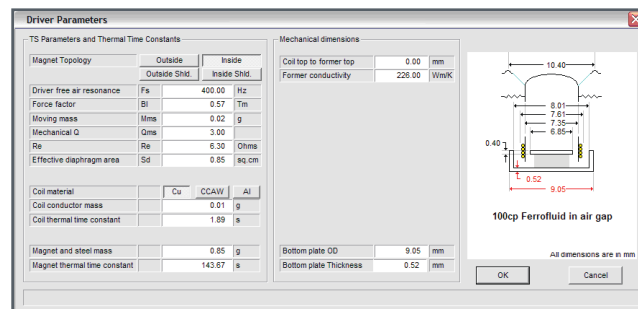


Figure 1: The 15-mm microspeaker's completed data can be imported from FINEMotor into the FINEBox program.

The results can then be imported into FINEBox, where the performance is predicted by simulation.

Start a micro box design by importing a 15-mm microspeaker design as a FINEMotor file—with Thiele-Small (T-S) parameters and thermal data—directly into FINEBox by pressing the Read Unit button.

Figure 1 shows the complete driver data, imported from FINEMotor. The voice coil and motor's thermal time constants are automatically calculated.

First, the 15-mm microspeaker/receiver unit is put in a closed-box volume of 0.1 ltr (100 cm³) by selecting the upper left Closed Box button and using the computer mouse to adjust the (front) volume to 0.1 ltr. This is shown as the

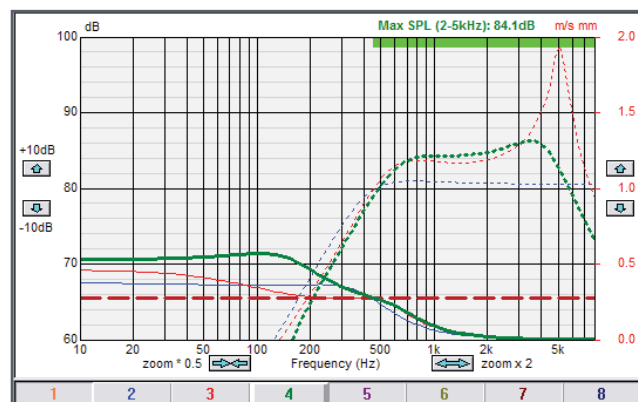


Figure 3: The 15-mm microspeaker's voice coil excursion is shown in closed-box, bandpass, and InterPort where the input is set to produce 0.28 mm (Xmlin) at the resonance frequency (Fs) in the box.

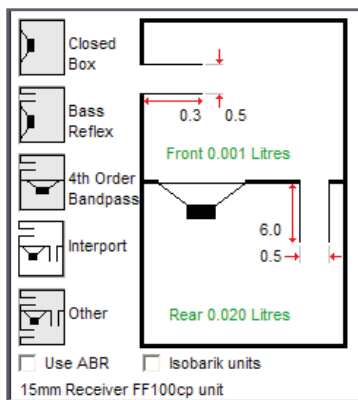


Figure 4: The FINEBox acoustic loadings are displayed in the InterPort option.

line shown in Figure 3.

In contrast, the red curve in Figure 3 is a bandpass design, with a small hole (port) in front of the speaker. This port is tuned to 4,000 Hz, after which the response drops at higher frequencies. Again, the input voltage is adjusted to provide a 0.28-mm maximum excursion and an approximate 83-dB maximum SPL at 0.1 m. However, there is a large peak at 4,000 Hz.

Choosing the InterPort option (see Figure 2 and Figure 4) and adjusting the InterPort Q to 0.9 (see Figure 5) brings down the peak and provides a flat bandpass response. The high damping (lower Q) is made by covering the (Inter) port with a cloth or felt material, which will enable air to pass but add damping. The front port can be damped in the same way. The maximum SPL is approximately 84 dB (2 to 5 kHz).

The calculated voice coil and magnet temperatures are shown in the upper right image in Figure 2. The voice coil's temperature is 28.9°C, which is no problem.

However, if the speaker was used in a car, then setting the ambient temperature to 55°C or higher would simulate the maximum temperature in the sun. In this case, the maximum temperature would be 83.9°C, which would demagnetize a standard-grade neodymium magnet. The test enables the designer to verify which magnet grade to use.

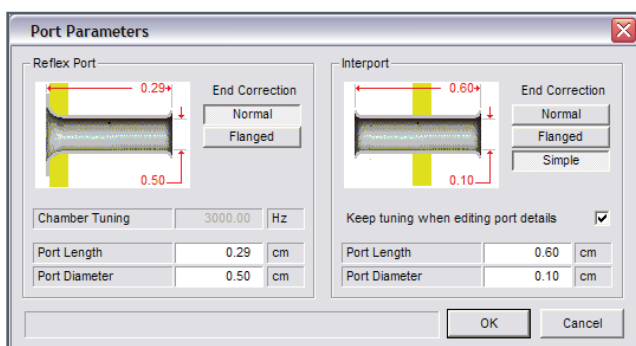


Figure 6: This screen enables you to change port diameters and simulated lengths.

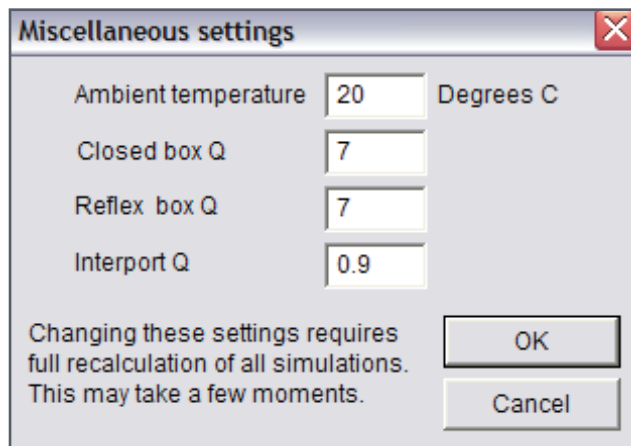


Figure 5: Miscellaneous settings include Port Q and damping data.

The ports can be changed by modifying the port diameters (see Figure 6). The length will be automatically simulated according to the chosen tuning frequency. A flange (trumpet) can reduce port noise/whistling.

Figure 3 shows the voice coil excursion of the three designs, where the input was set to produce 0.28 mm (X_{mlin}) at the resonance frequency (F_s) in the box. Because the excursion is increased at low frequencies, the design with the higher box resonance can produce a higher SPL in the pass band. To prevent problems, it is advisable to insert a high-pass filter to limit the voice coil travel below F_s.

Headphones and Earphones

A more advanced example is the small earphone (earbud) shown in Figure 7. This can be modeled using the "Other" option in the latest FINEBox (with a micro option). A full-simulation model is extremely complicated.

The proposed simplified model uses lumped elements while assuming an infinite baffle (no coupler or artificial ear). This method is convenient for measuring and verifying the performance, as well as investigating and optimizing the different cavities and holes.

The earphone shown in Figure 7 is an example of the typical small, on-ear earbud used with smartphones and

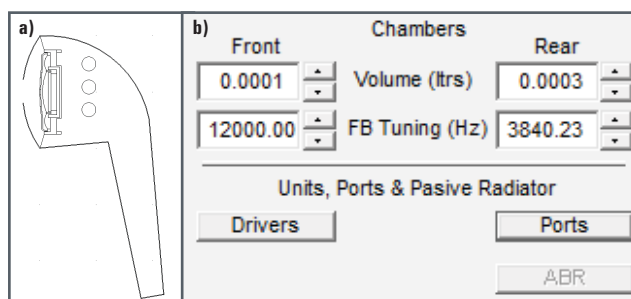


Figure 7: Utilizing a simplified sketch of a typical earphone or earbud is a convenient method to measure and verify performance (a). The results are shown in an adjacent screen (b).

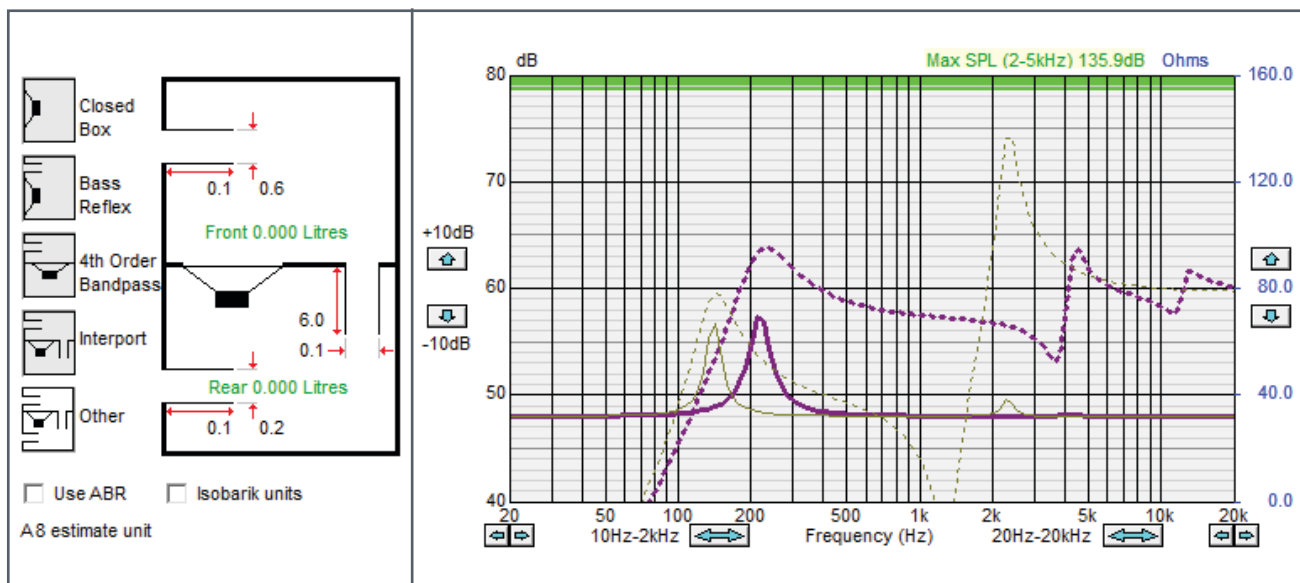


Figure 8: A FINEBox earphone (earbud) simulation tracks the frequency and SPL results.

MP3 players. The driver is around 15 mm in diameter, and there is usually a very small cavity in front with one or more holes to the outside. The rear cavity is larger but still quite small, causing a driver resonance of approximately 2,000 Hz.

Figure 8 shows the driver response in green, marking a sharp resonance around 2,000 Hz when the small holes are closed. The purple curve is the final simulated response including the small holes and the large tube (along the lead wire). The large resonance's amplitude is considerably reduced and the tube acts as a bass reflex, providing good response down to 200 Hz. This is the free-field response, but the near-field response may extend below 20 Hz, when the earphone is attached without leak to the human ear. The leak is quite difficult to avoid and will vary with the positioning, and so forth.

So far, we have assumed the driver response to be linear without break-up. Now, let us use the FINECone to analyze

the break-up in more detail.

Acoustical Finite Element Simulation

The acoustic FINECone simulation can help the engineer decide the cone thickness, cone profile, and material to obtain the best frequency response and low resonance. Larger headphones that fully cover the ear (i.e., circumaural) use larger drivers, normally around 38-to-40-mm diameter.

Figure 9 shows some direct measurements of 30-to-40-mm headphone speakers (capsules). The responses are far from flat due to break-up in the cone (diaphragm), which is especially visible in the waterfall. Let us analyze a typical good one in FINECone.

The geometry of the 38-mm headphone speaker was

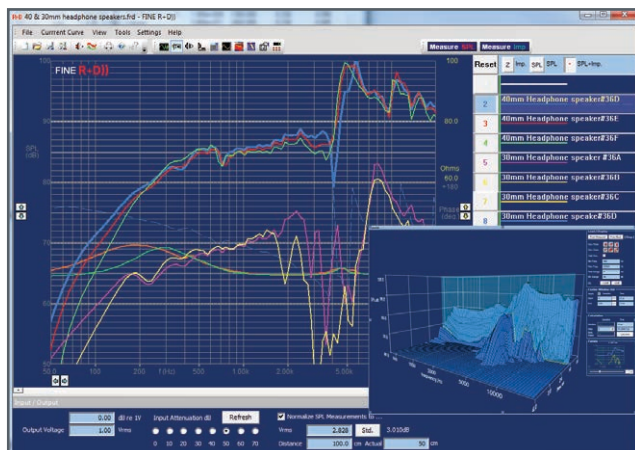


Figure 9: The typical responses of good 30-to-40-mm headphone speakers (capsules) are displayed in a graph and a waterfall plot.

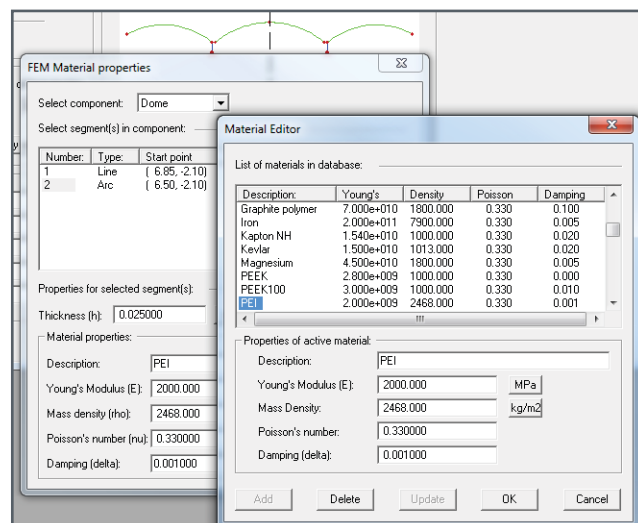


Figure 10: Finite Element Method (FEM) material properties can be input from the FINECone database.

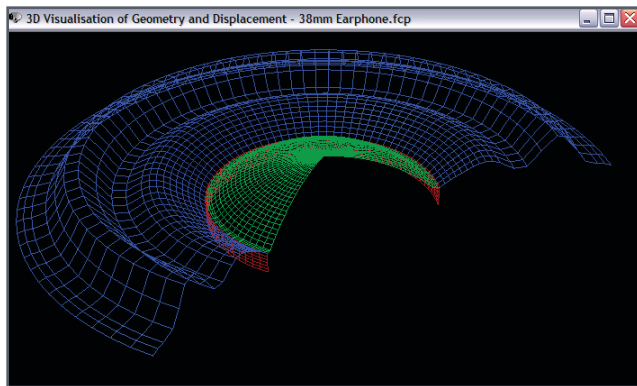


Figure 11: The 38-mm headphone speaker with a 3,165-Hz break-up is simulated in FINECone.

specified as a simple DXF file in the FINECone simulation. The materials for the diaphragm are inserted from the standard database (see **Figure 10**).

New materials may be added to FINECone's material database. In case the material data are not known, a documented method can be applied to find these data using measured frequency responses. (More information can be found in the FINECone manual available at www.loudsoft.com.)

Figure 11 shows the 38-mm headphone simulated in FINECone. The first break-up takes place at 3,165 Hz, where there is considerable break-up in the middle of the large surround. Since the surround area is a large percentage of the total cone area, the break-up here will considerably influence the response. **Figure 12** shows the calculated responses (0°, 30°, and 60° off-axis) including the break-up.

From 3,165 to 20,000 Hz, the response is dominated by break-up, which certainly is audible. The break-up is primarily caused by the shallow geometry. The 38-mm headphone speaker may be recalculated with an optimized geometry and other materials.

Once a good response has been found using the best geometry and material, the next challenge is to lower the resonance F_s . A pattern in the surround can help that to

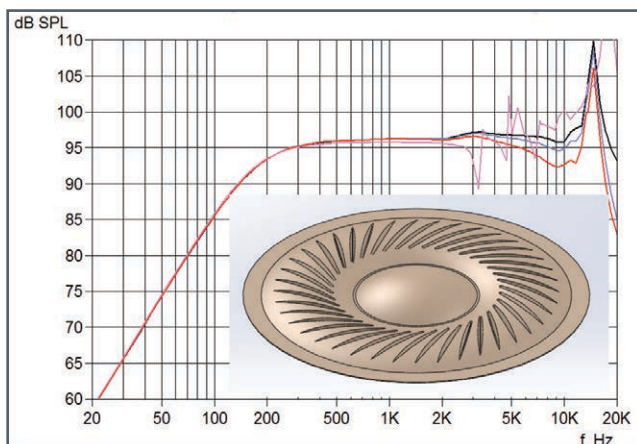


Figure 13: The 38-mm earphone diaphragm with a low F_s pattern is simulated in FEM.

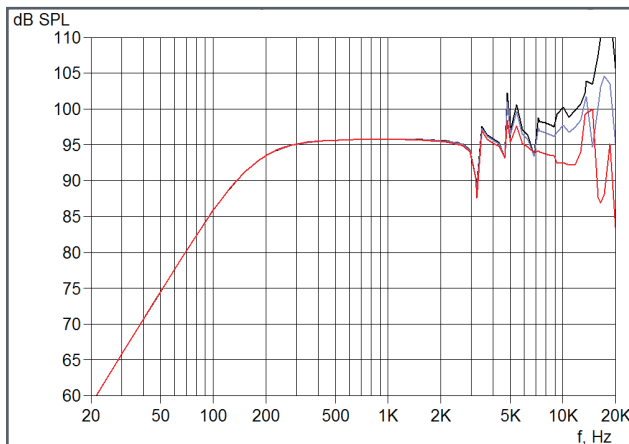


Figure 12: Response with break-up of the 38-mm earphone speaker's SPL at 0°, 30°, and 60° from FEM.

some extent (see **Figure 13**). The pattern will effectively make the diaphragm thinner for obtaining a low F_s , but the high profile will prevent high-frequency break-up to some extent.

FINEMotor Simulation

Finally, analyze the 15-mm micromotor system in FINEMotor. The magnet material is neodymium (N42). The direct current resistance (DCR) is 7 Ω (Z nominal impedance = 8 Ω). The winding width in FINEMotor is very close to the actual 1.05 mm when a 5% stretch is set. (The winding is normally stretched some percentage during winding.) An oval diaphragm should just use the active area (including the half surround) as input.

Note that the magnet system has a thin top plate, which is saturated. The top plate B_t = 2.39 tesla (T). B_t must be less than or equal to 2.1 T.

The voice coil is not placed symmetrically in the air gap, but offset 0.25 mm above. The BL(x) curve shows how the force factor BL varies when moving up through the air gap. The ideal BL(x) curve is flat and symmetrical, but in this

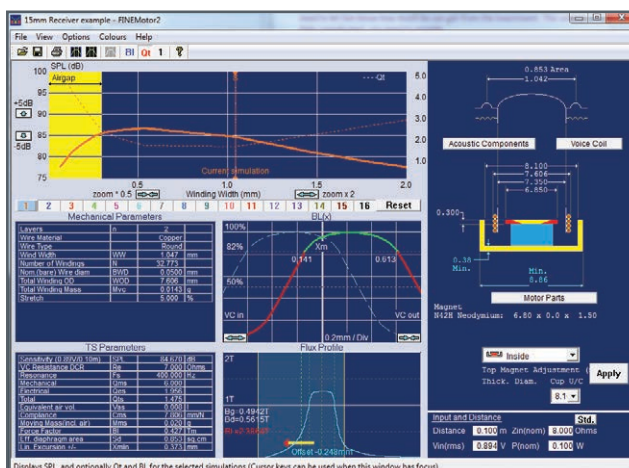


Figure 14: The 15-mm neodymium motor system is modeled in FINEMotor.

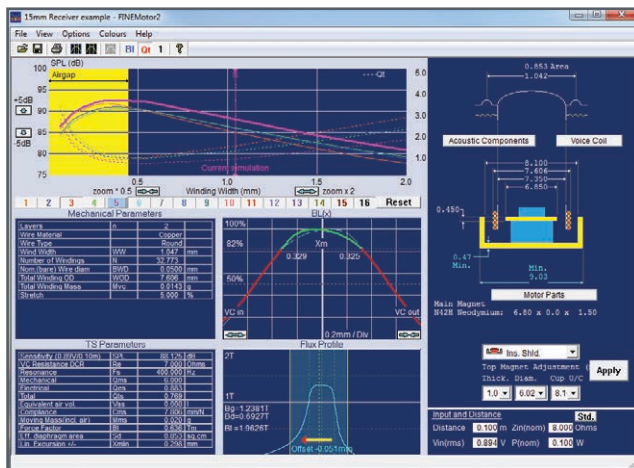


Figure 15: A display of the optimized 15-mm neodymium motor system, including the top magnet is shown.

case it is not symmetrical. The usable range for achieving low distortion is when BL is higher than 82% of the maximum value.

The X_{max} (up) = 0.613 mm, but the X_{max} (down) = 0.141 mm, which is quite bad. In other words, the usable X_{max} is only 0.14 mm.

To correct this, first move the voice coil by dragging it with the left button on the computer mouse. This makes

Mechanical Parameters			
Layers	n	2	
Wire Material		Copper	
Wire Type		Round	
Wind Width	WW	1.05	mm
Number of Windings	N	32.77	
Nom. (bare) Wire diam	BWD	0.050	mm
Total Winding OD	WOD	7.61	mm
Total Winding Mass	Mvc	0.014	g
Stretch		5.00	%
Ferrofluid Volume	FF vol	4.19	uL
Ferrofluid Saturation	FF sat	200 - 150	Gauss
Ferrofluid Viscosity		200.00	Cps

TS Parameters			
Sensitivity (0.89V/0.10m)	SPL	86.56	dB
VC Resistance DCR	Re	7.00	Ohms
Resonance	Fs	400.00	Hz
Mechanical	Qms	1.16	
Electrical	Qes	1.27	
Total	Qts	0.60	
Equivalent air vol.	Vas	0.01	l
Compliance	Cms	7.81	mm/N
Moving Mass (incl. air)	Mms	0.02	g
Force Factor	Bl	0.53	Tm
Eff. diaphragm area	Sd	0.85	sq. cm
Lin. Excursion +/-	Xmlin	0.32	mm

Figure 16: Calculated T-S parameters, including ferrofluid, should detail the correct formula necessary to increase power handling.

the BL(x) curve quite symmetrical. Next, increase the top plate thickness to avoid saturation. In the next simulation, the voice coil is moved to center, and the top plate has been increased from 0.3 to 0.45 mm, which increased the sensitivity about 1 dB. Bt is now just at the limit (2.11 T).

There is also another way to obtain more SPL from the microspeaker. By placing a second neodymium magnet (magnetized in the opposite direction) on top of the top plate, some of the leakage flux is forced back into the air gap, providing higher sensitivity (see Figure 15). Note you can adjust the top magnet's thickness and diameter while observing the BL(x) curve change and have all T-S parameters automatically update.

Finally, improve the 15-mm micro receiver by using ferrofluid in the air gap. There are three significant advantages to doing so.

The power handling is increased considerably due to the cooling with the ferrofluid in the air gap. Actually, the ferrofluid can be selected to add much damping at resonance (Fs), which prevents distortion and increases power handling. The air gap can also be made smaller, which will increase the SPL and improve cooling.

Figure 16 shows the exact volume of ferrofluid to be dispensed in the air gap, the saturation strength, and the viscosity. The ferrofluid is specified (in red). The exact volume per Ferrotec's formula is listed, then the necessary magnetic saturation strength, and finally the chosen viscosity. *LIS*

ALMA®

Association of Loudspeaker
Manufacturing & Acoustics INTERNATIONAL

2014 WINTER SYMPOSIUM

Suppliers Unchained

Maximizing Value from Your Acoustic Component Sources

Focus on loudspeaker component suppliers – spiders, cones, baskets, voice coils, magnets, etc.

Special focus on cost effective quality control and standardization.



Saturday, January 4 – Sunday, January 5, 2014
Tuscany Suites & Casino, Las Vegas, NV

For more information visit www.ALMAInternational.org

Calibrating for Loudspeaker Impedance Measurements

By Christopher J. Struck (CJS Labs, United States)

Impedance is a standard measurement in the test battery for loudspeakers. From this measurement, the small signal parameters (i.e., Thiele-Small parameters) can be calculated and used to model a system's low-frequency behavior. The measurement generally requires a test circuit that feeds an analyzer or test system. Voltage dividers or large resistor (i.e., constant current) circuits can be used to measure a transducer's electrical impedance. However, the most common method is to use a small value series resistor (constant voltage) circuit shown in **Figure 1**.

Constant voltage is also most similar to the actual-use conditions of most loudspeakers driven by typical amplifiers. In general, the resistor's value is chosen to be at least an order of magnitude less than the minimum expected modulus of the loudspeaker impedance. Although sequential measurements at each node can be performed, the preferred method is a two-channel measurement, simultaneously capturing the voltage and current (voltage across the reference resistor proportional to current) at both nodes. In this way, any nonlinearity or time variance is captured at each frequency. From this data, the impedance vs. frequency is easily determined using the following equation:

$$Z(f) = \frac{V_s(f)R}{V_G(f) - V_s(f)}$$

The choice and value of the reference resistor, R , is critical. Clearly, inductive or wire-wound resistors must be avoided. Although it is common practice to use a precision resistor (less than 1%), the reference resistor's precise value must be known for the impedance calculation to be accurate. Given that the range of loudspeaker impedance modulus values is approximately 1 to 100 Ω , the typical value of R is generally between 0.1 and 1 Ω . Interestingly, 0.1 Ω is generally the precision limit on most digital multimeters.

So, how does one go about accurately determining the value of the reference resistor R ? Should you simply trust the manufacturer's specified value? One method would be to set up an old-fashioned "Wheatstone Bridge" arrangement. (Remember your first college EE lab class?) This is a four-resistor balanced circuit, similar to a full-wave rectifier, that attempts to null an imbalance. The difference in the adjustment to produce the balance returns the value of the unknown resistance. However, there is an easier method, using

your available (calibrated and accurate) digital multimeter and just one additional resistor. With this method, neither resistor needs to be precise (or expensive). The resistors just need to be stable over time. Choose the second resistor to be in the expected loudspeaker impedance's midrange (e.g., 25 to 47 Ω).

I'll use a 47- Ω resistor for this example. Measure this resistor's value to your digital multimeter's accuracy limit and record the value. Next, construct the loudspeaker impedance test circuit shown in **Figure 1**. Connect it to your test system or analyzer to measure impedance vs. frequency. Many test systems have macro or automation features for user input of the reference resistor's value and automatic calculation of the impedance. Substitute the resistor for the loudspeaker. Check the wattage of your resistors and set the test level appropriately. You don't want any smoke! Since the voltage across the reference resistor is quite small, you want enough level to provide a good signal-to-noise ratio (SNR) measurement, without burning up the resistors or driving the device under test into nonlinearity. Remember, the subsequent calculations are of "small signal" parameters! Keep in mind that the nonlinearities in a loudspeaker (e.g., BL, Le, and Cms) are displacement dependent, so linear models only apply for very small signals.

You can use Ohm's law to discover that with the 47- Ω and 0.1- Ω resistors, the limit is 3.5 V. But even that is rather high, so start with 250 mV and increase it slightly, if necessary. Measure the 47- Ω resistor's impedance vs. frequency. Your measurement system should show a flat—possibly slightly noisy—impedance vs. frequency curve, equal to the value you measured with the digital multimeter. Auto range on the display will exacerbate this "noisiness" visually. Go for a 25- Ω display range instead. Check it with the cursor to read the value at 1 kHz. Alternatively, set up your test system (or export the values) to calculate the average impedance magnitude across the 10-Hz-to-20-kHz frequency range. If this

does not equal the digital multimeter (DMM) measured value, slightly adjust the reference resistor's assumed value and remeasure until the desired accuracy is achieved. (My $\pm 1\%$ 0.1- Ω resistor turned out to be 0.117 Ω .) Now connect the loudspeaker under test and you're ready to go.

This iterative approach makes no assumptions about the reference resistor's value or precision and produces correct results every time. And, you don't have to go back to look up "Wheatstone Bridge." *LIS*

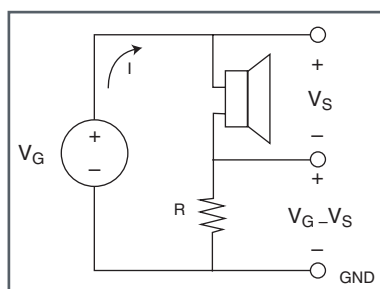


Figure 1: An impedance test circuit is often used to obtain an accurate measurement.

The Soundbar Challenge

By Sandy Gross (GoldenEar Technology, United States)

Over the last few years we have seen a tremendous growth in the availability and use of soundbars. Their use has been fueled by the steady decrease in the quality of built-in TV speakers, partially due to the dramatic thinning of TV enclosures. As sleek and stylish as new TVs are, the sound is often disappointing because there is very little room left inside their cabinets for speakers. However, consumers continue to desire high-quality sound.

By definition, a soundbar is a loudspeaker enclosure containing one or more speakers to create a “reasonable stereo effect” from a single cabinet. The cabinets are wider than they are tall for acoustical and aesthetic reasons.

The soundbar market is extensive and varied. Soundbar quality runs the gamut from inexpensive systems that are not much better than the standard built-in speakers to more expensive systems that attempt to offer something approaching home-theater quality sound. Most of these all-in-one systems are plug-and-play units that incorporate built-in amplification as well as surround-sound processing, which attempt to simulate surround sound from speakers located within the soundbar.

The Challenge with Soundbars

There is no question that a soundbar’s form, low cost, ease of use, and all-in-one unit style appeals to many listeners. However, most units offer sonic performance that classifies them as mere home-theater-in-a-box replacements, if that.

At GoldenEar Technology, we felt it was possible to offer listeners the exceptional sonic performance they desire in a soundbar by attacking the limitations head on. First, we decided the all-in-one concept was limiting in terms of power and dynamic range capability. Based on this theory, we chose a passive soundbar that enables listeners to incorporate a separate receiver or components to achieve the desired power and quality level.

We selected drivers of the same quality level used in our signature products. In this case, that meant cast basket bass/midrange drivers and high-velocity folded ribbon tweeters. We also selected aircraft-grade

extruded aluminum cabinet construction. Perhaps most importantly, we tackled the imaging challenges soundbars present. The biggest issue here is: How do you get a huge wall-to-wall soundfield from a narrow soundbar? The problem is interaural crosstalk distortion. Imaging is a psychoacoustic phenomenon that occurs within the brain. When your left ear hears the right speaker and your right ear hears the left speaker (especially when the two channels are close together, as they are in a soundbar), it confuses your hearing mechanism and prevents you from hearing the recording’s full imaging capability. Recent research by Dr. Edgar Choueiri at Princeton University in New Jersey has explored this hearing phenomenon in great detail. To overcome that challenge, we decided to incorporate a second set of drivers at the cabinet’s left and right edges to essentially put out a cancellation signal designed to eliminate most of this imaging-destroying crosstalk.

The result is a component-system-based soundbar, called the 3D Array (see **Photo 1**). The 3D Array is so effective that—even without discrete rear surround speakers recommended for ultimate performance—you get a true surround-sound experience. Of course, even though some soundbars purport to deliver home-theater-quality bass without a separate subwoofer, we decided that for true high-end performance, a separate subwoofer was necessary.

Soundbar Technology

With today’s technology, it is possible to receive rich, immersive sound from a soundbar. The key is finding the soundbar that best fits your needs. There are soundbars capable of producing bass so powerful it rattles the china set in another room.

There are also soundbars that offer slightly better sound than what your TV offers on its own. Solutions exist for people on both ends of the spectrum and everywhere in between. Some units even work in conjunction with an AV receiver and utilize true surround speakers as part of a hybrid system. For audiophiles who want a true surround-sound experience, the 3D Array is definitely an option. *LIS*

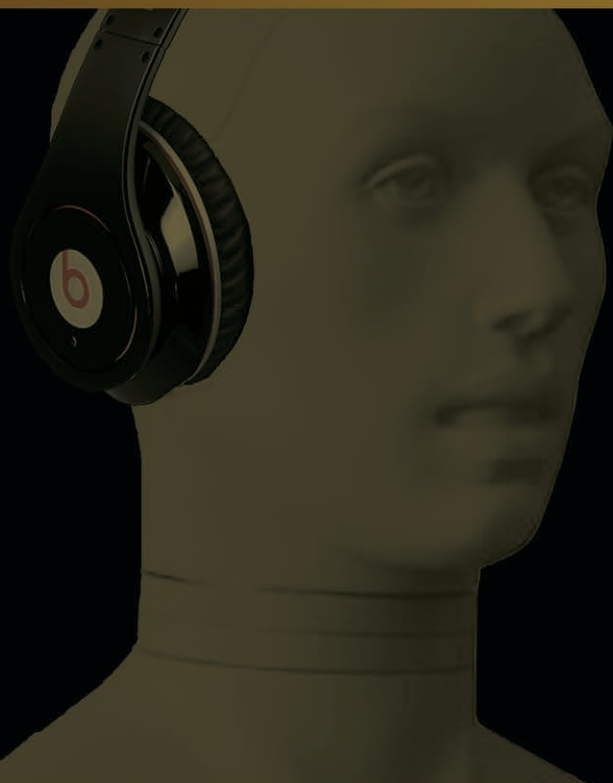


Photo 1: The 3D Array, a component-system-based soundbar, is recommended for audiophiles who want a true surround-sound experience.

Engineering Consulting for the Audio Community

Celebrating
30 YEARS
1983-2013

MENLO SCIENTIFIC



- Liaison Between Materials, Suppliers, & Audio Manufacturers
- Technical Support for Headset, Mic, Speaker & Manufacturers
- Product Development
- Test & Measurement Instrumentation
- Sourcing Guidance

sponsors of "The Loudspeaker University" seminars

MENLO
SCIENTIFIC

USA • tel 510.758.9014 • Michael Klasco • info@menloscientific.com • www.menloscientific.com

Trends in Loudspeaker Integration

By Rob Nijman (HiFi.nl, The Netherlands)

Loudspeakers come in many forms, serving many functions. Although loudspeakers have “many functions,” it’s mainly about the music. Last year’s *Loudspeaker Industry Sourcebook* discussed the 2012 trends, most notably soundbars to enhance the audio experience of ever-flattening television screens (and the inevitable loss of speaker capacity) and the domination of personal audio playback (e.g., docking stations, in-ear headsets, and various on-ear gear). The latter is now virtually ubiquitous in today’s urban streetscape. Personal audio, most illustriously Beats by Dr. Dre, House of Marley trinkets, Motörheadphönes, and other celebrity-endorsed headgear have become as much a fashion statement as clothes, shoes, and in-vogue accessories. These trends don’t seem to be going away in the foreseeable future, as almost all audio brands appear to be working on products for these markets. The 2013 International Consumer Electronics Show (CES) in Las Vegas, NV, featured many of tomorrow’s personal consumer electronic statements with stars’ names and fame attached to them.

Speakers Less Visible

For 2013, custom-installed and architecturally integrated speakers aren’t new, but we are witnessing an emerging trend within this segment of the audio market. It was evident in an increased presence of on-wall and in-wall loudspeaker solutions at the 2013 International CES and at the Integrated Systems Europe (ISE) 2013 show

in Amsterdam. And, it’s not just the usual brands (e.g., Stealth Acoustics and its invisible speakers). Now we’re seeing renowned manufacturers developing in-wall audio to rival their own (reference series) floor-standing product lines. High-end players (e.g., Bowers & Wilkins, Totem, Meridian, and Monitor Audio) are introducing integrated speakers that are said to match the performance of their finest traditional designs. In other words, those looking for architecturally integrated sound solutions for home audio over the more classic models no longer have to compromise on audio quality. Integration without deprivation, so to speak, is the new motto for loudspeaker integration.

In-Wall Systems

Early in 2013, Monitor Audio, one of the aforementioned British manufacturers, presented the installation possibilities of its PL-InWall solution. The company has basically said no room should be without its the Platinum Series performance loudspeakers. So Monitor Audio created an in-wall model that could compete with its Platinum Series. Monitor presented its design at ISE 2013. Monitor’s PL-InWall solution is a no-holds-barred, three-way, in-wall system based on the PL200 (a middle-level model of the flagship series), complete with twin 6.5" RDT bass drivers, a 4" RDT midrange tweeter, and the Platinum ribbon tweeter with the same driver configuration and construction found in its flagship series. The new system can be mounted horizontally or vertically, depending on the stereo or home cinema deployment. The panel with the midrange driver can easily be detached and turned 90° (see **Photo 1**).

Meridian also offered custom install highlights, albeit some 6,000 miles down the road at the 2013 International CES. Meridian showcased its new line of DSP in-wall loudspeakers, after highlighting its DSP520 in-wall speaker at last year’s Custom Electronic Design and Installation Association (CEDIA) Expo. This year, in Las Vegas’s Venetian Hotel, it was all about Meridian’s larger DSP640. Its drivers are based on the digitally active M6 speakers with 140-mm bass and 85-mm wide range. The DSP520 features one of each, but the DSP640 doubles this configuration to really compete with its freestanding brothers. “The musicality of our best



Photo 1: Monitor Audio showcased its PL-InWall speaker system at ISE 2013, pictured up close (a) and as displayed (b). (Photos courtesy of PHOTO40)

speakers can now be hid in virtually any room,” according to Meridian. The speakers cost \$7,500 each for the top model (see **Photo 2**).

Stealth(y) Speakers

A brand that cannot be overlooked in terms of integrated audio is Stealth Acoustics, which is based in Mount Vernon, WA. The company has become a stable, if “invisible,” presence at ISE, which takes place at the RAI Exhibition and Convention Centre in Amsterdam. Stealth Acoustics designed the new Image II speakers by configuring its award-winning invisible speaker technology and installing them into a thin, on-wall speaker package. The Image Wrap



Photo 2: Meridian’s DSP640 in-wall speakers were featured at the 2013 International CES. (Photo courtesy of Jochem Geerdink)

model features high-resolution images laminated to the speaker face. The images turn the speaker into a work of art and can be stock or provided by the customer (e.g., a song from Mumford and Sons is coming from that painting).

At ISE this year, Stealth Acoustics presented its 5.2 setup for an invisible home cinema. Imagine all the cables and the usual non-too-photogenic satellites replaced by family

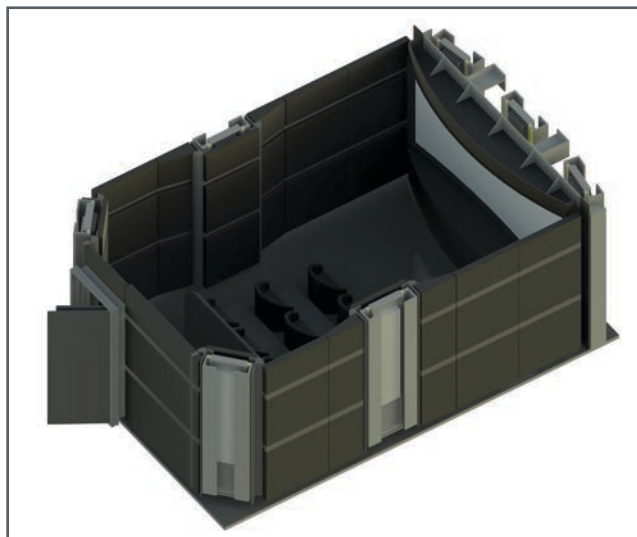


Photo 3: Bowers & Wilkins and Mutrox Soundproof Solutions joined forces to build a custom theater for ISE. (Photo courtesy of Mutrox Soundproof Solutions)



Photo 4: ISE 2013 attendees were offered a demonstration of the full CI 800 experience. (Photo courtesy of PHOTO40)

portraits that double as surround speakers. Stealth Acoustics then took it one step further outside the box with its StingRay, an environmental speaker designed to handle all of Mother Nature’s usual challenges. The company claims it is the world’s first completely sealed outdoor speaker. It features an impenetrable fiberglass radiating surface that is supposed to withstand the harshest elements—providing UV and marine-grade protection—so its users can enjoy poolside audio without the usual worries.

Stealth Acoustics also emphasized other possible speaker applications (e.g., saunas, bars, sports facilities, and ski resorts). Bowers & Wilkins is focusing on outdoor products, including the all-new AM-1 Architectural Monitor, which is weatherproof and waterproof. However, I was most impressed with Bowers & Wilkins’s innovative CI 800 theater solution, which conveniently enables us to come full circle with this palaver of loudspeaker trends. Bowers & Wilkins and Mutrox Soundproof Solutions (The Netherlands) joined forces to offer what was perhaps one of the more remarkable experiences at ISE’s 10-year jubilee event: a custom theater (see **Photo 3**).

The theater was designed and built specifically for the ISE (where it will be featured in 2014 and 2015) and acoustically optimized by Mutrox, a specialist in high-end studio and theater solutions. It features the new Bowers & Wilkins CI 800 Series speakers driven by Classé processors and amplifiers. Visitors were offered a “20 Minutes of Fame” demonstration of the full CI 800 experience. It features core Bowers & Wilkins specialties (e.g., carbon-braced tweeters, FST midrange technology, Matrix enclosures, and audiophile-grade crossover components new to the world of in-wall and in-ceiling speakers). The theater was constructed to set the standard for high-performance custom installation and provide a real audiophile sound from speakers that disappear into the environment (see **Photo 4**). As the marketers at Bowers & Wilkins sum it up, “Soak it up!”

I guess there’s nothing left to do but put some (or all) of these custom-install innovations to the test. That’s the only way to confirm audio performance claims. **LIS**

By Nora Wong and Maria Markowski (Menlo Scientific, United States)

Regnvägen 89, 976 32 Luleå, Sweden
Ingemar Johansson
(P) +46-920-269481

- IJData was founded in 1991 to construct and sell loudspeaker design software. Its products include Loudspeaker Computer Aided Design (LspCAD 6), which has full drag-and-drop capability and extensive possibilities for simulating active analog, digital, and passive crossovers. The software also can model various loudspeaker boxes.
- justMLS performs measurements based on maximum length sequences (MLS). justMLS measures both frequency response and impedance.

300 Léo-Pariseau, Suite 2222, Montreal, QC H2X 4B3, Canada
(P) 514-849-8752
info@infolytica.com
www.infolytica.com

- Infolytica offers a range of simulation programs for magnetics applications including MagNet, which offers loudspeaker-specific design functionality. MagNet provides a basic analysis of a loudspeaker design by analyzing a 2-D axisymmetric design's magnetostatic properties.

5248 SW Greenwood Place, Tualatin, OR 97062-8750
(P) 503-612-9565
sales@linearx.com
www.linearx.com

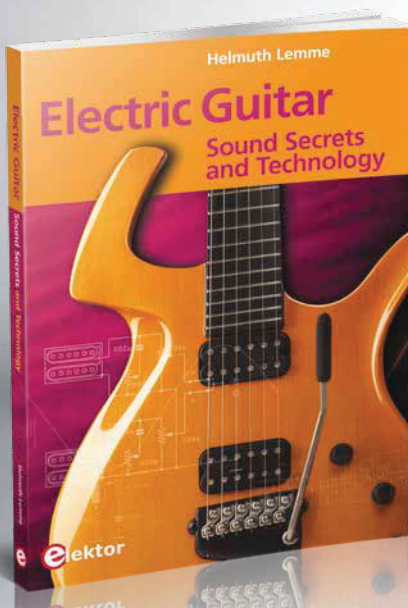
- LinearX Systems develops PC-based computer-aided engineering software and electroacoustic measurement systems. Its LEAP-5 package, which provides loudspeaker enclosure analysis for enclosure and crossover design, consists of two applications: EnclosureShop and CrossoverShop. EnclosureShop provides the transducer modeling and enclosure design. CrossoverShop provides the tools to design filter topologies based on measured response data. Together, the two programs form a complete design and analysis package for the development of loudspeaker enclosures and their crossovers.
- The company's FilterShop product is used for analog and digital filters design and analysis such as active crossovers and equalizer (EQ) filters.

Agern Alle 3 , DK-2970 Horsholm, Denmark
Dorit Larsen

Electric Guitar

Sound Secrets and technology

BEST-SELLER



What would today's rock and pop music be without electric lead and bass guitars? These instruments have been setting the tone for more than sixty years. Their underlying sound is determined largely by their electrical components. But, how do they actually work? This book answers many questions simply, in an easily-understandable manner. For the interested musician (and others), this book unveils, in a simple and well-grounded way, what have, until now, been regarded as manufacturer secrets. The examination explores deep within the guitar, including pickups and electrical environment, so that guitar electronics are no longer considered highly secret. With a few deft interventions, many instruments can be rendered more versatile and made to sound a lot better – in the most cost-effective manner.

287 pages • ISBN 978-1-907920-13-4 • \$47.60

elektor

Further information and ordering at www.elektor.com/electricguitar

Integrated Amplified Speaker Solutions

By Nora Wong (Menlo Scientific, United States)

The audio business has changed dramatically over the years. Traditionally, the home sound system consisted of a receiver and speakers. Go back far enough (e.g., 50 years) and a home system included one big mono speaker and an amplifier. Stereo ruled for decades with its pair of bookshelf speakers and a receiver.

Somehow, the focus has shifted in recent years. Perhaps large, flat-screen TVs took the emphasis away from sound or maybe there is just not enough space in today's living rooms for five channels of speakers, let alone six or seven channels. Space and budget often do not allow for a quality solution for surround sound. To remedy this, the soundbar came on the scene with the "instant audio" solution. Now the "integrated amplified speaker solution" (i.e., the soundbar) dominates the audio scene.

Many traditional speaker factories are fading and the one-stop shops that can supply enclosures, drivers, and electronics are dominating the supply chains. New "go-to" suppliers include electronics vendors that have moved into integrated solutions. Others are speaker vendors that have expanded or merged with electronics vendors. Prior to the soundbar, there was the powered subwoofer, a precursor to sound systems that combine enclosures, drivers, and electronics. Today, vendors also offer signal processing and wireless capabilities within the integrated amplified speaker solutions. **LIS**

OEM and ODM Amplifier Specialists

Ace International Electronics, Ltd.

Unit 2308, 23th Floor, Riley House, 88 Lei Muk Rd., Kwai Chung, Hong Kong
chelsey@hkcheery.com
(P) +852-24230223/(F) +852-24232818
www.ohayo-ace.com

- Ace International Electronics is an OEM and ODM vendor for docking stations and wireless speakers.

Anaview AB

Landskronavägen 25 B, 252 32 Helsingborg, Sweden
Patrik Boström
(P) +46-0-42-29 63 23

patrik.bostrom@anaview.com
www.anaview.com

- Anaview is a leading-edge developer and manufacturer of analog Class-D amplifiers and power supplies. Anaview bases its amplifier and power supply designs on its own patents and proprietary solutions to achieve leading-edge performance with the lowest possible parts count. Anaview, formerly the audio group of Abletec, has been under new ownership as of January 2013. The staff, the patents, and the entire amplifier product line can be found under the new "Anaview" moniker focusing on digital amplifier systems.

Beautiful Enterprise Co., Ltd.

Factory:

Fa Xia Mei Lin, Futian Area, Shenzhen, China

Hong Kong Offices:

26th Floor, Beautiful Group Tower, 77 Connaught Rd. Central, Hong Kong
Anthony Kwok
(P) +852-2327-0195/(F) +23523380
akwok@beautiful.com.hk
www.beautiful.com.hk

- Beautiful Enterprise does OEM work on docking stations, consumer audio, wireless and more.

GGEC America, Inc.

1801 E. Edinger Ave., Suite 255, Santa Ana, CA 92705
(P) 714-750-2280/(F) 714-750-2281
Robert Tetzlaff, President and CEO
bob@ggrec.com

Chinese Headquarters:

No. 8 Jinghu Rd., Xinhua Town, Huadu Region, Guangzhou, 510800, China
(P) +011-86-20-2860-9802/(F) +011-86-20-2860-9828
Charlie Zhou, Vice General Manager
charlie_zhou@ggrec.com.cn
www.ggrec.com

- GGEC provides OEM- and ODM-powered soundbars and powered subwoofers, all with optional DSP and wireless solutions.

22

(P) +31-0-50-5264993/(F) +31-0-50-5254591
www.hypexshop.com

- Hypex offers a full line of amplifier modules.

ICEpower A/S

G1. Lundtoftevej 1b, DK-2800 Kgs. Lyngby, Denmark
(P) +45-96-84-11-22/(F) +45-96-84-57-99
www.icepower.bang-olufsen.com

- ICEpower specializes in audio power conversion solutions.

Intersil

US Headquarters:
1650 Robert J Conlan Blvd., NE, Palm Bay, FL 32905
(P) 321-724-7000/(F) 321-729-7320
www.intersil.com/en/products/audiovideo/d2audio.html

- Intersil's d2Audio group offers a full line of power amplifier modules that uses PWM engines, asynchronous sample rate converters (ASCR), and digital processing algorithms to enhance audio quality.

Parts Express

725 Pleasant Valley Drive, Springboro, OH 45066
(P) 937-743-3000
www.parts-express.com

- Parts Express distributes plate amps, power amplifier modules, drivers, and more.

PowerPhysics, Inc.

877 Production Place, Newport Beach, CA 92663-2809
(P) 949-371-6202/(F) 815-572-8936
contact@powerphysics.com
www.powerphysics.com

China – PowerPhysics's Exclusive Agent:

Zhang Weining
Room 1103, Times Fortune Building, No.1, Hangfeng Rd., Science Park,
Fengtai District, Beijing, China
(P) 010-58090105/ 010-58090106
weiningz@hotmail.com

- PowerPhysics supplies amplifier modules for high-power applications.

Powersoft, S.p.A.

Via Enrico Conti, 5, 50018 Scandicci-Firenze, Italy
(P) +39-055-735-0230/(F) +39-055-735-6235
www.powersoft-audio.com/en/

- Powersoft offers a full line of lightweight, high-power, single-rack space, energy-efficient amplifier modules for high-power applications.

If you're an audio enthusiast who enjoys **speaker building** and **amp design**, or if you're interested in learning about **tubes**, **driver testing**, and **vintage audio**, *audioXpress* is the magazine for you!

Subscribe today at **www.audioamateur.com**.
Choose from print, digital or combo delivery.



By Mike Klasco (Menlo Scientific, United States)

Condenser vs. Self-Polarizing Back Electret Measurement Microphones

Free-Field, Diffuse-Field, and Pressure Measurement Microphones

A diffuse field or a random-incidence field is a sound field where the sound waves arrive equally from all directions. Another way to think of a diffuse field is that there are sounds coming from different directions in succession with no time in between their arrival. A pressure field is a sound field where the sound pressure has the same magnitude and phase at any position in the sound field.

Microphone Type/Class

The sound level meter's type or class describes its accuracy as defined by the relevant international standards (e.g., Type 1 is more accurate than Type 2). The American National Standards Institute (ANSI) S1.4 and the older International Electrotechnical Commission (IEC) standard IEC 60651 referred to the grade as "Type," but the new standard IEC 61672 refers to it as "Class."

A few of the low-cost ECM “measurement” microphones are simply commodity-grade 8-mm microphone capsules in a tube. The ECM microphone capsules’ signal-to-noise ratios (SNRs) can be below 56 dB to above 65 dB. This will impact the distortion floor you can measure. ECM capsules can be “treated” to help stabilize the sensitivity shift with temperature or by integrating an application-specific integrated circuit (ASIC) available from Fairchild Semiconductor. The preamplifier can compensate for this. Yet, it is not fair to group all ECM microphones together. Panasonic has a popular 8-mm capsule that is often used in low-cost measurement microphones. However, there are better and worse ECMs that can be used for entry-level measurement microphones. Panasonic’s back electret is relatively flat but 10 dB or

more noisier than lab-grade instruments with more variations on temperature and time.

Size Matters

Measurement microphones are pressure microphones that ideally have an omnidirectional pick-up pattern. In the real world, the microphone diameter determines the highest frequency a microphone can measure before directional effects and resonances kick in. Larger diameter microphones tend to have a wider dynamic range because they have more sensitivity and their maximum sound level tolerance tends to be higher.

On the other hand, a lower cost ECM-based 0.5" tip diameter measurement microphone can use a 10-mm capsule and achieve 70-dB signal-to-noise and better than 125-dB maximum sound level at the expense of some predictable anomalies at the top end. Why would you need your measurement microphone to handle high sound pressure levels (SPLs)? Well, you could be in a "sound off" auto-sound contest, but more serious applications include near-field measurements on woofers at low frequencies. Pressure gradient microphones are the alternative to omni-pressure microphones, but they have more conventional sound pickup applications where directionality is desired.

Measurement Microphone Calibration

To take a scientific (or legal) measurement with a microphone, its precise sensitivity must be known in volts per Pascal. Since this may change over the device's lifetime, it is necessary to regularly calibrate measurement microphones. This service is offered by some microphone manufacturers and by independently certified testing labs. All microphone calibration is traceable to primary standards at a National Measurement Institute (e.g., the National Physical Laboratory in the UK, Physikalisch-Technische Bundesanstalt (PTB) in Germany, and National Institute of Standards and Technology (NIST) in the US), where the reciprocity calibration is the internationally recognized means of realizing the primary standard. Laboratory standard microphones calibrated using this method are used to calibrate other microphones through comparison calibration techniques (i.e., secondary calibration), referencing the "test" microphone's output against that of the reference laboratory standard microphone's output.

Other Considerations

A microphone's sensitivity varies with frequency and other factors (e.g., environmental conditions) and is normally recorded as several sensitivity values, each for a specific frequency band. A microphone's sensitivity can also depend on the sound field's nature. For this reason, microphones are often calibrated in more than one sound field (e.g., a pressure field and a free field). Depending on their applications, measurement microphones must be periodically tested and after any potentially damaging event (e.g., being dropped

or exposed to sounds levels beyond the device’s operational range). ECMs are more likely to need frequent calibration compared to “true condenser” measurement microphones.

Production lines introduce additional considerations. Manufacturing environments are often hot and/or humid. Stability under changing temperature and humidity is important. In addition, the microphones must stand up to regular insertion into a calibrator (often several times a day) so ruggedness is more critical than it is in a laboratory setting.

Summary

Measurement microphones have always been an important tool for the audio engineer. But with the advent of low-cost measurement systems, auto EQ (pro and consumer), and other devices, the available options have increased, particularly in the low- and mid-price range. Precision measurement microphones will always be superior and most measurement labs have at least one of these in their microphone inventory for reference. However, for less demanding applications (e.g., field use and production line QC), many of the mid-priced models provide acceptable performance for those on a budget as long as they accept the microphone's shortcomings. *LIS*

ACO Pacific, Inc

2604 Read Ave., Belmont, CA 94002

Noland Lewis

(P) 650- 595-8588/(F) 650-591-2891

sales@acopacific.com

www.acopacific.com

- ACO Pacific has been an internationally known manufacturer and supplier of precision measurement microphones and microphone systems for more than 32 years. The comprehensive acoustic instrumentation product line includes the SLARM/NetSLARM family of indoor and outdoor industrial and community sound (noise) level alarm and monitoring systems, calibrators, MATT microphone attenuators, sound intensity probes, and “Extremely Random” noise generators. ACO Pacific measurement microphones meet the rigorous environmental and long-term stability requirements of the International Electrotechnical Commission’s IEC61094 (the accepted international microphone standard). Featuring stainless steel and titanium diaphragms, the capsules are burned in at more than 250°C during the manufacture process, assuring maximum stability and repeatability not found with polyester materials. From less than 1 Hz to greater than 120 kHz and 0 dBA to greater than 175 dB SPL, the variety of microphones and microphone systems (e.g., the stand-alone, phantom-powered, and IEPE-powered microphones) meet the needs of the professional/industrial end-user and OEM. ACO Pacific’s microphones

26

- Brüel & Kjaer Sound & Vibration Measurement (B&K) offers a comprehensive range of precision measurement microphones for laboratory use. Its website features analyzers, power supplies, and every conceivable jig, measurement microphone, sensor (e.g., “dummy heads”), accelerometer, preamplifier and calibrator.

- BSWA offers a comprehensive line of measurement microphones, including probe microphones, outdoor microphones, matched-sound intensity pairs, and more. However, this Chinese vendor caters more to OEMs looking to source a measurement microphone to add to their product offerings. Local service and support would be an issue for individual users.

- Dayton Audio has integrated a USB preamplifier and a measurement microphone into a single unit. The OmniMic V2 is a suite that includes the OmniMic V2 microphone, plus OmniMic V2 software. A host PC via the USB connection supplies the power. The preamplifier is integral to the OmniMic V2 microphone itself. OmniMic V2 can be used in laboratories thanks to its internal calibration or in the field.
- The Dayton Audio EMM-6 is a reasonably priced stand-alone ECM designed for measurement and critical recording applications. Each microphone includes a stand mount, a foam windscreen, a transport case, and its own printed and downloadable calibration response graph and .txt data file. The EMM-6 requires 48-V phantom power. The EMM-6 is compatible with a variety of USB preamplifiers already available. An external preamp is required for most PC-based measurement.
- The Dayton Audio UMM-6 offers a response to user requests for third-party measurement and testing software for a microphone with an integrated USB preamplifier. A host PC via the USB connection supplies power to the

- Earthworks is known for affordable, reliable reference and

29

Test and Measurement Instrumentation

Prepared by Maria Markowski (Menlo Scientific, United States)

In this directory, the *2013 Loudspeaker Industry Sourcebook* considers acoustic test and measurement instrumentation. The focus is on hardware and software integrated test solutions for measurement of speaker drivers and speaker systems rather than room tuning (e.g., 1/3 octave analyzers) or residential home auto EQ systems. **LIS**

Audiomatica, S.R.L.

Via Giuseppe Manfredi 12, 50136 Firenze, Italy
info@audiomatica.com
(P) +39-055-65-99-036/(F) +39-055-65-03-772
www.audiomatica.com

US Sales: E-Speakers.Com
5117 Tampa Ave., Tarzana, CA 91356
sales@e-speakers.com
(P) 888-349-9419
www.e-speakers.com

- Italian Audiomatica's Clio acoustic analyzer is a popular and cost-effective high-performance analyzer for speakers and microphones. The Clio 10 FW system includes the FW-01 interface as hardware and runs Clio 10 standard software or Clio 10 QC.
- Three different measurement techniques are provided. The MLS & LogChirp analysis uses pseudo-random noise or logarithmic chirps as stimuli and sinusoidal sweeps. The linearity and distortion function measures the nonlinear behavior of speakers or electronics.
- Beyond measured results, users receive sophisticated post-processing tools for Thiele-Small (T-S) parameters, waterfall plots to evaluate sound decay as 3-D or color graphs, directivity analysis for loudspeaker characterization as maps, circular or waterfall-like plots, and 3-D balloons.

Audio Precision

83 Longfellow Rd., Worcester, MA 01602
Dan Foley
(P) 508-202-2551/(F) 800-231-7350
danf@ap.com
www.ap.com

- Audio Precision (AP) has offered audio test equipment since 1984. It is best known for testing electronics from Blu-ray players, Bluetooth, amplifiers, digital formats, and

more. Some of its instrumentation (e.g., the 2700) provides comprehensive loudspeaker measurements for lab and production line testing. The 2700 series offers a range of test signals (e.g., chirp, MLS, etc.) and synchronous averaging for accurate results in noisy production environments. Designed for audio engineers who need high performance, low distortion, and flexibility in their audio analyzers, it is not just limited to speaker testing. It also tests electronics. The 2700 series' typical total harmonic distortion (THD) is less than or equal to 115 dB at 2 VRMS.

- The APx525 analyzer can also be used to make acoustic measurements. It has two analog and digital channels suitable for measuring speakers and electronics. If more channels are required, consider the APx526, the APx585, or the APx586 instruments with four-, eight-, and 16-input channels, respectively.

Brüel & Kjær Sound & Vibration Measurement A/S (B&K)

Skodsborgvej 307, DK-2850 Nærum, Denmark
info@bksv.com
(P) +45-77-41-20-00
www.bksv.com

US Headquarters: Brüel & Kjær North America, Inc.
2815-A Colonnades Court, Norcross, GA 30071-1588
(P) 770-209-6907
www.bkhome.com

- For speaker engineers, B&K offers the PULSE Electroacoustics Type 7907, a versatile platform for the evaluation of electroacoustic transducers. This includes a range of analysis capabilities required by any audio engineer working within the research and development field of acoustical designs. The PULSE Electroacoustics Type 7907 can be used for transducer pre-qualification, benchmarking, sample testing, and quality assurance, including linear and nonlinear system analysis.
- PULSE determines frequency and directional response and distortion measurements. Intelligent transducer correction compensates for amplitude response of microphones and ear simulators as well as speakers and mouth simulators. PULSE also determines T-S parameters based on simple impedance, added volume, added mass, or noncontact laser method. Additionally PULSE provides advanced display facilities (e.g., 3-D display, contour display, polar plot, etc.).

Dayton Audio

705 Pleasant Valley Drive, Springboro, OH 45066

info@daytonaudio.com

(P) 937-743-8248

www.daytonaudio.com

- OmniMic V2 is an entry-level system that can measure a speaker or sound system's frequency or impulse response. The OmniMic test track CD provides signal generation. The measurement is matched to the test signals provided on the specified tracks. Two signal types are available: "pseudo noise" and "sine sweep."

DRA Laboratories

4587 Cherrybark Court, Sarasota, FL 34241-9213

dra@mlssa.com

(P) 941-866-0632

www.mlssa.com

- MLSSA is a popular acoustic analyzer, based on an International Society of Automation (ISA) standard desktop computer card. The MLSSA version 10WI Rev 9 runs under Windows XP for analysis-only measurements stored on a disk.
- Many other new software features were added to MLSSA and MLSSA SPO (for T-S parameter measurements). MLSSA and SPO both include quality control PASS/FAIL functions for high-speed automated production line testing of loudspeakers and drivers.

ETANI Electronics Co., Ltd.

1-10-15, Ohmori-Honcho, Ohta-ku, Tokyo 143-0011, Japan

Mizue Watanabe

(P) +81-3-5763-1391

watanabe@etani.co.jp

www.etani.co.jp/eng

- ETANI offers a variety of measurement systems and analyzers for testing loudspeakers, microphones, and headphones. Comprehensive test capabilities include Rub & Buzz analysis. The Loudspeaker Test System S-255 uses DSP technology and its PC-based operation assures cost-effective, accurate, and stable analysis in near real-time. Measurement functions include SPL frequency response, THD, second- and third-harmonic distortion, abnormal noise (Rub & Buzz), impedance, polarity, phase frequency response, and sensitivity. All these test factors can be measured in one sweep and under different voltage settings, in a few sweeps.
- The S-280 T-S Parameter Analyzer uses a bare loudspeaker to measure T-S parameters. T-S parameters use a laser displacement sensor to measure the loudspeaker cone's displacement under test. The S-280 T-S Parameter Analyzer eliminates the need for added mass or mounting in a sealed box to add stiffness for measurement.

Gold Line

P.O. Box 500, West Redding, CT 06896

sales@gold-line.com

(P) 203-938-2588

www.gold-line.com

- The TEF25 is the descendent of the Crown Techron TEF analyzers. The TEF 25 USB Preamp combines the portability of a small USB preamp with the traditional TEF20 analyzer's accuracy, in an affordable package. The TEF25 comes with the SoundLab SLUPG1 software upgrade, which enables you to run all TEF20 programs including older versions and new Version 6 modules of the TDS, the MLS, the RTA, the PEQ, the PLR, and the SLX. The SLPPS60, a new post-processing module, is available in Version 6.

K & K Development, ApS

Sydvestvej 125 B, DK-2600 Glostrup, Denmark

kk-dev@kk-int.dk

(P) +45-4342-2294/+45 4468 2294

www.kkd.dk

- K & K Development provides its P630 series test and measuring systems for production testing and product development (e.g., loudspeaker units, loudspeaker systems, headphones, telephone handsets, and microphones). The product program ranges from high-performance and high-speed test systems to small, low-price test systems. Enabled by multi-core processors, a range of parameters can be measured at the same time in parallel. System multiplexing enables users to work on two different test systems simultaneously. A multi-chain function enables unlimited test sequencing.
- The software is split into an Unskilled Operator mode, an Engineer Setup mode, and an R&D Engineer mode. A test run in operator mode displays as approve/reject or as a full graph. Measured data for further statistical analysis can be simultaneously stored.

Klippel GmbH

Mendelssohnallee 30, 01309 Dresden, Germany

info@klippel.de

(P) +49-351-251-3535

www.klippel.de

- Klippel provides measurement instruments for designing and manufacturing loudspeaker drivers, audio systems, microspeakers, and more.
- Large signal analysis is used to find causes limiting the acoustical output and generating distortion (linear, nonlinear, and thermal modeling) to design smaller, lightweight and cost-effective speakers. Parameter measurements combine lumped parameter modeling with finite element analysis. Vibration and radiation analysis generates optimal directivity characteristics of the sound. High-speed 100% testing detects defective units (e.g., Rub & Buzz and many other defects) in a noisy

- The Klippel R&D System comprises the hardware Distortion Analyzer, the project management software dB-Lab, and many modules for a variety of measurements. The system offers everyday acoustical tests, small- and large-signal parameter measurement (including T-S parameters), distortion measurements, accelerated life and power testing, and simulation and naturalization modules. It measures a variety of speakers, from microspeakers to subwoofers and audio systems. Accessories including lasers, microphones, a power amplifier, and a mounting stand are optional.
- The Scanning Micrometer System is an add-on, using the Distortion Analyzer hardware, along with special software and accessories for cone vibration and radiation analysis. Other add-ons are offered for cone and spider testing (SPM) and speaker material measurement (MPM).
- The Klippel QC System satisfies the particular requirements of end-of-line transducer testing (e.g., loudspeaker drive units) and audio systems in a production environment (e.g., high-speed measurement at physical limits). A sensitive Rub & Buzz and air leakage module, which is robust in a production environment (high ambient-noise immunity), is also provided.

www.libinst.com

- Liberty Instruments's PRAXIS performs convenient, sophisticated, and high-quality audio measurements of loudspeakers, electronics, vibrating systems, and rooms. PRAXIS utilizes higher-quality Windows-based digital soundcard hardware for versatility, compatibility, and portability. The PRAXIS AudPod is a compact, portable audio interface and license key, which enables PRAXIS's entire feature set and capabilities. Because PRAXIS with the AudPod can calibrate for accurate measurements using PC Audio hardware, you can transfer the measuring system between computers without removing covers or uninstalling cards. Use the performance of better sound cards when higher sample rates (up to 192 kHz) or 24-bit measurements are needed.

www.linearx.com

- The LX700 modular signal-processing system was designed to cover many measurement application market segments, including both lab R&D and production QC/QA testing. The software includes a macro programming script capability, enabling users to create custom automated test programs for production-line testing. The

- After 20 years of production, the LX500 has replaced the LMS. Designed for maximum flexibility in permanent and portable applications, the LX500 is powered by a single 12-VDC source. The LX500's small size and light weight enables it to be tossed in a briefcase, placed on a desktop, or installed in a permanent engineering lab or a production QC environment. Featuring frequency domain, time domain, and dual-domain versions, the LX500 supports an array of different measurement types, techniques, and methods.
- The LX500's features include dual analog oscillators, triple multi-function inputs, a precision noise generator, a programmable filter, extensive bandwidth/weighting filters, a phase meter, high-resolution digital signal generator/spectrum analyzers, digital I/O control, and comprehensive Windows application software.

www.listeninc.com

- SoundCheck is a software-based electroacoustic and audio electronic measurement system that has strong acceptance in the speaker industry. Its data acquisition options and software modules work in straightforward integration into production and R&D test environments. A typical SoundCheck system consists of a PC or laptop with SoundCheck software and an audio input device (e.g., a professional audio sound card or data acquisition card). The system is configured to specific application and budget requirements by selecting input devices, software modules, and other accessories.
- SoundCheck offers a production line testing and loudspeaker QC package. All quality-related parameters, acoustical and electrical, are simultaneously measured. SoundCheck's stepped sine excitation signal (Sweep) permits detailed tests to be performed in as little as 3 s without sacrificing test accuracy. Its HarmonicTrak algorithm maintains measurement accuracy even in noisy environments.
- Pass/Fail limits can be user-defined, determined by offsetting data from a measurement (e.g., ± 3 dB from a reference loudspeaker's response curve), or determined statistically using SoundCheck's statistical analysis module. Results can be exported to other programs for additional processing, statistical control, and generating documents in standardized formats.
- R&D testing with SoundCheck's measurement algorithms enables rapid prototype characterization, performing



THE GLOBAL STAGE FOR INNOVATION



Save the Date

for the world's largest annual innovation event

Tuesday, January 7-Friday, January 10, 2014

2014 International CES® | Las Vegas, Nevada | CESweb.org

AAC-Applications Acoustiques de Composites
FRANCE
OEM Speaker Assembly, Speaker Parts

ACO Pacific, Inc.
UNITED STATES
Engineering Software, Measurement Microphones, Mic Capsules, Test Equipment

AcouTex Fabrics
UNITED STATES
Acoustic Design, Enclosures & Cabinets, Enclosure Parts, Finished Systems, OEM Speaker Assembly, Speaker Parts

Acoustic Fields
UNITED STATES
Acoustic Design, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Mic Capsules, OEM Speaker Assembly, Speaker Parts, Test Equipment

Acoustical Solutions, Inc.
UNITED STATES
Acoustic Design, Enclosure Parts, OEM Speaker Assembly, Speaker Parts

Acoustics First Corp.
UNITED STATES
Acoustic Design, Enclosure Parts, OEM Speaker Assembly, Test Equipment

AEX Laboratories
UNITED STATES
Acoustic Design, Associations, Consultants/Designers, Integrated Amplified Speaker Solutions, Licensing

ANAVIEW
UNITED STATES
Integrated Amplified Speaker Solutions, Speaker Parts

Area 52 RND
UNITED STATES
Consultants/Designers, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

Arizona Capacitors, Inc.
UNITED STATES
Passive Components, Crossovers, & Wiring

Assistance Audio, Inc.
UNITED STATES
OEM Speakers & Drivers

Association of Loudspeaker Manufacturing & Acoustics International (ALMA)
UNITED STATES
Associations

AUDAX
FRANCE
OEM Speaker Assembly, OEM Speakers & Drivers

Audio Media Group
UNITED STATES
Acoustic Design, Cables & Connectors, Consultants/Designers, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

Audience
UNITED STATES
Cables & Connectors, Finished Systems, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Audio Precision
UNITED STATES
Engineering Software, Manufacturing Equipment, Measurement Microphones, Test Equipment

Audio Technology Engineering (ATE)
GERMANY
Acoustic Design, Associations, Consultants/Designers, Finished Systems, Integrated Amplified Speaker Solutions, Licensing, Manufacturing Equipment, OEM Speakers & Drivers, Speaker Parts

Audiolight, Inc.
UNITED STATES
Driver Reconciling, Enclosures & Cabinets, Service

Audiomatica S.R.L.
ITALY
Consultants/Designers, Engineering Software, Test Equipment

AudioSoft
AUSTRALIA
Consultants/Designers, Engineering Software

Audiostar Electronics Co., Ltd.
CHINA
Cables & Connectors, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Manufacturing Equipment, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

Audioxplus, S.R.L.
ITALY
Acoustic Design, Cables & Connectors, Consultants/Designers, Driver Reconciling, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, Mic Capsules, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

Auratron Systems
UNITED STATES
Consultants/Designers, Finished Systems, Passive Components, Crossovers, & Wiring

Aureo
FRANCE
Acoustic Design, Consultants/Designers, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers, Periodicals/Books, Test Equipment

Axel Joost Elektronik
GERMANY
Consultants/Designers, Engineering Software, Finished Systems, Measurement Microphones, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Test Equipment

Axiomedia
ITALY
Acoustic Design, Cables & Connectors, Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts, Test Equipment

B&C Speakers S.p.A.
ITALY
Enclosures & Cabinets, Finished Systems, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Bamberg Engineering
UNITED STATES
Acoustic Design, Consultants/Designers, Finished Systems, Passive Components, Crossovers, & Wiring

Beach Dynamics, Inc.
UNITED STATES
Consultants/Designers, Test Equipment

BeStar Technologies, Inc.
UNITED STATES
Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers

BESTON Technology Corp.
TAIWAN
OEM Speakers & Drivers

Beyma Professional Loudspeakers
SPAIN
Enclosures & Cabinets, OEM Speakers & Drivers

BG Radia Corp.
UNITED STATES
Acoustic Design, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers

BishopSound
UNITED KINGDOM
Acoustic Design, Cables & Connectors, Consultants/Designers, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Blackhole
UNITED STATES
Enclosure Parts, OEM Speaker Assembly

BMS Speakers GmbH
GERMANY
OEM Speakers & Drivers

Bob Young and Associates
UNITED STATES
Acoustic Design, Consultants/Designers, Earphones & Headphones

Bogen Communications, Inc.
UNITED STATES
Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, Passive Components, Crossovers, & Wiring, Speaker Parts

Bohmer Audio, AB
SWEDEN
Consultants/Designers, Engineering Software, Integrated Amplified Speaker Solutions, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

BSWA Technology Co., Ltd.
CHINA
Acoustic Design, Cables & Connectors, Engineering Software, Measurement Microphones, Mic Capsules, OEM Speaker Assembly, Test Equipment

Bulk Molding Compounds, Inc.
UNITED STATES
Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speakers & Drivers, Service

Carl's Custom Loudspeakers
UNITED STATES
Driver Reconciling, Enclosure Parts, Passive Components, Crossovers, & Wiring, Service

Carvin Corp.

UNITED STATES

Acoustic Design, Cables & Connectors, Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

CE Distribution, LLC

UNITED STATES

Cables & Connectors, Enclosure Parts, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Test Equipment

Celestion (UK Head Office)

UNITED KINGDOM

OEM Speakers & Drivers

Celestion (US Sales Office)

UNITED STATES

OEM Speakers & Drivers, Speaker Parts

Centrotherm Systemtechnik GmbH

GERMANY

Acoustic Design, OEM Speaker Assembly, OEM Speakers & Drivers, Speaker Parts

CGN Audio Labs

UNITED STATES

Acoustic Design, Consultants/Designers, Enclosures & Cabinets, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

CJS Labs

UNITED STATES

Acoustic Design, Associations, Consultants/Designers

Clarasonic

THAILAND

Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Measurement Microphones, OEM Speaker Assembly, OEM Speakers & Drivers, Service, Speaker Parts, Test Equipment

Clear Lake Audio

UNITED STATES

Finished Systems, Integrated Amplified Speaker Solutions

CommonSense Audio

UNITED STATES

Acoustic Design, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers

Creative Sound Solutions

CANADA

Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Crista technologies, SABL

FRANCE

Finished Systems

Crystal Acoustics

UNITED STATES

Acoustic Design, Enclosures & Cabinets, Finished Systems, Integrated Amplified Speaker Solutions

Custom Audio

UNITED STATES

Acoustic Design, Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, OEM Speaker Assembly, Passive Components, Crossovers, & Wiring, Service

Dai-ichi Electronics Manufacturing Corp.

PHILIPPINES

Acoustic Design, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Measurement Microphones, OEM Speakers & Drivers, Speaker Parts

Danville Signal Processing, Inc.

UNITED STATES

Consultants/Designers, Engineering Software, Integrated Amplified Speaker Solutions, Passive Components, Crossovers, & Wiring

Dayton Audio

UNITED STATES

Acoustic Design, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Measurement Microphones, Mic Capsules, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

Decibel Eng Ind

BRAZIL

Acoustic Design, Associations, Cables & Connectors, Consultants/Designers, Driver Reconciling, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Licensing, Manufacturing Equipment, Measurement Microphones, Mic Capsules, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Periodicals/Books, Service, Speaker Parts, Test Equipment

Devine Audio

CANADA

Enclosures & Cabinets, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, Passive Components, Crossovers, & Wiring

Diamond Case Designs, Inc.

UNITED STATES

Acoustic Design, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, Speaker Parts

Dimensions Acoustiques

CANADA

Acoustic Design, Finished Systems, OEM Speakers & Drivers

Direct Acoustics

UNITED STATES

Finished Systems

Discovery Cable

UNITED STATES

Cables & Connectors

Dynavox Electronics, Inc.

UNITED STATES

Acoustic Design, Cables & Connectors, Driver Reconciling, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

DYNE Analytics, LLC

UNITED STATES

Consultants/Designers, Engineering Software

Earthquake Sound Corp.

UNITED STATES

Acoustic Design, Cables & Connectors, Consultants/Designers, Driver Reconciling, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

Earthworks, Inc.

UNITED STATES

Measurement Microphones, Test Equipment

Eckel Industries, Inc. (Acoustic Division)

UNITED STATES

Acoustic Design, Test Equipment

Eighteen Sound

ITALY

Finished Systems, OEM Speakers & Drivers

EKSC Eagle

UNITED STATES

Acoustic Design, Consultants/Designers, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, OEM Speakers & Drivers, Service, Speaker Parts

Electro-Acoustic Testing Co., Inc.

UNITED STATES

Enclosures & Cabinets, Finished Systems, Service

Elettromedia

ITALY

Acoustic Design, Cables & Connectors, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, Mic Capsules, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

eMagineFactory, LLC

UNITED STATES

Consultants/Designers

Eminence Dongguan Enterprise Co., Ltd.

CHINA

Enclosures & Cabinets, Engineering Software, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Eminence Speaker, LLC

UNITED STATES

Enclosure Parts, Engineering Software, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

ESS Labs, LLC

UNITED STATES

Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Licensing, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

estron A/S

DENMARK

Cables & Connectors, Earphones & Headphones, Manufacturing Equipment, Passive Components, Crossovers, & Wiring, Speaker Parts

ETANI Electronics Co., Ltd.

JAPAN

Acoustic Design, Engineering Software, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, Passive Components, Crossovers, & Wiring, Test Equipment

38

Josephson Engineering, Inc.

UNITED STATES

Measurement Microphones, Test Equipment

JTS Pro Audio

IRAN

Associations, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

Kadeton Audio Co., Ltd.

CHINA

Enclosures & Cabinets, Enclosure Parts, Finished Systems

Kamperman Engineering

THE NETHERLANDS

Acoustic Design, Consultants/Designers, Engineering Software, Finished Systems, Measurement Microphones, OEM Speaker Assembly, Test Equipment

Kinetic Audio International, Ltd.

UNITED STATES

Acoustic Design, Consultants/Designers, Driver Reconing, Enclosures & Cabinets, Finished Systems, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

Klippel GmbH

GERMANY

Consultants/Designers, Service, Test Equipment

Kravchenko-Audio

CANADA

Consultants/Designers

Lakshmi Metal Coils

INDIA

Consultants/Designers, Enclosure Parts, Manufacturing Equipment, Speaker Parts

LG Electronics

SOUTH KOREA

Acoustic Design, Associations, Cables & Connectors, Consultants/Designers, Driver Reconing, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Licensing, Manufacturing Equipment, Measurement Microphones, Mic Capsules, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Periodicals/Books, Service, Speaker Parts, Test Equipment

LOUDSOFT, Ltd.

DENMARK

Acoustic Design, Consultants/Designers, Engineering Software, Licensing, Measurement Microphones, Service, Test Equipment

Loudspeaker Components, LLC

UNITED STATES

Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, OEM Speakers & Drivers, Speaker Parts

Loudspeaker University

UNITED STATES

Acoustic Design

Loudspeakers Plus

UNITED STATES

Cables & Connectors, Driver Reconing, Finished Systems, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service

Lowell Manufacturing Co.

UNITED STATES

Enclosure Parts, Finished Systems, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Maeden International, Ltd.

TAIWAN

Acoustic Design, Cables & Connectors, Consultants/Designers, Earphones & Headphones, Manufacturing Equipment, OEM Speaker Assembly, Passive Components, Crossovers, & Wiring, Speaker Parts

Mango Electronics

UNITED KINGDOM

Acoustic Design, Consultants/Designers, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, Passive Components, Crossovers, & Wiring

Martin Sound Products, Inc.

UNITED STATES

Cables & Connectors, Driver Reconing, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

Materion Electrofusion

UNITED STATES

Speaker Parts

McKinney & Associates, LLC

UNITED STATES

Associations, Licensing, Service

Megatec AG

SWITZERLAND

Manufacturing Equipment, Test Equipment

Meniscus Audio Group, Inc.

UNITED STATES

Acoustic Design, Enclosure Parts, Engineering Software, Integrated Amplified Speaker Solutions, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

Menlo Scientific, Ltd.

UNITED STATES

Consultants/Designers

MenloEast Labs

UNITED STATES

Consultants/Designers

MISCO

UNITED STATES

Enclosures & Cabinets, Finished Systems, Integrated Amplified Speaker Solutions, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

Mitchell & Todd

UNITED KINGDOM

Finished Systems, Integrated Amplified Speaker Solutions

MK Audio, LLC

UNITED STATES

Acoustic Design, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

Morel, Ltd.

ISRAEL

Acoustic Design, Finished Systems, OEM Speakers & Drivers

Motus Audio

UNITED STATES

OEM Speakers & Drivers

MSC Software Corp.

UNITED STATES

Acoustic Design, Engineering Software

Mundorf EB GmbH

GERMANY

Acoustic Design, Enclosure Parts, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

NedLab

UNITED STATES

Acoustic Design, Consultants/Designers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

New Millennium Acoustics

UNITED STATES

Acoustic Design, Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Measurement Microphones, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service

Nordson EFD

UNITED STATES

Manufacturing Equipment, Passive Components, Crossovers, & Wiring, Service

North American Solidex, LLC

UNITED STATES

Acoustic Design, Consultants/Designers, Enclosures & Cabinets, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

North Reading Engineering

UNITED STATES

Consultants/Designers, Passive Components, Crossovers, & Wiring

NTI Americas, Inc.

UNITED STATES

Measurement Microphones, Test Equipment

OEB, S.R.L.

ITALY

Driver Reconing, Speaker Parts

ORCA Design and Manufacturing

UNITED STATES

Cables & Connectors, Consultants/Designers, Earphones & Headphones, Enclosure Parts, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Outline, S.R.L.

ITALY

Acoustic Design, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Measurement Microphones, Service

Palo Alto Audio Design, LLC

UNITED STATES

Earphones & Headphones, Finished Systems

SoCal Sound Shop

UNITED STATES

Acoustic Design, Consultants/Designers, Driver Reconciling, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service

Solen, Inc.

CANADA

Acoustic Design, Cables & Connectors, Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Integrated Amplified Speaker Solutions, Measurement Microphones, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts, Test Equipment

Solus/Clements Loudspeakers

UNITED STATES

Acoustic Design, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Test Equipment

Sound Advice

UNITED STATES

Acoustic Design, Consultants/Designers, Engineering Software

Sound Lab, Inc.

UNITED STATES

Consultants/Designers, Finished Systems

Sound Sources Technology, Inc.

UNITED STATES

Acoustic Design, Consultants/Designers, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

SoundKinetics

UNITED STATES

Acoustic Design, Consultants/Designers

Soundlabs Group Pty., Ltd.

AUSTRALIA

Cables & Connectors, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, Microspeakers, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

Sounddoctor

UNITED STATES

Cables & Connectors, Consultants/Designers, Engineering Software, Finished Systems, Passive Components, Crossovers, & Wiring, Test Equipment

Speaker Addiction

UNITED STATES

Acoustic Design, Cables & Connectors, Consultants/Designers, Driver Reconciling, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Licensing, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

Speaker Art

UNITED STATES

Acoustic Design, Engineering Software, Finished Systems, Passive Components, Crossovers, & Wiring

Speaker Clinic

UNITED STATES

Acoustic Design, Consultants/Designers, Engineering Software, Service

Suzuki Kanshi (Thailand) Co., Ltd.

THAILAND

Speaker Parts

Tang Band Industries Co., Ltd

TAIWAN

Enclosures & Cabinets, Finished Systems, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

tg-acoustics

THE NETHERLANDS

Acoustic Design, Consultants/Designers, Finished Systems, Passive Components, Crossovers, & Wiring

The Canadian Loudspeaker Corp.

CANADA

Enclosures & Cabinets, Enclosure Parts, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Thomas Scherer Audio Engineering

GERMANY

Acoustic Design, Finished Systems

Tonwel Audio Co., Ltd.

CHINA

Acoustic Design, Associations, Cables & Connectors, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts, Test Equipment

Tortech Sound, Inc.

CANADA

Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, Measurement Microphones, Mic Capsules, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts, Test Equipment

Transducer Lab

UNITED STATES

Consultants/Designers, OEM Speaker Assembly, OEM Speakers & Drivers

Trax Audio

UNITED STATES

Consultants/Designers, Enclosures & Cabinets, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts

True Technologies, Inc.

UNITED STATES

Acoustic Design, Consultants/Designers, Engineering Software, Test Equipment

Tymphony

UNITED STATES

Acoustic Design, Cables & Connectors, Earphones & Headphones, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, Measurement Microphones, Mic Capsules, Microspeakers, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

Underground Industries

UNITED STATES

Acoustic Design, Cables & Connectors, Consultants/Designers, Driver Reconciling, Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems, Integrated Amplified Speaker Solutions, Manufacturing Equipment, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Service, Speaker Parts, Test Equipment

United Gasket Corp.

UNITED STATES

Enclosures & Cabinets, Enclosure Parts, OEM Speaker Assembly, Passive Components, Crossovers, & Wiring, Speaker Parts

UpTone Audio, LLC

UNITED STATES

Passive Components, Crossovers, & Wiring

Vance Dickason Consulting

UNITED STATES

Consultants/Designers

Vertek/XTC

UNITED STATES

Acoustic Design, Consultants/Designers, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring

Vidyut Teletronics, Ltd.

INDIA

OEM Speaker Assembly, Passive Components, Crossovers, & Wiring, Speaker Parts

Volti Audio

UNITED STATES

OEM Speaker Assembly

Warkwyn Associates, Inc.

CANADA

Acoustic Design, Consultants/Designers, Engineering Software, Measurement Microphones, Service, Test Equipment

Wattre Corp.

UNITED STATES

Acoustic Design, Consultants/Designers, OEM Speakers & Drivers

Wavecor, Ltd.

CHINA

OEM Speakers & Drivers

Westlake Audio, Inc.

UNITED STATES

Cables & Connectors, Finished Systems, OEM Speaker Assembly

WW Speaker Cabinets

UNITED STATES

Enclosures & Cabinets, Enclosure Parts, Engineering Software, Finished Systems

Xiamen One Magnet Electronic Co., Ltd.

CHINA

Acoustic Design, Speaker Parts

Yung International, Inc.

TAIWAN

Associations, Cables & Connectors, Enclosures & Cabinets, Enclosure Parts, Finished Systems, Integrated Amplified Speaker Solutions, OEM Speaker Assembly, Passive Components, Crossovers, & Wiring, Service, Speaker Parts

Zhuhai HiVi Technology Co., Ltd.

CHINA

Acoustic Design, Enclosures & Cabinets, Finished Systems, Manufacturing Equipment, OEM Speaker Assembly, OEM Speakers & Drivers, Passive Components, Crossovers, & Wiring, Speaker Parts, Test Equipment

	Wire Channel	Connectors	Cables
AUSTRALIA			
Decibel Eng Ind	•		
ETI Research	•	•	
Soundlabs Group Pty., Ltd.	•	•	
CANADA			
Reference 3A	•		
Solen, Inc.	•	•	
CHINA			
Audiostar Electronics Co., Ltd.		•	
BSWA Technology Co., Ltd.	•	•	
QPro Audio	•	•	
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.	•	•	
Shenzhen Horn Audio Co., Ltd.	•		
Tonwel Audio Co., Ltd.		•	
DENMARK			
estron A/S	•	•	
Jantzen Audio Denmark	•	•	
GERMANY			
Proraum Vertriebs GmbH	•		
INDIA			
Power Electronics & Technologies	•		
ISRAEL			
R H Sound Technology, Ltd.	•	•	
ITALY			
Audioxplus, S.R.L.	•	•	
Axiomedia	•	•	
Elettromedia	•		
JAPAN			
Furutech Co., Ltd.	•	•	•

	Wire Channel	Connectors	Cables
SOUTH KOREA			
LG Electronics	•	•	•
Samsung	•	•	•
TAIWAN			
Exsonix Co., Ltd.	•		
Maeden International, Ltd.	•		•
Yung International, Inc.	•	•	
UNITED KINGDOM			
Bishopsound	•		
EuroTec International, PLC	•	•	
UNITED STATES			
Audio Media Group	•	•	•
Audience	•		
Carvin Corp.	•	•	
CE Distribution, LLC	•	•	
Discovery Cable	•	•	
Dynavox Electronics, Inc.	•	•	
Earthquake Sound Corp.	•	•	
G.R.A.S. Sound & Vibration	•		
JBL Selenium	•	•	•
Loudspeakers Plus		•	
Martin Sound Products, Inc.	•	•	
ORCA Design and Manufacturing	•		
Parts Express	•	•	•
Shogyo International Corp.	•	•	•
Soundactor	•		
Speaker Addiction	•	•	•
Tymphany			•
Underground Industries	•	•	
Westlake Audio, Inc.	•		



News, announcements, and offers for **audiophiles everywhere!**

Stay connected with **Audio Amateur.**

audioamateur.com



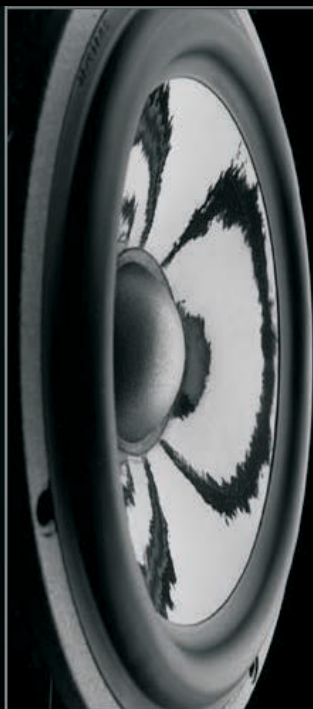
@AudioAmateur



AudioAmateur

Like. Follow. Share. Connect. Like. Follow. Share. Connect.

all you need is technology from



FDS A flat drive speaker

Fullrange OD 60 mm x H 17 mm
1W / 1m / 86 dB / 250 - 25.000 Hz



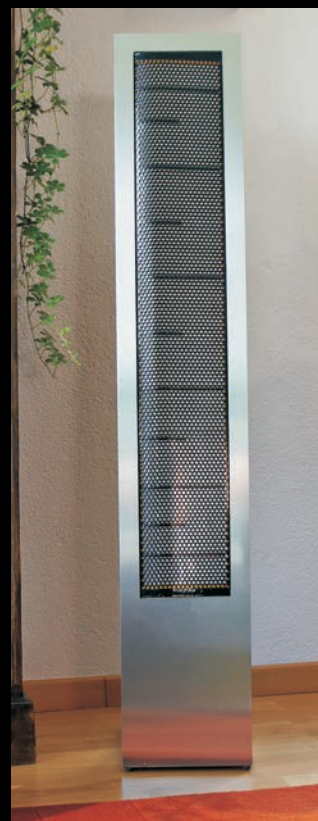
FDS C with passiv Radiator

Fullrange OD 100 mm x H 17 mm
1W / 1m / 86 dB / 150 - 25.000 Hz



ESL the sidewinder

hybrid electrostatic speaker
1 W / 1m / 85 dB 250 - 22.000 Hz



FBS flat bass speaker

Subwoofer OD 210 mm x H 45 mm
10 mm +/- straight linear field



ATE DSP class-D AMP

up to 6 x 80 watts per channel
IR contr., S/PDIF & analog input



and much more is coming soon

EARPHONES & HEADPHONES

	Headphones	Earphones
BRAZIL		
Decibel Eng Ind	•	
CANADA		
Tortech Sound, Inc.		•
CHINA		
QPro Audio		•
Shenzhen Horn Audio Co., Ltd.	•	•
DENMARK		
estron A/S	•	
iCapture ApS	•	•
ITALY		
Audioxplus, S.R.L.	•	•
Elettromedia	•	
JAPAN		
Furutech Co., Ltd.	•	•
LG Electronics	•	•
Samsung	•	•

	Headphones	Earphones
TAIWAN		
Exsonix Co., Ltd.	•	
Maeden International, Ltd.	•	•
UNITED KINGDOM		
Bishopsound		•
UNITED STATES		
Audia Media Group	•	•
Bob Young and Associates	•	•
Dynavox Electronics, Inc.	•	•
Holtz Industries	•	•
JBL Selenium	•	•
ORCA Design and Manufacturing		•
Palo Alto Audio Design, LLC		•
Parts Express	•	•
RBH Sound	•	
Shogyo International Corp.	•	•
Sound Sources Technology, Inc.	•	
Speaker Addiction	•	
Tymphany	•	•

ENCLOSURES & CABINETS

	Baffles		Finished Cabinets		Sub-Assemblies, Panels, Materials											Rigging	
	Ceiling Speaker Plates	In-Wall Plates	Box Arrays (PA)	Boxes	Bulk Molding Compound	Stand	Carpet	MDF (Fiberboard)	Hardwood	Paper/Paper Pulp	Other	Plastic	Plywood	Veneer	Wound Geometric Tubes		
BELGIUM																	
Hawk Audio						•	•										
Premium Sound Solutions						•											
BRAZIL																	
Decibel Eng Ind			•	•	•	•				•							
CANADA																	
Creative Sound Solutions						•											
Devine Audio						•	•										
Reference 3A						•	•										
Solen, Inc.		•	•			•	•								•		
The Canadian Loudspeaker Corp.		•	•			•											
Tortech Sound, Inc.		•	•								•		•				
CHINA																	
Audiostar Electronics Co., Ltd.		•		•				•				•					
Eminence Dongguan Enterprise Co., Ltd.				•	•												
FS Audio Co., Ltd.				•	•	•	•	•		•			•	•			
Kadeton Audio Co., Ltd.										•				•	•		
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.		•			•	•			•	•			•	•	•		
Shenzhen Horn Audio Co., Ltd.					•				•	•			•				
Tonwel Audio Co., Ltd.				•	•				•				•	•			
Zhuhai HiVi Technology Co., Ltd.					•												
DENMARK																	
iCapture ApS				•	•		•		•	•	•	•	•	•	•		
Jantzen Audio Denmark					•												

[illegible]

Strong - Dense - Inert

Composite Solutions

Horns

Cabinets

Baffles

*You should hear
what you're missing*

Phasing Plugs

GLOBE COMPOSITES, INC. - Chino, CA
800.806.6019 www.GlobeComposites.com

Toll free: 800-276-9955

MENLO
SCIENTIFIC

LOUDSPEAKER UNIVERSITY



SINCE 1994

Menlo Scientific Ltd. has facilitated the Loudspeaker University.

Our intensive seminar programs have been held in Boston, Los Angeles, London, Geneva, Taipei, and Dongguan.

COMING THIS YEAR!

Courses on-demand will be available on-line.

TOPICS INCLUDE:

- In-depth exploration of loudspeakers parts
- Design
- Manufacturing
- Materials
- Test and measurement
- Global sourcing

Individual and corporate membership available.

www.loudspeakeruniversity.com

2013 Loudspeaker Industry Sourcebook

	Enclosure Stuffing		Grille Assemblies			Hardware			Fasteners & Other		
	Enclosure Grilles	Fiberglass	Foam	Synthetic	Fabric Suppliers	Foam Suppliers	Perforated Metal Suppliers	Corners	Handles	Name Plates	Fasteners & Other
AUSTRALIA											
Soundlabs Group Pty., Ltd.	•		•	•	•	•	•		•	•	•
BRAZIL											
Decibel Eng Ind	•				•						•
CANADA											
Creative Sound Solutions	•			•	•						
Reference 3A	•										
Solen, Inc.	•	•	•	•	•	•					
The Canadian Loudspeaker Corp.	•		•			•		•	•	•	
Tortech Sound, Inc.	•			•				•			
CHINA											
Audiostar Electronics Co., Ltd.		•							•		
FS Audio Co., Ltd.	•	•	•			•	•	•	•	•	•
Kadeton Audio Co., Ltd.	•	•	•		•						•
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.	•	•	•	•	•	•	•	•	•	•	•
Shenzhen Horn Audio Co., Ltd.	•										
Tonwel Audio Co., Ltd.	•										
DENMARK											
iCapture ApS		•	•	•	•						
Jantzen Audio Denmark			•	•	•						•
GERMANY											
Mundorf EB GmbH				•	•						
Sebert Schwingungstechnik GmbH											•
INDIA											
Lakshmi Metal Coils											•
INDONESIA											
SB Acoustics	•										
IRAN											
JTS Pro Audio	•	•	•			•		•		•	•
ITALY											
Audioplus, S.R.L.	•	•	•	•	•	•	•				
Axiomedia	•							•	•	•	
Elettromedia	•	•	•	•		•	•	•			
PHILIPPINES											
Dai-ichi Electronics Manufacturing Corp.										•	•
SOUTH KOREA											
LG Electronics	•	•	•	•	•	•	•	•	•	•	•
Samsung	•	•	•	•	•	•	•	•	•	•	•
TAIWAN											
Huey Tung International Co., Ltd.	•	•	•						•	•	•
Yung International, Inc.	•										
THAILAND											
Clarasonic			•								
UNITED KINGDOM											
Bishopsound	•										
EuroTec International, PLC	•										
Mango Electronics	•										
UNITED STATES											
AcousTex Fabrics	•					•					

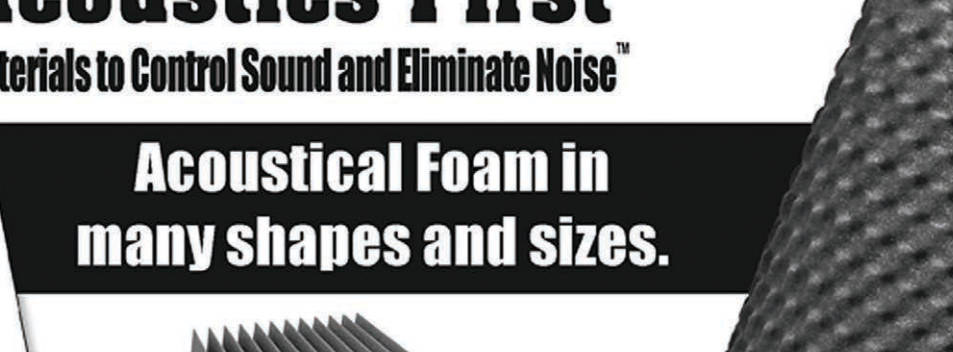
ENCLOSURE PARTS • ENCLOSURE PARTS • ENCLOSURE PARTS • ENCLOSURE PARTS • ENCL...



Acoustics First[®]

Materials to Control Sound and Eliminate Noise[™]

Acoustical Foam in many shapes and sizes.



Toll Free: 888-765-2900

Web Site www.AcousticsFirst.com

Independent Product Test and Evaluation for the Audio Community

- KEMAR HATS with mouth simulator
- Outline turntable

- Listen SoundCheck measurement system
- Keyence laser displacement measuring system

- Eight channel diffuse sound field generator
- Wind generator and calibration anemometer

Maria@menloscientific.com • tel 510.758.9001 | Michael Klasco • info@menloscientific.com • tel 510.758.9014

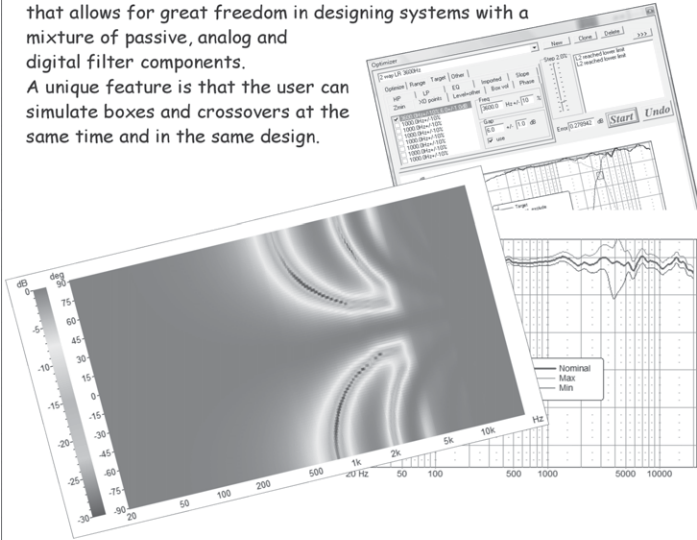
	Acoustic Analysis	Crossover Design	Box Design	Network Optimizer	CAE or CAD
GERMANY					
Axel Joost Elektronik	•	•			
R&D Team	•	•	•	•	•
IRAN					
JTS Pro Audio		•	•		•
ITALY					
Audiomatica, S.R.L.	•				
Audioxplus, S.R.L.	•	•	•	•	•
Elettromedia	•	•	•		
Outline, S.R.L.	•	•	•	•	•
RCF S.p.A.	•	•			
JAPAN					
ETANI Electronics Co., Ltd.	•	•			
THE NETHERLANDS					
Kamperman Engineering	•				
SOUTH KOREA					
LG Electronics	•	•	•	•	•
Samsung	•	•	•	•	•

	Acoustic Analysis	Crossover Design	Network Optimizer	CAE or CAD	
Loudspeaker Components, LLC					•
Martin Sound Products, Inc.		•			
Meniscus Audio Group, Inc.	•				
MSC Software Corp.	•	•			•
New Millennium Acoustics	•	•	•	•	•
Parts Express	•	•	•	•	
Power Sound Audio, LLC	•	•	•		•
Solus/Clements Loudspeakers	•	•	•		
Soundocor	•				
Speaker Addiction		•	•		
Speaker Art		•		•	
Speaker Clinic	•	•	•	•	•
True Technologies, Inc.	•				
Tymphony	•	•	•	•	•
Underground Industries		•	•		•
WW Speaker Cabinets					•

2013 Loudspeaker Industry Sourcebook

LspCAD 6
Loudspeaker modelling software

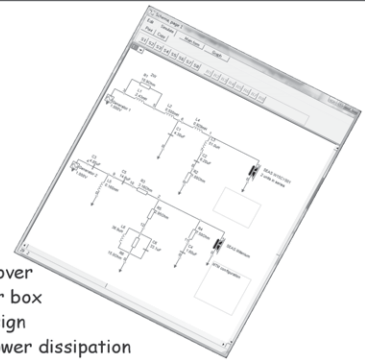
LspCAD 6 is a loudspeaker design software intended for the simulation of loudspeaker crossovers and boxes. The user interface is a simple and intuitive drag and drop interface that allows for great freedom in designing systems with a mixture of passive, analog and digital filter components. A unique feature is that the user can simulate boxes and crossovers at the same time and in the same design.



Visit **<http://www.ijdata.com>**
for additional info, a fully functional demo and a
list of distributors.

Features

- * Mix passive and active (analog and digital) crossover components + loudspeaker box modelling in the same design
 - * Passive components with power dissipation computation for resistors
 - * Tolerance analysis on passive components
 - * Active analog filter components using OP amplifiers
 - * Digital filters, using adder/delay elements or models of commercial crossovers from Behringer, dbxPro or XTA
 - * Fast prototyping analog and digital filter blocks such as HP/LP, notch, allpass, Matlab polynomials, BiQuad and more...
 - * Grouping of components, makes it easier to manage evaluation of e.g different crossover frequencies
 - * Templates with many ready to use component blocks such as active filters and closed/bassreflex boxes
 - * Thermal and nonlinear modelling
 - * Imports T/S parameters from Klippel, Praxis and CLIO
 - * Powerful optimizer with limits on component values.
- Additional constraints on e.g crossover frequency and total impedance can be applied
- * Polar maps, off axis modelling either from piston model or imported polar measurements
 - * Crossover emulator, makes it possible to evaluate crossovers without actually building them



Renew your subscription
to *Voice Coil* before it
it expires!

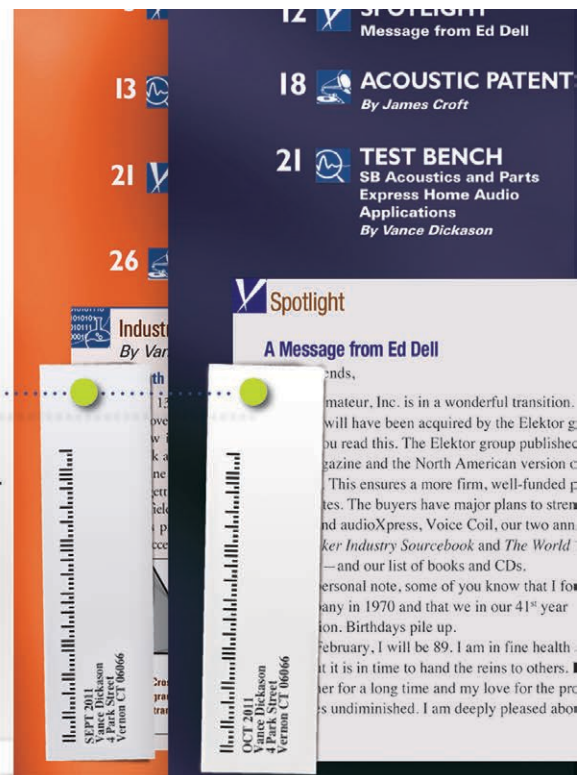
Check your label to find the expiration date.

For more information call **800.269.6301**

Qualified subscriptions to Voice Coil
run for one year.



Renew annually online at **www.audioamateur.com**



	Home	Pro	Car
AUSTRALIA			
ETI Research	•		
Soundlabs Group Pty., Ltd.	•	•	•
BELGIUM			
Hawk Audio	•		
Premium Sound Solutions	•		•
BRAZIL			
Decibel Eng Ind	•	•	•
CANADA			
Creative Sound Solutions	•		
Devine Audio	•		
Dimensions Acoustiques	•		
Reference 3A	•		
Tortech Sound, Inc.		•	
CHINA			
Audiostar Electronics Co., Ltd.	•	•	•
Eminence Dongguan Enterprise Co., Ltd.		•	
FS Audio Co., Ltd.	•	•	•
Guangzhou Fuhe Electronic Technology Co., Ltd.		•	
Kadeton Audio Co., Ltd.	•		
QPro Audio		•	
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.	•	•	
Shenzhen Horn Audio Co., Ltd.	•		•
Tonwel Audio Co., Ltd.	•	•	•
Zhuhai HiVi Technology Co., Ltd.	•	•	•
DENMARK			
iCapture ApS	•	•	•
FRANCE			
Aureo	•		
Crista technologies, SABL	•	•	
GERMANY			
Audio Technology Engineering (ATE)	•	•	•
Axel Joost Elektronik		•	
Proraum Vertriebs GmbH	•		•
Thomas Scherer Audio Engineering	•		
INDIA			
Power Electronics & Technologies	•	•	
INDONESIA			
SB Acoustics	•	•	•
IRAN			
JTS Pro Audio	•	•	•
ISRAEL			
Morel, Ltd.	•		•
R H Sound Technology, Ltd.	•	•	•

	Home	Pro	Car
ITALY			
Audioplus, S.R.L.		●	●
Axiomedia	●		
B&C Speakers S.p.A.		●	
Eighteen Sound		●	
Elettromedia		●	●
Outline, S.R.L		●	
RCF S.p.A.		●	
THE NETHERLANDS			
Kamperman Engineering	●	●	
tg-acoustics	●		
PHILIPPINES			
Dai-ichi Electronics Manufacturing Corp.	●	●	●
SOUTH KOREA			
LG Electronics	●	●	●
Samsung	●	●	●
TAIWAN			
Hi-Tech Sound System Co., Ltd.	●		●
Huey Tung International Co., Ltd.	●	●	●
Tang Band Industries Co., Ltd	●		●
Yung International, Inc.	●		
THAILAND			
Clarasonic			●
UNITED KINGDOM			
Bishopsound		●	
EuroTec International, PLC			●
Fane International		●	
Ferguson Hill Studios	●	●	
HiWave Technologies, Ltd.	●	●	●
Mango Electronics	●		
Mitchell & Todd	●	●	●
Precision Devices		●	
UNITED STATES			
AcousTex Fabrics	●	●	
Acoustic Fields	●	●	
Area 52 RND	●	●	
Audia Media Group	●		
Audience	●	●	
Auratron Systems	●	●	
Bamberg Engineering	●		
BG Radia Corp.	●	●	
Bogen Communications, Inc.		●	
Bulk Molding Compounds, Inc.	●	●	●
Carvin Corp.		●	
CGN Audio Labs		●	
Clear Lake Audio		●	
CommonSense Audio	●	●	●

Looking for even more loudspeaker design inspiration?

CC-WEBSHOP

ARCHIVE • STORE

Check out these two great books!

SPEAKER BUILDING 201

With this book, anyone can become a speaker builder. Learn the concepts you need **OR** choose any of the 11 tested and proven speaker designs included in this book. It features a variety of speaker projects and contains all the information you need to design a first-rate system. **\$34.95**

RIBBON LOUDSPEAKERS

This book presents the theory and history of ribbons and includes construction details for building your own ribbon loudspeakers. Often preferred for high- and mid-frequencies, they are inexpensive and can be easily constructed with minimal tools. **\$24.95**

Available now at

www.cc-webshop.com

or call 860.289.0800

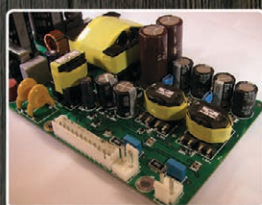


INTEGRATED AMPLIFIED SPEAKER SOLUTIONS

	High-Power Amplifier Modules DSP (Digital Signal Processing) Amplifiers	Subwoofer Plate Amps Soundbars	Wireless
AUSTRALIA Soundlabs Group Pty., Ltd.	•	•	•
BELGIUM Premium Sound Solutions	•	•	•
BRAZIL Decibel Eng Ind	•	•	•
CANADA Creative Sound Solutions Devine Audio Solen, Inc. The Canadian Loudspeaker Corp. Tortech Sound, Inc.	• • • •	• • • •	• • • •
CHINA FS Audio Co., Ltd. Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd. Shenzhen Horn Audio Co., Ltd. Tonwel Audio Co., Ltd.	• • • • •	• • • • •	• • • • •

	High-Power Amplifier Modules DSP (Digital Signal Processing) Amplifiers	Subwoofer Plate Amps Soundbars	Wireless
GERMANY Audio Technology Engineering (ATE) Proraum Vertriebs GmbH	• •	• •	• •
INDIA Power Electronics & Technologies	•	•	•
IRAN JTS Pro Audio	•	•	•
ITALY Audioxplus, S.R.L. Axiomedia Elettromedia Outline, S.R.L. Quattroitalia, S.R.L. RCF S.p.A.	• • • • • •	• • • • • •	• • • • • •
JAPAN ETANI Electronics Co., Ltd.	•	•	•
SOUTH KOREA LG Electronics Samsung	• •	• •	• •

ANAVIEW Analog Class-D Amplifiers



Anaview's Class-D amplifiers are available to discriminating OEMs looking for premium sound and audio performance.

- On-board Power Supply
- Robust Design with Advanced Protection
- Compact & Efficient
- Stby & Aux Voltages
- Easy to Integrate
- Award Winning Sound
- UL Certified

Activate your loudspeakers with Anaview!

SWEDEN | USA | HONG KONG | WWW.ANAVIEV.COM

Anaview is a member of the ETAL Group, AB

DVD Masterclass Feedback in Audio Amplifiers 140 min. Video Presentation and More

In this Masterclass we address several aspects of feedback in audio amplifiers. The focus of this Masterclass, although not entirely math-free, is on providing insight and understanding of the issues involved. Jan Didden provides a clear overview of the benefits that can be obtained by feedback and its sibling, error correction; but also of its limitations and disadvantages.

ISBN 978-907920-16-5 • \$40.20

Dual-layer
DVD



elektor

Further information and ordering at www.elektor.com/amplifiers

From End-to-End Misco Delivers The Sound You Want

From audio input to speaker output
now get complete audio systems from one trusted source: **MISCO**



Subwoofer



2.1 channel, class-D amp



*Left/right
two-way speaker*



Remote control

Providing custom audio systems for your product.

We've expanded on our 60-plus years of loudspeaker expertise to include the critical components of modular audio solutions: amplification, DSP, software algorithms, crossovers and, of course, loudspeakers.



2.1 Audio System

MISCO strategically partners with industry innovators, such as, DAL (Digital Audio Labs) to provide optimal quality, the best software solutions and easy integration. DAL has produced high performance audio interfaces, amplification and DSP in professional and OEM markets for more than 20 years.

We work with you to streamline the entire process; design, purchasing, manufacturing, and testing. Misco systems are **Made in the USA**. We maintain high production standards and are committed to delivering products with long-term availability.

Get your complete audio system right, the first time with MISCO.

Visit: audiosystems.miscospeakers.com, then go to **Complete Audio Systems**.



21" Pro Woofer



10" Car Audio Woofer



*1.2" X 4.7"
High Frequency Speaker*



*Ultra-Thin 3.5" X 1.6"
Full Range Speaker*



*Five Channel, 100 Watt
Amplifier with DSP*

MISCO
For The Sound You Want

Toll-Free: 800-276-9955 • E-mail: info@miscospeakers.com

Web: miscospeakers.com

Systems Web: audiosystems.miscospeakers.com

INTEGRATED AMPLIFIED SPEAKER SOLUTIONS

	High-Power Amplifier Modules DSP (Digital Signal Processing) Amplifiers	Subwoofer Plate Amps Soundbars	Wireless
SWEDEN			
Bohmer Audio, AB	•	•	•
TAIWAN			
Hi-Tech Sound System Co., Ltd.	•		•
Yung International, Inc.	•		•
UNITED KINGDOM			
Bishopsound	•	•	•
Fane International		•	•
Ferguson Hill Studios	•		•
HiWave Technologies (UK), Ltd.	•		•
Mango Electronics		•	
Mitchell & Todd	•		
UNITED STATES			
AEX Laboratories	•	•	•
ANAVIEW	•	•	•
Area 52 RND	•	•	•
Audia Media Group	•	•	•
Bogen Communications, Inc.	•	•	
Bulk Molding Compounds, Inc.			•
Carvin Corp.	•	•	•
CGN Audio Labs			•
Clear Lake Audio		•	
Crystal Acoustics			•
Danville Signal Processing, Inc.		•	•
Dayton Audio	•		•

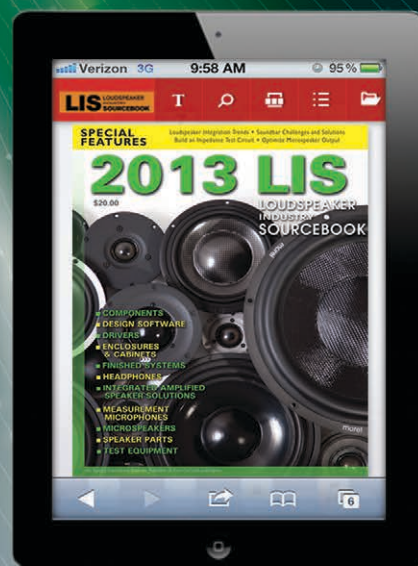
	High-Power Amplifier Modules DSP (Digital Signal Processing) Amplifiers	Subwoofer Plate Amps Soundbars	Wireless
Diamond Case Designs, Inc.	•		
Dynavox Electronics, Inc.	•	•	•
Earthquake Sound Corp.	•	•	•
EKSC Eagle	•	•	
Global Audio Source, Inc.	•	•	•
Globe Audio Design, Inc.	•	•	•
GR Research, Inc.			•
Hi-Tech Pro Electronics, Inc.	•	•	•
Holtz Industries	•	•	•
JBL Selenium	•	•	•
Martin Sound Products, Inc.	•	•	•
Meniscus Audio Group, Inc.			•
MISCO	•	•	•
MK Audio, LLC	•	•	
New Millennium Acoustics	•	•	
North American Solidex, LLC	•	•	•
Parts Express	•	•	•
PowerPhysics, Inc.	•	•	•
RBH Sound	•		•
Solus/Clements Loudspeakers		•	•
Sound Sources Technology, Inc.		•	
Speaker Addiction	•		•
Trax Audio	•	•	•
Tymphony	•	•	•
Underground Industries	•	•	•
Vertek/XTC			•

Like it. Tweet it. Share it. Like it. Tweet it. Share it.

LISTEN UP!

The digital edition of the
2013 Loudspeaker Industry Sourcebook
 is now **FREE** for audio professionals
 everywhere. Access it from your
 laptop or tablet today!

Visit
www.gotomylis.com



	Adhesive Dispensers	Lead Out Wire Termination Curing Ovens	Magnetizers/Demagnetizers	Production Line Equipment	Ultrasonic Assembly Equipment		
BRAZIL							
Decibel Eng Ind	•	•	•	•	•	•	•
CHINA							
Audiostar Electronics Co., Ltd.			•	•			
FS Audio Co., Ltd.	•	•	•	•	•	•	•
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.					•	•	•
Zhuhai HiVi Technology Co., Ltd.					•	•	
DENMARK							
estron A/S				•			
GERMANY							
Audio Technology Engineering (ATE)					•		
INDIA							
Lakshmi Metal Coils					•	•	
IRAN							
JTS Pro Audio		•	•		•		
ITALY							
Audioxplus, S.R.L.	•	•	•	•	•	•	•
Elettromedia	•		•	•	•	•	•
JAPAN							
ETANI Electronics Co., Ltd.					•		
SOUTH KOREA							
LG Electronics	•	•	•	•	•	•	•
Samsung	•	•	•	•	•	•	•
SWITZERLAND							
Megatec AG		•		•	•	•	•
TAIWAN							
Maeden International, Ltd.			•				
UNITED STATES							
Audia Media Group	•	•	•		•	•	•
Audio Precision					•		
Dynavox Electronics, Inc.						•	
Earthquake Sound Corp.				•			
EKSC Eagle			•				
Fluid Metering, Inc.	•				•		
Hernon Manufacturing, Inc.	•				•		
Incriminator Audio, LLC					•	•	
JBL Selenium	•		•		•	•	
Nordson EFD	•				•		
Tymphony	•	•	•	•	•	•	•
Underground Industries	•				•		

MEASUREMENT MICROPHONES



Earthworks Measurement Microphones

- Fast impulse response
- Virtually no handling noise
- Accurate wideband response
- Near-perfect polar characteristics
- Extended flat frequency response
- Meets or exceeds ANSI Type 1 and applicable IEC 61094 requirements
- Hand-tuned, tested, machined and assembled in our Milford, NH facility

earthworksaudio.com/mseries

MADE IN THE USA • 15 YEAR WARRANTY

	Consumer	Lab Instruments Field Mics	Measuring Mics	Professional
BRAZIL				
Decibel Eng Ind			•	•
CANADA				
Solen, Inc.		•	•	•
Tortech Sound, Inc.		•		•
Warkwyn Associates, Inc.			•	
CHINA				
BSWA Technology Co., Ltd.		•	•	•
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.		•	•	•
Shenzhen Horn Audio Co., Ltd.		•		
DENMARK				
LOUDSOFT, Ltd.			•	•
GERMANY				
Axel Joost Elektronik			•	•
Proraum Vertriebs GmbH				•
IRAN				
JTS Pro Audio			•	
ITALY				
Audioxplus, S.R.L.		•	•	•
Elettromedia			•	
Outline, S.R.L.			•	•
RCF S.p.A.				•
JAPAN				
ETANI Electronics Co., Ltd.				•
THE NETHERLANDS				
Kamperman Engineering				•
PHILIPPINES				
Dai-ichi Electronics Manufacturing Corp.				•
SOUTH KOREA				
LG Electronics		•	•	•
Samsung		•	•	•
THAILAND				
Clarasonic				•
UNITED STATES				
ACO Pacific, Inc.		•	•	•
Acoustic Fields				•
Audia Media Group		•	•	•
Audio Precision				•
Dayton Audio		•		•
Earthworks, Inc.		•	•	•
Full Scale AV		•	•	•
G.R.A.S. Sound & Vibration			•	•
Hi-Tech Pro Electronics, Inc.		•		•
iSEMcon, LLC				•

ORDER THE

Loudspeaker Design Cookbook TODAY!

This 7th edition is loaded with new content and provides everything you need to become a better speaker designer. Now including: Klippel analysis of drivers, loudspeaker voicing, testing and crossover changes, and much more.

FREE CD offer inside includes LDC7 Design Suite software (a \$99 value)

Loudspeaker Design Cookbook

NEW
SEVENTH
EDITION

BY Vance Dickason

www.cc-webshop.com

	Consumer	Field Mics	Lab Instruments	Measuring Mics	Professional
JBL Selenium					
Josephson Engineering, Inc.					
New Millennium Acoustics					
NTI Americas, Inc.					
Parts Express					
Shogyo International Corp.					
Tympany					

Consistent Measurements since 1988

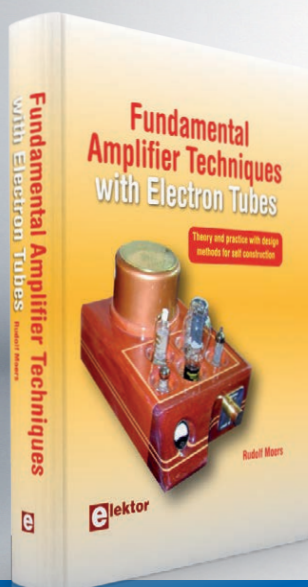


Josephson Engineering C550H
Measurement Microphone
www.josephson.com

Fundamental Amplifier Techniques with Electron Tubes

The ultimate tube amplifier reference book!

THUMP
800+ pages!



This book is a must-have for all tube fans and the growing circle of RAFs (retro-audio-aficionado's)! In a mind blowing 800+ pages Rudolf Moers covers just about everything you need to know about the fundamentals of electron tubes and the way these wonderful devices were designed to function at their best in their best known application: the (now vintage) tube audio amplifier. The aim of the book is to give the reader useful knowledge about electron tube technology in the application of audio amplifiers, including their power supplies, for the design and DIY construction of these electron tube amplifiers.

This is much more than just building an electron tube amplifier from a schematic made from the design from someone else: not only academic theory for scientific evidence, but also a theoretical explanation of how things work in practice.

834 pages (hard cover) • ISBN 978-0-905705-93-4 • \$104.90

elektor

Further Information and Ordering at www.elektor.com/electrontubes

www.jlielectronics.com

2013 Loudspeaker Industry Sourcebook

	Cell Phone	Tablet/MID	Laptop
BeStar Technologies, Inc.	●	●	●
Dayton Audio		●	
Dynavox Electronics, Inc.	●	●	
JBL Selenium	●	●	●
MISCO		●	
Parts Express	●	●	●
Shogyo International Corp.	●	●	●
Sound Sources Technology, Inc.	●	●	
Tymphany		●	

	Finished Goods	Acoustic Materials
Dynavox Electronics, Inc.	●	●
Earthquake Sound Corp.	●	●
ESS Labs, LLC	●	●
Extreme Landcruiser	●	●
Faital USA, Inc.	●	●
Global Audio Source, Inc.	●	●
Globe Plastics	●	●
GR Research, Inc.	●	●
Green Mountain Audio, Inc.	●	●
Hisco, Inc.	●	●
Hi-Tech Pro Electronics, Inc.	●	●
Holtz Industries	●	●
Incriminator Audio, LLC	●	●
JBL Selenium	●	●
Jensen Speakers	●	●
MISCO	●	●
MK Audio, LLC	●	●
NedLab	●	●
New Millennium Acoustics	●	●
North American Solidex, LLC	●	●
ORCA Design And Manufacturing	●	●
Parts Express	●	●
Pierce Audio Products	●	●
Power Sound Audio, LLC	●	●
PranaFidelity	●	●
Raven Design Studio	●	●
RBH Sound	●	●
Renaissance Audio Group	●	●
Shogyo International Corp.	●	●
SoCal Sound Shop	●	●
Solus/Clements Loudspeakers	●	●
Sound Sources Technology, Inc.	●	●
Speaker Addiction	●	●
Transducer Lab	●	●
Tymphany	●	●
Underground Industries	●	●
United Gasket Corp.	●	●
Vertek/XTC	●	●
Volti Audio	●	●
Westlake Audio, Inc.	●	●

66



18

EIGHTEEN
SOUND[®]

PROFESSIONAL
LOUDSPEAKERS

18TLW3000
Tetracoil 18" Subwoofer

TAKE A LOOK AT YOUR NEXT SPEAKER

Eighteen Sound made real innovation in the loudspeaker market from 14 years. We have made our contribution to professional audio with new ideas and a lot of passion.

We will be happy translating your ideas into world class products for today and tomorrow.

MADE IN ITALY

www.eighteensound.com



[illegible]

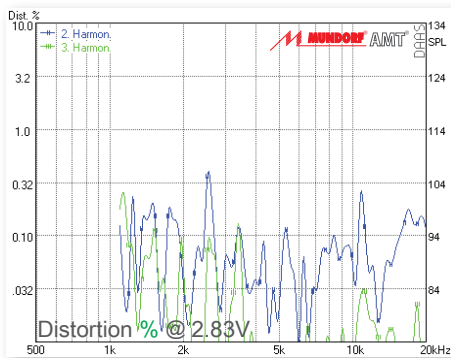
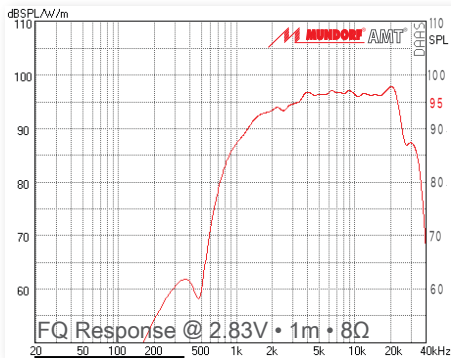
www.daiichielectronics.com.ph
International Inquiries: Mr. Pablo Tobiano
Email: ptobiano@daiichielectronics.com.ph

USA, here we come!

Premium AMTs for Premium Performance

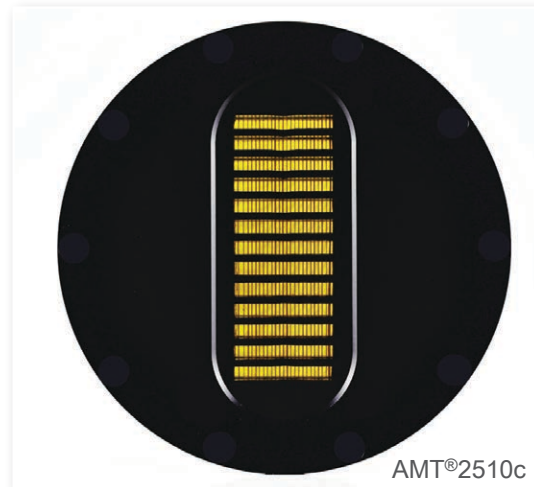
"There are many dome tweeters out there...But none of them sound as dynamic as the AMT"

*Dick Olsher in **The Absolute Sound** 11/2008 on our AMT 2310. Being already an outstanding tweeter back then, we kept on re-searching the AMT's principle in order to improve its music performance, ever since.



2012, MUNDORF introduces an all-new line of highly stressable but extremely distortionless AMT® tweeter devices. 8 home audio models including 4 true dipoles which can also be used as add-on 'super-tweeter' up to 32kHz.

In addition, a complete line of ProAudio



tweeters is now available, too. Based on our home audio AMTs which combine various patented and patent pending innovations, these proAMT not only match the sensitivity of HQ compression drivers but they yet exceed their power-handling ability - at a distortion ratio as low as never achieved before with any other tweeter device around.

For more information on our AMT® lines please visit www.mundorf.com/amtnews



For Premium Crossovers

MUNDORF EB GMBH

Liebigstrasse 110

50823 Cologne

Germany

+49 221 9777050

info@mundorf.com

www.mundorf.com

RAV EN



RAVEN BARD

- +/- 3DB 50HZ TO 50KHZ
- 6 OHM IMPEDANCE
- 86 DB SENSITIVITY
- 18.75"H X 10.25"W X 17.25"D
- WEIGHT: 35 LBS

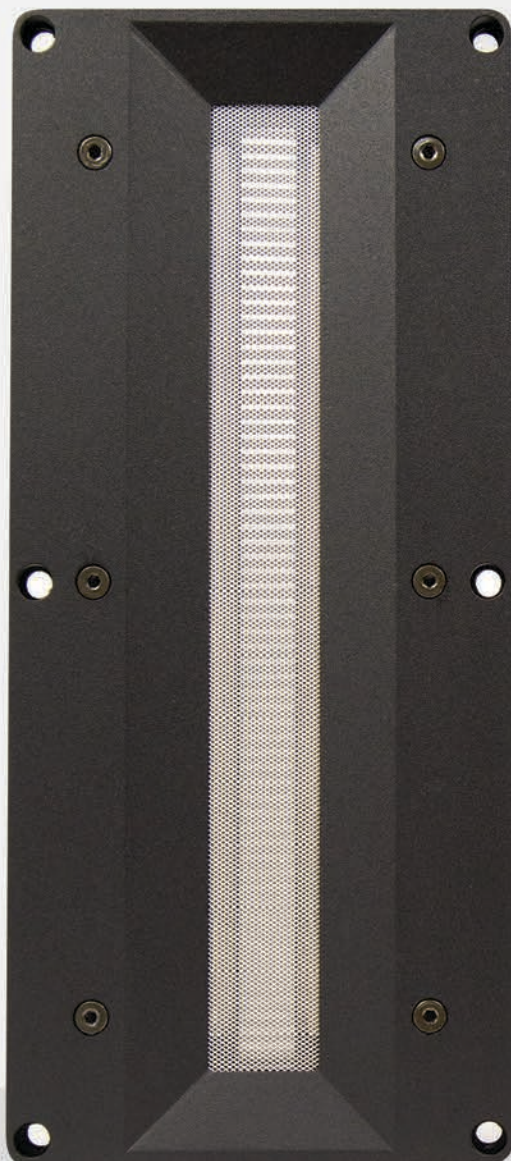


“ THE SOUND IS BEAUTIFULLY BALANCED AND SERVES UP A REMARKABLE AMOUNT OF INNER DETAIL. RAVEN IS A COMPANY TO WATCH. ”

CHRIS MARTENS, *THE PERFECT VISION*, OCTOBER 2009

RAV EN

WWW.RAVENDESIGNSTUDIO.COM
804 CALLE PLANO, CAMARILLO, CA 93012 USA
TEL: 1.805.978.5124 | TOLL FREE: 1.888.340.4403



LINE SOURCE

- PURE MMX RIBBON
- MOVING MASS: 0.05 GRAMS
- 7 OHM IMPEDANCE
- 12 1/8"H X 5 1/4"W X 5 1/8"D
- RECOMMEND 800HZ 24DB Crossover
- +/- 1.5DB 500HZ TO 40KHZ
- 97DB SENSITIVITY
- WEIGHT: 26 LBS

“The Raven tweeter endears itself to me. It has the ability to be alternately silky smooth or scapula sharp... both at the same time.”

Doeg Schroeder, Dagogo, September 2011

“...the best single-element true ribbons I've heard...”

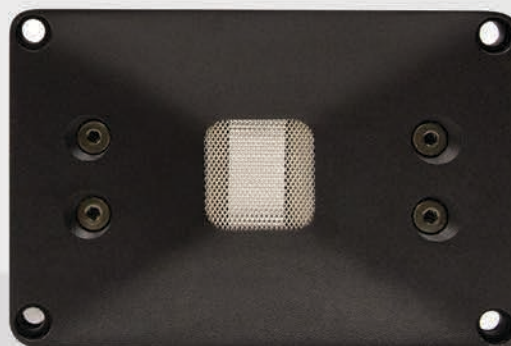
Harry Pearson, The Absolute Sound, February 2011

“I heard much more detail from the ribbon tweeter than I had heard before from any dome tweeter, but it was never harsh or in your face.”

Jim Swantko, Home Theater Review, December 2010

“Aerial's ribbon tweeter is an extraordinarily clean-sounding transducer... lacked any kind of grain or metallic edge, offering the same kind of silkiness you get from a mid-hall seat at a concert. It was also very low in conventional harmonic distortion... This is better linearity than some power amplifiers!”

John Atkinson, Stereophile, November 2009



POINT SOURCE

- PURE ALUMINUM RIBBON
- 5 OHM IMPEDANCE
- +/- 1.5 DB 2000HZ TO 50KHZ
- 3 1/2"H X 5 1/4"W X 5 1/8"D
- RECOMMEND 3000HZ 24DB Crossover
- MOVING MASS: 0.008 GRAMS
- 90DB SENSITIVITY
- WEIGHT: 5 LBS

ORCA DESIGN & MANUFACTURING: AT THE FOREFRONT OF DRIVER AND SYSTEM DESIGN FOR OVER 25 YEARS

DESIGN SERVICES:

- CUSTOM RIBBON DESIGN & MANUFACTURING
- CUSTOM DRIVER DESIGN & MANUFACTURING
- SYSTEM DESIGN

CURRENTLY USING RAVEN:

- AERIAL ACOUSTICS
- W.A.R. AUDIO
- HUFF LOUDSPEAKER
- NOLA
- SCAENA

MADE IN CALIFORNIA • INTERNATIONAL INQUIRIES WELCOME!



WWW.ORDCDESIGN.COM
804 CALLE PLANO, CAMARILLO, CA 93012 USA
TEL: 1.805.484.4355 | TOLL FREE: 1.888.340.4403

AUDAX www.audax.com - lis@audax.com
ZI Chemin de la Poterie 72340 LA CHARTRE SUR LE LOIR FRANCE - Tel. +33 (0) 2 43 79 03 60 - Fax +33 (0) 2 43 79 20 91



17 Hamazmera St. Ness-Ziona 70400, Israel, Tel.: +972 8 9301161, Email: info@morel.co.il **www.morelhifi.com**

PRECISION TRANSDUCERS

THE ART OF DETAIL



ND 940 COMPRESSION DRIVER

The ND940 is a ultra compact size, high performance, high power handling 4.0-inch diaphragm compression driver with a 1.4 inch exit throat. A thin copper ring is precision pressed on to the pole piece in order to modify and lower the inductance characteristics of the magnetic circuit and voice coil providing a controlled extension of the acoustic frequency response. The voice coil assembly is designed using a high strength, high temperature Kapton® voice coil former and edge wound copper clad aluminium wire directly joined to the diaphragm by RCF proprietary Direct Drive kapton technology.

- 4.0 inch, Kapton former, edge wound aluminium v. coil
- 1.4" throat
- 280 Watt continuous program power handling
- 110 dB Sensitivity
- 500 Hz –20 KHz Frequency range



sound culture
www.rcf.it







THE ITALIAN EDGE
FOR SOUND TECHNOLOGY

EXPLORE OUR ENTIRE PRODUCT LINE @
WWW.FAITALPRO.COM

FOLLOW US ON  & 

Faital S.p.A. - Via Bruno Buozzi, 12 - San Donato Milanese (MI) - 20097 - Italy / Tel. +39.02527703.1 - Fax +39.025231130 - info@fitalpro.com



This is what great sourcing in Asia looks like.

Tymphany's team of design, engineering and production experts get your leading-edge products to market on time—and on budget.

- Western leadership
- Innovative engineering & design
- Competitive costs
- Transparent business practices
- Partnership you can trust

TYMPHANYTM

We're not your outsource. We're your resource.



More than 23 years of experience in the audio industry.

Design manufacturer of acoustic products.

Seamless manufacturing: from raw drivers to fully finished speaker systems.

Piano lacquer finished / natural wood veneer finished / solid wood / PVC speaker cabinets.

Over two million square feet in newly built production facilities.

OEM / ODM – Our goal is to turn your design ideas into satisfactory products.

Largest anechoic chamber in Asia.



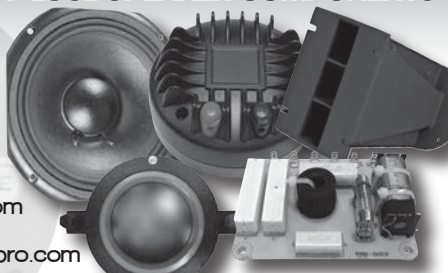
HiVi - hear the difference

HiVi OEM / ODM Department

Address: No. 1, South Dongcheng Road, Liangang Industrial Zone, Zhuhai, Guangdong, 519045, P. R. China

Tel: +86-756-6268133 Fax: +86-756-6268068 Website: www.hivi.com E-mail: oem_odm@hivi.com

HiVi and the Swans logo are registered trademark of HiVi Inc. or its subsidiaries in the United States and other countries. All rights reserved.



Martin Sound Products



PRV
AUDIO
Brazil

**Upgrade Today,
Hear the Difference**



PRV Audio Brazil

Brazil: Av. Parobe, 1031, Sao Leopoldo, RS 93010
USA: 3950 NW 77th St, Unit 1, Miami FL, 33166
support@prvaudio.com www.prvaudio.com

TEAMWORK | TECHNOLOGY | INVENTION | LISTEN | HEAR

BeStar
ACOUSTICS & SENSORS

ACOUSTICS & SENSORS

Loudspeakers
Microphones
Drivers

*Global Audio Components supplier
to OEMs worldwide.*

*Largest selection off-the-shelf
micro-speaker designs for hand held devices.*

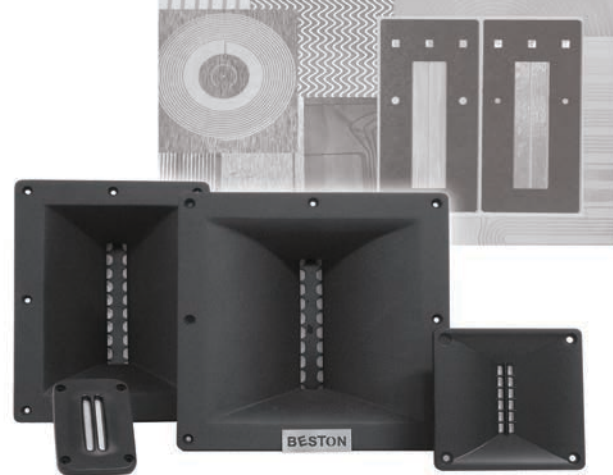
***Complete ODM Service,
extensive in-house audio engineering capabilities,
including anechoic chamber.***

BeStar® Technologies Inc., N.A.

Tel: 520-439-9204 Fax: 520-439-9214
email: sales@bestartech.com
www.bestartech.com

BESTON®

We Offer Ribbon Diaphragm & Isodynamic Ribbon Speaker



BESTON Technology Corporation

Address: 5F-13, No. 9, Ai Kuo West Rd., Taipei 100, Taiwan
TEL: (886)-2-23892956 FAX: (886)-2-23892952
E-Mail: s272@ms45.hinet.net
<http://www.ribbonspeaker.com.tw>

We're thinking **small**



CELESTION

Seems like all of a sudden, compact arrays are big business. So talk to Celestion about our range of high performance, small-format drivers.

**It's another
innovation in sound
from Celestion.**



Find us on Facebook

AN2075 50mm/2"



AN2775 70mm/2.75"



AN3510 88mm/3.5"



CELESTION

www.celestion.com

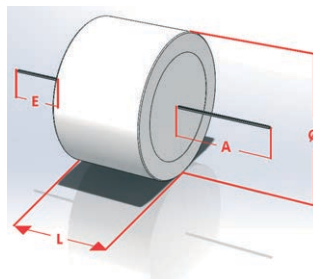


PASSIVE COMPONENTS, CROSSOVERS, & WIRING

	Passive Components										Wire & Wiring			
	Attenuators	Capacitors			Driver Protection Devices	Inductors	Plugs & Jack Dishes		Resistors	Solder	Electronic Crossovers		Terminal Plates	Transformers
		Ceramic	Electrolytic	Non-Polar			Air Core	Iron Core						
AUSTRALIA														
ETI Research														
Soundlabs Group Pty., Ltd.	•				•	•	•	•	•	•	•	•	•	•
BRAZIL														
Decibel Eng Ind	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PRV Audio Brazil														•
CANADA														
Creative Sound Solutions			•		•		•	•		•		•		•
Devine Audio														•
Solen, Inc.	•			•	•	•	•		•	•	•	•	•	•
The Canadian Loudspeaker Corp.					•	•				•		•		
Tortech Sound, Inc.	•												•	•
CHINA														
Audiostar Electronics Co., Ltd.					•		•							
Eminence Dongguan Enterprise Co., Ltd.	•					•								
FS Audio Co., Ltd.	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sanoway Speaker Box & Wooden Prod. (Shenzhen) Co., Ltd.							•	•		•	•	•	•	•
Shenzhen Horn Audio Co., Ltd.														•
Tonwel Audio Co., Ltd.													•	•
Zhuhai HiVi Technology Co., Ltd.			•										•	
DENMARK														
estron A/S														•
Jantzen Audio Denmark				•	•		•	•		•	•	•	•	•
GERMANY														
Axel Joost Elektronik													•	
Mundorf EB GmbH					•	•	•	•		•	•	•	•	•
Proraum Vertriebs GmbH												•	•	
Vidyut Teletronics, Ltd.														•
IRAN														
JTS Pro Audio				•		•	•	•	•	•	•	•	•	•
ISRAEL														
R H Sound Technology, Ltd.	•	•	•				•	•	•	•		•		•
ITALY														
Audioxplus, S.R.L.	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Axiomedia	•			•	•		•	•		•		•	•	•
B&C Speakers S.p.A.													•	
Elettromedia			•	•	•		•	•		•				
JAPAN														
ETANI Electronics Co., Ltd.										•		•		
Furutech Co., Ltd.									•		•			•
SOUTH KOREA														
LG Electronics	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Samsung	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SWEDEN														
Bohmer Audio, AB													•	

EVOLUTION

through INNOVATION



The main feature of the EVO winding technology comes with its unusually narrow but high capacitor reel. This geometry results in two, acoustically clearly perceptible benefits: A much shorter

and utmost little loss signal path between huge contact areas is granted, thus an extremely low equivalent series resistance/ESR. Secondly, in order to meet capacitance the number of paralleled windings is larger than with regular caps, thus an effectively minimized equivalent series inductivity/ESL.

After the utterly precise EVO winding process, these reels are spilled by hand in especially developed MCap* housings. By that, vibrations and microphonic effects on the reel are most effectively avoided. Furthermore, we only employ purest Polypropylene foil vaporized with thickest metal layer possible. Plus the unusual asymmetric wire lengths allow both mounting directions on PC boards, horizontal and vertical.

Now available: **MCap®EVO** • **MCap®EVOAlu.Oil**
MCap®EVOSilverGold.Oil



Made in Germany

mundorf.com

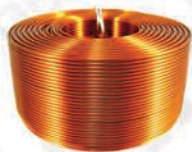
PASSIVE COMPONENTS, CROSSOVERS, & WIRING

	Passive Components							Wire & Wiring Harnesses								
	Attenuators	Capacitors			Driver Protection Devices	Inductors	Plugs & Jack Dishes		Resistors	Solder	Electronic Crossover		Terminal Plates	Transformers	Finished Passive X-over Nets	
		Ceramic	Electrolytic Non-Polar				Air Core	Iron Core			Resistors	Solder				Electronic Crossover
TAIWAN																
Exsonix Co., Ltd.								•	•							
Hi-Tech Sound System Co., Ltd.														•		
Huey Tung International Co., Ltd.						•								•	•	
Maeden International, Ltd.														•	•	
Tang Band Industries Co., Ltd														•	•	
Yung International, Inc.	•	•	•	•			•	•	•	•	•	•	•	•	•	
THE NETHERLANDS																
tg-acoustics															•	
UNITED KINGDOM																
Bishopssound														•	•	
EuroTec International, PLC											•			•	•	
Mango Electronics	•	•	•	•							•			•		
UNITED STATES																
Area 52 RND															•	
Arizona Capacitors, Inc.					•					•						
Audia Media Group				•	•		•	•	•	•	•	•	•	•	•	
Audience					•											
Auratron Systems														•		
Bamberg Engineering														•		
Bogen Communications, Inc.	•															
Carl's Custom Loudspeakers														•		
Carvin Corp.								•			•			•	•	
CE Distribution, LLC	•	•	•	•				•	•	•	•	•				
CGN Audio Labs						•									•	
Custom Audio															•	
Danville Signal Processing, Inc.														•		
Dayton Audio					•					•				•		
Dynavox Electronics, Inc.	•			•	•	•	•	•	•		•	•	•	•	•	
Earthquake Sound Corp.						•		•			•	•		•	•	
Eminence Speaker, LLC	•					•								•		
ESS Labs, LLC	•														•	
Extreme Landcruiser														•	•	
Global Audio Source, Inc.														•		
GR Research, Inc.							•			•					•	
Green Mountain Audio, Inc.														•		
Hisco, Inc.											•					
Hi-Tech Pro Electronics, Inc.														•	•	
JBL Selenium	•	•						•	•	•	•	•	•	•	•	
Kinetic Audio International, Ltd.							•							•	•	
Loudspeakers Plus														•		
Lowell Manufacturing Co.	•															
Martin Sound Products, Inc.	•	•	•	•	•				•		•	•		•	•	
Meniscus Audio Group, Inc.					•		•		•		•					
MISCO														•	•	
MK Audio, LLC														•	•	
NedLab														•		
New Millennium Acoustics	•	•	•	•	•	•	•		•	•	•		•	•	•	
Nordson EFD											•					
North American Solidex, LLC				•	•		•	•		•	•	•	•	•	•	
North Reading Engineering														•		

JANTZEN AUDIO

DENMARK

www.jantzen-audio.com



Baked Wire Coils

29 - 26 - 24 - 22 - 21 - 20 - 18 -
16 - 15 - 14 - 13 - 12 AWG



C-Coil

With up to 3500 W capacity.
Designed for bass, subwoofers
and amplifiers.
500 - 1500 - 2000 - 3500 WATT



Baked Wire Coil With None Ferrite Core

29 - 26 - 24 - 22 - 21 - 20 - 18 -
16 - 15 - 14 - 13 - 12 AWG



Wax Coil

Hard as a rock. A bestseller.
12 - 14 - 16 AWG



Cross Coil

High-end induction coil.
The closest to the most
ideal inductor in the
World. 8 - 12 - 14 - 16 AWG



Royal Silver Coil

Designed for the very best high-
end loudspeaker systems.
Up to 0.47 mH



Standard Z-Cap

Fast, smooth, detailed and less
grainy compared to similar
competitor Caps on the world
market. 400 VDC



Cross Cap

Wound with a thinner foil. Smaller
in size than Standard Z-Cap. Great
value for money on budget projects.



Diamond Tweeter 1024

Second to none.



Superior Z-Cap

Even the finest nuances can be
heard. The sound never gets
over-edged, really superb natu-
rality with a somewhat bright
top-end. 1200 VDC - 800 VDC



Silver Z-Cap

Super smooth cap without any
harsh additions to the sound.
Absolutely neutral tonal balance.
A truly outstanding audio part.
1200 VDC - 800 VDC



Silver Gold Z-Cap

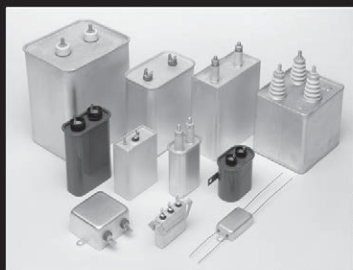
More resolution, more sound
stage. Lots of dynamics. Fast
reaction, life feeling and
natural sound.
1200 VDC - 800 VDC - 250 VDC

Realize your audio dreams

PASSIVE COMPONENTS, CROSSOVERS, & WIRING • PASSIVE COMPONENTS, CROSSOVERS, & WIRING • PASSIVE COMPONENTS, CROSSOVERS, & WIRING

2013 Loudspeaker Industry Sourcebook

*Where Capacitors Sound
Awesome*



TYPICAL APPLICATIONS:

- By-Pass
- Impulse Generators
- DC Filtering
- R-C Networks

AUDIO CAPACITORS



ISO 9001:2008 REGISTERED

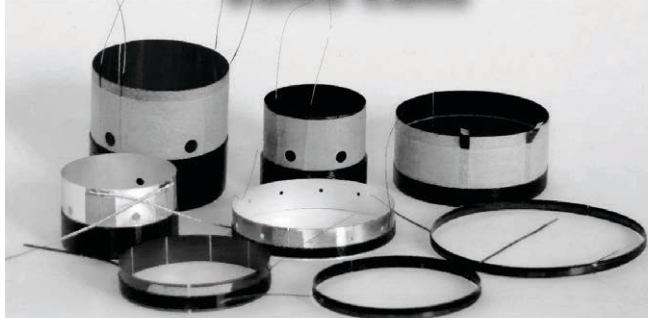
- Ferro Resonant • Audio
- Voltage Multiplier • Motor Start
- Spike Suppression • Matched Sets
- Pulse Discharge • Power Supplies

ARIZONA CAPACITORS, INC.



Phone: 520-573-0221 Fax: 520-573-0520
1100 S. Plumer Avenue, Tucson, AZ 85719
www.arizonacapacitors.com

Professional Manufacturing Voice Coils



**OEM/ODM
are more than welcome!**

EXSONIX CO., LTD.

TEL: 886-3-323-1660
FAX: 886-3-323-1771
EMAIL: info@exsonix.com.tw
www.exsonix.com.tw

Solen Fast Capacitors™ & Solen Perfect Layer Inductors, often imitated, sometimes copied - even counterfeited - yet never equaled.



SOLEN



SOLEN CAPACITORS

Metallized Polypropylene Film Fast Capacitors™

- First to use the "Fast Capacitor™" winding technique
- First to use bi-axially oriented metallized polypropylene film
- Lowest dissipation factor, lowest dielectric absorption
- Widest range of values, from 0.01 μ F to 330 μ F
- Wide range of voltages, from 250 Vdc to 630 Vdc.

Metallized Teflon™ Film - .22 μ F - 10 μ F, 1000Vdc

Teflon™ Film & Tin Foil - .033 μ F - .82 μ F, 450 Vdc - 1000 Vdc

Polypropylene Film & Tin Foil - .01 μ F - 4.7 μ F, 100 Vdc - 630 Vdc

Metallized Polyester Film - 1.0 μ F - 47 μ F, 160 Vdc

Non-Polar Electrolytic .5 % DF - 10 μ F - 330 μ F, 100 Vdc

SOLEN INDUCTORS

Perfect Layer Hexagonal Winding Air Core

- First to use Perfect Layer Hexagonal winding technique
- First to use Hepta-Litz seven strand insulated wire
- Zero distortion air core, lowest dc resistance
- Widest range of values, from 0.1 mH - 30 mH
- Wide range of wire diameters, from 0.8 mm - 2.6 mm

**Contact us for the FREE
Solen CDROM Catalog,
packed with speaker
drivers, hardware, and
crossover components
including Solen brand.**

4470 Avenue Thibault
St-Hubert, QC
J3Y 7T9 Canada

Tel: 450.656.2759
Fax: 450.443.4949
Email: solen@solen.ca
Web: www.solen.ca

88

SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E

The diagram illustrates the range of materials used by AAC for speaker components. It features a central graphic of a stylized speaker driver with a white cone and a black surround. To the right of this graphic, there are three horizontal rows of yellow rectangular boxes, each containing a material name. The first row contains 'Titanium', 'Aluminium', and 'Magnesium'. The second row contains 'Paper', 'Fabric', and 'Polymer'. The third row contains 'Aramid', 'Carbon', and 'Fiberglass'. Each box is connected to a central horizontal line by a short vertical line.

Titanium **Aluminium** **Magnesium**

Paper **Fabric** **Polymer**

Aramid **Carbon** **Fiberglass**

89

SET IT AND FORGET IT...

Precision, Valveless Ferrofluid Dispensing

"Pays for itself in Fluid Saved!!"



The image shows a black, rectangular dual-channel dispenser unit with two dispensing nozzles at the bottom. A digital display on the front shows 'Dispensed: 0.000000 g' and 'Speed: 0.4 g/min'. Below the display are four buttons: 'Up', 'Down', 'Set', and 'Clear'. A black pen is placed horizontally next to the nozzles for scale. The unit has 'PDS 100' and 'FMI FLUID METERING, INC.' printed on it.

Featuring ...

- Ceramic Internals
- One Moving Part
- No Valves
- 1% Accuracy for Millions of Dispenses

Ideal for Dispensing ...

- Ferrofluids
- Adhesives
- Solvents
- Electrolytes
- Lubricants
- Slurries

**PDS-100 Programmable
Dual Channel Dispenser**

Call 516-922-6050 ♦ www.fmipump.com

FMI FLUID METERING, INC.

Further information and ordering at www.elektor.com/valve

SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E

SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E • SPEAKER PARTS A-E

91

LEADING the INDUSTRY
in both
**Research & Development
and Manufacturing**

LOUDSPEAKER COMPONENTS, LLC www.loudspeakercomponents.com
7596 U.S. Highway 61 S. Lancaster, WI 53813-9608

email: lesales@lds.net
Call 608-723-2127

**Foam, Cloth and Elastomer
Surround**

**Cloth
Spider**

**Paper (Press and Non - Press) and Plastic (Injection Mold and Thermoform)
Cone**

*Pouring out
Solutions,
to Sound Evolution!*

NuWay
Precision Components For Quality Sound

Aslan Sales Manager Contact:
Mr. C.K. Woon ckwoonck@hotmail.com

Manufacturing in Lancaster Wisconsin and Nogales Mexico for sales World Wide.

92

SPEAKER PARTS F-L • SPEAKER PARTS F-L • SPEAKER PARTS F-L • SPEAKER PARTS F-L • SPEAKER PARTS F-L • SPEAKER PARTS F-L



export@maeden.com.tw



Website: www.maeden.com.tw

2013 Loudspeaker Industry Sourcebook

94

SPEAKER PARTS M-Z • SPEAKER PARTS M-Z • SPEAKER PARTS M-Z • SPEAKER PARTS M-Z • SPEAKER PARTS M-Z •

A Division of Hisco

*Serving the Speaker + Voice Coil
Industries since 1972*

400 E. Parkridge Ave. #101
Corona, CA 92879
951-493-0200



- > Custom B Stage, Adhesive Coated Nomex® & Fiberglass
- > Custom Thicknesses from 0.025" to 0.075"
- > Master Rolls, Slit Rolls, Custom Die Cut Shapes
- > Liquid Adhesives for Winding
- > Product Development Prototyping Support
- > High Volume Capabilities
- > AS9100C, ISO9001

David Carmo | 951-493-0161
dcarmo@hiscoinc.com

Magnets that meet the highest of quality standards

- Neodymium magnets
- Ferrite magnets
- Alnico magnets

SPEAKER PARTS M-Z • SPEAKER PARTS M-Z • SPEAKER PARTS M-Z • SPEAKER PARTS M-Z • SPEAKER PARTS M-Z •

97

98

2013 Loudspeaker Industry Sourcebook

TEST EQUIPMENT • TEST EQUIPMENT • TEST EQUIPMENT • TEST EQUIPMENT • TEST EQUIPMENT •

99

GERMANY

Axel Joost Elektronik
Klippel GmbH
Proraum Vertriebs GmbH

ITALY

Audiomatica, S.R.L.
Audioxplus, S.R.L.
Axiomedia
Elettromedia
ETANI Electronics Co., Ltd.

SOUTH KOREA

LG Electronics
Samsung

SWEDEN

Bohmer Audio, AB

SWITZERLAND

Megatec AG

THAILAND

Clarasonic



- ▶ 20 YEARS EXPERIENCE in producing measurement microphones.
- ▶ EACH YEAR, we supply thousands of microphones to OEMs.
- ▶ WIDE RANGE of models to fit your application needs.

BSWA

www.bswa-tech.com info@bswa-tech.com

AP does Vrms to dBSPL in 4 seconds

The most trusted name in audio test adds new acoustic measurements for R&D and production test of active speaker designs.



The accuracy, speed and ease of use of the APx audio analyzers covers both R&D and production needs. A single analyzer testing electronics and transducers with one intuitive UI, one automated test sequence and one graphic report at the end.

- ▶ Rub & Buzz Test **NEW**
- ▶ Air Leak Detection **NEW**
- ▶ Fast and Easy Setup
- ▶ Highest Analog Performance Available
- ▶ Widest Range of Digital I/O Options

www.ap.com/oneanalyzer



APx 515



APx 525



ACO PACIFIC

Stainless Steel and Titanium Diaphragms

- » 1, 1/2, 1/4-inch Capsules
- » Responses > 120 kHz
- » Noise <0dBA
- » >175 dBSPL
- » IEC 61094 Compliant

MIC SYSTEMS

- » Standalone "KIT"s
- » Phantom Powered "PH"
- » IEPE "SYS"
- » Precision machined capsules
- » Burned in at over 200°C insuring long-term stability
- » Interchangeable Capsules



**7052PH
PHANTOM POWERED
MEASUREMENT MIC**
IEC61094 Compliant
<4Hz to >25kHz
<18 dBA
Operational Temp <-20°C to >70°C
Storage Temp <-30°C to >85°C



**3025
EXTREMELY RANDOM™
NOISE GENERATOR**

For 35 years internationally recognized as a leading supplier of microphones and systems designed to meet stringent international and industry standards.

Our mics and systems have been supplied by HP/Agilent, Audio Precision, Gold Line, DRA Labs, Klippel and other OEMs. Used by universities, governments, and industry worldwide.



**PS9200KIT FAMILY
ACOustical Interface™
Measurement Mic System**

ACOustics begins with ACO™

2604 Read Ave., Belmont, CA 94002 (650) 595-8588
fax: (650) 591-2891 email: sales@acopacific.com www.acopacific.com

BRAZIL

Decibel Eng Ind

CHINA

FS Audio Co., Ltd.
Sanoway Speaker Box &
Wooden Prod. (Shenzhen) Co., Ltd.

ISRAEL

R H Sound Technology, Ltd.

ITALY

Audioxplus, S.R.L.
OEB, S.R.L.

SOUTH KOREA

LG Electronics
Samsung

UNITED STATES

Audiolight, Inc.
Carl's Custom Loudspeakers
Dynavox Electronics, Inc.
Earthquake Sound Corp.
Hi-Tech Pro Electronics, Inc.
Incriminator Audio, LLC
JBL Selenium
Kinetic Audio International, Ltd.

Loudspeakers Plus
Martin Sound Products, Inc.
Parts Express
Pierce Audio Products
PR Audio
Simply Speakers
SoCal Sound Shop
Speaker Addiction
Underground Industries

SERVICE

BRAZIL

Decibel Eng Ind

CANADA

Solen, Inc.
Tortech Sound, Inc.
Warkwyn Associates, Inc.

CHINA

Tonwel Audio Co., Ltd.

DENMARK

LOUDSOFT, Ltd.

GERMANY

Klippel GmbH
R&D Team

INDIA

Power Electronics & Technologies

IRAN

JTS Pro Audio

ISRAEL

R H Sound Technology, Ltd.

ITALY

Axiomedia
Outline, S.R.L.

SOUTH KOREA

LG Electronics

TAIWAN

Yung International, Inc.

THAILAND

Clarasonic

UNITED STATES

Area 52 RND
Audiolight, Inc.
Bulk Molding Compounds, Inc.
Carl's Custom Loudspeakers
Custom Audio
Dynavox Electronics, Inc.
Earthquake Sound Corp.
EKSC Eagle
Electro-Acoustic Testing Co., Inc.
ESS Labs, LLC
Globe Audio Design, Inc.
Globe Plastics
Hisco, Inc.

Hi-Tech Pro Electronics, Inc.
Incriminator Audio, LLC
Kinetic Audio International, Ltd.
Loudspeakers Plus
McKinney & Associates, LLC
New Millennium Acoustics
Nordson EFD
Parts Express
Pazandeh Audio Designs
Pierce Audio Products
PR Audio
Sherwood Industries, Inc.
SoCal Sound Shop
Speaker Clinic
Underground Industries

ASSOCIATIONS

BRAZIL

Decibel Eng Ind

CHINA

Tonwel Audio Co., Ltd.

GERMANY

Audio Technology Engineering (ATE)

IRAN

JTS Pro Audio

SOUTH KOREA

LG Electronics

TAIWAN

Yung International, Inc.

UNITED STATES

AEX Laboratories
CJS Labs
McKinney & Associates, LLC
Parts Express

BOOKS & PERIODICALS

BRAZIL

Decibel Eng Ind

FRANCE

Aureo

KOREA SOUTH

LG Electronics

UNITED STATES

Parts Express

LICENSING

BRAZIL

Decibel Eng Ind

DENMARK

LOUDSOFT, Ltd.

GERMANY

Audio Technology Engineering (ATE)
R&D Team

SOUTH KOREA

LG Electronics
Samsung

UNITED STATES

AEX Laboratories
ESS Labs, LLC
Globe Audio Design, Inc.
McKinney & Associates, LLC
Pazandeh Audio Designs
Planot, LLC
Speaker Addiction

www.nuway-speaker.com

www.speakerrepair.com

www.oversound.com.br

www.paudiothailand.com

www.peerlessaudio.com

www.penn-elcom.com

www.phlaudio.com

www.propexglobal.com

Queen Voice Co., Ltd.

www.rdmco.com

www.rtpcompany.com

www.ruhwa.com

Sanyu Enterprise, Ltd.

www.seas.no

www.shengkai.com

www.dgsy.com

www.horn.com.cn

Shi Jie Grandnic Electronic Factory

Shining Genius Electron (Shanghai) Co., Ltd.

Shiuh Sheng Electronics Co., Ltd.

www.sonavox.com

www.yingpo.com

www.speakerhu.com

www.starsound.ru

www.stetron.com

www.nuance.com.tw

www.tb-speaker.com

www.tannoy.com

www.nuance.com.tw

www.tcelect.com

www.china-speaker.com

www.tianle.com

www.u-sonics.com

www.usspeaker.com

www.vestronindustries.com

www.palmgarden.com.tw

Whida Plastic Factory

Xu Yixiong

www.yenlung.com

Yuan Da Electric Co., Ltd.

Zhejiang Tianle Group Corp.

Zhengsheng Electronics Factory

Liebgrabe 110
Cologne, NRW 50823
(P) +49-221-977-7050
Norbert Mundorf
info@mundorf.com
www.mundorf.com

109

110

401 Washington Blvd., Unit 10
Mundelein, IL 60060
(P) 847-566-6979
Robert F. Miller, Vice President
robertfmiller@wwdisplays.com
www.ww-speakercabinets.com

Superior Dispensing Solutions for Loudspeaker Assembly



Voice Coils

Surrounds

Magnet Assemblies

Spiders

Speaker Cones

Dust Caps

Improve speaker quality,
speed up throughput and
produce fewer rejects

For more information go to
www.nordsonefd.com/speaker
401.431.7000 800.556.3484

 **Nordson**
EFD



D-fend™

DIGITALLY FACTORED ENERGY DAMPING

SA300

300 Volt Stand-Alone Unit



PROTECT MORE THAN JUST YOUR LOUDSPEAKERS!

With the D-fend™ SA300 there are no more worries about blown speakers, HF drivers or crossovers. Or even worse: fire caused by excessive heat. Not only does this revolutionary, patent-pending technology keep your system safe, but your venue and audience as well. The user simply sets the thresholds and D-fend™ monitors and limits the amount of input power it passes through to the loudspeaker. It's USB compatible, and can be programmed to your specifications from a desktop or laptop. Just set it and forget it. Protect your products, venue, customers, and your reputation with the first passive speaker protection system that is virtually indestructible.

D-fend™ loudspeaker protection is ideal for:



SYSTEM INSTALLERS



RENTAL COMPANIES



OEM MANUFACTURERS*



VENUES AND BANDS

Learn more at

D-fend.net

and **Eminence.com/d-fend**


EMINENCE®

You Tube

See the technology demos on our YouTube channel:
www.youtube.com/user/eminencespeaker

* D-fend™ can be incorporated into your OEM application in board-only configurations. To license this technology for Professional Audio and Musical Instrument applications worldwide, please contact Eminence at (502)845-5622 or dfend@eminence.com.
© Eminence Speaker LLC. All rights reserved. D-FEND™ is a trademark of Intrinsic Audio Solutions, Inc., D.B.A SLS Audio.