# SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY

RECEIVED ADB

AUG. 1978 VOL. 1 NO. 7

### What's a Cameo?

Crossover: Divide&Conquer Disco Sound Installation Trends at theTrade Shows



hen you perform in front of a live audience, you put everything on the line. That's why you're so careful in selecting sound reinforcement equipment. Because once the music starts, you can't afford to have it stop.

At Yamaha, we know that the show must go on. Regardless.

That's why we designed our PM-1000 Series mixing consoles to the highest standard of quality and reliability. Professional.

Whether it's our 16-, 24-, or 32-channel model, the PM-1000 Series is capable of surviving the kind of punishment and abuse that only "the road" can dish out.

**Tough isn't enough.** Realizing that every job has different sound requirements, Yamaha also designed the PM-1000 Series for maximum flexibility. With

features like an exclusive 4x4 matrix with level controls that allows four independent mono mixes.

There's also the complete complement of controls you'd expect to find on the most sophisticated consoles. Transformer isolated inputs and outputs. Dual echo send busses. An input level attenuator that takes the +4dB line level to -60dB mike level in 11 steps. Plus 5-frequency equalization. To give you plenty of headroom for clean, undistorted sound, the PM-1000 can drive a 600 ohm load to  $+22\frac{1}{2}$ dBm.

Get your band on the wagon. All around the world – night after night, gig after gig – you'll find Yamaha mixing consoles the choice of more and more professionals. People who don't regard professional quality as a luxury, but as a necessity. Your Yamaha pro sound dealer can give you all the reasons why you should join them.

CIRCLE 94 ON READER SERVICE CARD

# Here's a company who's out standing in its field.



Designers & Constantiants of Professional Audio Systems & Equipment Featuring the Trouper Series & Professional Power Amplifiers 742 Hampshire Rd., Westlake Village, CA 91361, (805) 497-0766 Division of BSR (Canada) Ltd., 26 Clairville Rd., Rexdate, Ontario M9W5T9, (416) 675-2402

#### **RH60 RADIAL HORNS**

Meet the Community sixty degree radials, the horns for high definition, understandable sound. The horn pictured is our RH60, the midrange mainstay of the large system. We've recently added two new sixty degree horns to our line for HF and VHF projection, the SRH60 and the SQ60.

Some people still think that our horns and cabinets look a little strange, perhaps not realizing that at Community shape and construction are determined by the laws of physics, not marketing, packaging or the almighty dollar. For instance, you can see that the mouth of the RH60 is considerably taller than that of comparable sixty degree horns. Why? Well, if a horn is to act as a wave guide at its lower operative frequencies (which it is) it must have a tall mouth to support the larger wave forms generated near crossover. The idea of a thin, widemouthed radial may be pleasing in terms of packaging and handling, but it is a convenience that does not pay off in operation. Some conveniences that do pay off in operation are one-piece

construction, low resonance, high strength-to-weight ratios and the meticulously executed design that characterizes a Community horn.

Would you like more information? We recently published a catalog which details the performance of all Community products. Already it has been called a must for anyone wishing to design a sound system on a professional level. Please write or call to order.

#### **RESPONSE AND SPL**

_																	_											
RI	<b>I60</b>	Ā	D	RIV	ER: G	AUS	SS H	F400	0										E	AND	WII	OTH	PINK	(NO	ISE: 2	250H	z-161	Hz
			1	Watt	@ 1	Mete	er 10	7.24	dB-S	PL												1 W a	att @	4 Fe	eet 10	)7.28	dB-S	SPL
									-12	-7	-6	-4	-3	-1	0	+1	-1	-2	-1	-3	-5	-5	-9	-9	-9	-13	-17	
ß	40	50	63	80	100	125	160	200	250	315	400	500	630	800	18	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	10.0	12.5	16.0	KH2
SF	H6	D-B	D	RIVE	ER: A	LTEC	288	.160	à											BAN	DW	IDTH	I PIN	KNC	DISE:	3501	HZ-16	Hz
_			1	Wat	t @ 1	Met	er 10	8.99	db-S	PL												1 W a	att @	94 F	eet 10	05.52	dB-	SPL
											-10	-6	-4	-2	0	0	0	0	0	-2	-2	4	8	-8	-6	-10	-12	
8	40	50	63	80	100	125	160	200	250	315	400	500	630	800	18	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	10.0	12.5	16.0	KAZ
SC	260	C	D	RIVE	ER: E	MILA	RE	A. 17	5.16										В	AND	WIE	OTH I	PINK		ISE: 8	00H:	2-16K	Hz
			1	Wati	t@1	Mete	er 10	3.85	dB-S	PL												l Wa	tt @	4 Fe	et 10	2.14	dB-S	PL
														-6	-2	-2	0	0	+2	0	0	0	-2	-2	-5	-12	-16	
B2	40	50	63	80	100	125	160	200	250	315	400	500	630	800	18	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	10.0	12.5	16.0	Killz
									ſ			Ũ		Ĩ		Л	N		ļ	/								

Community Light & Sound. Inc. 5701 Grays Avenue Philadelphia, PA 19143 (215) 727-0900

CIRCLE 88 ON READER SERVICE CARD

**AUGUST 1978** 



VOL. 1 NO. 7

g

12

16

40

50

#### THE FEATURES

CONTENTS

#### THE STAPLES

YOUR SHOW OF SHOWS By Len Feldman and Mike Beigel Trendsetting at the trade shows: NAMM and CES.



tions of this new organization.



WHAT'S A CAMEO? The inception and implica-

**CROSSOVER NETWORKS:** DIVIDE AND CONQUER By L.A. Krause How to use this "most misunderstood" device.

**DISCO SOUND** INSTALLATION By Henry Collins

Should you or shouldn't you? An interview with Richard Long, sound installer of Studio 54 and Regine's.



#### **EDITOR'S LETTER**

#### **TERMS**

By Bob Heil, Mike Beigel, Larry Blakely A continuing industry glossary of commonly used audio-oriented terms.

#### **TROUBLESHOOTER'S BULLETIN**

Easy troubleshooting tips that will relay to the dealer those troubleshooting items not readily realized or understood by the outlet's staff.

#### **COMMON CONSUMER CUESTIONS**

14 The questions most asked of dealer, answered by 'those in the know.'

#### SO YOU WANT TO KNOW: MIXERS

By Craig Anderton This first part of a series explains basic mixer applications.

#### **DEALER DOSSIER**

By Murray Silver, Jr. Dirty Don's P.A. Palace.

#### **INDUSTRY UPDATE**

50 The latest 'poop' from our business community

**ADVERTISER'S INDEX** 

#### COMING NEXT ISSUE!

Artist Endorsements-How to Use Them The Nitty Gritty of Retail Advertising Zero Defects in the Selling of Mixers

#### Cover Design by Sheryl Stern

Sound Arts Merchandising Journal is published monthly by Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, N.Y. 11050. Design and contents are copyright by Sound Arts Merchandising. Inc. and must not be reproduced in any manner except by permission of the publisher. Con-trolled circulation postage paid at Hanover, New Hampshire 03755. Subscrip-tion rates for other than qualified individuals or companies. \$12.00 for 12 issues; \$22.00 for 24 issues. Add \$3.00 per year for subscriptions outside of U.S. Subscriptions must be paid in American currency. Postmaster: Send Form 3579 to Sound Arts Merchandising Journal, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

#### JERVING THE CREATIVE AVDIO AND MUSK ELECTRONICS INDUSTRY MERCHANDISING JOURNAL

JUDITH MORRISON LIPTON Editor

> AUDREY KURLAND Assistant Editor

CRAIG ANDERTON MIKE BEIGEL LARRY BLAKELY HENRY COLLINS LEN FELDMAN BOB HEIL L.A. KRAUSE MURRAY SILVER, JR. Contributors

MELANIE DEUTSCH Assistant to the Publisher

> LORI RESSA Production Manager

> > BILL TRAVIS Art Director

SHERYL STERN Art & Design

LIZ BEENER HAROLD PERRY BARRY SIMON FRAN VITRANO Art Staff

BILL SLAPIN & CO. West Coast Advertising Representative

#### VINCENT P. TESTA Publisher

Editorial and Executive Offices Sound Arts 14 Vanderventer Ave. Port Washington, N.Y. 11050 516-883-5705

COWAN PUBLISHING CORP. Chairman of the Board Sanford R. Cowan President Richard A. Cowan Controller Cary L. Cowan

Editorial contributions should be addressed to The Editor, Sound Arts, 14 Vanderventer Ave., Port Washington, N.Y. 11050. Unsolicited manuscripts will be treated with care and must be accompanied by return postage.

## A LETTER FROM THE EDITOR

The recent CES and NAMM trade shows had their complement of absurdities as we O.D.'d on hors d'oeuvres one day and involuntarily fasted the next as duty demanded. Our entire staff narrowly escaped decapitation when the McCormick Inn open air bus chugged merrily under an overpass that inconveniently reached our necks. The shopping bag lady at the Sheraton solicitously advised me that a sure way to wind up in her straits was to be a journalist.

But those were only datastic events in a realistic and upbeat world of products and promotion at the shows. Manufacturers were more than optimistic as they reported heavy buying, with at least one company expecting to exceed their yearly goal by the end of NAMM.

Thus this isssue of SOUND ARTS seems to be about crossover, both literally and figuratively: Literally, as L.A. Krause writes about what he considers one of "the most misunderstood components" in *Crossover Networks: Divide and Conquer*. And figuratively in our rundown of the trends at the trade shows, where, increasingly, lines are crossed over from what has been traditionally thought of as either electronics or musical instruments—and which of course is what SOUND ARTS is all about. The Creative Audio Seminar at CES, sponsored in part by SOUND ARTS, is only one indication of that crossover.

Another indication of the crossover is the ongoing formation of Cameo, a trade organization of manufacturers who service this hybrid industry. While Cameo has been discussed and reported on for a while, we thought that with its roster of 28 members as of the close of the NAMM Expo (remember, the 20-odd-year-old Institute of High Fidelity has only 38 members), Cameo was due for a report to retailers on what it is and where it is going—since one of its main aims is dealer support.

We are dealing this month with current reality in unconfusing crossover networks, sorting out trade shows, and finding new business outlets for retailers—as in disco sound installation, also presented in this issue.

Regards,

Judith Morrison Lipton

## HOW MANY OF THESE FINE MUSICAL INSTRUMENTS DO YOU CARRY?

Selling multi-track tape recorders without dbx tape noise reduction is like selling electric guitars without amplifiers.

Why dbx? Why tape noise reduction at the semi-pro level?

Easy. Because dbx tape noise reduction gives even the smallest studio the potential to make master tapes with full professional quality. With a dbx 155 or 158, you sell your customer an extra 30dB of signal-tonoise ratio on even the best TEAC, Otari, or TASCAM. Plus an extra 10dB of recording level headroom. Additive noise resulting from multi-track bouncing is virtually eliminated. Only dbx makes an economicallypriced, flexible series of professional tape noise reduction units for today's aspiring recording artists and smaller studios. dbx tape noise reduction is easy to operate, too. Level calibration is unnecessary, and gain riding is seldom required to produce noise-free, full dynamic range recordings.

dbx 155 and 158 are fully compatible with the professional line of dbx equipment used by larger studios worldwide. We supply 2, 4, 8, and 16-channel versions, as well as dbx mono and stereo compressor/ limiters. So now your customers can make demos and take them right to the big guys for anything from an audition to a record pressing.

Sell a key ingredient that will help today's aspiring talents to become tomorrow's recording stars: dbx tape noise reduction.



CIRCLE 90 ON READER SERVICE CARD

## This is a door to your audio signal.

## **MXR** opens this door.

MXR has made a commitment to itself, its customers and the future of the music industry—that is to continue as the leader in the field of electronic signal processing.



MXR Innovations, Inc., 247 N. Goodman Street Rochester, New York 14607, (716) 442-5320,

CIRCLE 98 ON READER SERVICE CARD

## TERMS:

#### A CONTINUING INDUSTRY GLOSSARY

RECORDING

#### ELECTRONIC MUSICAL INSTRUMENTS & ACCESSORIES

#### SOUND REINFORCEMENT

#### By Larry Blakely

There are many different types of microphone connectors available on the market. However, for clarity, I will only mention those most commonly used.

Two-Circuit Connector: Unbalanced (high impedance) microphones nearly always use the 1/4" phone plug that is a two-circuit connector. The barrel of this connector should carry the (-)conductor or shield, while the tip of the connector should carry the positive (+) conductor or the inner wire of the cable.



Three-Circuit Connector: Balanced (low impedance) microphones usually utilize one of two standard connectors. The three-circuit 1/4" phone plug is normally wired with the shield connected to the barrel, the (-) signal wire connected to the ring and the (+) signal wire connected to the tip.



XLR-3 Connector: Generally accepted as the "standard" and most rugged connector for balanced microphones. The XLR-3 connector is available in both male and female gender. However, the standard for microphones is the male type on the microphone cord.



The standard for wiring this connector may be disputed, depending on what part of the country you are in or

#### **By Mike Beigel**

Keyboard Trigger Pulses: When a key is pressed, a voltage "pulse" is generated to tell the envelope generator to start an envelope sequence. The pulse contains no other information.

Keyboard Gate Signal: Whenever a key is pressed, the gate signal remains "on" until the key is released. This allows the envelope generator to sustain the note as long as the key is held down.

Envelope Generator: One of the most important circuits in a synthesizer. This device generates the envelope or "loudness" contour of the musical sound, which is used to control a voltage-controlled amplifier and/or voltage controlled filter. Occasionally, the envelope generator is used to control the voltage-controlled oscillator in certain patches. Two common types of envelope generators are the Attack-Release (AR) and the more complex Attack-Decay-Sustain-Release (ADSR) generators.

Attack-Release Envelope Generator (AR): This device puts out a voltage that goes from zero to a predetermined final value according to a definite attack or onset time. It holds that value as long as the note is being played. When the note is released, the output voltage decays back to zero according to a definite release time.

Envelope Follower: Available on some synthesizers, the envelope follower takes an audio input signal and converts it into a control signal corresponding to the envelope of the input signal. This allows many synthesizer parameters to be controlled by the external audio signal, and generally provides an "envelope" of more complexity and naturalness than an envelope generator.

Low Frequency Oscillator (LFO): An oscillator that provides sub-audio signals for purposes such as vibrato or tremolo. The LFO is actually just a

#### By Bob Heil

Apex dome: The small curved dome placed over the voice coil opening in a loudspeaker to increase the radiation of high frequency response. It also is used to keep dirt from lodging in the voice coil gap area.

Heterodyne: The mixing or combining of two a.c. signals which produce harmonic frequencies, the sum and difference of the two originals.

Active Elements: Those components in a circuit which have gain or in which direct current flows: diodes, transistors.

Astable Multivibrator: A freerunning electronic circuit that generates pulses which can be used as timing signals or other similar signals.

Binary: A system of numerical representation which uses only two symbols, 0 and 1.

Chip: A single substrate on which all the active and passive elements of an electronic circuit have been fabricated utilizing the semiconductor technologies of diffusion, passivation, masking photoresist, epitaxial growth. A chip is not ready for use until it is packaged and provided with terminals for connection to the outside world.

Digital Circuit: A circuit which operates like a switch; that is, it is either "on" or "off."

Discrete: Electronic circuits built of separate, finished components, such as resistors, capacitors, transistors, etc.

Flip-Flop: An electronic circuit having two stable states, and having the ability to change from one state to the other upon the application of a signal in a specified manner. See specific types below.

Gate: A circuit having two or more inputs and one output, the output depending upon the combination of logic signals at the inputs. There are five gates called: AND, EXCLUSIVE OR, OR, NAND, NOR. The definitions below assume positive logic is used.



#### A CONTINUING INDUSTRY GLOSSARY

#### RECORDING

#### ELECTRONIC MUSICAL INSTRUMENTS & ACCESSORIES

#### SOUND REINFORCEMENT

what manufacturer's equipment you are using. The most commonly used standard is:

> shield - pin 1(-) - pin 2(+) - pin 3

Again, I comment that there are sometimes other types of connectors used with microphones. But the abovementioned connectors will account for by far the greatest majority of uses. I do not know of any microphone manufacturer who ships or recommends any other type of connectors than those mentioned above.

To date, we have investigated the different types of microphones and their various pickup patterns, along with impedance and the standard types of microphone connectors. The next device in the recording chain is the recording console.

Mixing consoles can have either balanced or unbalanced microphone inputs, depending on the type of mixing console that you might have.

Input Pad: Normally a resistive network before the microphone input transformer or transformerless microphone amplifier. This pad lowers the level sent to it by the microphone in order to prevent the microphone-preamplifier from overloading. Depending on the particular console, this may be in the form of a simple switch indicated as a pad in/out or a multiposition switch in six steps indicating in decibels the amount of level reduction of the pad. When instruments or vocals are close miced in a studio situation, a microphone can often send a higher level to the console than the microphone-preamplifier is designed to accommodate, thereby causing distortion. The input pad therefore decreases the level fed to the microphone-preamplifier and prevents overload distortion. When there is no danger of overload distortion from loud levels being fed to the microphone, the input pad can simply be switched out.

special case of the standard voltagecontrolled oscillators. In fact, many VCO's have a switch that extends their range into the low frequency area. This is an example of a case in which a device can be both an audio signal source and a control-voltage source. One oscillator can control (modulate) the pitch of another. The real power of voltage-controlled synthesis systems derives from the fact that signal sources can be used in many non-obvious ways.

Pitch Bend Control: An extra control on some synthesizer keyboards, the pitch bend control permits small variations about the keyboard output voltage, thus allowing for continuous pitch-change or "bending" of notes. Sometimes these controls are springloaded to return to a "neutral" position, but most often they are not.

Pedal Controller: A foot pedal provides a continuously variable control voltage that can be used for many purposes. Possibilities are: controlling a voltage-controlled filter for "way" or "brightness" effects, controlling a voltage controlled amplifier for volume control, even controlling a voltage controlled oscillator for unusual musical effects.

Synthesizer Signal Processors: The electrical signals from synthesizer signal sources (oscillators, noise generators, etc.) must be modified in a number of ways before they become interesting musical sounds. Signal Processors perform these modifications in a synthesizer. They do not generate sound themselves, but usually work in conjunction with control signal sources and audio signal sources to produce the musical output.



Integrated Circuit: The Electronic Industries Association defines semiconductor integrated circuit as—"the physical realization of a number of electrical elements inseparably associated on or within a continuous body of semiconductor material to perform the functions of a circuit."

*Memory:* A storage device into which information can be inserted and held for use at a later time.

Passive Elements: Those components in a circuit which have no gain characteristics: capacitors, resistors, inductors.

Schmitt Trigger: A sampling pulse which is used to enable a register, flipflop, counter, etc.

Accelerometer: An electromechanical transducer used in determining the change in velocity of a body. Most recently, the accelerometer is being used as a high quality pick-up for acoustic instruments.

Capacitor: Two conducting elements, or plates, separated by an insulating material referred to as the dielectric. The primary purpose of a capacitor is to acquire an electrical charge. In acquiring or losing that charge, the capacitor blocks the flow of DC, presents a reactance to varying AC, and forms a resonant circuit with the inductance.

Choke (Radio-Frequency): A choke whose inductance is used to block the passage of radio-frequency (RF) current. In many RF voltage or power amplifiers, it is desirable to keep the RF current out of the DC power supply, as well as to force all of the RF current into the LC resonant circuit and its load. Most radio-frequency chokes have an air core, but with lower radio frequencies the inductance must be larger.

Decade Resistance Box: A series of precision resistors with a switch arrangement to provide from 1.0 ohm and up in 1.0 ohm steps. This gives considerable flexibility for laboratory and circuit development work as well as circuit substitutions.

WRH

# THE NEW TADA BRIES OF THE SECOND STATE OF THE NEW TADA BRIESS TO THE SECOND STATE OF T

The new one-inch TAD driver is truly unique. There is nothing else like it. Use it with your favorite horn and you'll get a frequency response from 800 to 22,000 Hz. So one speaker does the same job it used to take both a tweeter and super-tweeter to do. Saves weight. And money.

The secret is the TAD driver's beryllium diaphragm.

The diaphragm is the heart of a driver. It must be both light yet rigid. We used beryllium to achieve a standard of performance never before known to the professional. Every single tone – no matter how subtle or how complex – is captured and reproduced just the way it is played or recorded. The resulting sound is a revelation.

The quality of both parts and workmanship, plus the same care in assembly given a fine watch, makes the TAD driver a new standard for the entire industry. It allows the driver to reproduce frequencies up to 22,000 Hz without any major drop-off in response and permits it to withstand high input power.

If your job involves professional sound reproduction – on stage, in concert halls, in clubs or studios – you have an obligation to yourself to hear this remarkable driver.

With the arrival of the TAD driver the state of the art just took a quantum leap.

#### TAD Technical Audio Devices

A Division of U.S. Pioneer Electronics Corp. 142 Redneck Avenue, Moonachie, New Jersey 07074 Telephone: (201) 440-8234

Phiast produ	Technical Audio Device 142 Redneck Avenue Moonachie, New Jersey e send technical data for uct line. (Dealer inquiries	s SA 07074 the TAD also invited.)
NAM	E	(Please Print)
TITLE	E	(1.000000000000000000000000000000000000
COMP	PANY	
	DIVISION	
	ADDRESS	
1120	CITY	
	STATE	ZIP
	PHONE() Area Code	EXT
-10	CIRCLE 99 ON READER S	RVICE CARD

Mai top

S.

ISI WRIT

20

## ROUBLESHOOTERS' BULLETIN

BASS PLAYING WITH GUITAR AMPLIFICATION We have seen musicians play bass through a guitar amplifier with no problems. If, however, a customer complains about distortion, he should understand that guitar amplifiers and bass amplifiers are different. We don't just make a bass head and bias it differently from a guitar head. They have different Circuitry, different transistors, and are designed for totally different response curves. Generally, you get better bass reproduction

2

from an amp whose tone control circuitry is If the setup procedure on the head is designed for the bass. not correct, the customer will get all not correct, the customer will bet all kinds of distortion and it is very possible he will lose his low end. If the bias settings are incorrect he could develop distortion and not produce the low end. We run across this when a customer has worked on the head and changed it. The complaint is usually too much distortion and not enough

(3)

1

power. The first thing to check is to see that the head meets specs.

But a customer's problem with distortion could be due to any number of things that have nothing to do with the amplifier.

The problem could result from the fact that the bass is not set up properly, so that he might be getting buzzing in the first fret area. When that buzzing is amplified, it could sound like distortion. Secondly, the

cabinet could have a rattle in it which duces distortion or a rattling sound at very low bass response because the bass caused the cabinet to vibrate more. Also, caused than that amplifier can provide. That away lifier is going to clip at a certain place and he may be overdriving his speakers.

(5)

JIM SMERDEL DAN SMITH YAMAHA (4)

6

<u>POWER FROM THE WALL</u> A customer can have the best P.A. System in the world, but if he isn't setting the correct electricity out of the wall, his equipment can malfunction. In areas with electrical fields, swi as those under elevated trains, the begins as those to 88 volts, the equipment board to distort, the gain up, and the equipment up to get the gain up, and the equipment malfunctions.

> The consumer should be informed to before plugging in his equipment. If the ower is inappropriate, he may find conditioning outlets for instance. If the meant for portable ovens for banquets.

GARY GAND GARY GAND MUSIC



When and how should balanced lines be used?

Basically, in order to send an audio signal from one piece of equipment to another, there has to be a complete electrical loop. Usually this loop consists of one signal wire and a ground for return. This arrangement is an unbalanced line since the signal is referenced to ground.



In today's cluttered electrical environment, there is a tremendous amount of radio frequency and electrical power radiation that can induce unwanted hum and noise into audio leads stuck out in the open. These induced signals are especially troublesome in low level lines such as microphone or phono pick-up cables. Therefore, an electrostatic shield in the form of a metal foil wrap or braided wire is used to surround the signal lead.



This surrounding shield works well for electrostatic (voltage) fields, but unless it is made of a magnetically shielding metal (which is impossible or impractical), it has little effect in shielding the signal lead from magnetically induced hum and noise.

The balanced line was developed to eliminate most of the effects of these magnetically induced signals. The balanced line consists of two conductors with equal but out of phase (180 degrees) signals. This type of signal condition is usually accomplished with transformers, although there are some electronic circuits that provide adequate balanced signals.



Since the desired signal on the two conductors in the balanced line is 180 degrees out of phase, when one conductor is positive the other is negative and vice-versa. Therefore, there is a balanced signal voltage across the receive transformer, and this signal voltage is coupled on into the piece of equipment. However, any induced signal on the two conductors will be the same in level and phase on both, so there will not be a hum and noise voltage between the conductors, and this unwanted signal will be cancelled in the transformer or input circuit.

Theoretically, the balanced line will not only reduce the effect of magnetically induced hum and noise, but it should also reduce the effect of electrostatic pickup in the same manner. However, the two conductors have to be close together and have equal capacitance to ground. To achieve these criteria, the conductors are usually twisted together. In low level applications the two conductors are also put in a shield and this balanced line is called a shielded pair.



Not only does the shield further reduce electrostatic pickup, but also ensures equal capacitance of each conductor to ground and helps keep the line balanced in level and phase.

Obviously, the balanced line has the

advantage of much lower hum and noise pickup, especially in magnetic fields. However, there are several parameters involved in hooking together equipment, which may determine whether a balanced or unbalanced line is needed.

Temporarily ignoring all the parameters involved in hooking a P.A. system together, there are two extreme situations which may illustrate when one line is advantageous over the other.

If the signal level is fairly high and the length of cable is short, the hum and noise pickup will probably be far enough below the signal level so that an unbalanced line will perform adequately. However, low level lines, such as microphone-cables, which are longer than a few feet, and exposed to who knows what kind of fields, should be balanced whenever possible.

> Lawrence Jaffe Uni-Sync

#### How should proper phasing of speakers be accomplished?

As long as you are hooking up loudspeakers from a single manufacturer with that manufacturer's crossover network, the phasing will be correct, as long as you hook them up according to the manufacturer's instructions. The fact that speaker companies phase their equipment differently will be irrelevant. However, if you are mixing products from different manufacturers, then the phasing should always be determined experimentally. In fact, in any custom system, phasing should be determined experimentally either by listening or by measurement with noise sources and the real time analyzer-looking for maximum output in the crossover region. When you build a custom system and the voice coils are in different planes, then you often have to make electrical compensation for the fact that the physical phase is out.

> Garry Margolis JBL

WRH

#### **IMMEDIATE DELIVERY**

#### PARTIAL LIST OF **RED SERIES USERS...** A & M Recording American Recording Applewood Studios A & R Recording Artists Recording Studio Asterik Recording Atlantic Recording Studio Audio Arts Autumn Sound Randy Bachman Bearsville Records Blood, Sweat & Tears Blue Rock Studios **Burbank Studios** Caribou Ranch CBS, N.Y.C. CBS, San Francisco Chapell Music **Chariot Studio** Chelsea Sound Cherokee Recording Chicago Recording **Conway Recording** Dallasonic Recording Davlen Sound Dawnbreaker Studio Disney World Dynamic Sounds Earth Audio Falcon Records Frankford-Wayne 4 Star Good Times Studio Great Lakes Audio Hallmark Studios Wally Heider, Los Angeles Hit Factory House of Music Hugo & Luigi Records John Kay Kendun Recorders David Kershenbaum Mama Jo's Manta Sound Mediasound, N.Y.C. Minot Sound **MZH Studios** Graham Nash **Nimbus Nine Productions Ochoa Recording Studio ODO** Recording Original Sound Paramount Recording P & P Recording Richard Perry **Pinellas Music** Producer's Workshop RCA, N.Y.C. RCA, Los Angeles RCA, Toronto Record Plant, N.Y.C. Record Specialists, Trinadad **Roade West Recording Rockland Recording** Salty Dog Studio Sigma Sound, Phila. Sigma Sound, N.Y.C. Sound Exchange Sound Factory Sound Ideas Sound Labs Soundmixers, N.Y.C. Springfield Sound Sundance Recording Sunset Sound Sunswept Studio Howard Schwartz Recording The Guess Who **Toronto Sound United Artists Studios** Valentine Recording Vantone Studios Venture Sound Village Recorder Western Recording

Whitney Recording

2.

#### 1. NEW 604-E2 LOUDSPEAKERS BY ALTEC

Direct replacement for Altec's 604E loudspeakers. Handles 140 watts of power for an increase in SPL of 6 dB. Available from Red Series Monitor Dealers for \$415 each.

3.

4.

#### 2. THE BIG RED MONITOR SYSTEM

We've put a 604-E2 and a Mastering Lab Network into a 6 cubic foot bass reflex enclosure to make our Big Red, the most popular monitor system for the small to medium-sized control room. \$815 each.

#### 3. THE MASTERING LAB FREQUENCY DIVIDING NETWORK

Add the famous M/L Network with its improved mid-range, distortion-free crossover plus extended bass to the 604-E2 to be in tune with the studios listed. \$175 each.

#### 4. THE SUPER RED MONITOR SYSTEM

For larger control rooms, we offer a 12 cubic foot infinite baffle cabinet enclosing the 604-E2 with the M/L Network and an extended range woofer for increased SPL capability and reduced intermodulation distortion. \$1115 each.

#### 5. THE LITTLE RED MONITOR SYSTEM (NOT SHOWN)

Big Red sound now available in a small size, ideal for listening rooms, small mix rooms, A & R departments or even the home listener who wishes to hear music as it was originally recorded. \$220 each.

For more information, see your nearest Red Series Monitor Dealer or contact . . .



652 GLENBROOK RD, STAMFORD, CT 06906 TEL: 203 359 2312 TELEX: 99 6519

CIRCLE 89 ON READER SERVICE CARD

# 2 now



bout

#### **By Craig Anderton**

#### WHAT IS A MIXER?

A mixer electrically combines many signals into a smaller number of outputs. For example, let's say you have an amplifier with one input jack, but you have four instruments that need to plug into that amplifier. A mixer would blend these four instruments together into a signal output that could plug into the amp's single input (see figure 1). A mixer that has any degree of sophistication whatsoever would also include level controls for the four instruments, so that the levels may be balanced with respect to one another. That way, if one of the instruments has a much higher output than the other instruments, its level may be reduced to match the other instruments.

#### **APPLICATIONS OF A MIXER**

A mixer is a very fundamental electronic circuit, and you will find it in many places.

1. Keyboard players often have multi-keyboard setups (organ, electric piano, synthesizer, string synthesizer, and so on). Yet, all these instruments must feed a simple amplifier input or perhaps a set of inputs for stereo. As an additional complication, the levels of these various keyboards may vary



#### Figure 1

wildly. Here a mixer can blend the keyboards together and feed them into the amplification system.

2. PA systems must include a mixer for blending together multiple microphones for feeding into a power amplification system. In addition, the PA mixer may accept signals other than microphones, such as direct taps from instrument amplifiers.

3. In recording studios, the mixer plays the role of traffic director. It can send multiple signals into a tape recorder, or take the multiple outputs of a multitrack tape recorder and mix them down to a 2-track recorder or to an amplification system (see figure 2).

4. In electronic synthesizers, you will often find one or more mixers inside the synthesizer itself. For



Figure 2

## ROLAND MEANS BUSINESS.



## LOTS OF BUSINESS.

All of the equipment pictured is Roland. It's part of the most impressive line of musical equipment in the world.

It's not just one line, but many lines. For example, Roland offers 12 models of guitar amps . . . signal processing equipment . . . combo organs and pianos . . . synthesizers . . . sound systems . . . Boss effect devices . . . rhythm units . . . the GR-500 Guitar Synthesizer . . . the MC-8 MicroComposer . . . you name it.

Roland is growing. And so are Roland Dealers. That's why RolandCorp US makes it easy to get started. Chances are there's a dealership plan just right for your business. After all, without your business, where would we be?



For information about a Roland Dealership contact Tom Beckmen, President, RolandCorp US, 2401 Saybrook Avenue, Los Angeles, CA 90040 or phone (213) 685-5141.

CIRCLE 96 ON READER SERVICE CARD

example, the mixer in a typical synthesizer might blend together the sound of a couple of oscillators.

#### CHARACTERIZING MIXERS

You may have heard a mixer referred to as an "8 in, 1 out" mixer, a "16 in, 8 out" mixer, a "24 in, 16 out" type, and so on. The first number refers to the number of input channels available. For example, an "8 in" mixer would have 8 different inputs available. This means you could plug in 8 microphones, 8 instruments, or any combination of signal sources up to a total of 8. A 16 in mixer could accept 16 input signals, etc.

The second number refers to the number of outputs available. This will take a little more explanation, so let's look at figure 3. In this figure, we show the input signal path as a vertical, downward flow, and the output signal path as a horizontal flow from left to right (don't worry, this will all make sense soon!). At the junction of the input and the output line, you'll find a potentiometer (*pot*) that controls the



#### Figure 3

level (often called a *fader*). This may be either a standard, rotary motion pot, or a linear motion (slide) pot.

In figure 3, we show four outputs. Each represents the output of a minimixer within the mixing console. Therefore, we can take any input signal and, by properly setting the level controls, we can mix that signal into any of the four output lines. These output lines are called *busses*.

Now, the word *output* is a bit ambiguous, so let's pin these outputs down to specific functions. We'll assume this mixer is going to be used for stereo PA purposes, so we'll assign input #1 to the right channel of the stereo amplification system. Next, we'll assign output #2 to the left chan-



#### Figure 4

nel of this same amplification system. For the moment, we'll ignore outputs #3 and #4.

By now, the implication of the mixer should be clear. By properly setting the level controls, we can send the input signal from input channel #1 to What if you have a quad, or four channel, system? Then we could assign outputs #3 and #4 to the other two channels used in the quad system.

However, there are other ways to use output busses, such as adding reverb and special effects. But before we get into this, let's recap: We characterize a mixer by how many inputs it can handle, and to how many outputs it can send these input signals. The more inputs and outputs, the more costly the mixer. However, when selling a mixer, don't automatically assume that "more is better." While it's nice to have the extra flexibility of multiple input channels and output busses, it would be somewhat pointless for a keyboard player to use a 24 in, 8 out console. On the other hand a studio with a 24-track recorder could very easily find this mixer too small for its needs.



#### Figure 5

either the right channel, the left channel, or both channels. To send to the right channel, we turn up the level control that feeds output buss #1. To send to the left channel, we turn up the level control that feeds output buss #2. By turning up both controls, the channel 1 signal goes to both output busses.

In practice, most mixers do not have separate level controls for each channel. Instead, they have one level control and a *panpot*, which places the signal in either the right channel, left channel, or anywhere in between. By adjusting the level control and panpot together, the signal may be placed anywhere in the stereo field at any desired level.

#### OTHER USES FOR OUTPUT BUSSES

While the primary purpose of an output buss is to feed some kind of amplifier or tape recorder, there are many other ways to use output busses.

For example, in the recording studio it is very handy to have a separate mix of instruments in the control room and in the studio itself. Refer to figure 4. Here we have a 4-track recorder feeding a mixer, and two of the output busses feed a stereo amplifier in the control room. In this manner, the recording engineer may listen to the tracks present on the recorder in the proper balance. However, let's suppose a musician is adding a vocal harmony part via overdubbing in the studio. In this instance, the musician will probably not want to hear the same mix as the engineer wants to hear; he or she will want to have the vocals featured more prominently, as this makes it easier to sing the harmony part. The drum and bass parts, while important to the final sound of the tape, are less important to the singer doing overdubs and may need to be mixed down somewhat so the singer can concentrate on the vocals.

The solution is to assign one of the output busses to a separate cue amplifier (also referred to as the monitor or foldback amplifier). This amplifier feeds headphones worn by the musician. The engineer can then set up a "master" mix on the two stereo output busses, and a "cue" mix on the cue buss for the musician in the studio.

Another application for the cue buss would be for the keyboard mixer mentioned earlier. Suppose a player needed to tune a synthesizer, or make some other adjustment to an instrument. By listening to the instrument on a separate cue buss through headphones, the instrument's signal goes to the musician only, and doesn't appear in the amplification system. This allows private tuning without letting the audience in on the process.

We can also use output busses to add special effects such as reverb, echo, or time delay. We do this by assigning an output buss to a reverb unit, and taking the output of the reverb unit and feeding it back into an unused input on the mixer (see figure 5). For example, if we wish to add reverb to channels 1, 2, and 4, we turn up the controls associated with these channels that feed the reverb buss, thus sending signals from these channels to the reverb buss. By listening to the output of the reverb system, we hear reverb being added to channels 1, 2, and 4. Of course, we are most likely listening to the signals from these channels through a stereo amplifier of some kind, so the reverb is added to these signals and we hear a composite of the "dry" and the "reverbed" sounds.

So far, we have a very basic picture of typical mixer applications ... but we need to go further into the input channels, which will be the subject of next month's column.

Copyright © 1978 by Craig Anderton

#### When Jerry Garcia, BobWeir, Steve Miller, Billy Cobham and George Benson all use the AD 230 Delay... You know it's good!

#### AD 230

Continuously variable delay up to 600 milliseconds

4 bandwidth selections up to 20 KHz

Built-in flanger with separate controls

Studio quality signal to noise ratio

LED ladder-type VU meters for input and delay levels

High/low impedence with either ¼" or 3-pin connectors Continuously variable delay up to 500 milliseconds

3 bandwidth selections up to 10KHz

**Built-in Flanger** 

Extremely low noise circuitry

Input sensitivity and output level controls

DELEN

MULTI-

0

19" rack mount cabinet

And you can bet that these experienced electronic pioneers know how to judge a delay line. The Ibanez Analog Delay with Multi-Flanger does what no other analog device of its kind has been able to do – beat the digital delays at their own game and at a price that almost any band can afford. It's unbelievably quiet, features selective bandwidth, and has the most versatile range of controls of any comparable device.

You can get double-tracking, slapback echo, long delay, flanging, automatic vibrato, reverb, and most any other time delay effect possible. Ask about it at your Ibanez dealer today.

......

Ibanez

IBANEZ, P.O. BOX 469, CORNWELLS HEIGHTS, PA 19020 • 327 BROADWAY, IDAHO FALLS, ID 83401 IN CANADA: EFKAY MUSICAL INST. LTD., 6355 PARK AVE., MONTREAL, P.Q. H2V 4H5 CIRCLE 76 ON READER SERVICE CARD It was Your Show of Shows-a twoparter, not a rerun-as the Consumer Electronics Show and the NAMM Music and Sound Expo appeared live from Chicago in full color and sound. They were prime time variety shows with high ratings accorded each by both readers and staff of SOUND ARTS.

At CES, creative audio received high audience viewing, with such products as mixers and signal processing devices turning on large numbers of people. The Creative Audio Seminar, held mid-show, was a healthily attended news and information break.

At NAMM, the new running title provided instant information on where this industry is headed. As the International Music and Sound Expo, the title itself conveys the increasing spinoff of music into electronics. As the NAMM-sponsored seminar heralded: "Electronics—You Can't Go Home Without It."

But that doesn't say it all. For a look at the trends indicated by the June trade shows, read on for a closer look at both CES and the NAMM Expo.

And now presenting ... – Editor





The recently held Consumer Electronics Show in Chicago turned out to be the biggest ever, with some 55,000 people attending the four-day event. More than ever, audio dominated the show and there was much there that will be of interest to the semi-pro and professional audio dealer. Here are some of the highlights.

#### **TAPE PROLIFERATION**

While the 3M company was the only tape manufacturer to officially announce availability of metal particle tape, nearly a half-dozen other domestic and foreign manufacturers admitted that they had been working on similar tapes which offer vastly increased headroom at both low and high frequencies. The question of compatibility of the tape with existing machines (metal particle tape requires much higher bias and erase current, which many existing tape heads and tape amplifiers can't handle) was faced head-on by Nakamichi Research, who demonstrated a "half way" tape which they call "broad bias" metal particle atape and which, while offering some of the advantages of the 3M Metafine variety, would, nevertheless work on most existing tape decks.

Tied in to their demonstration was an introduction of the consumer ver-

#### CES and NAMM present

#### Len Feldman and Mike Beigel

sion of Telefunken's noise reduction system. Previously available only as a minimum tracked by a special stylus/pickup ar-minimum professional noise reduction technique, the new version offers 20 dB of highfrequency noise reduction (as opposed wentional PVC material using existing) to the 10 dB afforded by the universally used Dolby B system) but, in an effort to make it compatible with playback of Dolby-encoded tapes, was demonstrated by Nakamichi with a 10 dB alternative switch position.

The almost overnight order-of-, magnitude improvement in tape performance that could result from the introduction of metal particle tape... and/or new noise reduction techniques may put a crimp in the plans of all tion during playback less than 0.1%. A those manufacturers who are busily 13-bit system is utilized and the working on digital-audio (PCM) taping techniques, since dynamic range capabilities in excess of 75 to 80 dB will become available in purely analog formats.

as Mitsubishi, Panasonic, Sony and JVC from demonstrating versions of PCM tape equipment, some of which "major" audiophile companies introare linked to VCR's, while others are self-contained.

#### **SPEAKING OF PCM**

In a semi-private press showing," Panasonic unveiled several versions of its new Visc recorded discs. Three of these were primarily designed for video recording, but are nevertheless of interest in the audio world because, unlike the proposed "laser disc," they have capability for a pair of stereo channels in addition to full bandwidth high resolution color reproduction.

Further, they are mechanically rangement and the discs themselves can be inexpensively pressed from conrecord manufacturing facilities.

Of greater interest to the audio I fraternity was the Visc AD disc, a 30-1 minute per side PCM audio version. All of the new Visc formats are played at 450 rpm and, in the case of the Visc AD version, intended for strictly-audio applications, dynamic range claimed is more than 85 dB, with audio bandwidth extending from 20 Hz clear out to 20 kHz ±1 dB and harmonic distorsampling frequency is 44.056 kHz.

#### **ON THE HARDWARE SIDE**

One notable trend visible at CES That didn't prevent such companies was the narrowing of the gap between man professional, semi-pro and audiophile electronics. With more and more of the ducing rack-mountable electronic equipment at price points to match manufactured by the MM more professionally-oriented companies, it's becoming hard to tell the difference between "true" pro equipment and cosmetically disguised "pro looking" gear.

> Interesting, also, is the reverse" trend. Witness the products from Uni-Sync, all of whose professional amplifiers feature modular, easily service-" able construction. Both their Model 50

(dual-channel 50 watts per channel) and Model 100 (twice as much power per channel) units offer power output ratings that are in complete conformance with the FTC rule on Amplifier Power Disclosure, even though, as professional units, they are not covered by the Rule. Since conformance does require rather rugged and fail-safe construction and design (amplifiers must be able to dissipate near-maximum heat for an hour of preconditioning time), the professional user can take comfort in knowing that such products are more likely to stand up when subjected to the punishment of professional use.

#### **GOODBYE METERS!?**

If companies like Audio Technology, Uni-Sync, Lectrotech and others have their way, the mechanical meter movement may be on its way out. Solid state LED peak reading meters seem to be taking over both as power indicators and as level meters at line and mixing levels.

Nor are the new meters confined to separate add-ons. An interesting application of LED's was exhibited by JVC in two of their newly introduced stereo cassette tape decks. In the Models KD-85 and KD-65, five rows of LED's (five per row) serve to indicate recording levels in different frequency spectra. These are used by the recordist in addition to ordinary VU meters, which are also contained in these decks. The idea here is that since high frequency musical content more easily saturates tape, the recordist can not only judge overall record level but can see what frequencies in the music represent greatest recording amplitude at any given instant. Call it a poor man's real-time analyzer if you like, but with today's electronic music and even conventional program sources, the old rules about high frequency energy content being much lower than mid- and low-frequency levels can no longer be relied upon.

#### MONITORING THE SPEAKER SCENE

The line between professional monitoring speaker systems and highfidelity speakers was also narrowed as JBL, in a departure from established policy, made its 4311 professional control monitor speaker system available to audio dealers who sell high fidelity to consumers. The 4311 is the counterpart of the now-discontinued Model L-100 which had been a favorite of rock and pop music fans (both in and out of the trade) for many years.

Speaking of speakers. I can't overlook one of the conversation pieces of the CES-The Hill Model I "plasma" speaker system offered by Plasmatronics, Inc. At a mere \$6500 the pair, these floor-standing models create sounds of all frequencies above 700 Hz with no moving parts! Air is electronically pushed and pulled by means of ionization. A glowing violet area near the top of the speaker creates the ion field which is modulated by applied electrical signals and which (are you ready for this?) also utilizes small amounts of helium gas in its operation. Accordingly, every 300 hours or so, you simply call your local welding supply outfit and order up a tank of helium gas which is stored in the speaker enclosure. Cost of operation (in terms of helium expended) is estimated at around 30 to 40 cents an hour of listening time. Since this is the only speaker of its kind, we are not in a position to estimate whether that's good audio gas mileage or not! Oh, yes, in case you were wondering, frequencies below 700 Hz are reproduced by means of an old fashioned, conventionally operating woofer.

#### **OVERALL TRENDS**

On a broader front, the electronics of audio seem to be getting better and better. The improvements are no longer measured in quantum leaps, but such design approaches as directcoupled, direct-current audio amplifiers are now found in both home and professional equipment. The D.C. concept has even filtered down into the "lowly" all-in-one stereo receiver, with several manufacturers, including Sansui and Technics, offering higher powered receivers which include all-DC power amplifier sections for improved transient and phase response.

#### NEW TEST EQUIPMENT ON DISPLAY, TOO

If you are involved in tape recording equipment sales or service, a new piece of test gear shown for the first time by Sound Technology will have instant appeal. A complete tape tester, the new unit includes a digital oscilloscope which, with the aid of a built-in sweep oscillator, not only displays swept frequency response of a given tape/tape deck combination but digitally reads out the response with a "plus or minus" dB tolerance. The unit also includes the means for measuring wowand-flutter, using any of the four commonly accepted w & f measurement standards. Signal-to-noise measurements are also simplified and, if you are in the business of having to tweak tape equipment, this one should cut down on your test and alignment time considerably. It won't be available for several months yet, but I would guess that by the time it's shipped the company will be heavily back-ordered. The company has also up-dated its 1700 series distortion measurement system with lower distortion in the built-in oscillator and the added ability to read "rms" voltages as well as average voltages. This last improvement was no doubt prompted by the new IHF amplifier standards which call for S/N and THD readings to be made by an rms reading meter.

B.P.I., Inc., of San Diego introduced its new IM Distortion analyzer, which not only reads SMPTE IM, but also can handle some of the newer IM measurement methods (such as the one using a pair of high frequencies separated by 1 kHz, commonly known as the CCIF method). The company, famous for its digital metering systems on earlier analyzers, now has a digital readout meter on the new analyzer that reads directly in dB as well as volts and millivolts.

#### A LOW COST REAL TIME ANALYZER, AT LAST

If you are in the business of selling sound reinforcement, or if you have need of an accurate means of properly equalizing any sound system, you'll be happy to learn that Crown International has come up with a rugged audio-band real time analyzer that will soon be available for under \$2600. Scope displays on the RTA-2 are switchable to full or 1/3 octave and can be set for 10 or 5 dB per division on the built-in scope. Dynamic range is a full 60 dB. Outside of the little hand-held Ivie 1/3-octave analyzer and sound level meter introduced a few months ago, we know of no other real-time analyzer at this price that offers as much to the professional sound installer.

With over 800 exhibitors on hand at CES, we have, understandably, only mentioned a few of the outstanding items that were on display. The obvious meshing of the pro, semi-pro and consumer segments of the audio industry suggests that it's no longer enough for the semi-pro dealer to attend only the AES and NAMM shows, since this CES had plenty to attract the attention of the professional, too. So, if you missed this big one in Chicago, don't forget there's another one coming up in Las Vegas, beginning on January 5th, that may turn out to be almost as big. —Len Feldman

Where is the music industry going? It seemed like a logical enough question when I agreed to chronicle the trends in musical products at the NAMM convention. Now, with my desk buried in brochures for products of every shape, size, price and manner of construction, with a list of product categories three pages long, and with the song "Fools Rush In" running through my head; I will attempt to give you my impression of the progress and near future of an industry which serves the cultural and emotional life of most of the world.

#### FROM HARPSICHORDS TO COMPUTER SYNTHESIZERS

Remember your school teacher telling you about woodwinds, brass, strings and percussion? Well, look around the music store: synthesizers, foot-pedals, mixing boards, amplifiers and speaker stacks, stage lighting controllers, pickups, equalizers, digital delays, microphones, tape recorders, some new box with a hundred knobs and buttons. Is there anything that doesn't have wires attached to it? I'm overdrawing, of course, but anybody with eyes (and ears) can see (and hear) that in the past few years electronic products have created a music industry which is going to dwarf and perhaps engulf the traditional music merchandise market.

Most acoustical instrument markets (with the possible exception of fretted and keyboard instruments) are stabilizing or declining with respect to the total musical product field. The reasons? Of prime importance is the fact that most musical instruments go through some electronic processing before they reach the listener. Whether it is a cheap amplifier or a recording studio, some electronic device intervenes. Even if we ignore all electronic musical instruments, we must admit that sound processing and reinforcement has become as large a factor in the music business as the instruments which create the sounds.

Then we have the electric and electronic musical instruments themselves: from direct transducers for acoustical instruments, to electric guitars and pianos, to synthesizers with growing tonal and control possibilities. These have become a main-stay of business for the "pop" music store and the professional music market. And new inventions, new ways of creating and controlling musical sounds are being developed.

#### ACOUSTIC-ELECTRIC INSTRUMENTS

Electric guitars, the main instrumental vehicles of the pop music culture, continue to evolve. Physically, exotic materials and a better scientific understanding of the "sustain" problem are providing guitars with light-weight, single piece neck and body construction. Aluminum and Graphite necks are becoming estabished, though not by storm. Pickups are a "hot" area of development. Companies like Veilette-Citron, Ovation and others boast of magnetic pickups with excellent dynamic range specifications, while industry marvels like DiMarzio have guitarists everywhere changing to their new "hot" line of pickups. This is an interesting approach to musical marketing, too: The musician seems eager to "soup up" his instrument, and can do so at a reasonable price.

Active electronics (that is, internal transistorized or integrated circuit preamps) are finally becoming a trend in guitars. Musicians seem to be increasingly concerned about the quality of their sound, and the active preamps provide a low-impedance output with excellent frequency response and signal-to-noise characteristics. Companies like Ibanez, Ovation, Kramer and numerous others are starting to offer the "active" systems, either battery operated or with "phantom" external power supplies.

Electric pianos also exhibit notable trends of development. Industry standards like the Fender-Rhodes (which uses vibrating tuning-bars and magnetic pickups) will soon feel pressure from pianos like the Yamaha Electric Grand and the Helpinstill Portable Grand. Though they are much higher in price than the Rhodes, they offer much more realistic piano touch and sound. Yamaha used a piezo-electric pickup system and a "two-string" version of the piano mechanism, whereas Helpinstill uses his famous magnetic pickups and a full "three-string" piano, complete with sounding board. Helpinstill maintains that the acoustic interaction between the strings and the sounding board, which creates the tone in an acoustic piano, is accurately represented by the signal from the magnetic pickups.

Virtually all acoustical instruments can now be interfaced directly to an electronic system without microphones and their attendant problems of isolation and feedback. Barcus-Berry, Frap, and other companies provide piezo-electric and magnetic pickups for winds, brasses, strings and percussion instruments. It is up to the musician to make the choice between the acoustical accuracy of high-quality microphones and the convenience of these electronic direct-sensing devices.

#### THE BOARD, THE RACK, AND THE SPEAKER STACK; OR SOUND REINFORCEMENT SYSTEMS

The trend towards high-quality musical audio systems is now assuming the proportions of an industrywide revolution. No offense meant to the Fender Twins and Marshalls (since guitar amplifiers and their characteristic sounds have not lost their appeal), but musicians seem to be responding en masse to the ideal of producing studio-quality sound in a variety of live-performance conditions.

Enter (at last) the wireless microphone. They're not for everybody, since the price of a good wireless microphone ranges from hundreds to thousands of dollars, but several companies seem to have solved the problems of wireless microphones and offer these products to the professional musician. These microphone systems consist of high-quality miniature FM transmitters attached to the microphone (or the musical instrument) and corresponding receivers located at the mixing-amplification system. With a range of two or three hundred feet, these systems give a performer complete freedom from the constraints of being "wired in" to the sound system. Cetec-Vega offers models which operate in the UHF region, with "dual-diversity" receivers that protect against dropouts and

irregularity in sound previously experienced by wireless microphone users. Nasty Cordless uses the standard FM band, but boasts a dynamic range as high as 95 dB, at prices distinctly less than Cetec-Vega. The Nasty models are designed to work with microphone and musical instrument pickups. HME offers a wide range of price-performance, ranging from its higher priced triple-antenna diversity system to a budget priced system with more modest performance specifications. All these companies seem to offer products of excellent quality.

Cables and wiring will continue to be with us for a long time, and a small industry segment now produces highquality lines of cables, connectors and PA wiring accessories. Even at the musical instrument end of the audio chain, there is a tendency to prefer high-reliability, heavy duty cables to the more common and less reliable "plastic" connectors and jacks.

The signal-processing chain is based upon four fundamental elements: mixing, sound processing, poweramplification and output transducers. The price, packaging and system complexity varies widely, from small systems for a single musician to semicustom professional systems for big groups and big auditoriums.

A definite trend in this field is the increasing popularity of the 19-inch standard rack-mount configuration. The 19-inch rack has been used in recording studios for many years, and most studio quality audio products mount readily in this universal enclosure system. The utility of this system has become apparent to performing musicians (and road managers), and the musical product manufacturers have been quick to enter this new market.

Echo and delay systems are useful to provide sound effects and to compensate for time delays involved in large acoustical spaces. Superseding the older magnetic tape units are the new analog and digital delay lines, which require no physical maintenance and often provide cleaner audio characteristics. Analog delays are offered by Ibanez, Yamaha and others; digital delays by MXR and Dynacord.

Power amps continue to get bigger, cleaner and safer. The power range is from 45 to 350 watts per channel, and the "rack-mount" configuration is available for the majority of units. Almost everybody who makes "guitar" amplifiers now makes a stand-alone power amp.

Speaker systems are evolving into a form that combines the accuracy of studio monitors with the portability and versatility of P.A. stacks. There are integrated systems (bass, mid and high range in one enclosure) and separate components for bi-amping. Bose lovers will be delighted with the new Model 802, which still uses the multi-driver concept and Bose equalizer but is otherwise re-designed for better efficiency, safety and roadworthiness. Another new development is the "Sound Plate" by Barcus-Berry. It is a transducer mounted to a piece of plate glass, and Barcus-Berry claims amazing realism in acoustical output.

#### SYNTHESIZERS AND ELECTRONIC MUSICAL INSTRUMENTS

This category includes everything from home organs that just about play the music for you to digital synthesizers that once again promise "any sound that can be imagined." The field has become competitive to the point of overcrowding and the technology is growing faster than the instruments can be designed. Microcomputers are beginning to appear as sophisticated synthesizer control elements. Digital sound generation is making its debut. Keyboards, percussion, wind instruments and guitars are all synthesizeable. "Orchestra" machines using magnetic tape, organ and synthesizer technology are becoming common. If you can imagine it, somebody probably makes it.

Electronic organs and pianos are sounding more and more like "the real thing." Allen's digital organ, intro-duced in 1972, still provides a standard of excellence and realism for church and theater organs. Yamaha, Crumar and many others fill the home and professional organ market with automatic rhythm generators, chord generators and an expanded set of tonal possibilitiies. Yamaha, Roland and Novaline offer touch-sensitive electronic pianos with believable tone and expression capabilities. Unicord, Crumar, Sound City, etc. offer "slab" pianos without touch sensitivity at economical prices.

Keyboard synthesizers, available as cheaply as a few hundred dollars and as expensively as fifty thousand, span the tonal range from mundane to sublime. Oberheim has the single-voice programmable OB1 and the polyphonic programmable 4 and 8 voice models, with digital sequencer and cassette program storage options. Sequential Circuits' Prophet is a 5-voice programmable synthesizer offering 40 programmable patches and a simple, logical control panel, in addition to a digital programmer and sequencer for general use. Polymoog and Yamaha are touch-sensitive polyphonic synthesizers. ARP's new Quadra (not yet available) offers a combination of bass synthesizer, programmable polysynthesizer, string synthesizer and solo synthesizer in a microcomputer-controlled configuration that really captures the eye and ear. Crumar and Multivox offer "Orchestrators" that allow mixing and blending of a combination of simulated instrumental sounds.

RMI's Keyboard Computer is an alldigital synthesizer based on Allen's digital organ architecture. Crumar has a new polyphonic synthesizer with digital oscillators. Coupland's digital synthesizer (the highest-priced device at the show, I believe) is computerized from front panel to output, and allows the use of all the latest techniques in digital synthesis. The age of digital synthesis is just beginning. Unlike the early history of analog synthesizers. we can expect heavy competition in this field from the beginning. Synthesizers are a fact of life, and digital synthesizers are an advancement rather than a new product type.

The keyboard no longer reigns supreme as the way to control a synthesizer. Guitar synthesizers by ARP, 360 Systems, MCI, and Zetaphon span the range from simple interface to fully polyphonic systems. Drummers can choose from Syndrum, Synare and Thin Skins for a wide range of price and versatility in percussion synthesizers. Lyricon, the wood-wind based synthesizer, has introduced the Lyricon II, based on a "standard" synthesis configuration. Lyricon also offers a controller that patches into any voltage-controlled synthesis system. Trumpet players can try out Steiner's trumpet-oriented synthesizer controller.

#### PEDALS AND FLOOR BOXES

For budget-priced, foot controlled signal processing, there exists a plethora of boxes with switches and/or pedals.

A new sound in the pedal business is

the "Harmony Synthesizer" by Analog-Digital Associates. It resynthesizes the input signal over a range of variable musical intervals, enabling the musician to play in harmony with his own instrument. What's more, it handles polyphonic inputs (unlike conventional octave dividers) and also provides a time-delay for free.

#### OTHER NEW EQUIPMENT

We are always confronted with new classes of musical products; that's one of the things that makes life more exciting.

The Gizmo (Gizmo, Inc.) is a device which fits on an electric guitar, just above the bridge, and mechanically "bows" the strings in any combination to simulate bowed instrument sounds and provide an alternative method of playing the guitar. An *electronic* device similar to the Gizmo, called the E-bow, which has been out for over a year, operates on one string at a time.

Vocoders. You play your synthesizer, sing into the microphone, and the synthesizer is talking-er-singing. Korg makes a very nice package, complete with its own keyboard for generating the tonal component of the synthesized singing, at a reasonable price. Moog makes a much higherpriced model, with correspondingly more accurate fidelity. The effect is strange and quite pleasing, and we should be hearing from these talkingsinging machines on records in the near future.

#### A CONSIDERED OPINION

Of course, I have only covered a fraction of it. Even with four days available to study all the products at the NAMM show, I was only able to scratch the surface. The trends are there; some are obvious, some only hinted at. For people involved in all aspects of the music industry there is an increasing need for study of present products and markets, and a sense of where it is all going.

Whether you are a musician, store owner or manufacturer, you owe it to yourself to carefully study the emerging music industry. Many worthy products and manufacturers are not mentioned here, only because there is not sufficient space or time. Consider them all: The music business and music itself will benefit.

-Mike Beigel

## automatic graphic equaliser



#### **Features**

- Fast, simple and extremely accurate equalization to ±0.75 dB using easy-to-read red and green LED indicators
- Economical self-contained Auto-EQ (pat. pend.) circuitry
- Double-tuned, minimal phase-shift, monolithic IC saturation-free active filters on standard ISO centres (leaves older "gyrator" designs undesirable due to distortion and saturation)
- Low-noise with super-wide dynamic range
- Precision pink-noise generator
- Time-delay circuit for noiseless operation
- Full spectrum controls with ±12 dB boost and cut input level controls
- Highest quality ADI design with rugged 19" rack mount construction
- U.S. professional net user price; \$795.

#### **Applications**

- Environmental equalization for flat frequency response
- Utmost in simplicity of operation
- Speediest solution to feedback elimination
- Acoustic level balancing
- Elimination of all peripheral test gear

#### AUDIO DEVELOPMENTS INTERNATIONAL CORP. 644 Emerson St., Palo Alto, Ca. 94301 USA tel:(415) 321-3035 telex: 470 464 ADIC UI

CIRCLE 82 ON READER SERVICE CARD



CAMEO, the Creative Audio and Music Electronics Organization, is a new trade association with 28 manufacturer members who sell professional audio, sound reinforcement and electronic musical instrument products. The birth of Cameo reflects serious and rapid changes that are taking place in the marketing of this kind of gear.

"The birth of Cameo is like three or four chemists working independently on the same new formula not knowing if others are all proceeding along similar lines," explains Ken Sacks, national sales manager of TEAC Tascam Series, who will be president of Cameo during its first year.

Cameo was born out of a need to produce a total marketing concept to this expanding but blurred marketing area. The fact is that what has been termed the *semi-pro* market (a term incidentally considered inappropriate by Cameo members) and the electronic music market have begun to sell their products in each others' back yard—the pro audio manufacturer marketing through musical instrument dealers and vice versa.

The professional consumer, that practicing musician and/or production person who uses this equipment voca-



tionally, just had to have help in the form of educational programs and cleaner distribution channels because the gear was getting more intricate in design, broader in scope, and was therefore demanding more of the person using it. Likewise, the audio and musical instrument dealers found themselves in a maze of new products. In order to pull this thing together, the manufacturers involved in this highly complex market felt they should join forces in some kind of trade organization.

When Sacks met with Larry Blakely, director of marketing at dbx, and Vinny Testa, publisher of MODERN RECORDING and SOUND ARTS MERCHANDISING JOURNAL at the 1977 summer CES, they were all thinking along similar lines. "That's when the semi-pro label was discarded and the term *professional consumer* came into being," Sacks remembers. "That was the first pre-Cameo meeting and it was agreed that the professional consumer was the person all of us were interested in."

Mr. Testa suggested the press be limited to associate membership in Cameo and excluded from the board of directors, since, "Cameo, in order to succeed, should be a cooperative effort of manufacturers."

In October 1977, a group of manufacturers met in Chicago to begin exploring the possibilities of forming an organization for the specialized market. At the meeting also were Vinny Testa and David Schulman, a partner in the Chicago law firm of Schulman, Silverman and Kreiter Ltd., which represents a number of companies in the industry. A steering committee was named to discuss the possibilities with other company officials. Some persons at the meeting



reacted negatively to the idea of a new trade association. Others were iffy.

A second meeting was held in December at which the term *Cameo* was born. It was an eight-hour-long session and the group wrestled torturously with words in an attempt to define the market and identify its parts. Coming to grips with this market was a very difficult job. "Even the name Cameo came very tough," says Schulman. "However, we found that certain words kept cropping up and took on immense importance. They became the bedrock of our definition. Words like *creative* and *vocationally* were most fundamental."

What the group finally emerged with was this: Companies whose primary function is in the manufacture or distribution of finished electronic products under their own brand names that are used by musicians and production people vocationally to produce creative and original sound are eligible for membership in Cameo.

An honored guest at this meeting was Les Propp, President of the American Music Conference, who brought the welcome word that Jim Johnson, President of NAMM, and the AMC were fully prepared to lend their support—physical as well as moral—to



help get the new association started. Propp pointed out that practically no figures or statistics were available on the growth of the music electronics industry and those at the meeting agreed that one of Cameo's purposes could very well be to provide statistics and other data on an industry-wide basis.

At the winter NAMM show last January, members of the Cameo steering committee, including David Schulman, who has acted as executive director and general legal guardian both before and after Cameo's inception, met with NAMM officials and dealers to discuss Cameo's aims in broad terms. Schulman explained that Cameo fits between NAMM and AMC on the one hand and the IHF and AES on the other. Cameo's members are concerned with electronic music, music amplification and recording, and the creation and production of music. He described Cameo's role as one of complete cooperation with existing trade associations, and reiterated one activity that Cameo would not engage in-stage its own trade show. Rather, Cameo members would prefer to show as a group within existing trade shows.

In fact, the IHF later invited Cameo to display at its Atlanta audio show, but the time element was too short for the organization to prepare properly.

Schulman related that Cameo's representation lay in the areas of power and music amplifiers, specialized speakers, mixers, microphones, signal processors and modifiers, tape recorders, synthesizers and the necessary accessories. "Cameo represents an industry," he said, "that is reflecting very rapid market growth, an industry that needs dealer and consumer programs, development of common industry-wide goals and positive information for its membership."

Schulman outlined Cameo's goals: To develop active programs which will provide dealers with a common goal and direction, as well as to promote and educate the professional consumer who is interested in these products; to work cooperatively with other trade groups to gather recommendations for standardization, market research and product safety; to amass statistical data for its members; and to represent the industry in government and legislative concerns.

Last May, at the close of the AES show in Los Angeles, the first formal meeting of Cameo was held. Nineteen



companies joined the organization at that time. They were: AKG, Altec, ARP, BGW, dbx, Fender-Rogers-Rhodes, ITX-Aphex, JBL, KM Records, MXR, Oberheim, Phase Linear, RolandCorpUS, SAE, Sirius Music, Soundcraftsmen, Tangent, Tapco, and TEAC Tascam Series.

Officers named, in addition to Sacks, were Larry Blakely, vice president; David Friend, president of ARP, secretary; and Ron Wilkerson, MXR director of marketing, treasurer. In an effort to assure equal representation for both manufacturers primarily identified with retail audio dealers and those identified with retail musical instrument dealers, six product categories were established and six atlarge representatives were chosen for the 12-man board of directors. The categories are: Musical instruments (Fender-Rogers-Rhodes); signal processing and interface equipment (SAE); microphone-speakers (AKG); amps and mixers (TAPCO); tape recorders and instrument amplification. Because Ken Sacks already was an officer of Cameo, it was decided to increase the at-large representation to seven members and vacate the tape recorder category.

This, as well as subsequent meetings, was well reported by the trade press, including *Down Beat* and *Billboard*. *Billboard*, in fact, has run several feature stories on Cameo.

Between this first meeting and the second successful session on the last morning of the NAMM show in Chicago in June, DiMarzio joined Cameo. At the Chicago meeting, eight additional companies joined the group: Acoustic Control, Bose Corp., Electro-Voice, Peavey Electronics, QSC Audio Products, Sound Workshop, Uni-Sync and Yamaha International. Peavey Electronics was elected to the board in the instrument amplification category. Seven at-large representatives were chosen: Electro-Voice, JBL, RolandCorp. US, Sound Workshop, Tangent, Uni-Sync and Yamaha.

A meeting of the full board and officers of Cameo is to be held in Chicago on August 4 to establish committees and a full blown industry membership drive to begin the task of bringing the industry together.

Early in the development of Cameo, in fact before there was a Cameo, certain premises were agreed to. Manufacturers, it was felt, should unite to solve common programs inherent in the emergence of a new fast-growing market. Cameo should be a tradegroup to educate and promote this new market, provide dealers with longrange direction via continuous active programs, and develop new markets. Simultaneously, it shall promote the almost constantly new technology both on a trade and consumer basis, participate in setting up standards by which more products could be more easily understood by consumers, and seek through a viable publicity program to promote the specific market.

Cameo now has 28 manufacturer members and expressions of support from nearly every major trade publisher and editor.

The meeting in August will go a long way toward developing Cameo's formal programs and projects. There will surely be a membership drive and a concerted effort will be made to transform the members' enthusiasm into viable and practical activities for the good of all.

## CROSSOVER NETWORKS Divide & Conquer

By L.A. Krause

R

IR JA (+ 3.17

Crossover networks are electronic circuits which divide the audio spectrum into two or more ranges which are directed to the appropriate segments of a multidriver loudspeaker system. The preceding statement is a very basic yet correct description of an electronic device that is probably one of the most misunderstood and therefore misused components available to the electronic consumer today. The purpose of this article is to describe some of the available crossover configurations and to give some suggestions as to their correct utilization in sound reinforcement and other critical applications.

This article is directed to the readers who are not design engineers and who do not have access to the test equipment required to design a laboratory standard speaker system. Many people do not understand that a high level crossover network is an integral part of a correctly designed speaker system. The crossover not only directs the proper frequency ranges to their respective drivers; it also provide phase correction, equalization, and proper termination for the drivers.

It has taken many years of trial and error, in addition to a university degree in engineering, for me to gain a personal insight into the complexity of a proper crossover network design. When I was doing my graduate studies, I had the somewhat naive idea that I would design (I use the word design very loosely) a speaker system for my home stereo using very high quality components.

After purchasing the component parts for my three-way system and going to great pains to build what I thought at the time to be a suitable enclosure, I realized that a crossover network of some kind was needed. This would seem to be a relatively simple problem, because my midrange horm and driver were designed for a 500 Hz crossover point and the top end transducer was designed for a 3500 Hz crossover point. I went back to the catalog and then to the store for the 800 and 3500 Hz crossover networks, cut the proper size holes for the gray boxes, made sure that everything was in phase, and turned up the music. After approximately 30 minutes, I realized that something was not quite correct, and in about an hour I realized that I had constructed a thousanddollar turkey. At the time I was more concerned with impressive data sheets than with fine detail and the results of my efforts were, to say the least, very disappointing. I made changes to those speaker systems for almost a full year before I gave up and sold them to a local rock band for about half the amount that I had invested in the raw components alone.

That personal experience has probably been repeated many times by both degreed engineers and audiophiles. The mistake that I and many sonal sound, after enough trial and error and research, you might come up with something. If, on the other hand, you are trying to please an audience of 10,000 at a rock concert, you would be well advised to follow the advice of recognized authorities.

#### SOME BASIC PROBLEMS

Figure 1 illustrates some of the problems encountered with regard to the speaker components in a typical two-way monitor system. The frequency range covered is from 10.0 Hz to 10.0 kHz, and is a plot drawn from a computer-generated mathematical model. The two most obvious problems are the frequency response of the components and the difference in relative efficiency.

Rather than dwell on the mathe-



Figure 1. Typical characteristics of components used in a two-way system.

other people made and continue to make is in the incorrect selection of the dividing or crossover networks. The crossovers I had selected were simply not compatible with the drivers and cone loudspeakers in a total system configuration. If I had followed the manufacturer's recommendations to the letter I would have saved a lot of money and worry.

It is important to appreciate how much research, money, testing and luck goes into the design of a high quality multidriver speaker system. Those black, gray or walnut systems are the result of many years of research and experience; and in most instances it would be impossible for the average design engineer to even approximate the performance of these systems. If you are seeking your permatical relationships of direct radiator cone speakers, the proper filter termination impedance, and the other confusing factors of passive network design, I will simply state that it is possible to obtain a frequency response that is flat  $(\pm 3.0 \text{ dB})$  from 40.0 Hz to 13.0 kHz using these components. I would feel very safe in stating that more than 50 percent of the recording studio monitor systems in use today are designed using twoway systems and high level passive crossover networks. This type of performance is possible only when a total system design is employed. The passive crossover networks used in these systems are very complex and are designed for very high power handling capabilities. I mention power handling because you cannot obtain frequency

response compensation, efficiency matching, and sustained high sound pressure level operation without giving up something. This "something" is efficiency.

If, for example, you must match the efficiencies of the components shown in figure 1, it is obvious that something must be done to reduce the acoustic output from the horn and driver combination. The 8.0 to 10.0 dB of efficiency-matching results in a substantial amount of power (heat) being dissipated somewhere in the crossover network. After all of the corrections are made, a typical response, as shown by the broken line, will result. If you consider that all of the area under the other two lines can be represented in terms of energy which must be expended or dissipated in the form of heat, it is easy to see why high level passive crossover networks are large, heavy, and expensive. It is also possible to see why speaker systems using passive crossover networks are relatively inefficient.

While you are not actually reducing the efficiency of the individual components, you are changing the electrical input to the components in order to obtain the desired frequency response. The net result is that if you are applying 20.0 volts R.M.S. to a system with a nominal impedance of 4.0 ohms, the power being dissipated by the total system is 100.0 watts. If only 60 watts are being delivered to the 15-inch bass speaker and high frequency driver combination, 40.0 watts are being dissipated in the crossover network. These 40.0 watts are going up as heat-not sound! There is a better way to handle high power applications, and that is the low level active crossover, multiple power amplifier approach. (See figure 2.)

#### MOST IMPORTANT DETAILS

There is a basic assumption that must be considered throughout the remainder of this article.

The signal applied to the input of all crossover networks is described as being *pink noise* or noise which has constant energy per octave. This simply means that the energy contained in the octave from 20.0 Hz to 40.0 Hz is exactly the same as the energy contained in the octave from

L.A. Krause is design engineer at Peavey Electronics.

8.0 Hz to 16.0 Hz. This consideration is important because it is difficult to visualize the actual spectral content of music. While the purpose of this writing is to describe crossover networks, it is impossible to adequately do so without considering their application in a complete system. Remember that there is a basic difference between home stereo systems and recording studios and sound reinforcement systems. There is a popular misconception of the power amplifier requirements as applied to these systems. It is true to a point that there should be a ratio of two to one, or that the bass system power amplifier should have approximately twice the available power capability of the high frequency section in a home stereo system. However, this popular theory falls apart when recording or designing a sound reinforcement system.

Consider the following statement: Power is the measurement of heat generated by the application of a voltage across a resistance. There is no mention of time in the definition of power. Everyone has heard the terms peak power, average power, R.M.S. power and so on. The reason for all of these terms is that a time factor has been added to the basic power equation. Time is an important factor when considering an audio signal, in that different types of instruments generate energy that can be differentiated both in terms of frequency bandwidth and the amount of time required to reach the point of maximum level (attack time or growth) and return to a minimum perceived level (decay time or release). If you connect a microphone to an oscilloscope and look at the output waveform of different instruments, you will notice that the relative amplitude of the different instruments is almost the same. Your mind perceives different frequencies as having unique amplitude characteristics because of the non-linear response of the ear.

The justification for all of this verbiage is that it makes no difference if the amplified signal is from a bass guitar or a snare drum as far as power amplifier requirements are concerned. If you have two 100-watt amplifiers in a bi-amplified system, both power amplifiers will be required to deliver maximum power for the duration of the applied signals. True, the duration of the requirement will be shorter for the snare drum, but the amplitude requirement is the same. It is my personal opinion that this is the reason some



sound reinforcement systems have more presence than others. A clipped signal is offensive regardless of the part of the spectrum in which it is contained. Your mind perceives clipping much more quickly and with greater definition at the lower frequencies, but clipping of the high end results in what is called *fatigue* over a longer period of time. A stereo record is compressed, limited, and equalized and has a very restricted dynamic range. You can justify a 2-to-1 power ratio on a stereo system, but with some additional mental work it becomes obvious that much greater available power is required for the more demanding applications.

#### THE CROSSOVER NETWORK CHARACTERISTIC

For the duration of this writing I shall be concerned with low-level

active filter electronic crossover networks. There are several approaches which can be taken to obtain the desired transfer characteristics or crossover functions with electronic circuits. The crossover point or frequency, for purposes of discussion, shall be the frequency at which the output from the high pass section (high end output) is 3.0 dB down from a reference point at least one octave above the crossover frequency. Refer to figure 3 to fully understand this definition.

Figure 3 shows an amplitude of frequency response curve for a 500 Hz, 12.0 dB per octave, electronic crossover network. The network shown has a symmetrical, second order, Butterworth characteristic transfer function. The "order" of a crossover network is a description of how fast the roll-off of the filters takes place. A first-order network exhibits a 6.0 dB per octave rate, a second-order network a 12.0 per



Figure 3. 500Hz, 12dB per octave crossover network frequency response.



Figure 4. 500Hz, 18dB per octave asymmetrical crossover network frequency response.

octave rate, and so on. The word symmetrical is important, because there are both symmetrical and asymmetrical forms of crossover networks. Figure 3 shows the response of a symmetrical network and figure 4 illustrates an assymmetrical network with a third-order (18.0 dB per octave) Butterworth characteristic function. As illustrated by figures 3 and 4, a truly flat frequency response active crossover does not exist except in the minds of advertising managers and other wishful thinkers. If a data or specification sheet should state that a crossover is flat over the entire bandwidth, please read the fine print; there is some small detail that has been overlooked or obscured.

The symmetrical crossover frequency response shown in figure 3 is defined as symmetrical due to the fact that the low pass filter and the high pass filter sections both roll off at the same rate. The Butterworth characteristic function is the most popular type of active filter network design and has several good points, which include a smooth frequency response change in the crossover region, and minimal amount of ringing in the transient response. It is easily designed. The symmetrical Butterworth filter response may also be adjusted over a wider range if proper tracking of the control potentiometers is maintained. There will, however, always be a 3.0 dB notch at the crossover point when this type of filter is used. This is not a problem, but remember, when you are trying to equalize your system, that the notch does exist.

The assymetrical crossover network response, as illustrated in figure 4, results from a filter network that exhibits a Butterworth response by the high-pass section and a somewhat unusual response by the low-pass section. The high-pass section exhibits an 18.0 dB per octave roll-off rate while the low-pass section has a 6.0 dB per octave roll-off rate. It should be noted that in this type of filter, the low-pass section will always have the 6.0 dB roll-off rate regardless of the roll-off rate of the high-pass section. This is not a big problem, because, in general, the bass speaker components will have to deliver the same amount of power regardless of the order of the low-pass filter section.

The asymmetrical crossover net-

nal represents the low-pass output. This is an elementary explanation, and I apologize for the simplistic approach with respect to the more analytical readers. The main point of this description is to point out that if you recombine the outputs from an assymmetrical network you will have an output which is exactly what you put in. I feel that this type of filter network will be found in many types of packaged systems in the future. The primary advantage of this approach is that you always know that your crossover frequencies are where they should be with respect to each other. If component values change in a crossover network, as illustrated in figure 5a, you might end up with a high-pass section being 3.0 dB down at 700 Hz and the lowpass section being 3.0 dB down at 400 Hz. The resulting hole in the overall frequency response would be impossible to correct by equalization.

#### CROSSOVER NETWORK ADJUSTMENT

At this point, let's go back to a point I stressed in the beginning of this article. In a properly designed system,



work is realized by the process of subtraction and is illustrated in figure 5b. Due to the design of the high-pass filter, it is necessary to invert the phase of full range input signal prior to application to the high-pass network. The high-pass network attenuates all frequencies below the crossover point, and this range of frequencies is applied to the subtracting amplifier along with the full range input signal. The subtracting amplifier subtracts the high frequency program material from the full range input and the remaining sigthe high level passive crossover network does much more than divide the audio spectrum into two or more ranges. With a typical packaged electronic crossover you are back to the same problems of phase and frequency compatibility of the various system components. The only basic difference is that the user has spent a lot more money to obtain the same bad results. You can turn all of the crossover point and level adjust knobs you desire and not have a properly adjusted system. The only saving grace for most people is the availability of narrow band equalization systems. It has been stated that equalization can only cover up poor original designs. Unfortunately this is a true statement. A narrow band equalization set and an adjustable crossover network in the hands of an inexperienced person can result in a rather large number of blown driver diaphragms.

Some drivers are more tolerant than others when it comes to crossover frequency. If maximum power is demanded from a driver you would do well to adjust the crossover network for as high a crossover frequency as practical. If, on the other hand, maximum sound pressure level is not required, you can go below the recommended crossover frequency at your own risk. When you send a driver back to the works for repair, the cause of failure is quite obvious in most instances. A diaphragm that is burned out when the suspension is still functional is indicative of excessive power being applied. You would be surprised at how many drivers are destroyed in an attempt to "equalize" a system using pink noise. A driver with the suspension completely destroyed is most likely the result of someone trying to operate the driver below its rated crossover point.

Aside from the obvious problems of excessive power and improper crossover point selection, we have another serious problem which in itself will not destroy a transducer, but will (and often does) result in very poor overall system performance. This problem is one of proper phase. Everyone seems to know that you have phasing problems in speaker systems, but very few people are able to adequately analyze and correct these problems. In a packaged active crossover network you are usually given a choice of two phase relationships. You are either in phase or are 180 degrees out of phase. A proper adjustment of phase relationship cannot be made given only the two choices in most systems. Expensive test equipment and complicated procedures are not required to tell that a bass speaker and driver are out of phase. Your ears can just as easily make this kind of measurement. Do not fool yourself into thinking that you have achieved an optimum system situation after adjusting all of the knobs, switches, and flashing lights that are associated with most "professional" crossover networks.

I do not intend to discourage anyone by making rash statements, but the only professional crossover networks are those which are designed as part of a total system and take all transducer performance variables into consideration. If I seem to be advocating adherence to a total system concept, as presented by most recognized manufacturers, you are quite correct in your assessment.

I do not feel that it is proper for an individual to be sold expensive sophisticated electronic equipment without adequate instructions as to correct operation and expected results. There seems to be more emphasis placed on fancy and complicated equipment than on basic knowledge of what can be done with the fundamental tools that represent good value. I sincerely hope that this short and rather elementary article will provoke the curiosity of the sincere audio technician. I strongly suggest that if you are going to design your own system, more detailed research is in order. Study the subject, apply the principles, objectively evaluate the results, and you will be surprised at your own capabilities. Knowledge does not come in a fancy box.



The Sound Workshop 223A Electronic Crossover is a departure from the typical electronic crossover available today. The use of state variable filters eliminates the phase shift problems associated with most designs. Single knob crossover frequency selection, level controls on all outputs, and crossover characteristic controls allow maximum system optimization with a minimum of hassle. The 223A has 2-color screening and push button mode selection for ease of use in either the stereo bi-amp or mono tri-amp mode. Unique booster amplifiers on all outputs permit levels of +20dBm into 600 Ohms (+26dBm into 300 Ohms) across the entire audio band with a maximum THD of .05%! Compare the features and performance of the Sound Workshop 223A with the unit you are now using or planning to use, and cross over



outputs (max level +26dBm into 600 Ohms) ...\$400.



#### **By Henry Collins**

Disco, at one time regarded as a mere fad, has become an industry in itself. It's a fact that a good many retailers are selling disco mixers, speakers, amplifiers, etc. Whether or not disco is a viable market to venture into is a serious matter to consider.

To get some idea just what it entails to both sell and install sound systems for discos, I spoke with Richard Long, president of Richard Long and Associates, one of the world's leading disco sound installers. Among his roster of well over 150 club installations are such well known names as Studio 54, Regine's and Annabele's in London. With over eight years of experience in the disco sound business. Richard Long is one of the early pioneers in this industry.

What is the difference between a PA or sound reinforcement system and a disco sound system?

Long: A public address system is designed primarily for voice amplification. Sound reinforcement equipment is generally used for both voice and musical instrument amplification by bands etc. Disco is quite a different matter. The demands for sound fidelity and sonic performance for disco sound systems are very exacting. Distortion of any type simply cannot be tolerated, especially at the high sound pressure levels that the systems normally operate at.

People who usually attend concert performances by rock groups or jazz bands generally accept distortion as part of that "live" music format. Records, on the other hand, are produced under controlled conditions in a recording studio and, as a result, disco-goers expect quality from a disco sound system. After all, people go to discos to dance and listen to the music, not watch a live performance. If you think that disco-goers don't take their music seriously, just check out the reactions of people on a packed dance floor when a deejay blows his mix.

What are the basic criteria for disco sound equipment?

Long: One thing to look for in a sound system designed for disco applications is reliability. A mixer must be able to withstand abuse from deejays who spill drinks from time to time and misplace cigarette ashes. Turntables must be virtually indestructible, free of acoustic feedback problems and must feature variable



All photos of Studio 54 by Vinnie Persico

pitch controls. The drive system must produce enough torque to maintain constant speed accuracy with increased loads. Amplifiers must be able to operate around the clock and with loads as low as two ohms. The speaker system must be highly efficient, offer impressive bass reproduction, along with well dispersed midrange and high end frequencies. Rarely if ever does one find these items sitting around in a retail audio store.

How does a retailer go out after the disco trade?

Long: I think we should first clear the air of some misconceptions about selling disco sound hardware. First of all, people who generally buy a disco sound system are buying it for the first time and know absolutely nothing about the equipment. Not only are they looking to buy the equipment, they also want it installed. Installing a sound system is an affair that can take anywhere from two hours to two weeks. A dealer might start out selling disco sound equipment and then find himself spending all his time installing it. A dealer will quickly learn that his ability to sell disco equipment will depend on how well and how fast he can install systems.

If a dealer wants to go after disco trade, he must first establish a reputation as an audio installer. Unfortunately, the only way he can do that is

WR



by doing several successful club installations. You might say that installing disco sound systems is like show business; you're as good as your last installation.

Servicing sound systems is an important point that a dealer will want to consider. Club owners will almost invariably want some kind of service agreement. After all, if something should go wrong with the system, they'll want to know who to call. In some instances you might be expected to provide loaner equipment until repairs are made, which will necessitate an investment in additional backup hardware. If you don't service your existing installations, you don't get new installations. You have to remember that in the disco sound business most of the jobs you'll get are by word of mouth and if the word out on you isn't good, business is bad.

What does the average club installation entail?

Long: First of all, no such animal exists. Club installations vary considerably in size, layout and cost. In order to determine what's average, we must first establish a basic norm. Let's say that the average club has a 1,000 square foot dance floor, large enough to contain 200 people. Assuming too that the ceilings are relatively high, about 12 feet or so, and that some speakers can be suspended over the dance floor, then I would say that a top-notch system would cost about \$20,000. A good system would be in the vicinity of \$12,000. Anything under \$6,000 I would regard as a good hi-fi system for home use. Some might argue that these figures are a bit high, but then they might not mind making frequent service calls.

By some standards, a club with a 1,000 square foot dance floor is considered above average. But for a disco located in a major city, this is about average. An installation of this type will generally require two or three people. You can get by with two people if they both have strong backs because a bass speaker alone can sometimes weigh as much as 200 lbs. or more. You will, without a doubt, need a truck or a van to transport the equipment. If the speakers must be mounted above the floor you will need a portable lift.

If every club that a dealer was called on to do was acoustically sound, he wouldn't have to be concerned with room acoustics. Unfortunately, this is not the case. In almost every case special acoustical treatment or 1/3 octave equalization or both are necessary for good, if not great, sound reproduction. I will say, however, that most club owners would rather dispense with the frills and simply want you to install the system. You will find on occasion that there are club owners who want the competitive edge that a finely tuned sound system offers. In this case a dealer may want to enlist the services of a competent acoustician. If equalization is all that is required, which in most cases is all that the club owner is willing to pay for, then a dealer might want to buy a 1/3 octave spectrum analyzer and a pink noise generator in order to properly adjust the audio equalizer. I must warn you though, a compact 1/3 octave band spectrum analyzer like the Ivie IE-301A goes for \$3,000.

What are some of the basic problems encountered in the design of a disco sound system?



## Our Sonalite 3 and Sonalite 4 are (L) listed\*...



"The Disco Industry Top of the Line Controller"

4 Individual Channel Dimmers 1200 Watts per Channel True 4 Channel Sound to Light 5 Different Automatic Chase Patterns 5 Different Automatic Fade Patterns 5 Different Audio Chase Patterns Extenders Available, Each Adding 1200 Watts per Channel 40 Amp Breaker Master Brightness Control

\* For Insurance Purposes , for Both Units Quote 🕖 Listing 893E



#### 'The Industry Standard for 3 Channel"

1 200 Watts per Channel True Sound to Light 3 Channel Automatic Chase 3 Channel Audio Chase Keyboard - Allows You to Play the Music Full Line Dimmer Emphasis Slider for Sensitivity Control 30 Amp Breaker

## with anything less you could be playing with fire



with Meteor-reliability is the bottom line

155 Michael Drive, Syosset, New York, 11791 (516) 364-1900 West Coast (213) 846-0500; Canada (416) 677-0545 105-109 Oyster Lane, Byfleet, England KT147LA (Byfleet 51051) Long: One of the major problems involved in designing a sound system is budget considerations. Club owners generally have no idea what a good sound system costs, though they do know how much they don't want to spend. To make matters worse, you might find that you're competing with several other dealers for the same job. Since there is no convenient way for a club owner to compare the sound and the performance of each proposed system, what normally happens is that the job goes to the installer offering the lowest bid.

The redesign of an existing sound system can also present problems. Since a club owner generally wants to save as much money as possible, you can find yourself working with undesirable components which can often present service problems. A wise thing to do would be to inform the club owner that you will service only the equipment installed by you. You'll find that sometimes it's better to turn down installations where you're pressured to use existing equipment.

A dealer who must work with existing or commercially available equipment will find installations that require custom designs simply out of the question. An excellent example of this is Regine's. In this installation, the size and the layout of the club precluded the use of conventional speaker designs. As a result, speakers had to be specially designed to fit in with the club's decor.

Another problem that merits serious concern is product availability. Sometimes an item can be back-ordered as much as two months and it still may not be available for at least another two months. Unless you're manufacturing and installing your own line of disco hardware, or have close personal ties with all your suppliers, you'll find this problem hard to get around. If a dealer is carrying a line that is frequently back-ordered, it would be wise not to specify it in any important installations.

If a dealer should happen to run into a big installation out of his immediate area, before he specifies any equipment he should first check out what service centers are in the vicinity of the installation site. It's not a good practice to specify equipment that can't be readily serviced, or which has its nearest authorized service center in the next state. Which audio dealers are best equipped to do disco sound installations?

Long: No audio dealer is really equipped to do disco sound installations. I have been called on a number of times to re-do installations performed by dealers moonlighting as sound installers. I would have to say though that any dealer who as a regular part of his business installs sound reinforcement systems or does custom home audio would be the lesser of two evils.

Designing sound systems for discos is a very exact science. There are a agreements with a club owner, especially if he has some doubts about his own ability to uphold the deal. At no time should a dealer take on a large installation with the hope that by over-pricing the job he can blanket his mistakes. In this business mistakes are very expensive. If a dealer is under a binding agreement to do a club installation and for some reason fails to provide the services outlined in the agreement, he stands an excellent chance of being sued. On the other hand a dealer might want to cover himself with a contract or a purchase order in the event that it becomes necessary



number of complicated design problems that can pop up during the course of an installation and if the dealer has no previous experience to fall back on he's in big trouble. A dealer dabbling in disco will quickly find that club owners become very indignant upon learning that they were paying for his education in sound installation, especially if he fails the course.

Are formal contracts and service agreements required practices in this business?

Long: It's not required, but it's a good practice. A retailer should think though before making any written to take court action against a club owner regarding slow payment.

Is there any personal advice that you would like to extend to dealers or salespersons who might be considering doing disco sound installations?

Long: Installing sound systems for discos is not something you can learn overnight. If a dealer is seriously considering expanding his business to include the design and installation of disco sound systems, I see nothing wrong, provided his primary push is quality first, and profit second. What this industry needs is more sincere professionals who can do the job right the first time.



On June 10, 1977 BIAMP introduced revolutionary circuitry to the professional audio industry at the NAMM Show in Atlanta, Ga. What this means to you is quieter mixers, faster slewing rates, lower distortion, greater bandwidth and improved output capability. In fact ... a superior product!

The BI-FET operational amplifier is the state-of-the-art device which solves many audio circuit challenges. This means recording studio quality at a fraction of the cost. All BIAMP mixing consoles use BI-FET technology.

Shown above is our model 8802 8-channel stereo-output mixing console. We also make 6 and 12 channel models. All BIAMP consoles feature BI-FET technology.

WATCH THE COMPETITION FOLLOW OUR LEAD! BELIEVE IN BIAMP!

Please send me more info.	
BIAMP SYSTEMS, II 10950 S.W. 5th, Suit Beaverton, Oregon	NC. te 110 97005
Name	
Address	
City	
State	Zip

#### Dirty Don's P.A. Palace Atlanta, Seorgia

Five years ago, somewhere in Atlanta, Georgia, Don Rosinsky sat pondering the future of his audio equipment sales enterprise. His education as a banker and stockbroker enabled him to predict from the tremendous sales potential of home entertainment systems the prosperity that would soon come to the sale of professional sound systems for concert and recording use. His audio shops were constantly fielding requests for P.A. systems which were available to him only as special order items. Across town, a musical instrument salesman named Ellis Baxter was making a daily ritual of dealing with professional musicians who made the same sorts of requests for P.A.'s. Such units were not available to traditional music stores, so Baxter was guiding musicians elsewhere.

A meeting between Don Rosinsky and Ellis Baxter was inevitable. They were selling related goods to the same buyers, but neither carried everything that the buyer needed. Pondering the old problems, and having a sincere



commitment to Atlanta's music industry, the two men speculated that what the world wanted most was simply what it needed—a palace of every conceivable musical delight.

Dirty Don's P.A. Palace overlooks a four-lane stretch of real estate designated by maps as I-85 and which Atlantans refer to as the Northeast Expressway. As its name implies, it stands as an imposing free-standing structure designated by a large black and yellow sign bearing a cartoon resemblance of the owner peeking out from under a slouch hat. The ground level houses part of a massive inventory and the owner's Rolls Royce. A flight of stairs leads to the entrance.

Stepping inside, a customer stands before the centrally located sales island from which all departments radiate. To the right, a Slingerland drum display rises and to the left are arranged the low-end acoustic guitars.

Most of the five demonstration rooms are acoustically designed and isolated from the rest of the store. Each room is fully operational. In the keyboard room, one can freely experiment with digital synthesizers and orchestrators by Cruman, dabble on the Oberheim Polyphonic Synthesizer Programmer or stretch out over a \$3500 Yamaha Electric Grand Piano. The walls are painted like the view from a star gazer's telescope and stage lights enhance the fine array of keys.

Next door, a guitarist might test acoustic guitars and amplifiers in one of two "Picking Parlors." Stepping two feet in any direction, the guitarist can readily compare amps by Road, Mitchell, Fender, Yamaha, Acoustic and Orange.

In another room, the musician can test P.A. systems by Cerwin-Vega, Acoustic and Yamaha running off

## Audio-Technica introduces five new microphones... and a pleasant surprise.



Take a close look at these new Audio-Technica microphones. Three electret condensers and two dynamics. Plus two clip-on miniature electrets (not shown). All are superbly finished. Carefully thought out in every detail. With the right "heft" and feel. Professional A3M Switchcraft output connectors, of course.

Then listen in your studio. Fullrange, peak-free, clean and crisp. With no distortion even when used close-up to high-level performers. And the balanced, phased Lo-Z (600 Ohm) output matches pro and semi-pro mixers alike.

Now for the surprise. The price. Both omnis are nationally advertised at just \$60, for either dynamic or electret condenser element. The two basic cardioids are just \$80, while the AT813 electret condenser with integral windscreen is pegged at \$95. All complete with full one-year warranty.

Once you've seen and tried these new Audio-Technica microphones we think you'll welcome them. Not just because they cost so little...but because they do so much. Available now from your Audio-Technica Professional Products dealer.

#### (A) audio-technica. Great sound. right from the start?

AUDIO-TECHNICA U.S., INC., Dept. 88SA, 33 Shiawassee Avenue, Fairlawn, Ohio 44313 In Canada: Superior Electronics, Inc CIRCLE 97 ON READER SERVICE CARD



## At last, professional performance at less than a dollar per Watt!

The latest high speed, high voltage, discrete technology combines with unique packaging and exclusive features to create the Peavey CS-800, a new stereo power amplifier that is unrivaled by anything on the market at its price.

The CS-800 produces 400 Watts RMS per channel. Overall that's 800 Watts of solid, high fidelity amplification retailing for only \$649.50\*. At about 81 cents a Watt, that's an incredible price for a stereo power amp with the CS-800's performance and versatility.

We invite you to compare the features designed into the CS-800. You'll see why no other power amp offers the value built into a Peavey.

- 5 Hz to 60 kHz response
  Less than .05% THD, 0.1% IMD
- LED overload indicators .
- Loudspeaker protection system
- Balanced inputs and electronic crossover capabilities
- 19-inch rack mount
- Forced air cooling

\*Suggested retail



The CS-800's twenty-four high voltage output transistors are mounted on massive, fan-cooled heatsinks for ultimate reliability even under the most demanding operating conditions.

**Peavey Electronics** Corporation Meridian, Mississippi 39301



CIRCLE 75 ON READER SERVICE CARD

mixers by Yamaha and Tapco. As in all demo rooms, the concept is to allow the musician to test equipment under his own playing conditions and often enables him to mix and match equipment that he owns.

The entire rear wall of Dirty Don's P.A. Palace is devoted to a chorus line of acoustic and electric guitars. Nearly one hundred units line the wall within easy reach of the customer. The display boasts the top of the line from Yamaha, Lo Prinzi, Guild, Ovation, Gretsch, Rickenbacker, Gibson, Fender and a host of others.

Another unique feature of the Palace is a fully operational 8-track with dbx recording studio featuring a TEAC Tascam system augmented by a Maestro Echoplex and an Ibanez Analog Delay and Multi-Flanger. Studio happenings are easily viewed from Rosinsky's offices.

Before exiting, the customer will pass a complete range of Audio-Technica and Beyer microphones, fourchannel stereo tape players and a display of mixers.

A "Meeting in Progress" sign hangs permanently from the door to General Manager Ellis Baxter's office and across the hall resides Uncle Dirty himself. To arrange an interview is not very difficult—both Rosinsky and Baxter are at the store at least eight hours every day, six days a week.

When the P.A. Palace opened in May of last year, was there anyone in the business who had already established your kind of format?

Rosinsky: To my knowledge, no one was doing this sort of thing. We thought there was a definite need for a unique entity based around professional sound systems. Because it was a new concept in marketing, we had to decide what products to use and how to display them to the public.

Our original plan was to handle both audio systems and P.A. systems and recording gear. Then we realized that P.A.'s and reel-to-reel should have an entity of their own. The only changes we have had to make since opening is refining product mix and usage.

Baxter: Everyone is trying to catch up to the market of the basement bands and recording hobbyists. They have to have some place to go. They don't want to go to an audio store and talk to some guy who is used to selling stereo gear or to go to a typical music store where a guy says, "You stick this thing in here," but doesn't know why.



Ninety percent of the problems people bring to us result from a bad hook-up. Mismatched equipment and poor design. So, an audio store or a music store won't do what needs to be done and that's where we come in—an entirely new concept for professional consumer products. If there is such a great need, and this operation is such a good idea, why aren't there more of them?

Rosinsky: Other stores abide by the traditional ways of doing business. They stock the equipment on the floor, the guitars on the wall, and wait for someone to come in with the business.



This fall we are presenting a brand new marketing concept to your public. We call it product programming. Every product in our line will share this concept. UNI-SYNC will be running multiple ads on your favorite products and some you don't even know about yet. These ads will give specific information and are designed to deliver UNI-SYNC customers to your door step.

So look for UNI-SYNC now. Call or write our Sales Manager, Wayne Freeman, UNI-SYNC - 742 Hampshire Road, Westlake Village, Ca 91361 (805) 497-0766.

UNI-SYNC, Division of BSR (Canada) Ltd., 26 Clairville Rd., Rexdale, Ontario M9W5T9 (416) 675-2402.



742 Hampshire Road/Westlake, California 91361 • (805) 497-0766 Uni-Sync Div of BSR (Canada) Ltd., 26 Clarville Rd., Rexdale, Ontario M9W5T9 • (416) 675-2402

CIRCLE 83 ON READER SERVICE CARD

#### DON'T SETTLE FOR LESS THAN THE BEST IN INTERCONNECTING DEVICES

- AUDIO CONNECTORS
- JACK PANELS
- SNAKE CABLES
- CABLES

- MULTI-SWITCH® SWITCHES
- AUDIO ACCESSORIES
- CONNECTORS
- IN DEPTH INVENTORY IMMEDIATE DELIVERY SEND FOR FREE CATALOG

13717 S. Normandie Avenue Gardena, CA 90249 (213) 770-2333

CIRCLE 85 ON READER SERVICE CARD



CIRCLE 84 ON READER SERVICE CARD

Baxter: The problem is that the industry has not bothered to educate the consumer. It takes a promotional facility and operation to bring people in.

The industry is caught up in technology instead of promotion. Where the industry misses the point is that our business thrives on the P.A. systems sold to countless numbers of nightclub acts. The ultimate consumer is the person who leaves a \$1500 stereo at home to go out and hear a live performance. He expects to hear a professional sound.

The performers are fighting to keep up with what the audiences are demanding. It has gotten to the point that the first question a club manager asks a band is, "What kind of sound system do you have and will it carry the room?".

When you stop to realize that Dirty Don's P.A. Palace is already bigger than 50 percent of our suppliers, you can see how small the industry is. The reason there aren't more Dirty Don's is because we introduced this concept a year ago and it is now catching on.

Rosinsky: We are striving to replace the traditional music store—the incompetents, the parasites who do nothing for the industry. They sell out cheap, refuse to re-invest and are only interested in bleeding the consumer today with no real concern for tomorrow.

What are the unique concepts that were introduced to the market by the Palace?

Rosinsky: The major factor is that our complete showroom area is utilitarian. It encourages people to try the equipment out, unlike the traditional store that prohibits the use of the items. All of our rooms are fully operational and we encourage the musicians to come in and try out whatever they are interested in. For this purpose we have specially designed a fully functional recording studio where musicians can tape their material. We have a P.A. room where they can switch panels for mixing and matching cabinets, mixing boards and amplifiers.

For acoustic guitarists, we have two "Picking Parlors" where the musician can go in, pick out the guitar he wants and play without the pressure of a salesman on him. We also have rooms set aside for electric guitars and amps which allow the musician complete privacy from interruption. Amps and guitars can be tried out in the same room.

What does the P.A. Palace specialize in?

Rosinsky: We are geared toward the professional recording consumer. No one in this part of the country comes close to our standards of equipment, service and knowledge. We also fully service everything we sell.

How has the industry created a market?

Rosinsky: The consumer reacts to what the industry offers. The public does not create the demand. With new breakthroughs in technology such as vocal and drum synthesizers, the industry creates a new demand and a new customer. Some people will buy a synthesizer where they might not have any interest in a conventional organ.

From the beginner to the professional, each customer has a separate and specific need. His demands are unique, so we have to meet his requirements.

Baxter: There is a growing cult of hobbyists who will spend \$20,000 on a home studio. You're shocked, but face it, I know an attorney who owns race horses. How much do you think he spends a year on his hobby? What about the businessman who spends \$20,000 a year easy on country club memberships or house boats or antique cars? You don't have to be a professional musician to want a home studio.

There are a lot of people who are influenced by the group Boston. Here is a group of unknowns that created a hot sound in a home studio that sold 6 million albums. A lot of people are dazed by the aura of fame and fortune and honestly believe they can be the next Boston.

How have you developed and trained your sales staff?

Rosinsky: We have certain criteria for salespeople. We don't administer tests to applicants. This is a people business and we have to make people judgments. We look for a basic knowledge and a specialized interest in our people. They must be able to demonstrate the equipment they are asked to sell. Aside from an interest in music, the most important quality is a willingness to work with the customer. A good salesman must be able to determine what the customer's needs are. Unlike most stores, we sell products, not price.

The salesman is a resident chaplain. He listens to the musician's problems with his equipment and his playing and then tries to solve them. Most



stores will have one ace salesman. We have six big guns.

Baxter: These days a sound system must be able to perform longer and more efficiently with less strain. When you talk about P.A. systems, you're talking about large investments. The professional musician must be treated like a businessman. He cannot afford to spend more than he can expect to make. But price is not the major factor when it comes to equipment that requires service, knowledge and attention. In the end, that cooperation is more valuable than what the musician has bought.

We try to utilize as much as possible of what the musician already owns.



This fall UNI-SYNC inaugurates a brand new concept in marketing. We call it dealer programming. Its total purpose is to bring UNI-SYNC business to your door. What we do is put our marketing expertise to work for you. putting together ad and marketing programs designed specifically for your needs.

What do you have to do to qualify? Just be a UNI-SYNC dealer. Call MADLYN JAMISON, the UNI-SYNC Communications Director, and she will get your marketing consultation under way.



742 Hampshire Road/Westlake, California 91361 

(805) 497-0766 Uni-Sync Div. of BSR (Canada) Ltd., 26 Clairville Rd., Rexdale, Ontario M9W5T9 

(416) 675-2402

CIRCLE 86 ON READER SERVICE CARD



Then we provide him with the alternatives of trading part or all of his system in to upgrade his present system according to his new needs. Whatever it takes, we will do. Therefore, we surround ourselves with very creative



For years, everybody thought that conneclief available with a reliable contact-making tors were about as basic as you could getdiamond-shaped tip. so nobody improved them. Then along The Tip looks just like a "military" plug, with came Whinwind. We recognized the must a high-impact, shatterproof black housing, cians' needs for high-quality, rugged and noiseless cords that lived up to their and brass body-but its stainless steel tip is an instant giveaway. A double strain-relief system and simplified soldering ar-STAINLESS guarantees, and so we started designing STEEL TIP our own cords, having them manufactured rangement complete the picture, to provide by Belden, and selling them to you. you with the most secure phone plug there is. Now our designers have recognized SIMPLIFIED SOLDERING another need in connectors that no one The Tip - sure it's not big; but we got big has bothered to think about before - 1/4" CONNECTION by caring about the little things. Only at phone plugs. We went beyond the "standauthorized Whirlwind dealers. DUAL STRAIN ard," constructing a plug that exceeds RELIEFS: the positive contact properties of the "military" or "computer" plug, by using a - CLAMP Another Whirlwind exclusive. new, stainless-steel diamond-shaped tip, BRASS and then designed a tougher strain relief system and outer shell, to make THREADING the plug virtually indestructible. We call it the Tip. It's a phone plug that's designed from scratch to combine the most secure strain re-

CIRCLE 87 ON READER SERVICE CARD

between the staff and management to settle problems. We encourage the salesmen to instigate changes and involve their ideas in promotions. What happens is that a guy working 9 to 5 starts staying four hours late to make his ideas work.

salesmen. There is a constant dialogue

Rosinsky: In the end, if the customer is happy with what he bought here, if he has someone with which he can discuss these matters, someone who understands both his problems and his equipment, he is going to come back when he needs something else. The customer comes to depend on the store and the salesman.

What sort of clientele do you particularly cater to?

Baxter: When this store first opened, we premiered the Yamaha Electric Grand Piano and that generated a major professional interest. We sold an electric grand to Keith Emerson of Emerson, Lake and Palmer. We regularly work with members of Ted Nugent's band, Foghat, Atlanta Rhythm Section, Wet Willie, Mother's Finest and Mylon LeFevre.

However, that is not to say that only millionaire rock stars patronize the P.A. Palace. Our customer mix is as wide as our product mix. We have provided sound reinforcement for theaters, churches, Bell Telephone, discos, concert halls, festivals and home studios. Last week, our three major sales were to an Elvis Presley impersonator, a Baptist church and a disco.

What sorts of ad campaigns have you found to be the most effective in reaching the consumer?

Rosinsky: We do two types of ads. One is done in a humorous vein where the customer gets a chuckle out of it, such as the time we had a guitar sale and advertised that we had so many in stock that they were stacked in the bathroom and that it was necessary to move them before we had an accident. Recently we ran an ad where our prices had dropped to such a low level that Dirty Don had been institutionalized for insanity until the sale was over and his sanity restored.

On the other hand, during the same week we will run another ad that says, "As the largest equipment dealer in this territory, we have a commitment to help the aspiring musician in any way we can"—by educating him and making the equipment available to him to experiment with.

P.O. Box 1075 • Bochester, N.Y. 14603 • (716) 663-8820



The light side and the heavy side give us accessibility to a great portion of the market, whether beginners or professionals.

What sort of image has been created with the Dirty Don gangster character?

Baxter: The Dirty Don cartoon char-

acter was created for visual retention. Don has a personal rapport with the public based on the fact that he records his own radio ads. The public believes that they are dealing personally with Don and they feel secure.

The average consumer is afraid to go into most music stores. Even the name

of the place may scare him away if it sounds too technical. The customer is not an engineer in most cases and he is afraid that he does not know enough of the right questions to ask. So, we create a friendly image, a name people can warm up to. Nobody calls us Dirty Don's P.A. Palace. Some call us Dirty Don's or just Don's, but most refer to us as The Palace, which is a strange name to call a music store.

Rosinsky: We aren't a typical shopping environment located in a shopping mall. We have a building that lives up to its name. Everything gets equal attention. We don't pile things up on the floor and we use lighting to create an atmosphere in each room.

What kinds of problems have you had with advertising and public relations?

Baxter: The biggest problem in establishing this business is that we are dealing with industries that weren't here five years ago. Most manufacturers were in the audio business and saw the explosion in home systems five years ago, but very few of them predicted what would happen to the P.A. market. That's why Yamaha



CIRCLE 78 ON READER SERVICE CARD

is on top. Along with JBL, Crown, SAE, Cerwin-Vega and Teac, they jumped on top because they realized that the audio trend was translating into professional sound and recording equipment terms.

The industry has been unable to keep up with the trends. The audio business simply ignored the P.A. boom.

The major problems with advertising are being solved now. We are just beginning to receive co-op ad money. All of our print ads, locally and nationally, and our radio spots come out of our pocket. In the early 70's, the industry set up ad departments but the dealers never used them. Dealers racked up thousands of dollars worth of ad money that they never took the time and interest to use, so the manufacturers cut it off. Now they realize that they should be doing more and they are starting to cooperate again.

What are some of the related services that you provide?

Baxter: We have a research and development department that is working to improve and create new instruments. We have noticed the price of

## When it comes to designing small amps, we don't do things half way.

Write for our free catalog and "Sound, not just wattage" booklet.



Today, everyone seems to be making small amps. At Marlboro, that's the only kind of equipment we've ever made.

So, while the other companies are still trying to figure out how to get exceptional sound, power and features into their compact units, musicians have been getting all three out of Marlboro systems for years.

Why not test out a Marlboro. You'll see and hear that when a company doesn't do things half way, you get a whole lot more out of an amp.

CIRCLE 77 ON READER SERVICE CARD

guitars has risen to the point that sales are declining because it is too expensive for a beginner to invest in. We are looking for ways to create guitar sounds in other instruments. We are also pushing for low-priced guitars for the beginner who can't afford expensive ones. That 14-yearold beginner will be the 24-year-old superstar. In order for the industry to survive, we have to create second, third and fourth generation musicians.

What sets us apart is our personal involvement with the musician. We go see an act in concert and troubleshoot their equipment in order to improve the total sound product. That is our commitment to the industry.

We will only sell what we test and we test every piece of equipment we sell. Before we will handle a product, we request the manufacturer to send us a unit for evaluation. If they will not do that, we won't do business with them. Our service policy is too strong to carry anything but the best products. We have canned a lot of big names because their equipment breaks down in the field. We must know what we sell and that it will work. One of the additional services we provide is placing the equipment in the field with a working band for evaluation before we sell it.

Rosinsky: Another aspect of our total involvement is that Ellis, as general manager, also spends a lot of time in direct contact with the consumer. Ellis can spend the customer's money better and more wisely than the customer himself. He can cut a better deal. Instead of getting what he thought he needed, the consumer gets more flexibility and that is the key: maximum flexibility for the dollars.

**Baxter:** For instance, most semiprofessional groups have a budget of \$7,000 to \$8,000. I am going to get that amount regardless of how it is spent. But, most bands completely leave out equalization and real time analyzers, which is half of the system. We educate them as to the practical purposes of such benefits.

Face it, all dealers stock the same thing at near the same price and most rely only on low prices to survive. A total commitment has to go beyond that.

Do you stock everything that is on display?

Rosinsky: One of our major services is that we carry a full line of equipment and accessories. Regardless of whether it's performance or recording, we can accommodate anything the musician is into.

We inventory everything we display. Ninety-nine percent of the time, we have an abundant stock of everything we carry. This is important because when a customer comes in to buy something, he wants it now, not six weeks from now. When he wants it, it's here.

Don, what are the other related areas that you are personally involved in?

Rosinsky: Being in this business, I find many people day-to-day who need more than just equipment. They need managers, promoters, backers, recording studio time, business consultants and an in to a record company. Therefore, I have become involved in all of these areas out of necessity. Atlanta is a young music town and my number one priority is to promote the Atlanta music and entertainment circles.

At this moment, my commitments only allow us to manage two acts. But we do furnish many others with equipment, recording time, business guidance and, when they are ready, we move them toward a record deal.

I have always felt that the musician deserves the right to say what he has to say and he should be listened to. The average musician cannot afford \$150 an hour for studio time. We make it possible for him to make a quality recording at home or at the Palace because that is the only way he can go.

From all of your involvements, what has become your philosophy?

Rosinsky: Sell the store first, product second and price third. If you do business with the right store, a competent staff, and sell the right product at a fair price, that is all you can do.

We mold each sale to the individual. We do the very best with his budget and help him reach his goal.

The music dealer of today is the same music dealer of yesterday. Most are nothing more than supply houses or musical drugstores. No merchandising is being done. Everything is stocked on a shelf and the store waits for a person to come in already knowing what he wants.

The selling of professional recording equipment and sound reinforcement is a new professional interest. We strive to be creative, imaginative and educational. That is where we have the edge over the traditional music store. That is why we are called The Palace. Help Help You

If you are a retailer of creative audio, sound reinforcement equipment and/or electronic musical instruments and

accessories... then you and your sales staff should be getting— SOUND ARTS a continuing reference for anyone in the business of selling sound. Help us, Help you, by filling out the coupon below.



14 Vanderventer Avenue Port Washington, New York 11050
in the set of the

AUGUST 1978

Michael L. Joseph has been promoted to Director of Marketing for Scientific Audio Electronics. Inc. His responsibilities will include directing SAE's new marketing team as well as all sales, advertising and service questions. Joseph was previously National Marketing Manager and Technical Services Manager of the company. SAE has also announced the formation of a Professional Products Group established to develop a "comprehensive line of products and accessories specifically designed for professional audio applications." Mark Damon Cohen has been appointed Director of Professional Products Group. Cohen was previously a product specialist with Fender. William B. McPhetridge has been named National Sales Manager. responsible for the "establishment and direction of all sales programs for SAE and SAE TWO products."

Several staff appointments have been made at Bertagni Electroacoustic Systems, Inc. Greg Stoff was recently appointed President. Tom Frisina, former national sales manager for JBL, has been named Vice President Marketing. Glen Urgel has been named Regional Sales Manager. And Jeff Martini, most recently product manager for Centrex Division, Pioneer Electronics of America, has been named National Marketing Manager of B.E.S.

Yamaha International Corporation has made several new assignments. John McLaren, Joe Yoshida and Peter Suzuki have been appointed Senior Vice Presidents and will be elected to the Board of Directors. Karl Bruhn has been appointed Vice President for the MI and Combo Division. Stewart Greenberg has been named Vice President for the Audio Division.

A special Recognition Award was presented by the International Tape Association to Sho Okiyama, U.S. President of TDK Electronics Corp. and Ken Kohda, Marketing Manager, in recognition of TDK's "tenth anniversary of ... pioneering, developing and marketing of the high fidelity audiocassette."

TDK has awarded prizes to the winners of its "Machine for your Machine Showoffs" nationwide dealer contest, which covered advertising, display and sales growth. Grand prize winners included HiFiFoFum, New York; Record Shack, Ohio; and Quement Electronics, California.

New territorial marketing managers have been appointed at TDK. Steve Voyles, based in Chicago, will cover the Great Lakes area. Philip Lapkin, based in California, will cover the northern California and Pacific Northwest area.

David Oren has been named National Manager for the Micro Seiki turntable line and TEAC's new accessory line. Oren has held marketing and sales positions at TEAC for over five years. Roy Kamin has been named Manager of Dealer Relations. His chief responsibility will be to "help solve dealer problems." He will alert dealers to TEAC promotions, assist with merchandising, display, technical information and selling techniques. Any TEAC dealer can call Kamin personto-person collect for assistance.

Hershel Green has been named Director of Marketing for Electro Music, the manufacturer of Leslie speakers and related products. Green has been with Electro since 1972.

U.S. JVC Corp. has presented its 1977-78 rep awards to David H. Brothers Co., Inc.; Borrett & Lee Corp.; Al Moskau & Associates; and Profit Lines.

Jon Rapp has been appointed Executive Vice President, Operations, at James B. Lansing Sound, Inc. Rapp will directly supervise JBL's engineering, manufacturing and product development divisions.

#### Advertiser's Index

RS#	Advertiser	Page #
82	Audio Developments	25
89	AudioMarketing	15
97	Audio-Technica	41
96	Beckmen/Roland	17
93	Biamp	39
85	California Switch & Signal	44
88	Community Light & Sound	4
90	dbx	7
92	DiMarzio	Cov. 4
76	Ibanez	19
78	Keas/Ross	47
77	Mariboro	48
91	Meteor Light & Sound Co.	37
84	Music Technology	44
98	MXR	8
75	Peavey	42
99	Pioneer/TAD	11
No #	Sound Workshop	33
95	Uni-sync	3
83	Uni-sync	43
86	Uni-sync	45
87	Whirlwind	46
94	Yamaha	Cvr. 2



If this copy of Sound Arts is not personally addressed to you... you risk not receiving it in the future. Please help us continue to help you by filling out and mailing the coupon below

0r----

by completing the **\$ postage paid \$** card at the front of this issue.

Thank you, Janet Kurtz

Circulation Direct

Mail to		My Outlet Sells:	My Function with the Company is Primarily			
YOURD ARTS 14 Vanderventer A Port Washington, N TYPE OF BUSINESS (check only	ve. NY 11050	<ul> <li>Home Recording</li> <li>Equipment</li> <li>Sound Reinforcement</li> <li>Equipment</li> <li>Electronic Musical</li> <li>Instruments</li> <li>Accessories</li> </ul>	(check one only) management purchasing sales servicing other (please specif			
Musical Instrument Retailer Audio Retailer Sound Contractor Pro Audio Retailer Manufacturers Representative	COMPANY NAME NAME ADDRESS CITY SIGNATURE	TITLESTATI	EZIP			

## Don't choose one of these for <u>our</u> sound. Choose one for <u>yours</u>.



#### Super Distortion Humbucker





Dual Sound

Humbucker

We also make the FS-I and Pre B-I direct replacement pickups for Stratocasters and Telecasters.









For a full color catalog on all our fine pickups, send 75¢. Also, if you'd like a poster of this ad, send \$1.00 to cover postage and handling.



11.12

1388 Richmond Terrace Staten Island, N.Y. 10310 (212) 981-9286