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Music in the Studio

8-394

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ELECTRONICS



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The Recording Engineer

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Larry Zide

Two highly talented musician/technocrats in lower Manhattan.

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ABOUT THE COVER

● Beat-On-Beat is the studio portion of Red House Music and is featured on our cover. The AMEK ANGELA console is flanked by the Studer A-800 with a synth keyboard just in the lower left corner. For the story see page 4.

LETTER FROM THE PUBLISHER

db Magazine Has Moved!

We are pleased to announce that db Magazine and Romaine Pierson Publishers, Inc. of Port Washington, NY have joined forces. Romaine Pierson publishes a number of trade magazines and journals and has been successfully doing just that for more than a hundred years!

What does this mean for db? First, a redesign for even better readability is in this issue, there's more color and more valuable information—the editorial and publishing staff remains the same.

With the design and production resources of Romaine Pierson, its long history in publishing, and db Magazine's twenty-seven years of publishing, a synergy exists that will make the db Magazine you've known before bigger and better.

As of June 6th our new address is 80 Shore Road, Port Washington NY 11050. At that date, our new phone number became 516 883-6350.

Larry Zide



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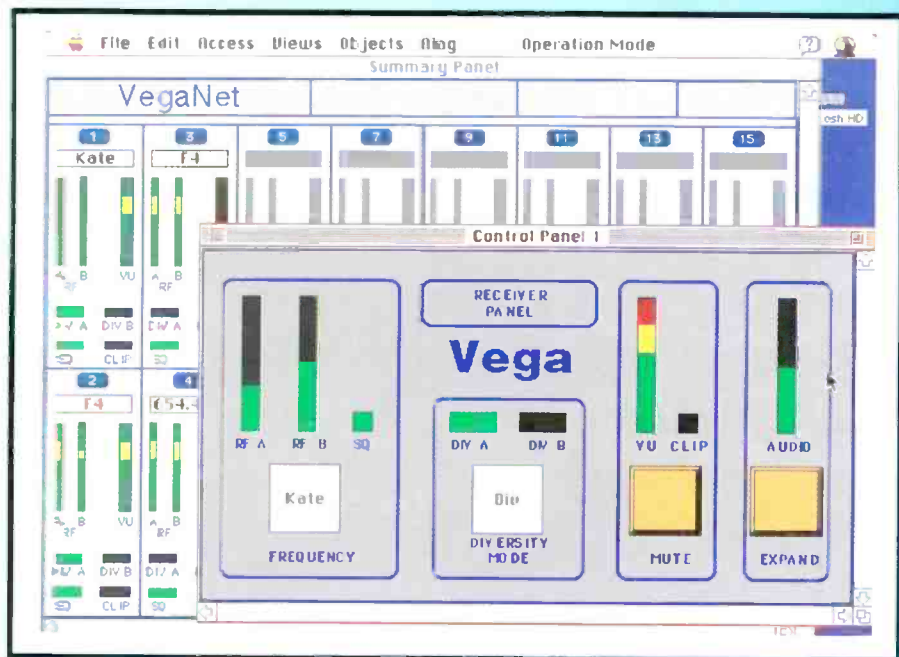
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Trademark names are editorially used throughout this issue. Rather than place a trademark symbol next to each issue, we state that these names are used only in an editorial fashion, and to the benefit of the trademark owner, and that there is no intention of trademark infringement.

BPA Audit applied for in June 1994

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Circle 17 on Reader Service Card



Music in the Studio

A call from a New York City PR agency began this story of two young musician-composer-technocrats. My visit to their studio in lower Manhattan followed up on them.

Larry Zide

The commercial music company is Red House Music, their studio is Beat-On-Beat. The talent is Lloyd Landesman and Alan Zahn. Their studio is in an old apartment building on East 4th Street, just east of Fifth Avenue. Today, it is mixed residential and commercial, featuring large rooms and high ceil-

ings. I met them there. Who are Landesman and Zahn—what have they brought to this new venture?

Lloyd Landesman, who left Crushing Music/NY after six years, is the composer of the *Proud to Be A Bud* for Budweiser beer, has struck gold at the London Advertising Awards. His *You're A Part Of Me* for Dr. Pepper is

currently running on TV and radio. He recently completed a package of eight spots for Coca-Cola Classic.

Alan Zahn comes from the agency side of the business. For the past five years he was responsible for the creative and production of all music produced at Backer Spielvogel Bates/NY. While there, he composed campaigns for M&Ms, Avis, Miller Lite, and Campbell's Soup.

The partners-to-be first joined forces several years ago, when Alan Zahn composed a jingle for Snickers, and commissioned Lloyd Landesman to write the arrangements. A mutual respect grew from that.

They recently decided to make their collaborations a permanent one.

Said Lloyd Landesman, "Throughout our careers, both Alan and I have been involved in the creation of national campaigns. Our depth of experience and the relationships we have established over the years, have enabled us to hit the ground running."

Alan Zahn added, "There are always composers who specialize in



Figure 1. Alan Zahn (left) and Lloyd Landesman in their control room

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Claus Wiedemann
Chief Engineer



Figure 2. Red House Music's control room.

classic song writing, and other whose strength is contemporary sound design, but nobody was putting them together. We do, Lloyd is a great songwriter, and a very cutting-edge musician. Together, these talents fill a major void in today's commercial music industry."

BEAT-ON BEAT

Beat-On-Beat is the studio's name as mentioned in the second paragraph. I sat down with Lloyd and Alan in their control room (see our cover). There is the control room, the studio itself, and a separate MIDI room crammed with computers, synthesizers, etc. (See the *Equipment List* at the end of this article.)

I first asked them about how much of the studio is for Red House Music work (commercials, etc.) and how much is recording studio work. Lloyd answered, "much of the studio's time is used for our Red House Music work, but we are open to the general public and there has been a

good proportion of recording work for others coming in."

When they come in, is it with picture complete?

Said Lloyd, Yes, we're a twenty-four track studio with a Studer A-800 with full video lockup, our console, and a couple of computers that lock up our sequencers as well as picture."

I asked about the Studer twenty-four track analog machine. How do you handle potential clients who want digital audio?

The response by Alan, "Most clients don't specify digital or analog, but if they do want it, we simply rent one for the sessions. It's also true that the sonic differences between the two is small at best, today's analog is much better than before and obviously more affordable."

Lloyd added, "When I worked, before we started this studio, on the *Proud to Be a Bud* we did the audio on a Sony 3348 with full automation on the console. Since this had a number of sessions and sweetening, we didn't

have to start from scratch each time. That made it a lot easier. So we can do it either way, but analog today is still what most clients need."

I thanked Lloyd and Alan for their time.

EQUIPMENT LIST

Console

36 Channel 74 inputs AMEK ANGELA

Tape Machine

Studer A-800 Ak III track
Panasonic SV-3 700 DAT Recorder
Tascam 122 Cassette Recorder

CD Player

Tascam CD-401 (with Pitch Control)

Control Room Monitor

Genelec S30NF
Yamaha NS-10M
Tannoy PBM-6.5

Monitor Amplifier

Bryston 4B

Outboard Gear

EGs & Mic Pre
2 Neve 1066
2 Pultec EQP-1A3 Tube
2 API 550b
2 API 560b
2 API 512

Compressor & Limiters

2 dbx 160
2 dbx 16OXT
2 Neve 2254-E
2 Teletronix LA-3A
2 UREI 1176-Black Face
1 Dynamite Gate
6 Kepex II Gate

Digital Effects

Lexicon PCM-70 Digital Reverb
1 Lexicon PCM-60 Digital Reverb
1 Roland SRV-2000 Digital Reverb
3 Lexicon PCM-42 Digital Delay
1 'IC Electronic 2290 Digital Effects

1 Yamaha SPX-90 II Digital Effects
Microphones

2 Neumann U-87 (consecutive numbers)

2 Neumann U-67 tube (consecutive numbers)

2 AKG 414B-ULS

2 AKG 451c

3 Sennheiser MD-42 I

2 Shure SM-57

1 Electro-Voice RE-20

MIDI EQUIPMENT ROOM

Computer

Macintosh II-FX (8 meg memory and 240 meg hard disk) with 17-in. Panasonic color monitor

Software

Mark of Unicorn Performer v.4.02

MIDI Interface

Opcode Studio 5

Mark of Unicorn MIDI Time Piece
Sampler

AKAI S-1000 10 meg Memory, 40 meg hard Disk and SCSI port)

Roland S-770 10 meg memory, 40 meg hard disk and SCSI port

Keyboard Synth

Korg T-2 w/4 meg memory

Prophet 5w/ MIDI

Yamaha DX-7

Yamaha DX-7 II-FD

Module Synth

Alesis D4 Percussion Module

E-mu Proteus I-XR

Yamaha TX-81Z

Korg OIWR

Korg WaveStation AD

Roland D-550

Roland MKS-70

Roland MKS-80 w/Programmer

Guitar Amplifier

Rivera M100-112 (JBL Speaker)
GREAT!

Other Instrument

Vintage Fender Rhodes Suitcase Piano (Great Condition)

Other Floating Gear

Drum Cat - Midi Percussion Pad

Korg A3 Guitar Signal Processor

Roland TR-909 Drum Machine

Roland TR-505 Drum Machine

Roland MT-32 Sound Module

Korg DDD-1 Drum Machine

Casio CZ-101 Synth

Mark of Unicorn Midi Time Piece

Casio Guitar Synthesizer

DataFrame 330 meg Harddisk

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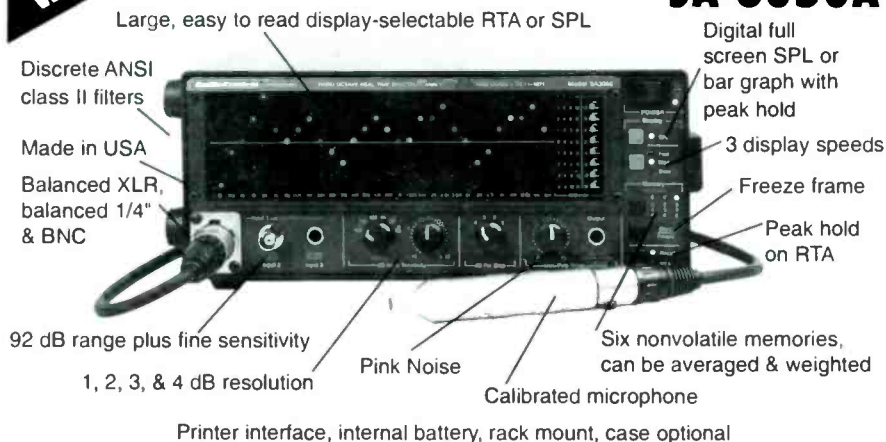
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LETTERS

Readers interested in obtaining the two releases which Shelley Herman wrote about in *Tools of the Trade* in September/October 1993 have had difficulty because the published phone number and address were incorrect. (Nevertheless, requests have come in, showing that readers pay attention to what db Magazine says and also that db Magazine readers are persistent.)

Those not finding the albums in their local stores can buy them directly from the U.S. distributor, Harmonia Mundi USA at (phone)310 478-1311, or (fax) 310 996-1389. The stereo micing demo is Performance Recordings catalog PR6CD, while the analog/digital comparison on my concert recording of *Pictures at an Exhibition* is on PR7CD and PR7LP.

James Boyk
 President
 Performance Recordings
 Los Angeles, CA

We don't know how the original information got garbled, but are happy to hear that our readers won't give up just for such a detail.



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Circle 6 on Reader Service Card

Graphic Equalizer Design Provides Flat Unity Gain Response

Audio systems typically include filter circuits tuned to a user specified frequency band.

Johnny Molina

Gain or attenuation of these bands can enhance the “timbre” of the audio sound once the signal source becomes audible through a pair of speakers. One such filter circuit is a graphic equalizer.

Graphic equalizers for audio equipment commonly use a group of bandpass filters to separate the audio spectrum into different frequency bands (Figure 1). The amplitude of each band can then be individually adjusted to balance the response of the various ranges. The outputs are then summed to create a single output. However, it is difficult to build filters that will sum to a signal that is equal to the input. There should be no audible difference even when the amplitude of each band is made identical. The output has ripples in the frequency response.

The circuit approach shown in Figure 2 achieves this desired response. State variable filters are used to imple-

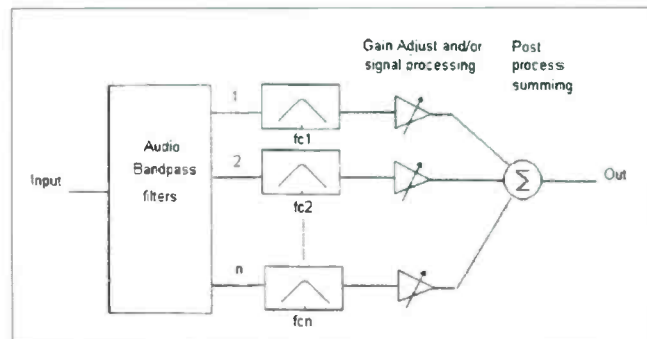


Figure 1. The basic filter circuit.

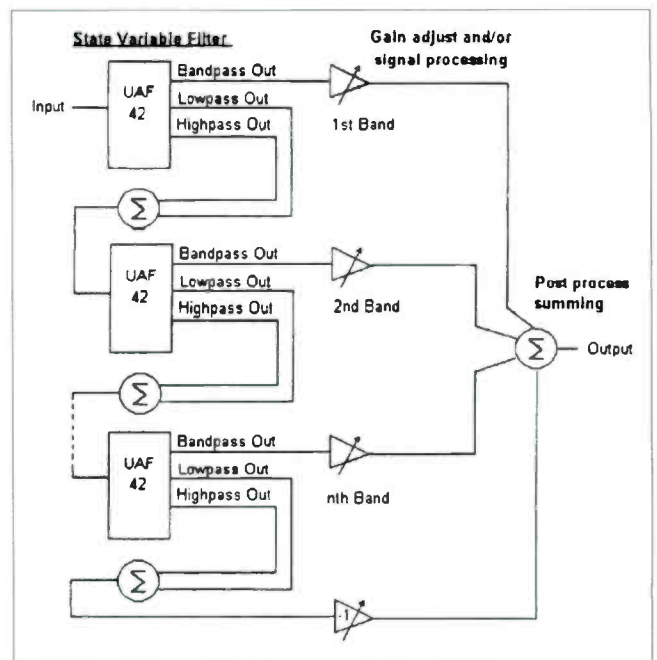


Figure 2. The better filter circuit.

ment the required transfer functions of each stage. Each state variable filter has simultaneous, bandpass, lowpass and highpass outputs. The bandpass signal is routed to the gain and/or signal processing stage while the lowpass and highpass outputs are summed and then routed to the next-higher frequency bandpass filter. This recursive filtering technique assures that the roll-off charac-



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Equalizer Design

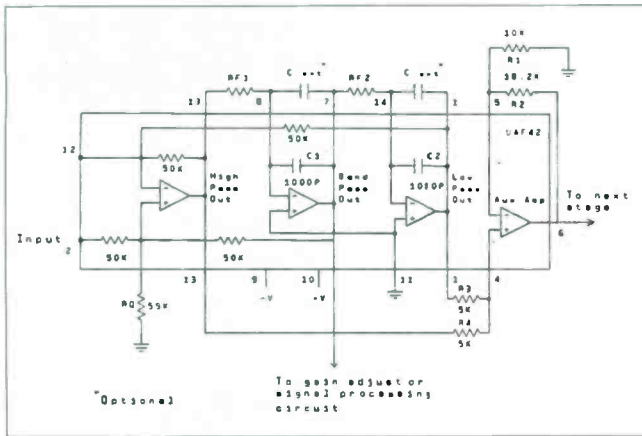


Figure 3. The UAF with external components.

teristics of one filter ideally "mesh" with the next to produce a smooth frequency response when summed at equal amplitudes.

State variable filter chips like Burr Brown's UAF42, provide lowpass, bandpass and highpass outputs. Added features like an auxiliary FET input op amp and two on board 0.5 percent 1000 pF integrator capacitors lower the required component list. Figure 3 shows a diagram of the UAF42 along with the external components required to realize each stage of this filter.

IMPLEMENTING A DESIGN

A typical design would have the audio frequency range broken up into ten frequency bands starting with an f_c of 31.25 Hz and ending at $f_c=16$ kHz (f_c =center frequency). Each band is centered one octave beyond the previous one and has a half power bandwidth of $f_c/1.4$. The bandpass out nodes of each UAF42 provides the frequency range of interest which can then be attenuated, gained up, compressed, noise gated or subjected to any desired signal processing. All the bands are then summed back together using a post processing summing circuit.

The lowpass and highpass out nodes are summed and gain adjusted using the internally supplied auxiliary op amp. This amplifier then drives the subsequent stage. The signal from the final summing amplifier is inverted and then routed to the post processing summing amplifier as shown in Figures 2 and 5.

CALCULATING COMPONENT VALUES

Figures 3 and 4 show the circuit layout for each indi-

vidual stage. The center frequency setting resistors RF1 and RF2 can be set using equation 1,

$$(1) \text{ RF1} = \text{RF2} = \frac{1}{2\pi(1000\text{pF} + C_{\text{ext}})} f_c$$

where C_{ext} is an optional externally supplied capacitor. For center frequency designs below 100 Hz, it's recommended that a good NPO ceramic or mica external capacitor be used in order to avoid large RF1, 2 values. The table below shows RF1, 2 values for this circuit. All resistor values are standard 1 percent tolerance available "off the shelf".

f_c (Hz)	RF1,2	C_{ext}
31.2	511K	0.01 μ F
62.5	255K	0.01 μ F
125	1.27Meg	—
250	634K	—
500	316K	—
1K	158K	—
2K	78.7K	—
4K	40.2K	—
8K	20K	—
16K	10K	—

Note that a seven band version of this circuit can easily be implemented by simply omitting the 31.2, 62.5 and 125 Hz bands.

SETTING THE BANDPASS -3DB FREQUENCY RANGE

The -3dB bandwidth of each stage and the filter Q are related by the following:

$$(2) Q = \frac{f_c}{\text{BW}_{-3\text{db}}}$$

For audio graphic equalizer designs where each filter stage center frequency is an octave above that of the previous stage, a Q of 1.4 is recommended. Q setting resistor R_Q can be set using equation 3.

$$(3) R_Q = \frac{25K}{Q-1} = 59K \quad (Q=1.4)$$

SUMMING AND GAIN ADJUSTMENTS

The gain and phase of all the signals summed into the post processing summing amplifier should be as close to unity and as free of externally induced phase distortion

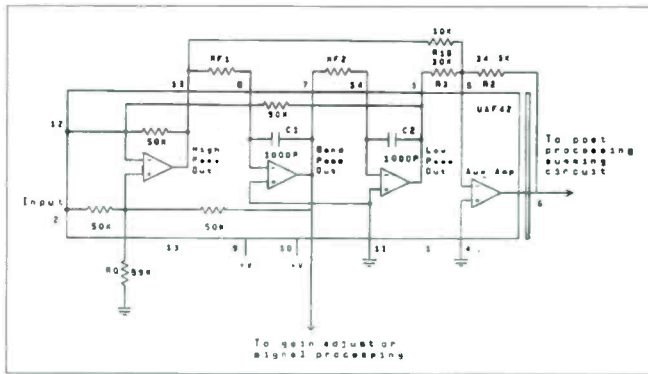


Figure 4. How the Figure 2 circuits can be achieved.

as possible. This is essential for maintaining inaudible differences between the input and output signals when the gain of all frequency bands are set the same. The UAF42 does not provide unity gain response at all three outputs. Gain adjustments must be made. The pass band gain of the highpass and lowpass transfer functions is inversely proportional to the filter Q. That is,

$$(4) A_{lp} = A_{hp} = \frac{1}{Q}$$

where A_{lp} and A_{hp} are the lowpass and highpass gains respectively. Thus for a Q of 1.4, the passband gain at both the high and lowpass outputs is 0.71 V/V. Figure 3 shows how resistors R3 and R4 sum and couple the lowpass and highpass outputs to the input of the sum-

ming and gain adjust (auxiliary) amplifier. This also attenuates the signal by a factor of two. The gain loss due to these effects is adjusted back to unity with R1 and R2.

Note that Figure 2 shows that the summing and gain adjust circuit of the final stage inverts the signal prior to passing it on to the post processing summing amplifier. Figure 4 shows how this can be achieved. The auxiliary amplifier, R1, R2 and R1b are used to create an inverting summing amplifier. This is required to compensate for the 180 degree phase inversion that's inherent from input to bandpass out of each UAF42 stage. Figure 5 shows a more detailed schematic that includes a post processing summing circuit.

CIRCUIT PERFORMANCE

A slightly modified version of this circuit has been implemented by Joseph Brennan, audio engineer at Sky Walker Sound studios in Santa Monica, CA. Brennan designs and implements audio signal processing circuits for major film producers such as Oliver Stone. A seven band version of the above mentioned circuit was recently used on the sound track of Stone's soon-to-be-released *Natural Born Killers*.

Brennan reports that THD+N for the circuit, which included signal processing circuitry along with the filter, was below 0.015 percent. Other tests show the gain ripple from 10 Hz to 20 kHz to be within 0.4 dB. Phase ripple is between ± 5 degrees. [db]

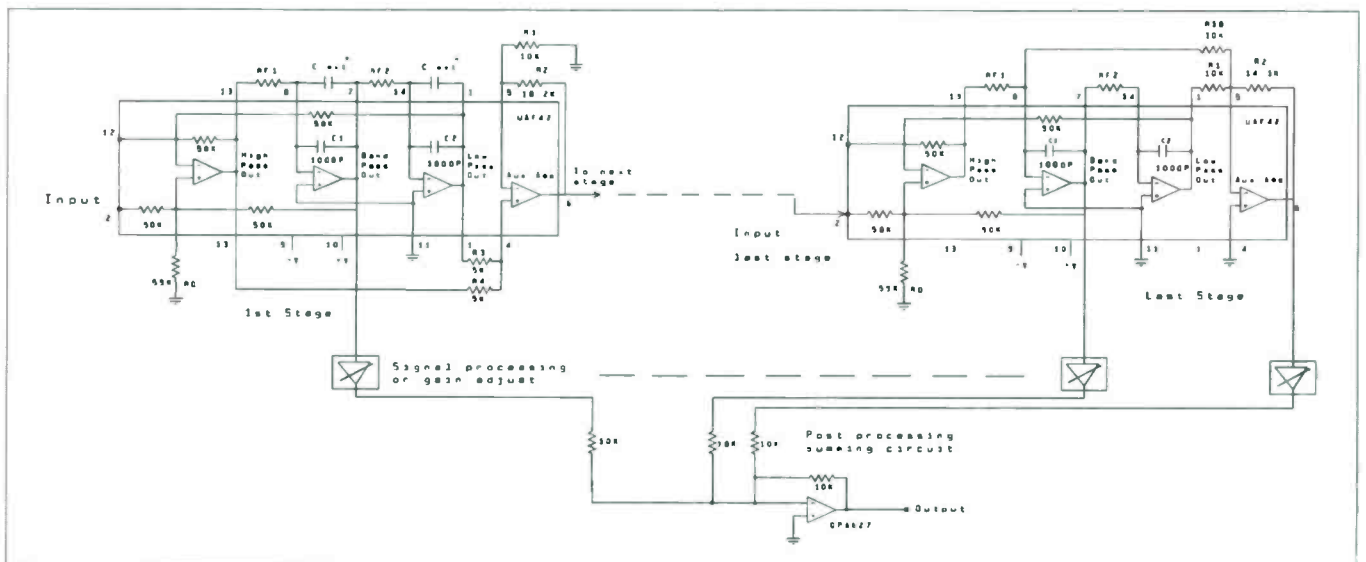


Figure 5. Final UAF42 stage with auxiliary amp used as an inverting summing amplifier.

The Serious

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the transport is lightning fast and yet so quiet you'll barely hear it blaze through a tape.

We didn't stop there. Because production environments are notorious for constant, if not abusive, shuttling, punching, 24-hour operation — you get the idea — the transport was designed and built to take a beating.

Even more impressive is the transport's responsiveness. Take a look at the front panel. Notice the shuttle wheel? Turn it just a bit and the tape moves at one fourth the normal play speed. Turn it all the way and it flies at 8 times faster. Do it all night if you want. It's quick, smooth and it's precise. Need to get to a location quickly? Accurately? Shuttle a bit and you're there. The location is easily viewed on the DA-88's 8-digit absolute time display — in hours, minutes, seconds and frames. With the optional SY-88 sync card it displays timecode and offset, too.

YOU ALREADY KNOW HOW TO OPERATE IT

Unlike other digital multitrack decks, the DA-88 works logically and is simple to operate. Like your analog deck. All functions are familiar and easily operated from the front of the deck.



Adding the optional SY-88 synchronizer card is as easy as changing a Nintendo® cartridge. With it you're SMPTE and MIDI compatible. And no matter how many DA-88s you have locked up, you need only one sync card. Other optional accessories include AES/EBU and SDIF2 digital interfaces allowing the digital audio signal to be converted for direct-digital interfacing with digital consoles, signal processors and recording equipment.

s Machine



Take punching-in and out, for example. You have three easy ways to do it. You can punch-in and out of single tracks on the fly. Just hit the track button at the punch-in point. Hit it again to punch-out. You can use the optional foot switch, if you like.

Or, for multiple tracks, simply select the track numbers you want to punch, push play, and when you're ready, hit record to punch-in, play to punch-out.

Finally, for those frame accurate punch-ins, you've got auto punch-in and out. In this mode you can rehearse your part prior to committing it to tape.

No matter which way you choose, your punch-in and out is seamless and glitch free due to TASCAM's sophisticated variable digital crossfade technology.

That's not all, you also can set your pitch ($\pm 6\%$), sample rates (44.1 or 48K), as well as crossfade and track delay times. All from the front of the DA-88.

COMPLETE SYNCHRONICITY

There's more. Add the optional SY-88 synchronizer card to just one of your DA-88s and you've got full SMPTE/EBU chase synchronization. The best part is, you can record time-code without sacrificing one of your audio tracks. You also get video sync input, an RS-422 port to allow control of the DA-88 from a video editor, and MIDI ports for MIDI machine control.

A DIGITAL RECORDING SYSTEM THAT GROWS WITH YOU

The DA-88 is truly part of a digital recording system. Start with 8 tracks today — add more tomorrow.



Adding tracks is as simple as adding machines — up to 16 for a total of 128 tracks. They interconnect with one simple cable, and no matter how many DA-88s you have, they'll all lock up in less than 2 seconds.

Controlling multiple machines is made simple with the optional RC-848 remote. With it you can auto locate and catch 99 cue points on the fly. It comes complete with shuttle wheel, jog dial, RS-422 and parallel ports, and it controls other digital and analog machines, too.

LISTEN TO THE REST

Of course, the sound quality is stunning. With a flat frequency response from 20Hz to 20kHz and dynamic range greater than 92dB, it delivers the performance you expect in digital recording.

So get to your authorized TASCAM dealer now. Check it out. Touch it. And listen to it. Once you do you'll know why the TASCAM DA-88 is the serious machine for digital production. The TASCAM DA-88 is the choice of studios worldwide. And at only \$4,499, it should be your choice.



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January 1994 NAMM Coverage

Shelley Herman

After the earth-shaking stopped, I looked at my calendar and discovered that it was once again time for the annual masochistic trip to the Anaheim Convention Center.

I cleaned off my earplugs and headed south. Just down the road from Disneyland, the Anaheim Convention Center is one of the largest on earth. The Music Manufacturers of the world filled it to capacity. Five huge rooms, each almost the size of a football field, plus the arena area and two hotels were filled to the brim with everything from guitar picks to stadium size sound systems. As Ed McMahon used to say; "Everything you could ever imagine" that could be sold in a music store was represented there.

Until you have personally experienced several days with the average SPL up around 90 dB and the HPL (Hype Pressure Level) well over 200, you can't imagine what it's like. Every drum and cymbal manufacturer feels it is their heaven sent mission to demonstrate their wares with the most athletic players available. Each guitar amplifier maker must

show that their product is louder than the competitors. This is usually accomplished with the help of heavy metal musicians. The din is incredible, yet to someone in the business, realizing what all this activity means to the industry, it's exciting. However when you finally leave and step outside, there is a moment when you think that you have gone deaf.

An additional benefit, for those of us in the music business that are still straight, is the display of femininity at the show. The musicians that visit or play at many of the booths seem to gather some of the most beautiful women that Spandex can contain. It pains me greatly to realize that I own, and regularly wear, articles of clothing older than most of them.

For the first time this year, the arena section of the convention center was reserved for pro-audio. There you found **Crown** with their new MA-5000VZ amplifier. Imagine, 5000 watts, with P.I.P., a compressor and all the bells and whistles in only three rack spaces and 16-in. behind the panel. Also in the arena was: **Apogee Sound** showing their Artist series aimed at the MI market; **Com-**

munity Light & Sound introducing their CSX series of loudspeakers; **Crest Audio Inc.** with their new CA6 and CA9 amplifiers and new Consoles; **Neutrik**, although after over forty years in the business I have found that you can't teach an old dog Neutrik; **Eastern Audio Works**; **Klipsch**; **Renkus Heinz** showing their CoEntrant systems and EASE and EARS acoustic simulation programs; **Sennheiser** showing their musicians series of microphones and, of course, Neumann with their new TLM 193, allowing everyone to own a Neumann; **Manley Laboratories/VTL-Langevin** showing their excellent vacuum-tube processors, equalizers, amplifiers, microphones, and the new Model 10 Near Field Monitor with a Tannoy 10-in. dual concentric (coaxial for those of you who don't speak British) with a Mastering Lab Crossover; **ATM FLY-WARE** had an exhibit with a very complete catalog, the first I've seen devoted just to hardware for flying loudspeakers; and many other well known favorites. We didn't have to sort through the cymbals and guitar picks to find them either.

In the main rooms the scope of the items was staggering. The most interesting name for a product was "Gorilla Snot". This is a chemical product that helps a musician hold their pick, as it becomes tacky when warmed by the human body. However as a friend of mine pointed out, so do a lot of things! **BGW** showed their Performance Series and their new Model 2200 Powered Subwoofer by decorating their booth as a jungle with their staff in appropriate costume with shorts and pith helmets. Some of us just don't have the legs for that sort of thing!

An increased number of displays had drums made by Native Americans. (Funny, when I was a kid I never once remember playing cowboys and Native Americans.) They were really banging away on them, but the rain didn't get there until the third day of the show. I guess communications aren't what they used to be.

An interesting exhibit was **Austin Pittman's Groove Tube** booth. They have a new Vacuum Tube equalizer, the VARI-X EQ. A five band R/C equalizer with variable bandwidth and twelve selectable crossover points, the equalization circuits are completely passive with no inductors to induce any problems, and a wide band, low distortion amplifier at each end, making up for losses and providing the correct impedance coupling to all parties. In addition to their line of fine vacuum-tube products was a portion of Austin's collection of guitar amplifiers made over the last half century.

Yamaha was there with their brand new line of "WAVEFORCE"

Series of sound reinforcement loudspeakers. These five new units are designed with no sharp or square edges, and all HF drivers are coupled to symmetrical wave guides that resist distortion from attempting to place a rectangular pattern on a spherical driver. The units are constructed, in the ever popular trapezoid shape, at Yamaha's plant in Thomaston, Georgia. Not content with just loudspeakers, the Yamaha people also showed their new A100A power amplifier with a whopping 50W/channel and large meters on the front panel.

Yamaha, also famous for its consoles, had a PM4000 in the booth, always impressive, even to one who is used to them, and for those who can't handle the expense of the large consoles, they also showcased their new M2000 series, MIDI controllable with 128 scene memories, eight output groups, a stereo output bus and a mono output. There is a four-channel matrix, six independent aux sends on each channel, and four aux returns. The forty input model is less than 66-in. wide for easy transportability and installation in restricted spaces. For you Digifreaks Yamaha introduced its new digital graphic equalizer (YDG2030) and digital parametric equalizer (YDP2006). The graphic is a two-channel, 30 band graphic with four notch filters plus high- and low-pass filters. The parametric can be used in stereo, providing six bands of parametric plus the four notch and high and low-pass filters, or in mono providing twelve parametric bands plus eight notch filters and high- and low-pass filters. Variable output

delay up to 730 ms is provided. The units have the usual LCD screens and can remember up to 40 programs, and they even connect to MIDI for those who like that sort of thing.

JBL was there with their usual display of top notch products including a super fully automated Soundcraft console that will be featured in these columns within the next few issues. The folks in the booth were just a bit spacey as the epicenter of the earthquake was only about a half mile from the factory, and with over 3,000 aftershocks at the time, they were still rattled.

beyerdynamic microphones had a booth showing their ever-expanding line of microphones. Although it is a mystery to me why a company would decapitalize their name and then have it all run together, no engineer can fault the excellent products they make. However, in the new catalog I picked up, I was unable to find my favorite, the model 500. Perhaps it was a catalog misprint or the wrong catalog. One of the finest sounds I ever heard was Sarah Vaughn singing into a model 500. In the dictionary next to the word *smooth* was that illustration.

A booth not to be missed was one of the ones that made no products that generated any sound, but we would all be lost without **Ultimate Support**. They had a complete showing of their products old and new, and now seem to be the US outlet for K&M, Koenig & Meyer. We know them as AKG or Sennheiser or some other name stands, but those European fold up stands are all made by K&M and they were all there,

NAMM Convention

from microphone and speaker stands to instrument stands that hold anything that can be blown, plucked, strummed, twanged, bowed, or snorted into.

Speaking of that, some folks from northern California (naturally) had a booth full of instruments that fit all of the above categories, and then some. **Lark In The Morning** had everything from Didgeridoos to Shofars to Bouzoukis, Balalaikas, Madal, Gopichand, Dholak, and the always popular Ghungroo! They even featured a professional Dumbek, which I thought was a musician, but later found out it was an Arabic drum. They had just about every type of bagpipe a Gentleman could want. (A Gentleman is one who knows how to play the Bagpipe, but refrains from doing so.) Along with all of these amazing instruments are books and videos about how to play these instruments, which will be invaluable because, after hearing some of them, chances are you are going to be rehearsing alone.

MOJO Musical Supply in San Anselmo, CA had a display featuring supplies such as tubes, resistors, capacitors, and hardware aimed primarily at restoring and maintaining ancient guitars, amplifiers, and other period electronic devices.

Eventide, long at the forefront of digital equipment has announced two new versions of its famous H3000 Ultra Harmonizer. The H3000-D/SX includes the original 11 algorithms and presets that made the H3000S a staple in studios, but the new unit features the modular algorithm kit Mod Factory and a

unique 19 waveform function generator, a six octave Multi-Shift algorithm and over 300 presets including 100 new guitar presets from many famous artists. The H3000-D/SE, designed for the studio, has a modular algorithm construction kit plus over 400 presets, spatial imaging, and many dynamic effects including: compression, ducking, gating, EQ, dynamic delay, vocoder, and pitch shifting. These are in addition to the effects that have been a part of the H3000 since its introduction. The unit is fully MIDI compatible, and users can control everything with soft functions and customized front controls. Eventide also showed their H3500 and DSP 4000 Ultra Harmonizers. The effects processing and sampling abilities of these units are awesome. See them for yourself, when you have a few hours for a demonstration. But there is one caution: These units are complicated computers, and like any other computer, their benefit is directly proportional to the time commitment the operator makes to learn how to use them. They are not units you can just plug in and turn on, the concept of their functions is complex and if the operator does not learn how to use them, they will become an expensive rack decoration.

If you have a **Mackie 1604** and would like to automate, fear not, your prayers have been answered. Mackie has created OTTOMix. For only \$849.00 you can add internal MIDI automation to your CR-1604, or if you haven't bought a CR-1604 yet you can order a OOB-1604 and get a CR 1604 with the automation

built in, for less than \$2000.00. You can't beat that with a stick! Although the Ottomation is available for a myriad of computers, it seems to have been designed for the Macintosh. Portions of the front panel of the mixer are recreated on the computer screen, and the mixer may be operated from the keyboard alongside your favorite sequencing program. You can assign an unlimited number of fader and mute subgroups to up to three OTTO'd 1604s. Because the fades can be automatic, with adjustable dynamics, most of the retakes because of missed fades are eliminated. There are many more features to this addition to your CR-1604, just do your homework and read the brochures. Mackie also announced their LM 3204 line mixer with 2 mic inputs that fits into 5 rack spaces, and their entire collection of 16-24-32 x 8 Recording/PA consoles and expanders. In the last few years Mackie has progressed from oblivion to one of the major players in the home-studio market. Someone once said: "Give the people what they want and they'll beat a path to your door." This is working for Mackie.

Last year I was at a concert featuring one of the popular idols of the 1950s. I had bid on providing the sound and was aware that he was nearly as deaf as a post. He asked for a specific layout of Meyer speakers as monitors, and was unbending in that demand. As I watched the events leading up to this concert, I said a little thank you to the man above because I lost the contract. This concert was held at a fairground

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NAMM Convention

in January and it proceeded to rain buckets-full. The concert, originally scheduled for an outside venue, had to be moved inside of one of the large fairground's barn-like buildings, with terrible acoustics, which had been set up with the stage at the end of a long hall seating about 6,000 people. (They would have had a fighting chance if they were set up the short way.) Because of the performer's hearing problem, his monitors were so loud that the mixer had to take the performer's voice completely out of the front mains, and just let the moni-

tors carry the voice to the front section of seats. When the performer went out into the audience to sing, he went so flat that he thought Sing On Key was the owner of a Chinese Restaurant. My thought was: Why isn't he wearing earplug monitors? These devices are becoming ever more popular (especially with the Rock and Roll oldies that have been standing in front of a stack of Marshalls too long). **Circuits Maximus** was one of the companies that was showing the in-ear worn monitors at NAMM. They have both wired and wireless ear monitors. They were not the only manufacturer showing this type of equipment, Future Sonics seems to have the majority of the market, and others are joining. In-ear monitors seem to be the monitor system of the future, especially as the performers age. Other advantages of ear monitors are: Stage monitor levels can be decreased drastically; the performer always has the same acoustics no matter what the venue; and they allow singers to perform with much less strain on their voices. The other advantage is that the performers are always hearing the same thing so the monitor check, which is always the longest and most difficult part of setup and checkout is eliminated. It's about time this product evolved.


Marantz, since its evolution from a hi-fi company has continued to bring us some fine products. Their small, battery operated cassette recorders are found everywhere in professional applications, and now in addition to their well publicized recordable CD, they have come out

with a real professional dual well cassette deck. Their model PMD510 has all the features professionals have asked for in a dual cassette deck. Two completely independent cassette record/play machines on a single 3 space (5.25-in.) panel. Each deck has independent inputs and outputs, however the units can be coupled for serial record and play. There is a 15 percent pitch control for each well, RC-5 remote control port, real time counters, Dolby B, C, and HX Pro noise reduction, auto reverse, standard and high speed dubbing, and a headphone listening system that allows monitoring either or both decks. Several units may be coupled for series recording. All this for only \$799.00 with another \$200.00 for balanced XL connections.

Finally, **Panasonic** has upgraded their successful SV 3700 with the SV 4100. The SV 3700 features we have come to know and love have all been retained and the upgrade features are: Instant start; accurate PNO/CUE; five programmable Cue locations; software enhanced digital interface; programmable output level control; Optical I/Os; enhanced system diagnosis; and external sync capability. These units cost almost twice as much as a SV 3700 but in certain applications, they can't be beat.

There were thousands of other fine things to see at NAMM, but these were some of the ones that caught my eye. Why don't you come to the next AES, NAMM, NAB, NSCA, or trade show of your choice. If you're a professional in this business, it's time well spent.

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The Tube Sound and Tube Emulators

Eric K. Pritchard

Are tubes magic? Is there really a difference between tubes and transistors? Some hear the warmth and appreciate the full body of the tube sound, and others deride the thought. Is the magic of the tube sound more than mere nostalgia? A recording engineer, Russell O. Hamm, could hear the difference. Determined to find and explain the difference, he began testing microphone preamplifiers of various technologies. His famous paper, "Tubes Versus Transistors; Is There an Audible Difference?" [1], shows that the harmonic structures in overdrive conditions for different technologies are quite different, almost like fingerprints.

More recently, an electronics engineer, the author, started down the circuitous path to bring the two worlds together and to give solid state the character of tubes. The elusive tube sound has finally succumbed to an intensive research and

development program that has produced solid-state tube emulators and tube emulator circuits [2]. The effort began nearly seven years ago with the search for a solid state guitar amplifier that sounded like tubes. After snaking through myths and theories, the research turned to emulating the tubes, both triodes and pentodes.

Russell Hamm's work provided a test and an independent source of data to correlate the operation of the triode tube emulator.

TUBES AND THE TUBE SOUND

In retrospect, the tube has many technically superior aspects, it is fairly linear, its operational parameters do not vary badly, at least for tubes of yesteryear.

It operates reasonably without feedback. Its gain-bandwidth product is not low, about 8 MHz for a 12AX7 in a generic audio stage, compared with 3 MHz for typical audio operational amplifiers. Tube parameters do not vary as badly as semiconductor parameters.

They do not have the widely vary-

ing input voltage threshold of FETs. Tubes, in fact, may be the most natural amplifier. Unfortunately, they are large, they are fragile, they are microphonic, they drift, they burn out, they are nearly obsolete, and they are rapidly becoming unavailable.

The tube sound has been so elusive that many consider it to be mysterious and beyond the capability of modern instrumentation. This is partly true. The tube sound is often more subtle than the oscilloscope display. Low level harmonics are not visible, but are audible. Distortion meters do not consider individual harmonics, but our ears do. Standard audio tests do not tell the whole story.

Russell Hamm moved beyond the Total Harmonic Distortion measurement and developed a test that separated different types of microphone preamplifiers: triode, pentode, transistor, and operational amplifier. This test measured and plotted the percentage of each harmonic as a function of overdrive.

The harmonic character of these preamplifiers, *Figures 1 through 5*

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[1], are quite different, virtual fingerprints of the various technologies and their respective circuits. The triode curves, *Figure 1*, show significant second harmonic generated by the bias shifting in the coupling capacitor created by grid conduction. The pentode curves, *Figure 2*, show the grid conduction delayed by the plate load curve going through the saturation region well below the knee into the high plate resistance region. The semiconductor preamp curves, *Figures 3 through 5*, show no equivalence to grid conduction. The operational amplifier, *Figure 5*, shows the rapid rise in distortion created by high gains and substantial feedback.

The second harmonic provides punch in contrast to the blanket of the third harmonic [1]. Consequently, these figures show that the triode, *Figure 1* initially provides a blanket-punch that fades into a lot of punch. The pentode is primarily blanketed with a little punch. Semiconductors vary from quite blanketed to completely blanketed.

The next remarkable feature is the generation or rather the lack of high order harmonics. The high order harmonics, especially odd ones, put a discordant edge on the signal. A prime source of high order harmonics is feedback. Although feedback corrects for amplifier errors, it also attempts to correct for power supply limits. The feedback slams the output against the power supply rails and creates sharp corners that translate into high harmonics. This is quite evident in an operational-amplifier-based preamplifier, *Figure 5*. A transistor amplifier patent, in

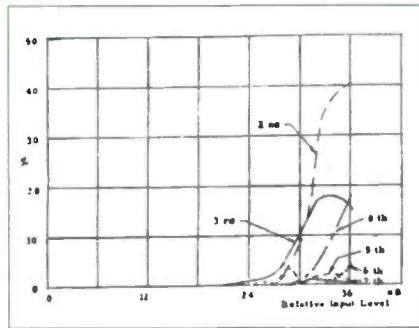


Figure 1. Distortion components for two-stage triode amplifier.

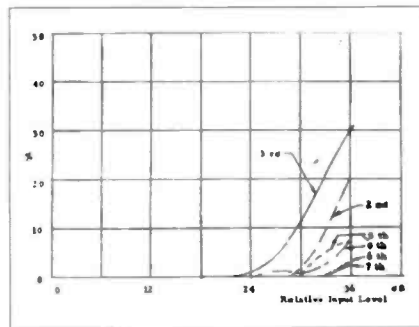


Figure 2. Distortion components for two-stage pentode amplifier.

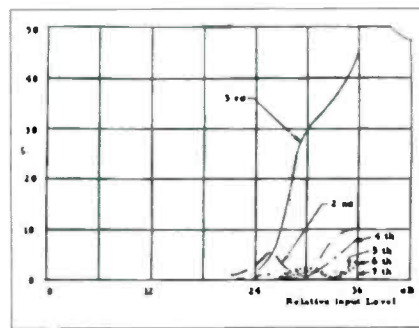


Figure 3. Distortion components for multi-stage capacitor-coupled transistor amplifier.

an attempt to sound like tubes, has reduced the extent of feedback to avoid these problems [6]. Tubes, being more natural amplifiers, need less feedback and consequently do not generate as much of these high, harsh, discordant harmonics.

Tubes, particularly triodes pro-

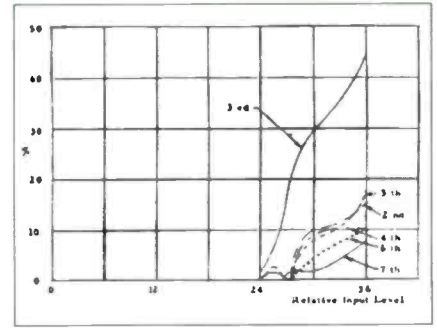


Figure 4. Distortion components for multi-stage transformer-coupled transistor amplifier.

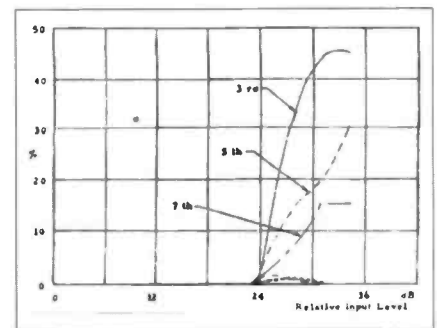


Figure 5. Distortion components for monolithic operational amplifier with hybrid output stage.

duce significant second harmonics, *Figure 1*. The second harmonic has two sources: the non-linearity of tube characteristics and the interaction of the coupling capacitor and the grid-to-cathode diode [7]. The non-linear characteristics are the plate resistance and the gain. The plate resistance and the gain produce harmonics at all signal levels. These harmonics are superseded by those created by the interaction of the coupling capacitor, grid-to-cathode diode, and clipping. The grid-to-cathode diode charges the coupling capacitor when the grid conducts. The resulting change in charge creates an offset that shifts

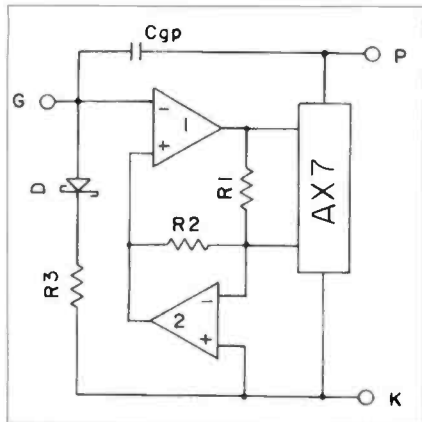


Figure 6. Complete Tube Emulator for a 12AX7

the bias from quiescent conditions. This bias shift alters the duty cycle of the resulting waveform. A duty cycle which is not 50-50 produces even harmonics. The two harmonic sources plus the low feedback combine to produce harmonics that occur over a wide range of input. This range is far wider than found in typical transistor or semiconductor designs. By comparison then, they distort too fast.

The grid conduction plus the unique plate characteristics give triodes the soft clip characteristic. Triode plate resistance is unique because the plate current sweeps upward with increasing plate voltage. Other devices, pentodes and all semiconductors, have a sharply rising current in the saturation region that then bends over into a constant current region. The triode plate characteristic ensures that for moderate-to-high impedance circuits the grid conduction always limits the negative excursion of the plate for any reasonable load line. This contrasts with pentodes and semi-

conductors which saturate for small loads. This is evident in the pentode preamplifier which has the second harmonic rising substantially later than it rises in the triode preamplifier.

THE TRIODE TUBE EMULATOR

The full triode emulation circuit, shown in Figure 6, has all of the needed features: grid, plate, and cathode terminals, grid-to-cathode conduction, grid-to-plate capacitance, gain, and the non-linear networks. The gain is created by two operational amplifiers such as the dual op amp, OPA2604. This operational amplifier has a sufficient gain-bandwidth product, about 10 MHz, to simulate audio tube circuits. The grid terminal drives the negative input of the first op amp to produce the needed inversion, while the second op amp creates the feedback for the first. R1 determines the proportion of distortion in the voltage gain. R2 then determines the voltage gain.

The choice of voltage gains is limited by the selection of the grid conduction components. The grid drive circuit cannot produce so much grid-to-cathode voltage that the first operational amplifier goes into negative saturation, yet a large output voltage swing is desirable. Thus, there is an engineering choice between the diode voltage drop, the power supply voltage, and the gain.

The reason why the tube emulator does not behave as its operational amplifier is that the operational amplifier is kept out of negative saturation by the grid-to-cathode diode and the positive satu-

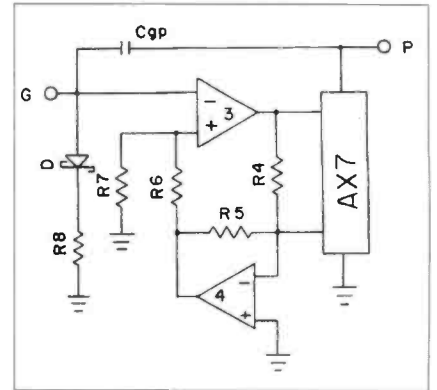


Figure 7. Low-noise Tube Emulator for a 12AX7

ration effects are not transmitted by an output resistance that becomes effectively infinite. Of course, this requires that the tube emulator plate supply be at or below the op amp saturation level.

The low-noise implementation, shown in Figure 7, is viable for flat response stages. A difference between these circuits is the feedback connection between the two operational amplifiers is attenuated by R6 and R7 so that the noise of the second op amp is also attenuated. This circuit drops the noise from 3 dB over a single operational amplifier to about 1 dB higher. The restriction is that the cathode terminal is grounded. This corresponds to a cathode bypass capacitor large enough to bypass the lowest frequency of interest. This does not upset the bias since this arrangement corresponds to a bias of about 1.3 volts on a 12AX7.

The non-inverting implementation, shown in Figure 8, is also viable for the flat response stage. Since the amplifier is non-inverting, the diode network must have the opposite



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Input Section

All inputs feature professional standard connectors: TRS balanced line inputs, and individual 48 v phantom power switch (avoid embarrassing pops and fully power your hottest power hungry microphones.) Our mic/line switch works as a 20 dB pad on the XLR connector allowing you to plug into balanced XLR line level inputs when you need to.



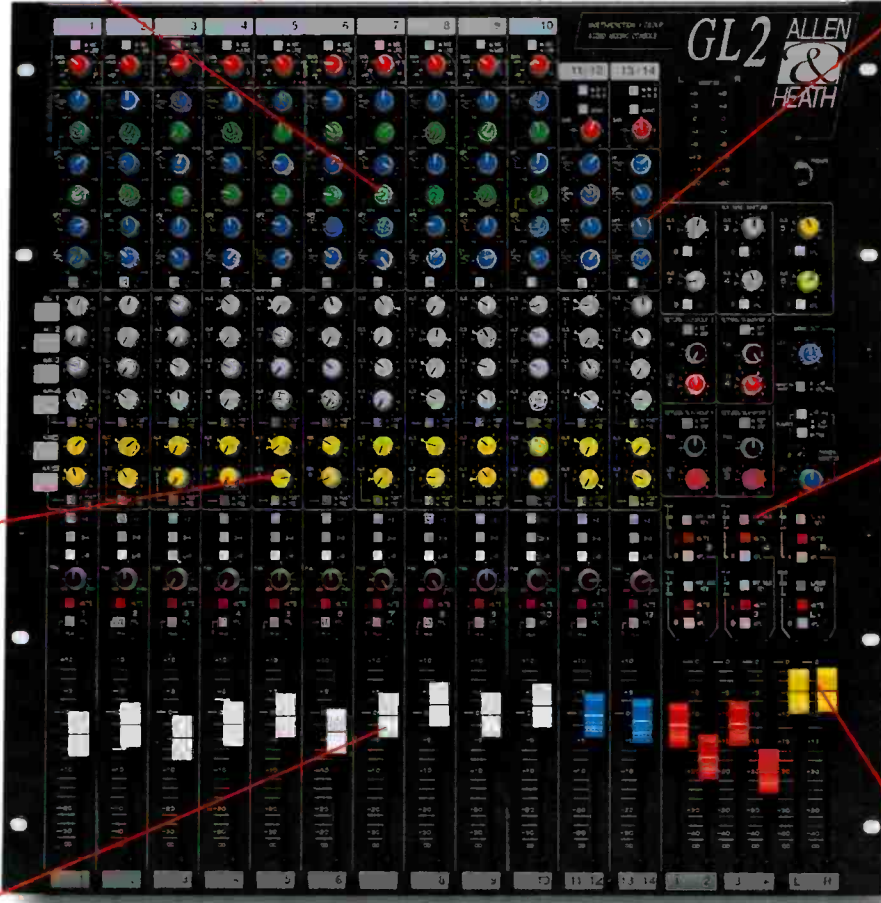
Output Section

All four discrete subgroup outputs. Left Right and Main outputs feature balanced XLR connectors and TRS insert points for simple interfacing of your finest signal processors.



Stereo Inputs

Stereo inputs featuring more EQ than most consoles have on their mono inputs. With two sets of inputs per channel and an A/B switch, you have the flexibility to select between 4 stereo sources (keyboards, CD etc.) For multitrack recording, used in conjunction with the 4 AUX/tape returns, you can bring in 8 tracks of tape while still tracking all of the other 10 inputs and getting a full function studio monitor feeds as well!



Auxiliary Section

6 discrete auxiliary sends selectable pre-fader/EQ (for monitor or studio headphone sends) or post-fader (for effects sends) Routing and flexibility not found on mixers costing hundreds, even thousands more!



AUX Reverse Routing

Full function stage monitor console. **it's that simple!** Routing switches via our unique source reverse switch allows the console to be converted from a recording/Front-of-House sound reinforcement board to an expandable 18:6 stage monitor console with a fully selectable engineer's cue mix.



Faders

As is the standard on all professional mixers of its class, the GL2 boasts full throw 100 mm Alps™ faders for thousands of hours of smooth, seamless operation.



Master Section

Four discrete subgroups, left and right outputs, and the AUX reverse section allow the GL2 to adapt in ways impossible on other compact mixers.

Tools, not toys.

Under the Hood

Careful attention to detail, as in individual circuit boards for each channel, fastidious component selection, and the best of British engineering all combine to establish the highest standard of performance... performance that is daily tested and confirmed anew.

The GL2 is the world's first multi-function mixer perfectly suited for Front-of-House Monitor, and Multitrack recording. The ultimate in flexibility, this compact rackmount unit reveals a world of new opportunity — the ability to adapt. In basic format, the GL2 is a 16 by 4 by 2 by 1 system for quality Front-of-House

mixing, but at the touch of a button it's instantly configured as a 16 by 6 plus 1 Stage Monitor mixer. Another button and you're set up for digital Multitrack recording. No fuss — no compromise — no limitations for the future. Our unique SYS-LINK™ system gives the GL2 the means to grow as you do. Designed and built by engineers that have been bringing you audio tools with the superb specifications and quality you expect from Allen & Heath. Audition the latest tool for the working professional at your nearest Allen & Heath dealer or call us for more information.

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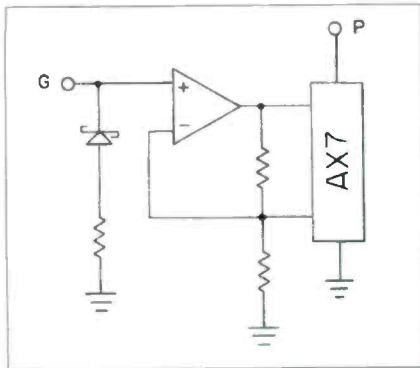


Figure 8. Non-Inverting Tube Emulator

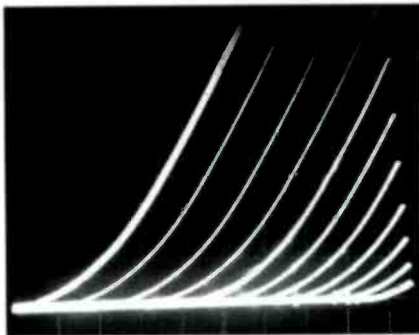


Figure 9. Output (plate) characteristics of a 12AX7 triode tube emulator:
 Horz: 5 volts / div,
 Vert: 0.5 milliamps / div,
 Step: .05 volts

polarity and the circuit cannot use the input-to-output capacitor.

The output characteristics of the tube emulator, shown in Figure 9, are similar to the plate characteristics of a 12AX7 triode. The output characteristics are quite accurate around normal load lines. The inaccuracy in the region of simultaneous low currents and low voltages is not important since the emulator is not operated there. These characteristics do not resemble the current limited characteristics of pentodes nor any semiconductor.

A tube emulator was operated alongside a 12AX7 to compare output waveforms, see Figure 10. After adjusting the tube bias, the input and output gains and the emulator grid-to-plate capacitance, the waveforms for a variety of input levels and frequencies show a good match at various overdrives, frequencies and loads, see Figures 11-20. A close examination of these figures show slight differences in the curvature in

some portions of some of the waveforms. This is reflected in slight differences in harmonic levels.

Harmonic analysis showed that the tube emulator erred in the direction of a more ideal tube, slightly more rounded waveforms and consequently less intense high order harmonics.

THE TUBE EMULATOR MICROPHONE PREAMPLIFIER

The complete tube emulator of Figure 6 was used to build a microphone preamplifier, Figure 21, to compare harmonic structures against Russell Hamm's findings. The preamplifier is a paraphrase of a generic two-stage triode amplifier. The circuit topology is the same except for the cathode follower and is replaced by a unity gain buffer. The impedances are lowered by a factor of 10 so that the tube emulators operate at semiconductor voltages at the same currents as their tube counterparts. The biasing, however, is lower than proportional simply because that is the character of the tube emulators. After finding the appropriate biasing, the tube emulator tested like Russell Hamm's generic two-stage triode preamplifier. It did not correlate with the pentode, transistor, or operational amplifier based preamps.

The test designed by Russell Hamm is simple. The harmonic percentage for harmonics 2 through 7 are plotted against overdrive. The input level that creates 1 percent third harmonic distortion becomes the 24 dB reference level. The result for the tube emulator microphone

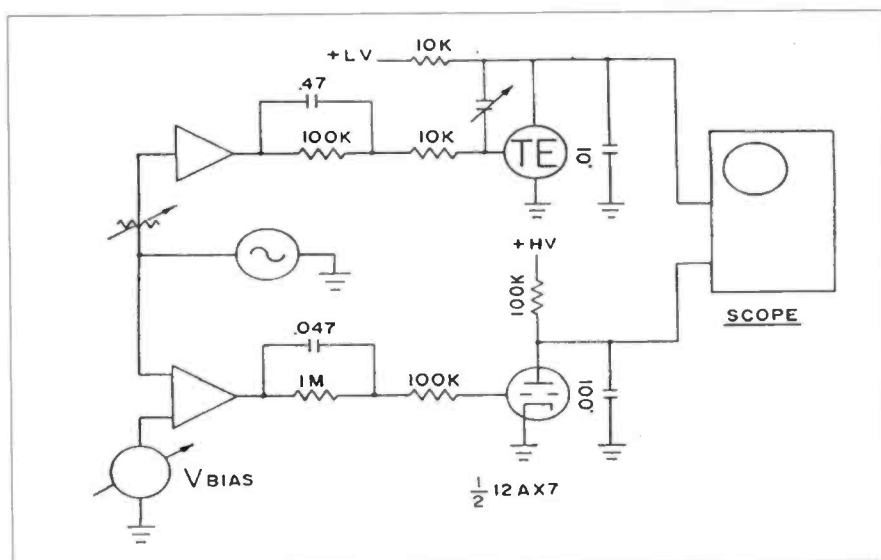


Figure 10. Comparison Tester for 12AX7 versus a Tube Emulator

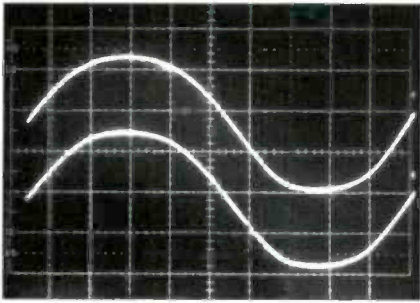


Figure 11. Output Waveform Comparison with tube at +5

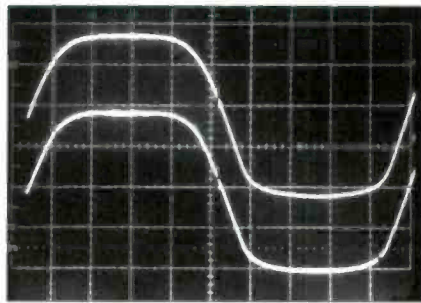


Figure 15. Output Waveform Comparison with tube at +11

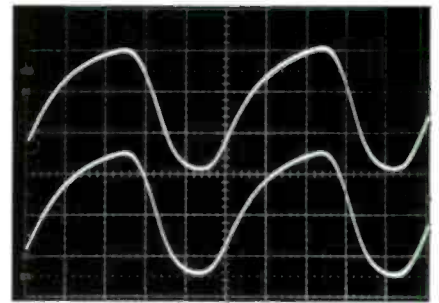


Figure 19. Output Waveform Comparison with reactive load

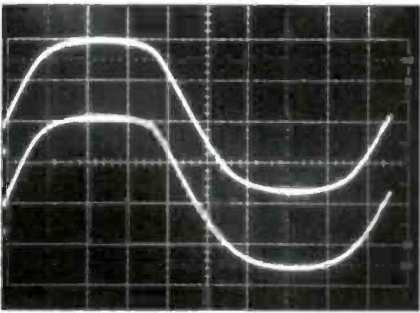


Figure 12. Output Waveform Comparison with tube at +8

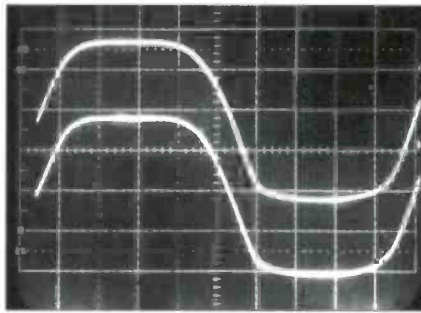


Figure 16. Output Waveform Comparison with tube at +11

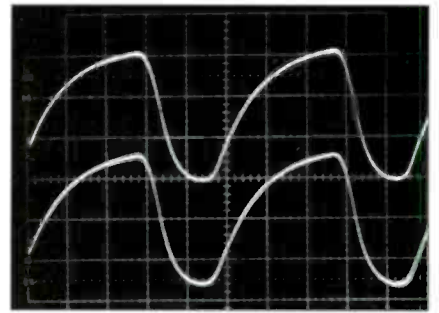


Figure 20. Output Waveform Comparison with reactive load

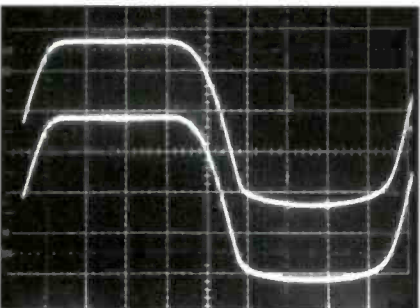


Figure 13. Output Waveform Comparison with tube at +14

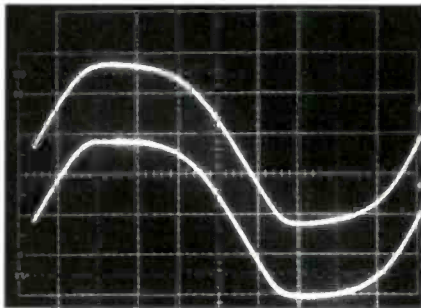


Figure 17. Output Waveform Comparison with tube at +11

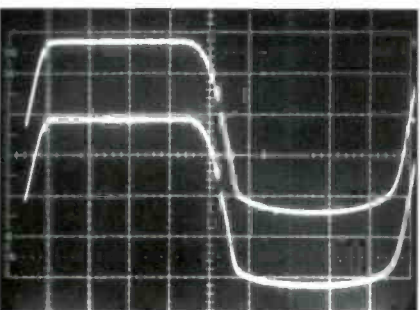


Figure 14. Output Waveform Comparison with tube at +17

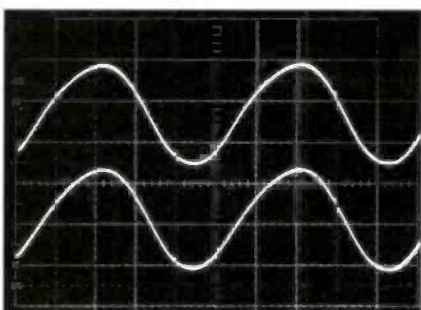


Figure 18. Output Waveform Comparison with reactive load

preamplifier is shown in *Figure 22*. The third harmonic rises first. The second harmonic rises from a lower level at the same time, then overtakes and dominates. The fourth rises about 4 decibels later than the second. The remaining harmonics remain below 5 percent, at least for 12 decibels of overdrive. This matches the description by Russell Hamm for a triode preamplifier: "The outstanding characteristic is the dominance of the second harmonic followed closely by the third. The fourth harmonic rises 3-4 dB later, running parallel to the third. The fifth, sixth, and seventh remain below 5 percent out to the 12 dB overload point" [1]. The harmonic percentage curves for the tube emu-

Tubes

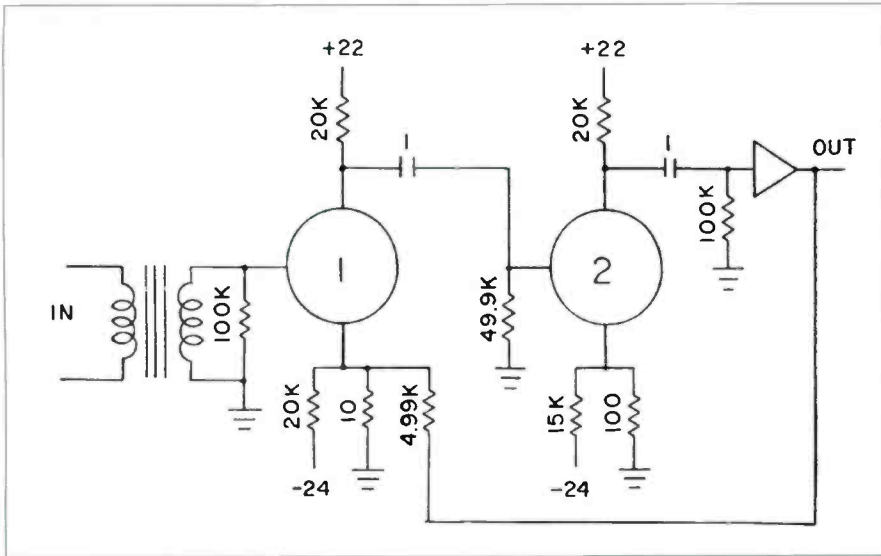


Figure 21. A microphone preamplifier using triode tube emulators.

lator and for the triode amplifiers are quite different from the curves for amplifiers made with pentodes, Figure 2, for transistors, Figures 3 and 4, and operational amplifiers, Figure 5. These amplifiers show a dominant third harmonic and smaller or zero even harmonic levels. Although the pentode is a tube, the second

harmonic generation is delayed and smaller, certainly does not dominant. The solid state examples, Figures 3 through 5, also show a faster rise in the third harmonic. The operational amplifier version, Figure 5, has significant, rapidly rising fifth and seventh harmonics as well.

Russell Hamm did not specify

which microphone preamplifiers he tested. Consequently, the only similarity between the Russell Hamm test amplifier and the source for the paraphrase of the tube emulator microphone preamplifier was that they both had two triode stages and two-stage triode amplifiers tended to be designed similarly. However, the inherent tube character is evident in both.

The good emulation of tube microphone preamplifiers by a tube emulator preamplifier indicates that many of the professional recording classics may be recreated with tube emulators because they use two-stage preamplifiers. For example, a generic two-stage amplifier is used in Pultec equalizers and Teletronics limiter/compressors as well as microphone preamplifiers.

Just as Russell Hamm pointed to the need for tube based components [1], the tube emulator has application wherever overloads are likely: microphone preamplifiers, limiters, compressors, equalizers, and power amplifiers.

Tube emulators allow designers to easily create synergistic combinations of solid state and tube characteristics. db

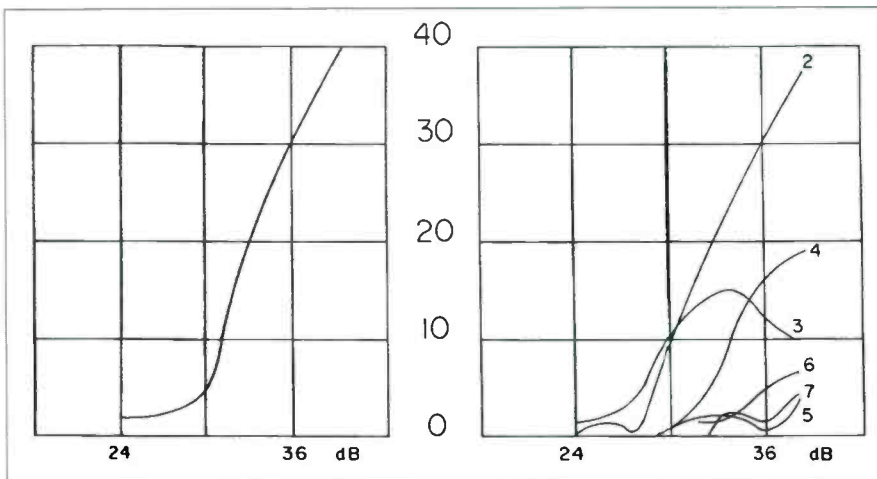


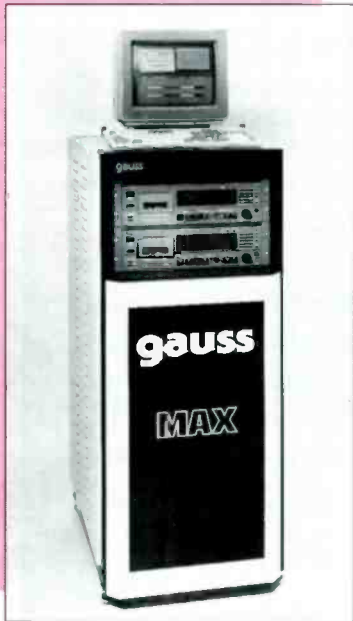
Figure 22. At left THD and at right harmonic distortion components for the tube emulator preamplifier.

REFERENCES

1. "Tubes Versus Transistors—Is There an Audible Difference?" by Russell Hamm, Journal of the Audio Engineering Society, May 1973, Volume 21, Number 4, pp. 267-273.
2. Patents by Eric K. Pritchard. U.S.: 4,809,336, 4,995,084, 5,133,014, plus one pending, plus foreign patents
3. Musical Merchandise Review, June 1992, pages 16-27, Larkin-Pluznick-Larkin, Inc. Newton, MA
4. "Semiconductors, Printed Circuit Boards, and Other Electronic Components", MA36Q(91)-1, October 1992, U.S. Government Printing Office, Washington, DC
5. Electronic Industry Association Market Services Department, 2001 Pennsylvania Ave., Washington, DC 20006-1813
6. U.S. Patent 4,987,361 by Brent K. Butler
7. U.S. Patent 4,995,084 and patents pending by Eric K. Pritchard

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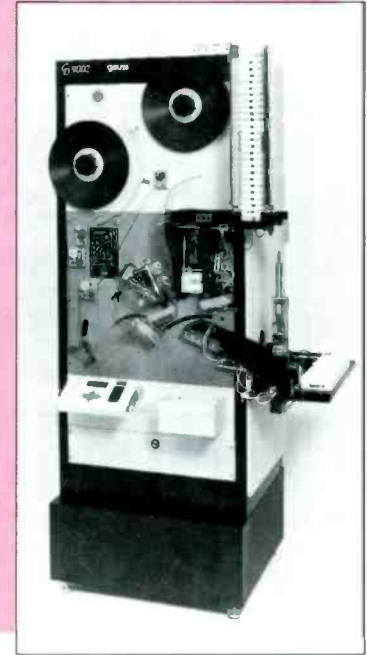


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TUBE EMULATOR DEVELOPMENT

The triode tube emulator became the first because it could be tested independently, outside of a guitar amplifier, against published data. The second tube emulator with its application specific components emulate a power output stage. They translate the output of a tube emulator phase splitter to drive power MOSFETs so that they behave approximately as either 6L6s or EL34s. The third tube emulator is a low-cost triode emulator that has only the absolutely necessary essence of tube characteristics.

The triode tube emulator is a combination of non-linear networks built into an epoxy encapsulated hybrid SIP and application specific components. This SIP has 15 pins on 0.1 inch centers along its entire length and is 0.71 inches high and about 0.125 inches thick. The

application specific components provide the gain elements and the grid conduction components. Figures 6 through 8 show various tube emulator circuits.

TUBE EMULATOR PRODUCT DEVELOPMENT

The triode and output stage tube emulators have been used in a proof-of-concept prototype guitar amplifiers. These amplifiers, a 111 watt and an 11 watt, have been received very well. The general concept and the overall tone has been accepted as tubes. The low-cost emulator has also worked quite well in its prototype guitar amplifier. The guitar amplifier makes a good test platform for the emulators because the guitar exercises the emulators in all regions.

The triode emulators have been used in microphone preamp prototypes. This

preamp has the synergistic quality of dual chains, one tube emulator and the other standard solid state. This provides

Additionally, the tube emulator is being built into Neumann U67 housings in a variety of circuit topologies: Neumann U67, Neumann M49, and AKG C12.

the user with the rich, warm tube sound or the clean, transparent solid state sound and the flick of a switch.

Additionally, the tube emulator is being built into Neumann U67 housings in a variety of circuit topologies: Neumann U67, Neumann M49, and AKG C12.

THE TUBE MARKET

The reason for creating the tube emulator is the declining supply and quality of tubes. Although some believe that the tube supply will prevail and continue to make high quality tubes, others differ. Hartley Peavey of Peavey Electronics: "It's just a matter of time before these countries catch up to the west, and stop making cheap but reliable tubes. This is why so many companies, including Peavey, are working feverishly to create the solid state equivalent of a tube amp." [3] Paul Meisenzahl of Yamaha: "One of the big concerns for most customers is the availability of replacement tubes. No one wants to invest good money in an amp and then have to go through all sorts of trouble when the tube burns out in six months or a year." [3] Cathy Duncan of Seymour Duncan: "We do extensive computer testing on all the tubes we receive, and we send most back to the vendor." [3]

The tube market is constantly being eroded by the advance of solid state technology. New semiconductors are replacing tubes constantly.

The latest threat is the flat video display that will replace picture tubes short-

ly. The picture tube is 50 to 80 percent of tube markets.[4,5] Although tubes are available from former Communist Block countries, their solid state revolution should occur faster since the technology is now available from the West.

Although tubes are available from former Communist Block countries, their solid state revolution should occur faster since the technology is now available from the West.

The audio or receiving tube market has been in decline for years. The U.S. Department of Commerce Bureau of Census found that the receiving tube market dropped from \$39.8 million in 1986 to \$21.6 million in 1991.[3] This market segment is so small the Census is likely to stop collecting this data. The Electronic Industry Association reports a drop in imported receiving tubes from \$8.3 million in 1985 to \$2.67 million in 1991.[4] The receiving tubes of all types imported in 1991 numbered less than

0.77 million units.[4] This is very low. By comparison, large semiconductor manufacturers do not consider manufacturing less than a million units of a single type per year.

The ever increasing capability of semiconductors is a continuing threat to the tube market. The only growth area in the tube industry has been the cathode ray or picture tube. Census data shows an increase from \$911 million in 1986 to \$1.415 billion in 1991. But this market is also under attack from advancing technology, the flat video display. These replacements for picture tubes will appear in television sets in two or three years. The tube industry will lose a substantial portion of its market.

The loss of the video display market plus the expected semiconductor revolution in the former Communist Block countries will accelerate the decline of audio tubes through a chain reaction. Fewer tubes will require less metal. The foundries will impose minimums, charge higher prices, and ship inferior material. Tube prices will go up and the quality will go down. Then more semiconductors will be used, etc.

Bringing DAWs Into the World of Big Buttons with a MIDI Remote

William A. Armstrong

At WSVN we have been using Digital Audio Workstations for more than two years. Our first was a Macintosh II with 42 and 500 Meg hard drives, a Digidesign AD IN and DAT 10 running Digidesign's Sound Designer II and Opcode's Studio Vision. The workstation was purchased for our Music EFX Production suite. WSVN is one of the only local TV stations to employ a full time Music EFX person. The Macintosh was primarily running Studio Vision, which is a sophisticated MIDI sequencer, to control our two Akai 51000 samplers and Roland JD-800 synthesizer. And we also used Sound Designer to record digital audio to disc, edit, and then trigger the track back at the proper time with the MIDI score.

About six months ago the music suite was upgraded and a Macintosh Quadra 800 was purchased. The Macintosh II with the AD IN and

DAT I/O was then installed in our main production control room. WSVN does seven hours of live newscasts a day. The shows are fast paced and music and graphics play a big part in the shows. For some time we have been wanting to get away from using carts for our music and upgrade to something that was CD quality, so we decided to give the DAW a try for live on-air use. It certainly had the audio quality we wanted and its extensive on screen editing and digital sound processing functions were an added plus.

The 600 Meg hard drive remained in the music suite, and for our purposes we purchased a 90 Meg Bernoulli removable hard drive. Transferring and editing our news music was very straight-forward. Sampling at 44.1 kHz, we could fit about 8½ minutes of music on one disc. We use 3 or 4 discs to cover the different music needed in the various shows during a day. At first we used Digidesign's "Master List" software to compile lists of music cuts, but our problem arose when we tried to find an easy way to play them live during

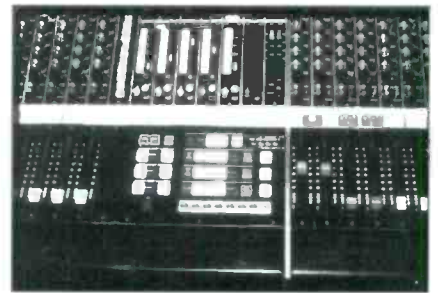


Figure 1. The Ward Beck remote panel.



Figure 2. Studio 3: the MIDI remote panel

our hectic newscasts. In all of my experience in broadcasting we always had big buttons on the console to turn on channels or start carts. But with this DAW and "Master List" we either had to use the computer keyboard or a mouse. And with a mouse, make sure that it didn't slip off the

William A. Armstrong is Broadcast Engineer with WSVN-TV in Miami, Florida

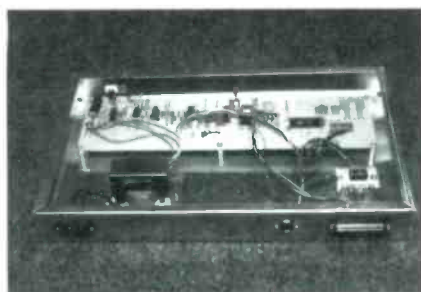


Figure 3. The PAIA MIDI remote-in-a-box.

play icon. We did just this for some time with relatively good success but we decided that ideally we wanted those big buttons on the console to trigger the DAW.

Digidesign also has software called

Livelist. The application, as its name entails is more suited for live use. It requires that you trigger playback with either a Mac key or a MIDI note. For the latter, besides having something that can provide a MIDI note, you also need a MIDI to Mac port interface. Many are available, we use Opcode's Studio 3, which is really more than we need.

Our Ward Beck console had 8 empty switch closures on our remote panel that, along with all of our other tape and cart remotes, were installed when we purchased it back in 1985. We never had a use for them until now. Our challenge was

how to turn them into MIDI notes. We had hoped that there was a company out there that made a black box to do this sort of thing, but after extensive inquiries I could find none. We even thought of cannibalizing a cheap MIDI keyboard, but after a long search, we found what we needed from a company in Edmond, Oklahoma.

PAIA Electronics is one of the few companies left that sell kits for the do-it-yourselfers.

They sell a variety of kits geared mostly to the electronically-minded musician. The one kit that caught our eye was their MIDI Remote Keyboard project. This provided exactly what we were looking for, a way to turn a simple dry switch closure into a MIDI note. The kit is based on an article that appeared in the April and May 1984 edition of *Polyphony Magazine*.


For roughly \$85.00, you get a PC board, a Rockwell 6511 processor, and a programmed 2716 PROM chip.

You then populate the board with your own readily-available parts including a transformer for the power supply, and a box to keep it in, and you're in business.

We turned our eight switches into a C Major scale, C1 to C2.

With "Livelist" software, the MIDI notes act almost as soft keys, and they can do several things. They can start, stop, or advance any cut of music.

We use seven start buttons and one stop. In this way we can fire any one of seven music cuts randomly.

The system works flawlessly and this DAW has big buttons thanks to a MIDI remote. 



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The Effect of The January 17, 1994 Earthquake on the Studio Business in Los Angeles

Shelley Herman

In the weeks since the Northridge Earthquake I have been visiting and calling Los Angeles area studios to find out how they survived the disaster.

For those of you who have never experienced an earthquake, here is a little background information. As a native born Californian I have experienced every tremor in this area since the 1933 Long Beach quake, except for the one in 1951. Most of the quakes, except the 1971 Sylmar quake, felt like someone was just pushing on the house and rocking it back and forth, or in the case of the aftershocks, a sudden bump. The 1971 Sylmar quake felt like the house was right next to a railroad track and a very heavy train was passing by and the house was bouncing around. As I awakened I thought o'boy that train is close! Then it dawned on me that we were miles from any train tracks. The house was moving enough to make the mercury in a "silent" light switch bounce enough to cause the lights to be flashing. A few years ago, during the Landers quake, over 100 miles away, I was recording a radio drama in front

of a live audience in a hotel ballroom. The performance stopped when the chandeliers, which were made of hundreds of glass crystals which were therefore all clanking together, drowned out the players. We had to wait about five minutes for the noise to stop.

I had awakened about ten minutes before the Northridge quake with a premonition that something was wrong. When the quake started it felt like a jackhammer that continued for about half a minute. I have spoken to people who live as much as forty miles away and they felt the same jackhammer effect, just not as strongly. Las Vegas, 300 miles away, was shaken hard enough for water beds to slosh around and chandeliers to sway. In both major quakes the noise level was well over 90 dB SPL. The majority of the damage in the Los Angeles area was concentrated in the epicenter area which was almost under the JBL/UREI factory, the Sherman Oaks area, Santa Monica, and parts of Hollywood. Several areas to the north and west of the San Fernando Valley were also severely impacted. Manufacturers such as JBL

and Dorrugh Electronics in the heart of the area were disrupted for several days while they sorted out all of the parts that were now in one big pile on the floor, realigned precision machinery that was now uncalibrated, and allowed their staff sufficient time off to deal with their personal problems. A store near me that specializes in screws, nuts, bolts and other fasteners had a sale on "Assorted Mixed Hardware, By the Pound" after the quake.

Right after the quake, which was at 4:31 a.m., all of the power in the Los Angeles basin was off. When I went outside to check things out, I was treated to the most beautiful display of stars since I had been out in the mountains of Colorado. We forget how much light is generated in a large city, even early in the morning. One of the more surprising reactions was that during the quake, and during every major aftershock, hundreds of car alarms went off, filling the air with their din.

In a masterpiece of good timing, Jim and Jan Bauer of Bauer Electronics scheduled their move to Oregon for Sunday January 16th, when they

Earthquake Report

left with a huge truckload of all their equipment.

I have called many of the studios around town and found out that there was very little structural or equipment damage. The most common problems were that the near field monitors had fallen onto the console and broken some of the controls and tape libraries were dumped off the shelves. One studio lost a part of the acoustical treatment on the ceiling, another lost a portion of one of its exterior walls, and the famous old Decca Records studio on the Paramount Pictures lot was

declared unsafe. However it was closed and scheduled for destruction anyway. It was the studio where Bing Crosby recorded *White Christmas*. Utilities were disrupted for several days, and it often took a while to get an inspector to declare your building safe (or otherwise), giving the studio personnel an unplanned vacation.


Most surprising was that Cornerstone Recorders and Sounder Recordings, both in Chatsworth near the epicenter were up and running as soon as they cleaned up the stuff that had fallen on the floor and power was

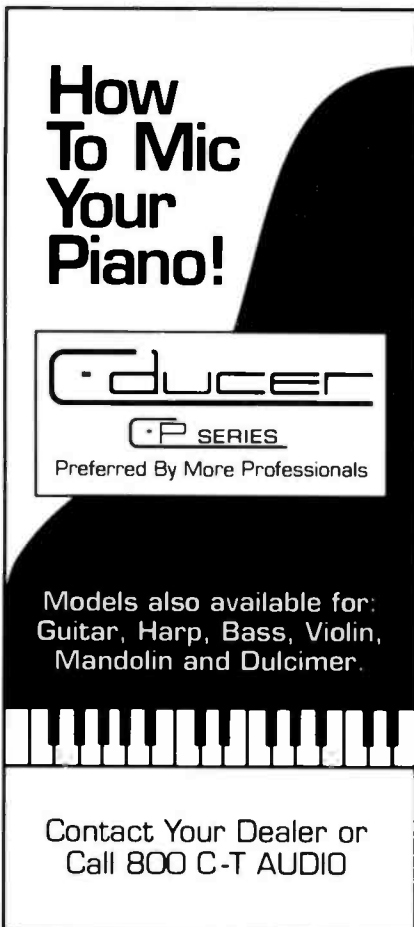
restored, although it's difficult to continue to record when aftershocks come rumbling through every hour or so. The other pleasant surprise was Record One in Sherman Oaks. All around this studio, large apartment houses were condemned, buildings collapsed, windows were shattered, and except for the fact that the electric gate on the parking lot malfunctioned, the studio sustained no damage. Their greatest damage was the loss of a several-month lockout session with a famous star who decided, right after the earthquake, that they really wanted to be somewhere else, thousands of miles away, for a while.

Two studios that have been recently featured in *db Magazine*, Serafini Studios and The Record Plant were unaffected by the quake.

The next trash collection day in Los Angeles county had some of the most expensive trash in the world: Waterford; Lladro; Hummel; etc. All that stuff broke right along with the 50 cent drinking glasses. (Ed note: a close friend, living high in the Hollywood hills, only lost three crystal wine glasses.)

Although some of the video post-production houses, where the construction and layout did not consider 120 dB sound pressure levels and excited musicians, suffered considerable damage, the general consensus in the recording studio business was that except for all the stuff that was dumped on the floor and had to be picked up, the studio business is still alive and well out here.

I guess if we build studios to withstand music they will withstand anything! 

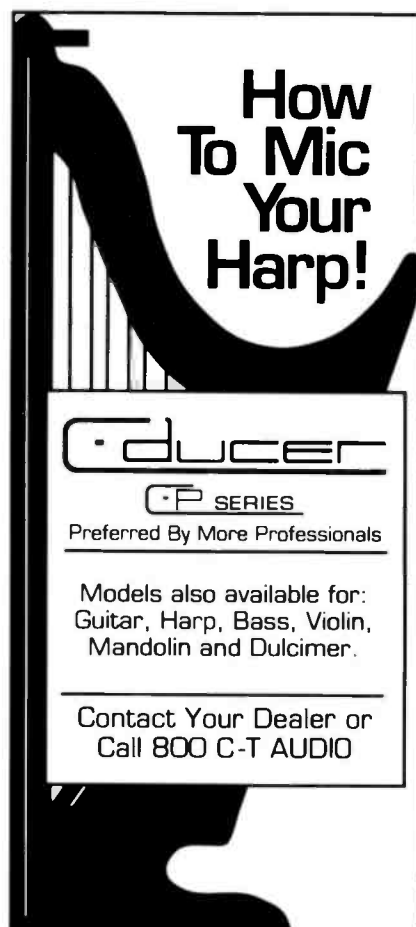


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Consoles and Mixers

The information on the following pages is supplied by the respective manufacturers. An address list of those manufacturers is at the end of the guide

ADVANTAGE (division of Biamp Systems)

Advantage One 7 Ex Mic/line Mixers are part of a modular mixing "system," which includes automatic mixing, remote control, EQ, gain control, and limitless input/output capabilities. ADVANTAGE ONE includes: 8n mic/line inputs; talk-over muting; phantom power. EX is an 8-channel expander. Price-available on request.

Advantage 601i Mic/line Mixers are single rack space, 6 input mixers. Inputs are provided to accept signals from mics, standard line level devices, and devices such as telephone lines, which require a 600 ohm transformer input. Features include: talk-over muting; phantom power; optional transformers. Price-available on request.

Advantage PM602 Presentation Mixers are rack-mount audio mixers designed specifically for multimedia presentations in board rooms, corporate facilities, schools, etc. It controls audio from video tape, audio tape and compact disc, as well as signals from mics and auxiliary mixers. Price-available on request.

Advantage Scm 7500 Stereo Club Mixers are designed as complete control centers for night-club sound. It controls audio from turntables, video and audio tape, compact and laser discs as well as signals from mics and auxiliary equipment. It also includes 6 stereo outputs, sub-woofer output, and extensive routing and patching. Price-available on request.

Advantage 7/3000 Powered Mixers are complete sound complete sound systems combining a 7-channel mixer, a 9-band graphic EQ, and a 300 watt power amplifier into a rack mounted package. Features include: 2-band EQ; 2 Aux. sends; mixer output patching; amp-limiter; phantom power. Price-available on request.

Advantage D60m Powered Mixers are designed primarily for public address applications with distributed

speaker systems. Features include: 2 mic/line inputs; talk-over muting; announcement chime; remote control; mixer output; 9-band graphic EQ; 60 watt amplifier; 25/70 V auto-former table-top or rack-mount. Price-available on request.

Advantage Dp/m 28 Distribution preamplifier/mixers are single spaced units, which combine a 2-channel mic/line mixer with an 8-output distribution preamplifier. A "mode" switch allows operation either as a single 2X8 distribution preamplifier/mixer or as two independent 1X4 distribution amplifiers. Price-available on request.

ALLEN & HEATH

GL2 is a 14 x 4 x 2 x 1 rack-mount mixer with 10 mic/line inputs, 2 stereo inputs., a 4-band eq with 2 mid sweeps and 6 aux sends. Price-\$1,495.00.

GL3 is a live sound mixer with a 4-band eq with 2 mid sweeps, 6 aux sends per channel. It comes in 16, 24, 32 and 40 configurations. Price-starts at \$3,495.

GS3 is a recording console with MIDI mute automation, dedicated eq on every input, in-line format. 16, 23 and up to 32 inputs are available. Price-starting at \$4,495.00.

GS34 is a VCA-automated version of the GS3. Is has automation on all channel faders, mute automation is also included. It comes with V-edit software. It is available up to 32 inputs. Price-starting at 6,495.00.

ALTEC LANSING CORPORATION

3308,3316A,3324A mixing consoles are 8, 16 and 24-channel mixers with a quasidifferential mix bus, 3-band eq with sweepable mid, 3-sends per channel,tape send and record bus, VU meters for bus monitoring,

BUYER'S GUIDE *continued*

electrically-balanced inputs and outputs. Dimensions: 3308A 19 by 6.3 by 17.5 in.; 3316A 29 by 6.25 by 20.75 in.; 3324A 39 by 6.25 by 20.75 in. Weights: 27,40 and 53 lbs. respectively. Prices: \$1390.00, \$1990.00 and \$2720.00.

PS2100A is a stereo powered mixing console with ten inputs, 3-band eq on each channel, 2 effects sends per channel, 2 built-in 100 W power amplifiers, 2 8-band graphic eq on outputs, internal peak-limited reverb. Dimensions: 20 by 8 by 19 in. Price: \$1,998.00.

1684A is an automatic microphone mixer. Its 4 channels are easily upgraded to 8 channels, NOM-1 function automatically adjusts system gain without gating, channel line and logic p/outputs, remote volume control, priority/mute system, multiple units may be linked. Dimensions: 20 by 8 by 12 in. Weight: 21 lbs. Price: \$2,300.

1700C Modular Sound Reinforcement Mixer has 6 input ports and 1 output. Traditional bass and treble controls and a high performance limiter circuit are all adjustable from the front panel. This model features phantom power, 2 mode muting with "slave and priority" settings, high-pass and low-pass controls and remote volume control circuitry. Dimensions-Height: 5.25 in.; Width: 19 in.; Deep: 12.50 in. Weight is 15 lbs. Price: \$508.00.

AMEK/TAC U.S. OPERATIONS

TAC B2 is a compact modular audio mixing console for video post and sound reinforcement applications, in 8/4/2, 16/4/2 and 28/4/2 formats. All formats available with stereo modules, and both parallel and serial interfaces to most major video editors. Dimensions-front to back: 20.41 in., height: 8 in. width: 17.13 in. (8 input) or 26.69 in. (16 input) or 41.03 in. (28 input). Price-8/4/2: \$3,950.00; 16/4/2: \$6,207.00; 28/4/2: \$9,590.00.

TAC BULLET. Similar to the TAC B2, this unit features 4 or 8 buses and LED or VU meter options, with up to 30 inputs. All formats available with stereo modules, and both parallel and serial interfaces to most major video editors. Dimensions-front to back: 20.41 in.; height: 8 in.; width: 17.13 in. (8 input) or 26.69 in. (16 input) or 41.03 in. (28 input). Price-10/4/2: \$4,463.00; 16/8/2: \$7,257.00; 28/8/2: \$11,080.00

TAC SR6000. Sound reinforcement/TV monitoring console, available as 24/8/2, 32/8/2 or 40/8/2. All have

eight VCA groups, eight mute groups, plus 10x8 matrix; a split auxiliary system (sixteen sends maximum) plus VCA grouping of outputs; parametric EQ, four stereo line inputs, input metering. Dimensions-(40 input console): front to back: 34 in.; height: 15 in.; length: 66.43 in. weight approx. 330 lbs. Price-24/8/2: \$40,943.00; 32/8/2: \$50,226.00; 40/8/2: \$59,500.00

AMEK BCIII Multi-format broadcast/production console includes such features as: up to four stereo sub-groups, Rupert Neve designed TLA input amplifiers, stereo image controls, M/S capabilities, optional VCAs and the ESM32 serial interface provide AFV control in video post production applications.

Dimensions-vary depending on chassis option. Price-from \$17,640.00 for a 12/2 format.

AMEK CLASSIC is a stereo broadcasting console system featuring a wide variety of options, including multi-track monitoring, metering (moving coil, LED bargraph, high resolution plasma bargraph), dynamics and automation (VCA, GML Moving Fader). Dimensions-front to back: 39 in.; height: 41 in.; width: 78 in. (32 inputs) or 97 in. (48 inputs) or 117 in. (64 inputs). Price-starts at about \$70,000.00.

AMEK EINSTEIN is an automated recording console aimed at small production facilities, mobile units and project studios. It has sixty-four inputs, all with faders and four band EQ. Optional : SUPERTRUE automation and VIRTUAL DYNAMICS packages. Dimension-front to back: 41 in.; height: 44 in.; width: 55 in. Price-\$35,000.00 for 64 SUPERTRUE automation-ready inputs.

AMEK HENDRIX is a space efficient, multipurpose, multi-track console based on the technology and concepts used in the MOZART system. SUPERTRUE automation system now features VIRTUAL DYNAMICS, an option that provides advanced compressors, gates, limiters, expanders and auto-panning through a software-based package. Dimensions- front to back: 46 in.; height: 45 in.; width: 77 in. (40 inputs) or 112 in. (56 inputs).

Price-\$93,516.00 for 40 inputs with SUPERTRUE automation

AMEK MOZART is a 32 bus, in-line console with a very high level of automation via the SUPERTRUE system: 15 switches per input module are automated in addition to the fader and mute. The mic and line pre-

amps, EQ section, and bus driver on the MOZART RN Series are all designed to the highest specifications by Mr. Rupert Neve. Dimensions-front to back: 48 in.; height: 43 in. width: 99 in. (40 inputs) or 136 in. (56 inputs) or 170 in. (80 inputs). Price-starting at \$107,882.00 for 32 SUPERTRUE automation-ready inputs.

APPLIED RESEARCH & TECHNOLOGY

Phantom Series Consoles series is designed for the recording and as a high-headroom live console. The 2408 features include: 16 XLR channels plus 8 additional line channels; multi-function metering; solo and muting per channel; 4 monitor sends; 4 post fader aux. sends; 4 master subgroups and XLR outputs. In addition it has 8 dedicated line returns; panning; soloing; assignable and separate outputs for a two channel control room output, or 2 track tape group submix. Separate XLR talkback input can be assigned to the main or monitor sends. For live applications the 2408 offers 4 monitor mixes; 4 aux. mixes; 24X4 subgroups and independent controls; outputs for each mix, monitor, main and subgroup; channel insert points for each channel, 8 direct outs for solo performer headphone monitoring, stereo headphone outputs, 3-band EQ with para-sweepable midrange, phantom power. The 2408 (24 channels) and the 1608 (16 channels) are rack mountable. The 3208 has 32 channels. Price-\$1,099.00 (2408).

Phantom 1608 is a recording and reinforcement console. Inputs are 8 XLR or 16 mono, talkback and 2 track return inputs, 8 channel inserts, Outputs include 8 direct, 4 sub group, 2-track track out and balanced main outputs. There are control room, mono, solo, and headphone levels, phantom power is available on the first 8 channels. Price-\$799.00.

AUDITRONICS, INC.

210 Series Broadcast On-Air Console is available in 4 standard mainframe sizes (6, 12, 18 and 24 dual input modules) with multiple options. It retains all features of classic 200 Series consoles and has many features including an optional 3 caller Telephone module. Price-depending on configuration.

800 Series Broadcast On-Air Console is utilizing hybrid technology, it has 3 mainframe sizes (12, 18 & 24 dual input modules). Stereo program, audition, util-

ity and Aux. output buses, 2 mono output buses, 2 line Telco module. It has an extensive user-programmable logic control system. All push button controls are electronic with LED status indicators. All faders are precisely stereo balanced controlling VCAs.

Price-depending on configuration.

850 Series Broadcast/Work Station Console

Identical to the 800 series console with the addition of signal processing and routing options electrically and physically in line with input and output modules. This console is a companion to the 800 on-air console and is designed for sweetening and special production with your workstation. Price-depending on configuration.

DESTINY 2000 is an on-air program management system which integrates and provides complete control of both music and traffic logs controlling all of your on-air sources. It is designed to operate as an interactive console with the integrated program log under your program director's control and in an auto mode under computer control. Price-depending on configuration.

BIAMP SYSTEMS

Legend Recording Consoles feature in-line modular recording, discrete transistor pre-amplifiers; 3-band sweep EQ with bypass and HPF; 4 aux. sends, balanced group outputs and tape returns.

Prices-2016 is \$6499.00; 3216 is \$10,074.00; 3224 is \$10,339.00.

Columbia Eight-Submaster Sound Reinforcement Consoles are available in 24, 32, and 40 input versions. Features include: discrete transistor pre-amplifiers; 4-band EQ with sweep mids; 8 aux. sends; balanced inputs and outputs. Prices-24-channel is \$7,699.00; 32-channel is \$9,399.00; 40-channel is \$11,099.00.

Olympia Four-Submaster Sound Reinforcement Consoles. This series is available in 24 and 32 input versions. Features include: discrete transistor pre-amplifiers; 4-band EQ with sweep mids; 6 aux. sends, balanced inputs and outputs. Prices-24-channel is \$6,699.00; 32-channel is \$8,399.00.

Newport Four-Submaster Sound Reinforcement Consoles. This series is available in 16 and 24 input versions. Features include: discrete transistor pre-amplifiers, 3-band EQ; 4 aux. sends, 4 aux. returns, balanced inputs and outputs. Prices-16-channel is \$2,699.00; 24-channel is \$3,383.00.

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BUYER'S GUIDE *continued*

Cascade Stereo Sound Reinforcement Consoles

This series is available in portable 12 and 16 input versions, as well as an 8 input rack mount version. Features include: discrete transistor pre-amplifiers; 3-band EQ, 4 aux. sends; balanced inputs and outputs. Prices-8-channel is \$1,199.00; 12-channel is \$1,759.00; 16-channel is \$2,099.00

Rackmax II Stereo Sound Reinforcement Mixers

This series contains many of the same features as the larger Biamp consoles such as: discrete transistor pre-amplifiers; 3-band EQ; 4 aux. sends; balanced inputs and outputs. The Rackmax IIEX includes: 4-band EQ; 6 Aux sends. Prices-12-channel is \$1,659.00; 16-channel is \$1,999.00; 16-channel EX is \$2,859.00.

MAXXAM Electronic Instrument Mixer. These rack mount mixers are designed primarily for electronic musical instruments and provide input, send and patching capability. Features include: 8 stereo inputs; 8 mono inputs; 2 mic pre-amplifiers; 4 aux. sends; 4 stereo returns, balanced inputs and outputs. Price-Maxxam 8+8 is \$1,332.00.

MIXPAK Powered Sound Reinforcement Mixers are complete sound systems combining a multi-channel mixer, a 9-band graphic EQ, and a 300 watt power amplifier into portable 6 and 8 input versions. Features include: 2-band EQ; 2 aux. sends; mixer output patching amp-limiter.

Prices-6-channel is \$714.00; 8-channel is \$814.00.

CARVIN

FX844 is a sound reinforcement/recording console with 8 in, 4 out capability. It has 250 watt/channel at 4 ohm amplification. Price: \$1,149.00 sold direct only.

FX1244 is as above but with 12 by 4 configuration. Price: \$1,499.00 sold direct only.

FX1644 is as above but has 16 by 4 configuration but no power amplification. Price: \$1,699.00 sold direct only.

FX2444 is as above but has 24 by 4 configuration. Price: \$2,299.00 sold direct only.

MX1688 is a recording consoles with 16 inputs and 8 outputs. Price: \$2,995.00 sold direct only.

MX2488 is similar to the MX1688 but offers 24 in by 8 outputs. Price: \$3,995.00 sold direct only.

CREST AUDIO INC.

Gamble Series Ex Monitor Console is configured with

48 input channels with 16 mono mix buses that feed a 16X16 matrix which feeds 16 output channels, each channel includes 4 band full parametric EQ, 24 dB per octave sweepable low cut filter, stereo aux level and pan, 20 segment LED meter and 8 programmable scene mutes. Has 20 segment LED meter.

Price: \$74,900.00.

Gamble House Console. The standard console consists of 56 input channels, 8 stereo subgroups, 8 stereo matrixes and a comprehensive internal patchbay. Features on each input channel include: a 4 band full parametric EQ, 24 dB per octave sweepable low cut filter, 10 aux. sends, 8 programmable scene mutes and a 20 segment LED meter. Price: \$74,900.00.

DDA

Profile Console is equipped with: 24 bus with 24 track monitoring; 56 module chassis which gives 32/24 format; 136 inputs available in mix; 4 band parametric EQ on all modules; split solo in place; full patchbay and automation available. Dimension-Height: 42 in; front to back: 43 in.; Length: 96.6 in. Price-available on request.

Interface Console is equipped as follows: 8/16/24/32 inputs; 4 sub groups; tape monitoring; parametric sweep mid range; stereo in place solo; stereo line input options; 6 aux sends; direct out each channel. Price-available on request.

DOD ELECTRONICS *See our ad on page 25*

1642 Mixer is a 16 line and 8 balanced mic inputs for use as a 16 X 4 for recording or a 16X2X2 for sound reinforcement. Four discrete mix buses out; 6 configurable pre or post sends; 2 subgroups, solo to mains. There is a convertible table top to rack mount. Price-available on request

1222XL and 122RM Stereo Mixers

These are 12-channel mixers. Features include: balanced XLR and unbalanced 0.25-in. jacks on all channels; two stereo effects return groups; L/R outputs, high, mid and low eq; phantom power, two effects sends per channel, monitor sends. XL model is table top, RM model is rack mount. Price-available on request.

822XL AND 822RM Stereo Mixers are 8-channel mixers with the same specs as for the 1222XL and 122RM. Price-available on request.

ELECTRO-VOICE, INC.

BK-42 Series Mixing Consoles. This series is configured in 8, 12, 16 & 24 channel mixing consoles. They have high speed op-amp, three band parametric EQ, and rack mountable versions are available.

Dimensions and prices:

BK-842: Height 5.5 in.; Width 19 in.; Length 17.5 in. Weight 33 lbs. Price-\$1,250.00.

BK-1242: Height 5.5 in.; Width 23.75 in.; Length 20.5 in. Weight 41 lbs. Price-\$1,510.00.

BK-1642: Height 5.5 in.; Width 28.75 in.; Length 20.5 in. Weight 49 lbs. Price-\$1,820.00.

BK-2442: Height 5.5 in.; Width 39 in.; Length 20.5 in. Weight 63 lbs. Price-\$2,500.00.

61/81PMX Powered Mixers. These 6- and 8-channel powered mixers offer features that offer flexibility and convenience for both portable and fixed applications. Features include: 40 volt phantom power supply, digital reverb delay; 9 amps; optimum tone control and individual sends on each channel. Dimensions: 61PMX: Height 6.87 in.; Width 17.75 in.; Length 15.5 in. Weight 25 lbs. Price-\$1,000.00.

81PMX: Height 6.87 in.; Width 17.75 in.; Length 15.5 in. Weight 27 lbs. Price-\$1,180.00.

200M mixer includes a digital MOSFET amplifier capable of delivering 300 watts per channel into 4 ohms. An on-board 30-program Lexicon stereo digital effects processor provides studio quality effects. It also features eight mic/line input channels with a ninth channel having an RCA type connectors for CD/tape and 1/4 in. phone jacks for instruments. Dimensions: Height 7.94 in.; Width 18.25 in.; Length 19.5 in. Weight 38 lbs. Price-\$2,798.00.

100M mixer has a 100 watt per channel powered package for portability and ease of operation. It features 3-band channel EQ, gain control, monitor and reverb send, pan pot and channel peak indicator. Dimensions: Height 6.85 in.; Width 17.5 in.; Length 15.5 in. Weight 25 lbs. Price-\$1,980.00.

FOSTEX *See our ad on Cover III*

Model 2412 inputs: 24 (48) X 12 X 2; aux. sends: 3 X mono; 2 X stereo; monitor outs: mono X 3; aux. returns: X 6; echo returns: X 6 EQ: Low/High-shelving; low-mid/high-mid sweep. Insert send: X 60; insert receive: X 60; solo: in place; stereo muting: X 4 scenes. Price-available on request.

Model 820 inputs: 12 X 6 X 2; aux. send: 1 effects send; 2 effects returns: X 3 stereo; EQ: low/low-mid sweep; high-shelving; solo: in place; stereo, optional MIDI muting. Price-available on request.

FURMAN SOUND, INC.

MM-4A and MM-8A Rackmount Mixers are compact utility mixers suitable for sound reinforcement or recording. Features include: four inputs, mono (MM-4A) or stereo (MM-8A) outputs, pan posts on each MM-8A input, effects bus with send and return jacks, stereo auxiliary inputs with RCA jacks and level control, low cut buttons on each input are -3dB at 100 Hz, master fader, headphone amp with front panel jack and volume control. The "B" models also contain balanced ins with both phone and XLR connectors, mic/line switch. The "BP" models are the same as "B" plus 48V phantom power on all inputs and phantom power switch. Dimensions: Height 1.75 in.; Width 19 in.; Deep 8 in. Weight 6 lbs. Prices-MM-4A: \$339.00; MM-4AB: \$379.00; MM-4ABP: \$415.00; MM-8A: \$399.00; MM-8AB: \$445.00; MM-8ABP: \$475.00

DJM-8 production mixer has the following features: eight stereo inputs (2 phono, 6 line) feed four input faders; by-passable crossfader with "Beat Sync" LRDs; 2 talk-over mic inputs with 2-band EQ, dim/mute button; cue button/LED on each fader; headphones can receive stereo cue/program blend or "split mono"; master and two Aux. zone faders; patch points aux switch for external processor; stereo VU meters; output 3-band EQ with proprietary Sub-harmonic Synthesizer; extra outputs for tape dubs (with or without talk-over); lighting system sync and mono subwoofer. Dimensions: Height 5.25 in.; Width 19 in.; Deep 8 in. Weight 12 lbs. Price \$849.00

MIDAS XL3/16 Console contains the following features: 16 inputs; 18 mix sends; 8 VCA groups; 8 stereo groups; input meters; 4-band EQ parametric; mix matrix; PFL or "solo-in-place". The XL88 Modular Matrix Mixer is an 8-into- line level add on to the XL3/16 or a stand alone mixer. Price-available on request.

NEOTEK CORPORATION

Elite Series consoles are made to order for the recording/production/broadcast market. All products can be

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specified with a variety of inputs, frame configurations and custom features. Prices-starting at \$59,495.00

Elan Series. These are recording/production consoles with many of the same components of the Elite series, including frame design.

Prices-starting at \$36,700.00.

Encore Series. This is a film style re-recording console that is built to order. Price-available on request.

Essence Series. This is an ADR/Foley/Effects Lay up console designed for film and television. Price-starting at \$23,900.00.

Esprit Series. This broadcast/production console is a new design developed as an on-air board as well as a production console. Price-available on request.

PANASONIC-RAMSA

WR-S852 is a 52/8/8/2 sound reinforcement console with 52 inputs, mono, monitor and submix, 8 groups, 8 aux, l-r output, 4-band EQ, 293 lbs. Dimensions-Height: 12in.; Width: 72.87 in.; Deep: 39.37 in. Price: \$36,300.00.

WR-C900. A 32 input theater sound reinforcement console with true l-c-r panning 4-band sweep EQ, 4 groups, 4 aux., 191 lbs. Dimensions-Height: 12.5 in.; Width: 63.75 in.; Deep: 36.37 in. Price: \$36,000.00.

WR-S840F A 40 input stage monitor console, has 18 aux., 4-band sweep EQ, and monitor, mono, submix inputs, 293 lbs. Dimensions-Height: 12 in.; Width: 72.87 in.; Deep: 39.37 in. Price: \$38,500.00.

WR-8616. A 32-input compact fully modular production console, has 16 + 16 mono, stereo, tape inputs, 4 groups, 4 aux., l-r output, 3-band sweep EQ, 114 lbs. Dimensions-Height: 10.5 in.; Width: 35.83 in.; Deep: 39.72 in. Price: \$12,000.00.

WR-T820B. A 20 + 20-input recording console, has mono, tape and line inputs, 8 groups, 4 aux and l-r output and can have up to 48 separate inputs for mix-down, 115 lbs. Dimensions-Height: 11.56 in.; Width: 42.125 in.; Deep: 32.75 in. Price-\$8,950.00.

WR-S216. A sound-reinforcement mixer with 16 inputs of mono, line, stereo, 3-band mid-sweep EQ, and 3 groups and 3 aux. outs, 47 lbs. Dimensions-Height: 5.87 in.; Width: 30.56 in.; Deep: 20.75 in. Price-\$2,850.00.

WR-133. An 8-input sound-reinforcement console, user friendly with 2 groups and 2 aux. outputs, 2-band

EQ, rack mount option, 22 lbs. Dimensions-Height: 6.93 in.; Width: 18.25 in.; Deep: 16.125 in. Price-\$1,290.00.

WR-M10A. A multi-purpose rack mixer with 4 + 2 inputs of mono, stereo, phono, 2 groups and 1 aux. out, 2-band EQ, built-in compression and auto-mute, 15 lbs. Dimensions-Height: 6.93 in.; Width: 17.43 in.; Deep: 6.125 in. Price-\$900.00.

WR-S44 SERIES. These 4-bus sound reinforcement mixing consoles are available with 12, 16 or 24 inputs. Other features include stereo aux.; master L/R; 3-band mid sweep; balanced I/O, 100mm faders and up to 15/19/27 Aux. sends (depending on model). Dimensions and price are:

WR-S4412: Height: 6 in.; Width: 25 in.; Deep: 22 in. Weight 41 lbs.; Price-\$1,995.00.

WR-S4416: Height: 6 in.; Width: 29.5 in.; Deep: 22 in. Weight 46 lbs.; Price-\$2,395.00.

WR-S4424: Height: 6 in.; Width: 38.62 in.; Deep: 22 in. Weight 61 lbs. Price-\$3,195.00.

PEAVEY/AUDIO MEDIA RESEARCH

2400PB Recording Console. This console, part of the production series contains the following features: 32 input channels, each with 8 sends and 4-band sweepable EQ.; 4-dual return channels; 24 submasters, each with two monitor inputs; master section includes MIDI command center, talkback, slate, RTT type patch with 300 patch points, simultaneous PK/VU LED meter arrays. Dimensions-Height: 14.25 in.; Width: 94.125 in.; Deep: 41.81 in. Price-available on request.

1600 PB Recording Console

This console has the same features as the 2400PB with 28 inputs and 16 submasters. Dimensions-Height: 14.25 in.; Width: 77.625 in.; Deep: 41.81 in. Price-available on request.

2400 Recording Console. Part of the production series, this console has the following features: 36 input channels, each with 8 sends and 4-band sweepable EQ.; 4-dual return channels; 24 submasters, each with two monitor inputs; master section includes MIDI command center, talkback, slate, 100 mm faders. Dimensions-Height: 14.25 in.; Width: 94.125 in.; Deep: 41.81 in. Price-\$15,999.99.

1600 Recording Console. The same features as the 2400 with 32 inputs and 16 submasters. Dimensions-

Height: 14.25 in.; Width: 77.625 in.; Deep: 41.81 in. Price-\$12,999.99.

800 Recording Console. The same features as the 2400 console available with 32 and 24 input channels and 8 submasters. Dimensions-Height: 14.25 in.; Width: 55.625 in.; Deep: 41.81 in. Price-\$11,499.99.

AMR 1242 Recording Mixer

This unit has 12 input channels with 3-band EQ with sweepable mid; 2 aux./effects sends, XLR inputs (1-8); direct outs (1-4); assign switch; master section includes left and right main and monitor, 4 tape outs, 2 send and returns, 8 input monitor section, headphone output. Dimensions-Height: 4.625 in.; Width: 30.625 in.; Deep: 24.625 in. Weight 29 lbs. Price-\$1,449.99.

LM 8. This is a sound reinforcement/performance mixer with the following features: 8 line level inputs with level, pan, mute and two aux. sends; 2 aux. returns with level and pan control; master left and right out with level control, headphone amplifier, stereo input jack direct to left and right bus. Dimensions-Height: 7.25 in.; Width: 19 in.; Deep: 8.25 in. Weight 8 lbs. Price-\$299.99.

AMR 64. This recording mixer contains the following features: 6 input channels with XLR mic and 0.25-in. line inputs, preamp out, 3-band EQ with sweepable mid, insert patch points, assignment switch, aux. send; 4-channel monitor, headphone output L/R master outs, and is rack mountable. Price-\$599.99.

PEAVEY/SOUND REINFORCEMENT & PERFORMANCE SOUND MIXERS

Mark VIII. These mixers are available with either 24 or 36 channels with 4-band sweepable EQ; eight aux. sends; assignment switches; PFL; eight submasters with aux. returns with 3-band EQ, PFL; L/R modules with slate; talk back; four matrix mix capability, communications module; clear-com compatible.

Dimensions and price-24-channel: Height: 14.50 in.; Width: 53 in.; Deep: 33.75 in. Price with power supply-\$7,999.99.

32-channel: Height: 15 in.; Width: 69.50 in.; Deep: 33.75 in. Price with power supply-\$9,999.99.

XR 1600D. This unit features: 16 input channels with 4-band EQ, 2 monitor and two effects sends; 2X300 watts into 4 ohms; master includes two 9-band graphic

EQ's (L/R); effects A & B send and stereo returns; 16-bit digital stereo effects processor with 128 presets. Dimensions-Height: 6.5 in.; Width: 33.5 in.; Deep: 26 in. Weight 59.6 lbs. Price-\$1,999.99.

MD III SERIES. These stereo mixers are available in 12 and 16-channel versions with 3-band EQ sweepable mid; 6 aux. sends; pre send and return patch; PFL. Master features aux. inputs to L/R master and all aux. buses, 4-aux. returns; 48 volt phantom power; 12 volt AC lamp socket; 2 LED arrays for L and R master. Dimensions and price-12-channel: Height: 5 in.; Width: 28.75 in.; Deep: 25.375 in. Weight 32 lbs. Price-\$1,299.99. 16-channel: Height: 4.75 in.; Width: 34.75 in.; Deep: 25.375 in. Weight 37 lbs. Price-\$1,549.99.

SRC 2400. This model contains the following features: 24 inputs; XLR balanced and 0.25 in. unbalanced inputs; pre EQ send and return patch; 3-band EQ with sweepable mid, six aux. sends, PFL, full channel assignment, 4 submasters, stereo mix-down capability, four LED array meters, stereo record output.

Dimensions- Height: 4.75 in.; Width: 52.25 in.; Deep: 25.375 in.; Weight 54 lbs. Price-\$2,599.99.

CD 9072. This model has CD/phono switches on all three phono music inputs; 4-way assignable crossfade switches; seven music inputs; mic effects loop; 7-band graphic EQ; cueing; 3-band EQ for both mics; twin beat eights; full stereo metering; headphone out with volume slider. Dimensions-Height: 10.50 in.; Width: 19 in.; Deep: 3 in. Weight 8.4 lbs. Price-\$399.99.

Series 3680. Contains 36 inputs with 8 aux. sends; PFL; pre EQ send and return patch; 4-band sweepable EQ; 8 submasters with PFL; post slider send and return; aux. input; 8 stereo aux. returns; matrix mixes of all subs and L & R; slate, talkback; intercom controls. Dimensions-Height: 14.625 in.; Width: 69.5 in.; Deep: 33.625 in. Weight 190 lbs. Price-\$10,999.99.

Series 2480. Same features as the Series 3680 with 24 inputs. Dimensions-Height: 14.5 in.; Width: 53 in.; Deep: 33.5 in. Price-\$8,999.99.

PZS Series Mixer. This mixer has 5 input channels with terminal strip inputs; four zone switches per channel; high & low EQ; level control; 2 mic inputs with paging capability; separate zone level control for all four zones; load impedance matching. Dimensions-Height: 5.875 in.; Width: 17 in.; Deep: 11.5 in. Price-\$459.99.

continued ►

RANE CORPORATION

SM 82 Stereo Line Level Mixer. This unit for recording and sound reinforcement is an eight input stereo line level mixer. Eight pairs of 0.25-in. input jacks supply signal to eight level controls and eight aux. send controls. Each of the eight stereo input channels also include a balanced control allowing proper positioning of the input signals in the stereo mix. A left and right aux. send jack is provided along with a left and right aux. return. Main expand and aux. expand jacks are provided allowing more than one SM 82 to be used in a system. Dimensions-Height: 1.75 in.; Width: 19 in.; Deep: 5.3 in. Weight 5 lbs. Price-\$599.00.

SIEMENS AUDIO INC.

NEVE VR Series Consoles. Multi-track recording consoles for the music industry with total storage and recall of virtually all console settings. Operable in automatic or individual channel mode, with high-resolution color graphic display. Console inputs of 36, 48, 60, 72 and beyond. Price-available on request.

NEVE VRP Series Consoles. Multi-track consoles for audio, video post and film recording with total storage and recall of virtually all console settings. Dolby matrix monitoring on switchable four- or eight-track buses up to 48 tracks; four- and eight-track to stereo or mono television feeds; independent master recorder and stereo monitoring; separate feeds for music and effects; inset switching for Dolby DS4 matrix with solo interrupt; two- and four-channel LCRS (left/center/right/surround) monitoring. Price-available on request.

NEVE Flying Faders Automation System. 4th generation of moving systems from Neve, with expanded 12-bit resolution providing accuracy to over 4,000 digital steps. Allows all level to be stored to 1/10th dB accuracy. System is retro-fittable to all Neve consoles and most consoles from other manufacturers to a maximum of 256 moving faders. Price-available on request.

NEVE 66 Series. This series of stereo TV broadcast and production consoles have features which include an integral microprocessor controlled reset system for switch status and input gain, with an optional system able to restore other rotary controls and fader settings. Other features include: dual input mono and stereo mic/line channels; multiple clean feed system (mix-minus); 4-band parametric EQ; silent matrix switching;

four or eight stereo groups; up to 12 mono and two stereo aux.; and 24- or 32-track recording and post-production options. Price-available on request.

AMS Logic 2. This is the first large-format, stand-alone, all-digital post production/recording/mixing console in North America. Each channel strip controls 4 completely independent mono or stereo signal paths. 27 faders can control up to 108 fully equipped stereo channels, 63 up to 252. Features total dynamic automation of all functions and 48 fully automated aux. sends. 8 main outputs, 16 aux. 64-track routing. Totally reconfigurable from stored setups, it integrates fully into the TV, film or post production environments. Price-available on request.

NEVE 44 Series. This is a new range of compact audio consoles for broadcast and video-post editing applications. Features include: stereo and mono input modules and 2 main stereo outputs; separate mic (transformer balance) and line (electronic balance) inputs on the mono module, plus line level (electronic balance) input on the stereo module. Selectable 3-frequency high pass filter followed by 3-band EQ with sweepable mid-bands. Provision for ESAM-II interface is also included. Price-available on request.

DTC-2 Digital Transfer Console. An enhanced version of the Neve DTC-1. New equalization consists of 2 pairs of selections for LF and HF, with a full range of peak/shelf responses in both sections. Mid-range band coverage between 1000 Hz and 3150 Hz with a choice of up to 7 different Q values. A/B store system to facilitate comparisons between different EQ settings. Optional dither as a cure for low-level distortion. New Neve A/D and D/A converters include special anti-aliasing and anti-imaging filters resulting in s/n figures exceeding 102 dB. Price-available on request.

SAJE-INFOSCÈNE TECHNOLOGIE INC.

The Memory Console in standard version contains 4-8 fader block 4-8 VU8 meter blocks and the computer. The separate audio rack can contain 16, 24, 32, 40 or 48 input modules, 8 dual output modules, monitoring serial interface and power supplies. All of the operating parameters of the console are digitally-controlled so they can be memorized and thereby benefit from the power of the host computer. Many options including SMPTE/EBU and MIDI control are available. Price-available on request.

SHURE BROTHERS INC. See our ad on the Back Cover

Model M267 is a microphone mixer with limiter designed for studio, remote or sound reinforcement use. 30 to 20,000 Hz; 120/240V AC; four switchable mic or line level balanced inputs with individual gain controls and low frequency roll-off switches; feedback-type gain controls for maximum clipping levels and dynamic range. Dimensions-Height: 2.72 in.; Width: 12.16 in.; Deep: 9 in. Weight 5 lbs. 2 oz. Price-\$535.00.

Model M268. Portable microphone mixer designed for sound reinforcement, tape recording, and audio visual systems. 40 to 20,000 Hz; 120/240V AC; four low-impedance balanced and four high-impedance unbalanced inputs; high-level aux. input for tape, tuner and accessories. Dimensions-Height: 2.72 in.; Width: 12.16 in.; Deep 9 in. Weight 4 lbs. 1 oz. Price-\$325.00.

Model FP31. Portable ENG/EFP/film production mixer for remotes. 30 to 20,000 Hz; battery power; three transformer-coupled, 3-socket XLR connector inputs switchable to low-impedance mic or line level; 2 transformer-coupled 3-pin XLR-connector outputs switchable to low-impedance balanced mic or 600 ohm balanced line level. Dimensions-Height: 1.875 in.; Width: 6.31 in.; Deep: 5.31 in. Weight 2.2 lbs. Price-\$1,095.00.

FP32A. Portable stereo ENG/EFP/film production mixer for remotes. 50 to 15,000 Hz; batter power; 3 transformer coupled, 3-socket XLR connectors inputs switchable to low impedance mic or line lever; transformer coupled left and right 3-pin XLR connector outputs switchable to low impedance balanced mic or 600 ohm balanced line level. Dimensions-Height: 2.31 in.; Width: 7.25 in.; Deep: 6 in. Weight 3.5 lbs. Price-\$1,795.00.

FP42. Compact, self-contained stereo mixer for broadcast, recording and sound reinforcement. 30 to 20,000 Hz.; 120/240V AC or battery power; 4 transformer coupled XLR inputs each mic-line switchable with low-cut filters and cueing function; left and right channel transformer coupled XLR outputs with mic line and mono stereo switches.

Dimensions-Height: 3.125 in.; Width: 12.22 in.; Deep: 9.06 in. Weight 6 lbs. 8 oz. Price-\$1,050.00.

FP410. A portable automatic mixer for broadcast and corporate video use, featuring Shure's patented Intel-

liMix circuitry. Keeps unused open mics turned down and instantly activates them when needed. Handles up to four mic or line level signals. Front panel channel gain and master controls operate as in conventional mixers. Dimensions-Height: 1.75 in.; Width: 14.5 in.; Deep: 8.25 in. Weight 5 lbs. Price-\$1,595.00.

SOLID STATE LOGIC

Ultimation G Series Console Automation System. SSL's combination moving fader/VCA console automation system with three modes of operation. Ultimation can work as either a dedicated VCA system, a dedicated moving fader system, or in a way that combines features of both systems. Ultimation is an extension of the G Series Automation, and is available as a standard option on all new G Series consoles or as a retrofit to any console using the G Series computer. Price-available on request.

SL 8000 Multi-Format Production System. This is an advanced post-production console, suitable for everything from music scoring to stereo surround sound mixing. It can work in any current or proposed format, but is particularly suitable for TV post-production with up to 4 stereo stripes; Dolby Surround TV post-production, film production from 4 strip LCRS to multiple DMEF dubs, 5/6 channel discrete mixes for HDTV, Dolby SR-D or Kodak CDS. Price-available on request.

SK 4000 G Series Master Studio System. The latest development in the classic Master Studio Design, the G Series features the most advanced signal processing and the new G Series Studio Computer, which utilizes 20 megabyte data cartridges, a full size keyboard and new software that handles large and complex mixes effortlessly, on and off line. It is also equipped with the Total Recall Computer. Options for the music production system include oxygen free cable for improved sonic performance, plus a choice of both G Series and E Series equalizers.

Price-available on request.

SL 5000 GP. A production version of the SL 5000 console, it is specifically configured for television and radio production, and on-air presentation where routing flexibility and multiple output capability are essential. It offers 24 mono and 8 stereo channels with full EQ and routing to the main program bus, plus an additional 12 stereo balanced mix buses that are used for

BUYER'S GUIDE *continued*

subgroups and independent main outputs. Options include Instant Reset and Total Recall computer systems, together with an auxiliary system and dynamic fader automation. Price-available on request.

SONY COMMUNICATIONS PRODUCTS COMPANY, PROFESSIONAL AUDIO DIVISION

MXP-3056 VF. This audio recording/remixing console is intended for use in recording studios. It has 56 channels which allows for interfacing with the Sony PCM-3348 digital audio multi-track recorder. Each input/output module features modular equalizers and mic/line pre-amplifiers. The Audio Group Master (AGM) function allows for audio grouping on the ACN bus and conventional in-line operation. Price: up to \$100,000.00 depending on configuration.

MXP-3036 VF. Designed with a vacuum fluorescent (VF) light meter that displays various selectable scales including VU, BBC Peak, Din Peak, Nordic Peak and a d.c. scale. This d.c. scale indicates fader position in the automated version of the MXP-3036 VF. The automated version includes Version 2.0 software and optional wild faders that permit a user to increase the number of effects in a mix. Price: up to \$110,000.00 depending on configuration.

MXP-3000 This series is a modular 24-bus console primarily intended for music recording applications. Available in 20-, 36- and 56- input frame sizes with many options including five types of equalizers, four input configurations, and automation choices. Price: \$55,000.00 to \$200,000.00 depending on size and configuration.

MXP-2900. The audio consoles is a modular audio-for-video system available from 8 to 36 inputs in four frame sizes. Extensive video interface options are available, mono and stereo modules, built-in compressor/limiters, and extensive routing and communication capabilities. Price: \$15,000.00 to \$45,000.00 depending on size and configuration.

MXP-290 is an 8-input mixer designed primarily to be used in conjunction with a video editor in a post-production environment, it offers microphone, balanced, and unbalanced inputs on each input channel and balanced outputs, an internal audio edit preview function also included. Price: \$3,819.00.

MXP210

This has all of the features of the MXP-290, except

those related to video editor interface, the MXP-210, like the MXP-290, offers excellent audio performance in a rack-mountable mixer.

Price: \$1,992.00.

MX-P61VU is a 12-channel audio mixer. It is equipped with 12 mic/line inputs and 4 line outputs. Features include built-in 1 kHz test tone for precise level setting, high-cut and low-cut filters for convenient bandwidth limiting and a.c./d.c. operation. Price: \$10,675.00.

SOUNDCRAFT

Delta Consoles are Delta 8-mono, stereo input modules w/various equalizer configurations; 6 aux. sends; 4 to 8 bus available w/8, 16 track tape monitor returns. Delta Monitor-10 mono & 1 stereo monitor mix for stage monitor and production foldback. Up to forty inputs frames available.

Price-from \$3,900.00 to \$20,000.00.

Venue consoles have 8 bus live: 16, 24, 32 or 40 channel available; 8 plus 2 receive matrix section with meter bridge and center master section standard in larger frames. Inputs include 6 aux. sends; 4-band EQ; phase reverse; patented pad-less mic preamp; 4 mute groups.

Price-from \$11,000.00 to \$26,000.00.

Sapphyre. Multi-track/production console w/in-line monitoring and sophisticated film/post features. Channels have 4-band EQ; integral noise gate for signal control; signal routing includes 6 aux. sends; track buses available as additional aux. sends; mono and stereo inputs available, full metering standard. Available in patchbay version also. Price-\$25,000.00 to \$55,000.00.

6000 Auto. 16 or 24 bus recording console. Each input has 6 independent sends and 4-band EQ with 2 sweepable mids. Features include PFL and true solo in place; low crosstalk routing matrix; silent electronic muting. Available in 16-56 input versions. Automation package includes faders; mutes; VCA groups and noise gates. Price-\$12,000.00 to \$52,000.00.

Spirit Consoles. Live consoles-8, 16, 24 inputs w/ 3-band EQ; two sweep controls; high-pass filter; 4 aux. sends; separate stereo/mono bus assignment allow various routing possibilities. Studio consoles- 16, 24 inputs w/ in-line monitoring for up to 56 inputs w/ EQ

on all paths.

Price-\$1,295.00 to \$5,650.00.

Spirit Monitor. This is a 24 channel console with 8 monitor outputs designed for on-stage monitoring applications. Each input module has balanced mic and line inputs with a 3-band, two sweep EQ design; high pass filter and polarity reverse. A 60mm fader controls the signal level sent to the eight monitor send controls. An ON and Pre Fade Listen control with LED indication complete each module.

Price-\$5,650.00.

Europa. This is Soundcraft's newest live reinforcement console. Frame sizes range up to forty inputs, each size standard with 4-band parametric EQ; integrated noise gate; eight VCA subgroups and eight mute groups. The VCA Soloing system incorporates solo clear. Full metering on all inputs and groups included. All inputs and outputs are balanced along with fully differential balanced bussing. Twelve aux. sends each with individual on/off complete the module. Price-from \$35,000.00 to \$60,000.00.

Delta Ave. Audio production, audio follow video capability. Up to 16 inputs, mono or stereo. External control via parallel, GPI or Serial. Supports ESAM 1, ESAM 2, GVG 100; AMX 100; other popular protocols both in eavesdrop and reply mode.

Price-\$6,000.00 to \$20,000.00.

STUDER/REVOX

990 Console. This is Studer's top of the line, digitally controlled console that is suited to a variety of applications including multi-track music recording and production, radio and TV broadcasts and post production. The 990 is available in sizes from as small as 20 inputs to as large as 80 inputs with up to 48 buses. There are optional modules available such as mono and stereo inputs, mono or stereo submasters, dynamic processors, in-line monitoring, bargraph and VU metering. Snapshot automation is standard with optional PC Graphic Control Unit for dynamic automation and all store and recall functions. Prices-starting at \$150,000.00.

961/962 Console

This console is designed for a wide range of applications including post production, remote recording, on-air broadcasts. Features include up to 16 inputs; 4 mas-

ter outputs; 2 aux. outputs; 3-band EQ on each input; compressor/limiter on outputs. An optional editor interface is available as well as a comprehensive range of peripherals and accessories. Prices-starting at \$13,4000.00.

900 Series Consoles

This series can be configured for post production, on-air TV broadcasting, multi-track recording and other production tasks. Features include 12 to 60 inputs with 4-band EQ; mono or stereo inputs; multiple stereo masters. Moving fader automation is available. Outputs can include compressor/limiters. The 900 series can be customized to exact user requirements.

Prices-starting at \$50,975.00.

963 Console

This console offers flexibility for a wide range of music and broadcast applications. Housed in an extremely compact unit, it is available with 16 to 56 inputs; up to 8 subgroups; 2-4 masters; 3-band EQ on each input; a compressor/limiter on outputs. Alternate input modules, input pre-selectors metering, monitor mixes and machine remotes are available. Prices-starting at \$48,900.00.

A779 Console

This is a compact, portable mixing console with 6 mono or 6 stereo inputs. Features include EQ; 1 aux. bus and stereo master output. Designed for video edit suites, mobile and remote applications. Price-\$4,500.00.

SUNN a division of Fender Musical Instruments

See our ad on Cover 2

PSM-8 Mixing Console

This is a personal stereo mixer which includes 8 input channels, each with trim, effects send, bass and treble controls and pan control. Master section includes master faders, aux. and effects returns and headphone output. Price-\$419.99.

RMX 4110 Mixing Console

This is a rack mount mixers whose features include 10 input channels; stereo and summed mono outputs (balanced & unbalanced outputs); monitor; effects and aux. (3-buses total); 3-stereo return lines; 3-band EQ; trim control; 6 rack spaces; three 12 segment LED output displays. Price-\$899.99.

continued ►

BUYER'S GUIDE *continued*

MX 4212 Mixing Console

Features include 12 channels each with high and balanced low impedance inputs; trim control; 3-band EQ; 3 send buses (eff/reverb, monitor and aux.) with internal jumper for pre/post assignment; pan; individual cue bus and precision channel fader. The master section includes phantom power; reverb; 2 switchable LED bargraphs; 4 master faders (program L/R, main, monitor); complete compliment of return controls; and cue with headphone jack and level control. Additional features include individual channel in and out patch points; direct in jacks and extensive back panel patching capabilities. Price-\$1,499.99.

PX 2008 Powered Mixing Console

Sound reinforcement mixing console that has among its features the following: 8 input mixing system; two 150 watt amplifiers, one for the main house p.a. and one for stage monitors. Each input channel has a balanced XLR mic input and 0.25-in. TRS phone jack; a channel access patch point; variable gain trim control, 3-band EQ; separate send level controls for monitors, effects and aux. send. Master section features separate 9-band graphic EQ for both main and monitors; send level controls; 2 returns; tape send; RCA phono jacks tape playback level control; LED VU meters, proprietary DeltaComp clip protection circuit. Price-\$1,299.99.

PX 2012

Same as PX 2008 with the following additional: 12 input mixer; two 250 watt (at 4 ohm) amplifiers. Price-\$1,599.99.

PX 2112

250 watts per channel into 4 ohms, 12 channels each with high and balanced low impedance inputs; trim control; 3 separate sends (eff/reverb, monitor and aux.); internal jumper for pre/post assignment; 3-band EQ; pan and channel fader. Master section features dual 10-band graphic EQ; phantom power; 2 switchable LED bar graphs; reverb; switchable compression; 4 master faders; channel in and out patch points; direct in jacks and back panel patching capabilities. Price-\$1,899.99.

LX Series Portable Powered Mixers

The LX 1504 with 4 input channels and the LX 1506 with 6 input channels features: 150 watt (at 4 ohms) amplifier; balanced XLR mic input; 0.25-in. phone jack;

separate level controls for main, monitor and effects/reverb sends; 2-band EQ for each channel. The output section has master level controls to main, monitor and effects send levels; effects/reverb returns; aux. effects return; RCA phone jacks; patch bay. Price-LX 1504 \$399.99; LX 1506 \$499.99.

TASCAM *See our ad on page 14 and 15*

M1500 Series

This series of recording mixers all employ dual Mix systems for recording flexibility, plus 3-band mid sweep EQ per channel. The M1516 is 16 in/4 group/16 monitor. The M1508 is 8 in/4 group/8 monitor. Dimensions and prices-M1508: H: 4.75 in.; W: 16.44 in.; D: 23.81 in. Weight 13.25 lbs. Price-\$1,099.00.

M1516: H:4.75 in.; W: 24 in.; D: 23.81 in. Weight 19.188 lbs. Price-\$1,849.00.

M2500 Series

This series of recording mixers feature in line monitor systems; MIDI automated channel muting and snapshot scene memory. The M2500 is 24 in/8 groups/24 monitor. The M2516 is 16 in/8 groups/16 monitor. Dimensions and prices-M2524: H:6.25 in.; W: 39.31 in.; D: 25.25 in. Weight 57.188 lbs. Price-\$3,999.00.

M2516: H: 6.25 in.; W: 30.5 in.; D: 25.25 in. Weight 44 lbs. Price-\$2,999.00.

M3500 Series

This series of recording mixers feature in line monitor system that effectively doubles input capacity. The M3500-24 is 24 in/8 group/24 monitor. The M3500-32 is 32 in/8 group/32 monitor. The M3500-24ST is 24 mono, 8 stereo in/8 group/24 monitor. Dimensions and prices-M3500-24: H:12 in.; W: 44.125 in.; D: 37.5 in. Weight 133 lbs. Price-\$7,499.00.

M3500-32: H: 12 in.; W: 53.625 in.; D: 37.5 in. Weight 155 lbs. Price-\$8,499.00.

M3500-24ST: H: 12 in.; W: 44.125 in.; D: 37.5 in. Weight 133 lbs. Price-\$9,499.00.

M3700 Series

These automated recording mixers feature on-board computer for automation of VCA fader level; channel mute; aux. mute; monitor mute; EQ on/off; internal disc drive for data storage; on-board SMPTE reader/generator and MIDI in, out and thru included. The M3700/24 is 24 in/8 group/24 monitor. The M3700/32 is 32 in/8

group/24 monitor. Dimensions and prices-M3700/24: H: 12 in.; W: 44.125 in.; D: 37.5 in. Weight 133 lbs. Price-\$12,999.00.

M3700/32: H: 12 in.; W: 53.625 in.; D: 37.5 in. Weight 155 lbs. Price-\$14,999.00.

YAMAHA PRO AUDIO PRODUCTS

PM3000-24/32/40C

Available in 24, 32 or 40 inputs, 8 group buses, 8 aux. buses (each Pre/Off/Post) and separate stereo bus, VCA assignable grouping with 8 submasters with automation interface 8 bus muting master system with safety override. XLR inputs are differentially balanced with 34 dB trim and 5 position pad for optimizing gain structure.

Prices: PM3000-24: \$34,000.00

PM3000-32: \$39,000.00

PM3000-40C: \$42,000.00.

PM4000

Available in 24, 32, 40 and 48 inputs, 8 group buses, 12 aux. sends, has 4 full stereo input modules, 4-band parametric EQ, solo cue, and 8 mix matrices.

Prices: PM4000-24: \$44,000.00

PM4000-32: \$49,000.00

PM4000-40: \$55,000.00

PM4000-48: \$63,000.00.

DMP7D Digital Mixing Processor

All digital mixing and signal processing with digital inputs and outputs, 3 on-board Digital Signal Processors. Digital 3-band Parametric EQ on each channel. Preset memories: 32 internal, 67 external via supplied RAM Cartridge. Motorized multi-function faders, digital stereo output, compressor, 4 bargraph meters and LCD parameter read-out. Price: \$5,995.00.

DMP11 Digital Mixing Processor

All digital mixing and signal processing with analog inputs/outputs, 2 on-board DSPs. Digital 3-band Parametric EQ on each channel, preset memories: 32 internal, 67 external via supplied RAM Cartridge, digital stereo output, compressor. MIDI control of preset changes and parameter manipulations, 4 bargraph meters and LCD parameter read-out. Price: see your dealer.

MC120+II/160+II/240+II/2408M

Available in 12, 16 or 24 inputs—4 program mix

buses, 2 effects buses, 2 foldback buses and a cue bus, each input features a pad, gain control and peak LED for precise gain matching, 4 band EQ with the two mid-bands featuring quasi-parametric control, foldback 1 and 2, and ECHO 1 and 2 strappable pre/post EQ.

Prices: MC120+II: \$3,100.00

MC160+II: \$3,600.00

MC240+II: \$4,300.00

MC2408M Stage Monitor: \$3,995.00.

YORKVILLE SOUND

AUDIOPRO SERIES

1212/1216 12 and 16 channel stereo powered mixing consoles with continuous power avg. per channel. (650 W at 2 ohms; 480 W at 4 ohms; 310 W at 8 ohms) the 1216 is 16X2X1; the 1212 is 12X2X1. Features include: 2 EFX sends; 2 monitor sends fully buffered channel patching; balanced XLR-<\$E1/4> in. jack inputs; self correcting hum reduction outputs for balanced/unbalanced line compatibility; 48 V phantom power; selectable headphone monitoring; on-board speaker processor; dual 9-band graphic EQ for mains & monitors; 3-band channel EQ. Dimensions and prices-1212: H: 4.75 in.; W: 24.5 in.; D: 15.75 in. Weight 45 lbs. Price-\$2,449.00.

1216: H: 4.75 in.; W: 29.8 in.; D: 15.75 in. Weight 50 lbs. Price-\$2,699.00.

508/512

8 and 12 channel stereo powered mixing consoles with same features as 1212/1216 but 250 watts cont. avg. per channel at 2 ohms. Dimensions and prices-508: H: 5.3 in.; W: 19.8 in.; D: 15.75 in. Weight 43 lbs. Price-\$1,799.00

512: H: 5.3 in.; W: 24.5 in.; D: 15.75 in. Weight 45 lbs. Price-\$1,999.00.

208/212/216

8, 12, and 16 channel stereo mixing consoles with the same features as above but un-powered. Dimensions and prices-208: H: 3.9 in.; W: 19.8 in.; D: 15.75 in.; Weight 23 lbs. Price-to be announced.

212: H: 3.9 in.; W: 24.5 in.; D: 15.75 in. Weight 29 lbs. Price-to be announced.

216: H: 3.9 in.; W: 29.8 in.; D: 15.75 in.; Weight 33 lbs. Price-to be announced. **db**

ADDRESSES

Advantage—see Biamp

AMEK/TAC U.S. Operations

10815 Burbank Boulevard
North Hollywood, CA 91601

Allen & Heath

5639 S Riley Lane
Salt Lake City, UT 84107

Altec Lansing Corporation

P.O. Box 26105
Oklahoma City, OK 73126
Applied Research and Technology
215 Tremont St.
Rochester, NY 14608

Auditronics, Inc.

3750 Old Getwell Road
Memphis, TN 38118

Biamp Systems

14270 NW Science Park Drive
Portland, OR 97229

Carvin

1155 Industrial Avenue
Escondido, CA 92025

Crest Audio Inc.

150 Florence Avenue
Hawthorne, NJ 07506

DDA

200 Sea Lane
Farmingdale, NY 11735

DOD Electronics

5639 S Riley Lane
Salt Lake City, UT 84107

Electro-Voice

600 Cecil Street
Buchanan, MI 49107

Fostex Corporation of America

15431 Blackburn Avenue
Norwalk, CA 90650

Furman Sound, Inc.

30 Rich Street
Greenbrae, CA 94004

Midas

200 Sea Lane
Farmingdale, NY 11735

Neotek Corp.

1154 West Belmont
Chicago, IL 60657

Neve—see Siemens Audio

Panasonic-Ramsa
6550 Katella Avenue
Cypress, CA 90630

Peavey Electronics Corp.

711 A Street
Meridian, MS 39301

Rane Corp.

10802 47th Ave.
West Mukilteo, WA 98275

SAJE-Infoscène Technologie Inc.

4600 Hôtel de Ville, Suite 200
Montréal (Québec) Canada, H2T
2B1

Siemens Audio Inc.

7 Parklawn Drive

Berkshire Industrial Park
Bethel, CT 06801

Shure Brothers Inc.

222 Hartrey Avenue
Evanston, IL 60202-3696

Solid State Logic

320 West 46th St., 2nd floor
New York, NY 10036

Sony, Professional Audio Division

3 Paragon Drive
Montvale, NJ 07645-1735

Soundcraft

P.O. Box 2200
8500 Balboa Boulevard
Northridge, CA 91329

Studer Revox America, Inc.

1425 Elm Hill Pike
Nashville, TN 37210

SUNN/Fender

7975 N. Hayden Rd.
Scottsdale AZ 85258

TASCAM, TEAC Corporation of America

7733 Telegraph Road
Montebello, CA 90640

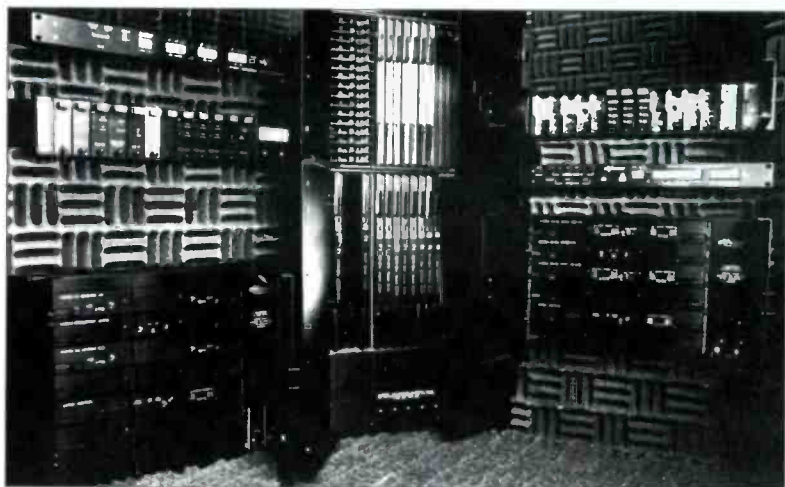
Yamaha Pro Audio Products

P.O. Box 6600
Buena Park, CA 90622

Yorkville Sound

4600 Witmer Industrial Estate, Unit 11
Niagara Falls, NY 14305

NEW PRODUCTS



EDIT SUITE MIXER

● D/ESAM 800 is a Digital Edit Suite Audio Mixer with 18-bit A/D converters, plus 20-bit data paths.

Mfr: Graham-Patten

Circle 60 on Reader Service Card

WIRELESS MICS

● Model 311DR is a true diversity receiver, housed in a rugged black metal case, and the body pack transmitter is of ABS with the hand/held mic having a rubber coating for comfortable feel and low handling noise. The hand-held mic is model 31HT, an available lavalier is 31LT. A choice of ten frequencies is available.

Mfr: AZDEN Corporation

Circle 61 on Reader Service Card



SOUND BARRIER

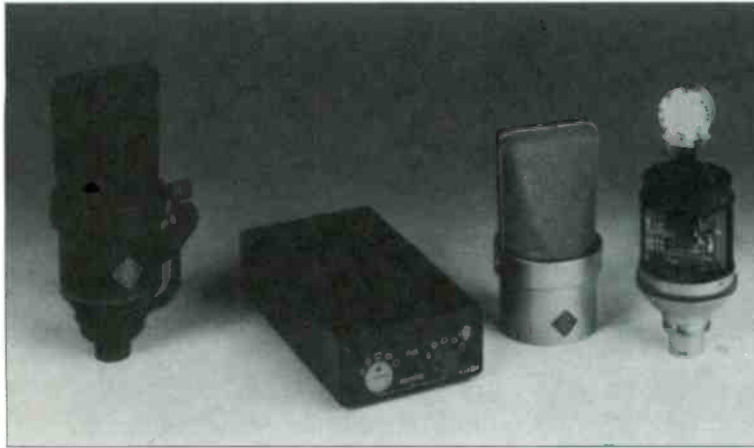
● This new Audioseal Sound Barrier is a highly-efficient material that blocks the airborne transmission of sound (ST27). This dense limp-mass barrier material is made of tough, high-temperature fused vinyl. The barrier is good for walls, floors and ceilings and comes in a 54-in. width. It can be cut with scissors or a utility knife.

Mfr: Acoustic Solutions

Circle 62 on Reader Service Card



NEW PRODUCTS *continues*



MULTI-PATTERN MIC

● TLM 170R is a large-diaphragm mic with five polar patterns selected by either a rotary switch on the mic's rear side, or remotely by the N 48 R-2 dual phantom-power supply/controller. This remote control is achieved via standard three-pin XLR mic cable. The mic will function conventionally with polar patterns selected on the mic, as long as 48 V phantom power per DIN standard 45 596 is supplied. The remote-control unit will power/control two mics.

Mfr: Neumann/USA

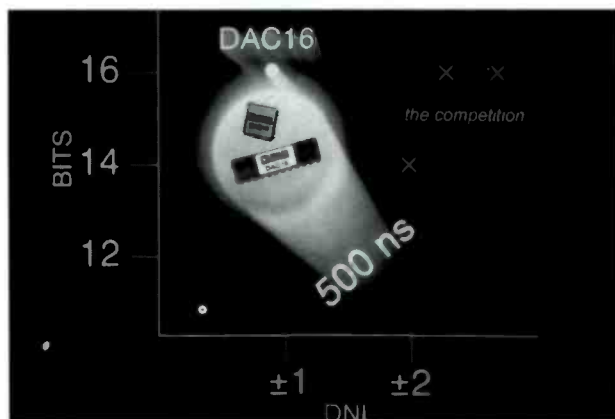
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POST PRODUCTION DIGITAL MIXER

● DMX-E200 is a digital mixer with ten stereo inputs, two-mix buses, and two-channel pre-view/monitoring and conforms to the AES/EBU digital format. The mixer's sixteen channel inputs can be connected with up to four stereo digital audio sources. The two-channel aux sends permit direct connection of external digital effects equipment. The mixer's internal RAM can be used to store up to 99 snapshots of manual movements and audio-follow crossfades. Signal processing can be locked to a TSCS/PAL video signal, either composite or block burst. Sampling output can be either 48 kHz or 41.1 kHz.

Mfr: Sony Electronics

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DYNAMIC DAC

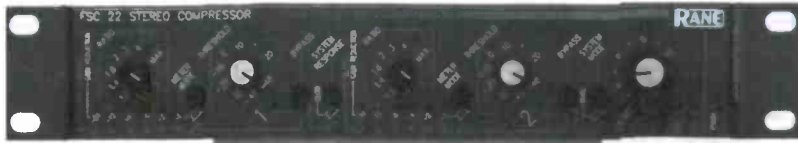
● DAC 16 is a high-speed parallel-input current-output 16-bit digital-to-analog converter. Guaranteed specifications include maximum noise equivalent to 0.3 LSB, differential non-linearity error of ± 1 LSB, and temperature drifts of no more than 0.025 ppm/ $^{\circ}$ C zero error, or 5ppm/ $^{\circ}$ C. The DAC 16 draws 190 mW to produce a 5 mA full-scale output

with a guaranteed 16-bit monotonicity. The chip is available in 24-pin skinny DIP package, 24-pin surface mount SOL.

Mfr: Analog Devices, Inc.

Price: \$21.75 in 1000s

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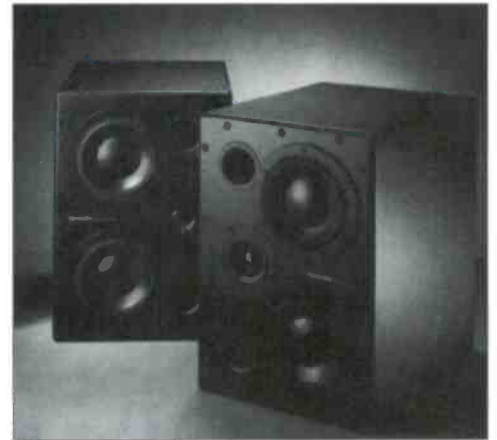
STEREO COMPRESSION

● Housed in a compact HR format for vertical or 2-across standard rack mounting, the FSC Stereo Compressor features separate threshold and ratio controls for each channel. There is also separate switchable attack/release time and dual function metering with displays either gain reduction or channel output. The compressor uses Analog Devices SSM 2018 VCAs for low noise and distortion. Both 0.25-in. and professional 3-pin input and output connectors are standard. -10 dBV or +4 dBp is switchable on the rear panel.

Mfr: Rane Corporation

Price: \$399.00

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MINI MONITOR

● Designed for the near-field or console use, PPM3 Mini-Main monitors are only 18-in. high by 12-in. wide by 16-in. deep, but offers 40-20 kHz response at up to a 120 dB SPL.

Mfr: AXI/Dynaudio Acoustics

Price: \$3199.00 pair

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TOOL BOX

● Three new models contain solutions to interface and synchronization problems that plague video, broadcast and audio post-production facilities. They are: NV1050 four-channel sample rate convert-

er which accepts any AES/EBU-format signal at sample rates between 32 and 50 kHz. NV1055 is a four-channel digital audio mix/minus and routing module. This permits four-channels of AES-format I/O to be intermixed or phase inverted.

NV1060 is a digital audio delay compensator which provides up to 20 video fields (330 ms) of delay on two AES-format signals.

CP1055 is a remote controller for the NV1055 module.

Mfr: NVISION, Inc.

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CONTRACTOR AMPS

● CA-650 and CA-900 are 325W and 450W power amplifiers delivering this power into 4 ohms at less than 0.1% THD. They have been specifically designed for fixed sound installations. For applications requiring comprehensive computer control, both accept this manufacturer's proprietary PowerLink. Both amps are also equipped with both XLR and balanced barrier-strip inputs along with barrier strip power output connectors. The rear panels have eleven-detent level controls and stereo, dual mono, bridged mono is included. Both also include 2-speed fans for quiet operation.

Mfr: Carver Professional

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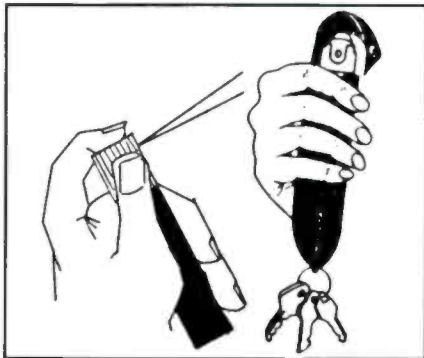
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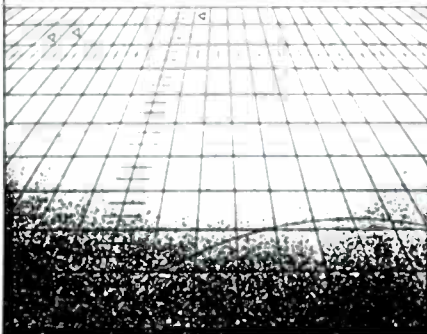
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Len Feldman

Len Feldman died at home on February 14th, his over two-year-long battle with cancer, lost. He was a week short of his 67th birthday.

Len and I go back more than thirty years. Before there was a **db Magazine**, (1967) I was an editor at **Audio Magazine**, and before even that I was the high fidelity reviewer for *The American Record Guide*. That's when I first met Len, who at the time was deeply involved with several different manufacturers as engineer and co-owner and chief engineer. He later developed a system for four-channel sound, that stood every technical test that could be thrown at it, but could not survive the political realities that existed.

For several years Len and Bob Long (then of *High Fidelity Magazine*) and I toured the United States (and beyond) under the auspices of the Institute of High Fidelity, lecturing and demonstrating to consumer audiences what could be done with superior-quality sound. That's when I really got to know and respect this brilliant and knowledgeable man.

In the sixties Len opened his Len Feldman Labs operation to do product evaluations and other engineering chores for both publications and manufacturers. Len did several for **Audio Magazine** while I was there, and continued with them when **db Magazine** was created and continued with us until quite recently.

In the late seventies to the mid eighties I did a local (NYC) radio show on high-fidelity music topics. After each Consumer Electronics Show, and some AES Conventions, we would get together in front of the mics and tell the listeners about the technology promises of the convention. This was always a pleasure for me, since Len needed no direction from me to make the program (and me) sound good, and always had a knack for simplifying the most complex, without leaving anyone with the feeling that he was talking down.

We were friends, I shall deeply miss him. *Larry Zide*

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