db
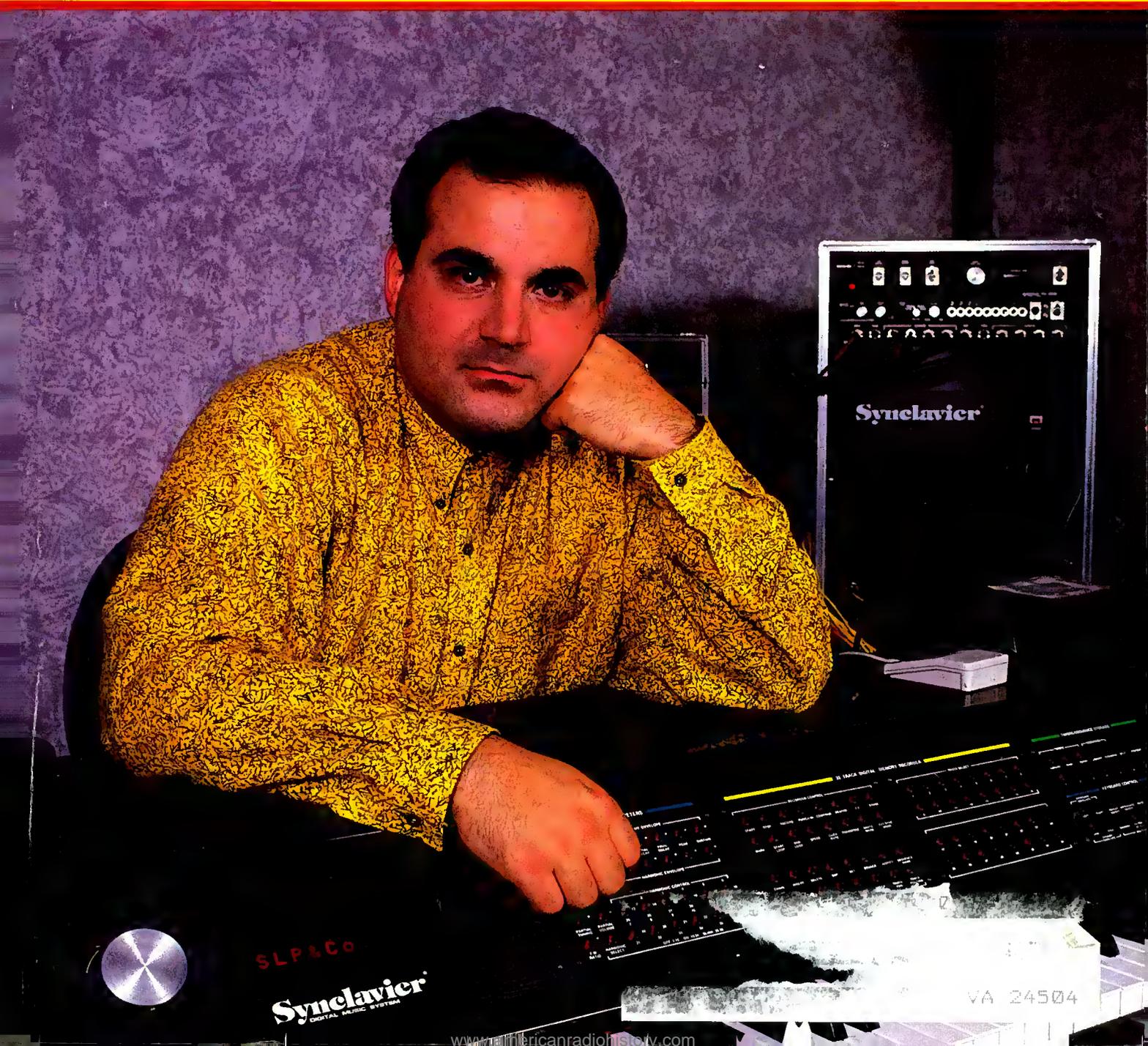
THE SOUND ENGINEERING MAGAZINE

serving:recording, broadcast and sound contracting fields

Our 20th Year!
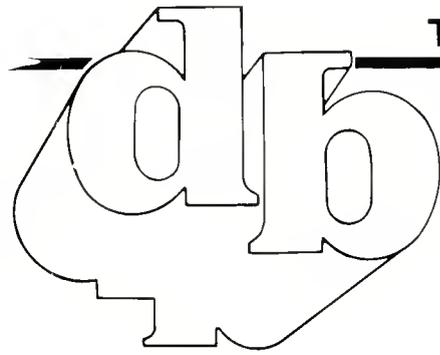
Featuring 2 to 8 trk–The Smaller Recording Studio
Guides: Consoles & Mixers; Equalizers

Circle 10 on Reader Service Card

See us at AES Booth 433

the recording engineer

the sound contracting engineer

the broadcast engineer

2 to 8trk the smaller recording studio

About the cover

● Shelly Palmer's state of the art studio complex and his operating philosophy is the subject of our feature story beginning on page 22. You'll learn what a "tapeless" studio is, and why it is needed.

About the 2-8trk cover

● On page 30 we present a montage of the control room and studio of Atmosound. An article on this fine, smaller complex follows.

www.americanradiohistorv.com

Calendar

COMMTEX International '88 is an exposition for communications equipment, software and accessories for professional dealers and users. It will be held on January 16-18, 1988, at the New Orleans Convention Center in New Orleans, Louisiana, and is co-sponsored by International Communications Industries Association and the Association for Educational Communications and Technology. Video, computer, audio-visual and other communications equipment will be featured. Activities held in conjunction with COMMTEX include ICIA- and AECT-sponsored conferences and seminars designed to help participants develop sales and business management skills and provide technological updates on communications product developments. Additional COMMTEX exhibit information is available from Kay Hynson at the **International Communications Industries Association, (703) 273-7200.**

The **Carpenter's Home Church,** located in Lakeland, Florida, will host the 2nd annual Audio/Music Seminar on November 12-14, 1987. This year there will be 500+ audio engineers and musicians in attendance, and both a basic and an advanced level of instruction will be offered. These individuals will be responsible for the major equipment purchases for their facilities and organizations. The goal is to provide an educational environment in which audio engineers, technicians, music directors, and musicians can come together and learn. For more information, contact:

Dennis Cockerham
Audio Coordinator
The Carpenter's Home Church
777 Carpenter's Way
Lakeland, FL 33805
813 859-1477

Synergetic Audio Concepts announced their fall schedule for their two-day audio engineering seminars. The classes are intended specifically for those seeking a better basic un-

The first 500-Hz Driver that doesn't turn cymbals into trash can lids

Listen to most of today's HF drivers, including our leading competitor's, and you could logically conclude that "trashy" sound is an inescapable fact of life. Poor definition, inadequate output beyond 10 kHz, annoying breakups, and "ringing" are all too common.

EV engineers, rejecting the notion that poor high frequency sound is inevitable, created the DH1A, a driver that deals effectively with every one of these problems.

To boost high-frequency output we utilized a magnet with the greatest flux density available, plus an optimized, balanced magnetic circuit to "stiffen" the coupling between the amplifier and the diaphragm. The resulting increase in high-end response also solved the problem of definition and articulation, so the sound is cleaner and livelier, with better transient-handling capability. As a result, trashy instrumental and vocal sounds are consigned to the trash can, where they belong.

The 10 kHz breakup you've heard in our competitor's driver was eliminated by using a 3-inch diaphragm instead of the other guy's 4-inch component, moving the primary diaphragm breakup point all the way out to 16 kHz, well beyond fundamentals and first harmonics.

A field-replaceable diaphragm, we reasoned, could make the DH1A still more useful. So we made that a part of the package, too. Plus the option of 8- and 16-ohm impedance match. And our EV-exclusive PROTEF™ feature that guards against voice coil damage.

Talk, as they say, is cheap. So, we insist that you make us prove our claims. Audition a DH1A today and hear for yourself how easily you can bid a hasty goodby to trash-can cymbals and high-end distortion.

For more information, write Electro-Voice, Inc., 600 Cecil Street, Buchanan, MI 49107.

EV | Electro·Voice®
SOUND IN ACTION™
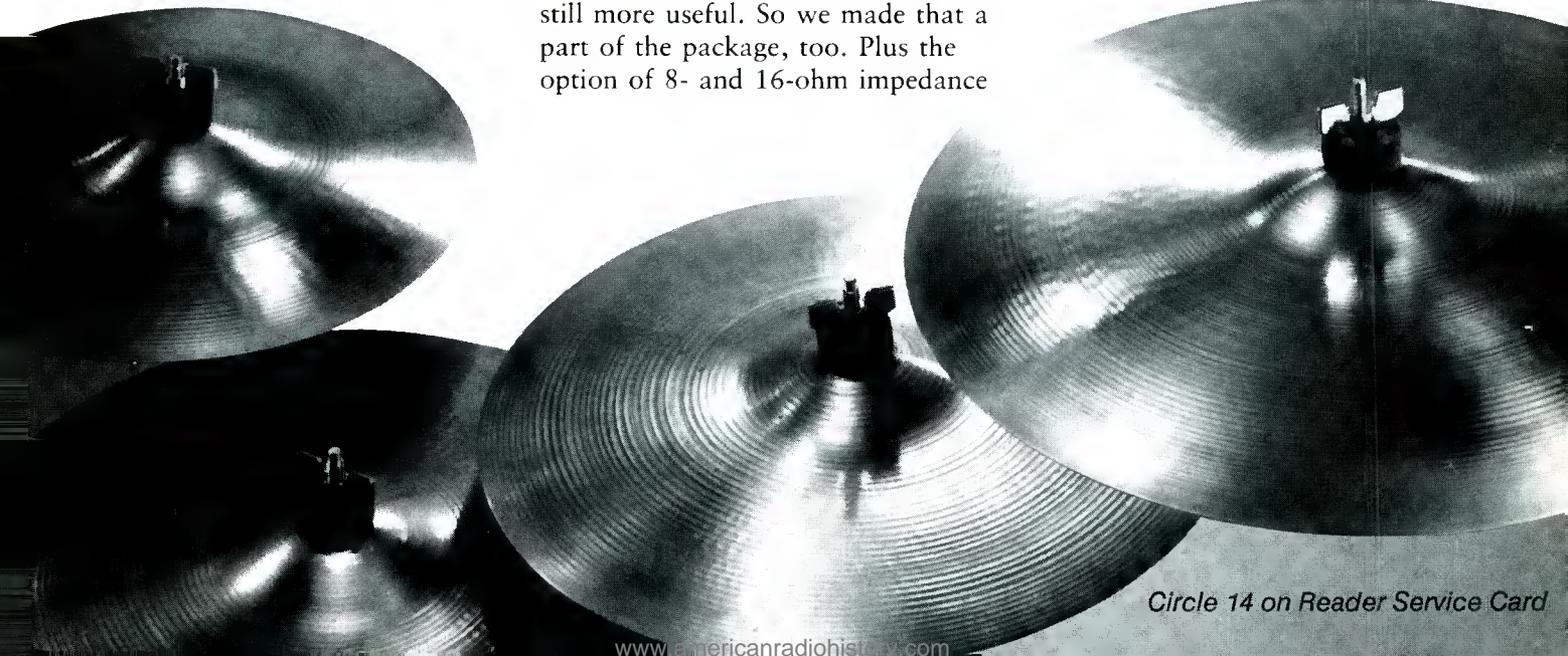
derstanding of how to solve everyday audio and acoustic problems. Demonstrations include signal alignment of loudspeakers, measurement of %ALcons and RASTI, the fundamental difference between impulse and energy time curve measurements, and the proven procedure to follow when designing large loudspeaker arrays.

Kansas City, MO-October 6-7
New York, NY-October 14-15

Washington, DC-October 27-28

For more information contact:
Synergetic Audio Concepts
PO Box 1239
Bedford, IN 47421

Broadcast '87, the international trade fair for film, radio and television, will be held on October 14-17 in Frankfurt, West Germany. Lectures and practical demonstrations will be offered for radio experts, sound recordists and engineers from private audio studios, as well as newcomers to the professional audio sphere. The focal point of the Audio Workshop will be a fully equipped production studio giving speakers the opportunity to make practical demonstrations. The main themes covered by the workshop will include recording and editing, hard-disk recording systems, digital audio processors, time-code applications, automatic mixing desks, one-man studio operation, wireless microphone systems, stereo recording processes and their suitability for film and video productions, automatic broadcasting presentation and conference engineering.

For more information contact:
Messe Frankfurt GmbH
Dept. 1202
PO Box 970126
D-6000 Frankfurt 1, West Germany

www.americanradiohistory.com

www.americanradiohistory.com

On Taxes

MARK E. BATTERSBY

Taxes and Zoning

● Although few sound engineers or musicians would hire an employee solely to make up rules, levy fines and generally make doing business more troublesome, in essence that is just what we do when we elect or appoint government officials. Nowhere are those onerous restrictions felt more painfully than in the area of that zoning which is necessary in order to operate a business on your property.

We have elected government officials who, in turn, have appointed boards which tell us what we can and cannot do with our property. Then we elect other officials who make complex laws dictating just which expenses incurred in fighting those zoning rules are tax deductible.

Looking at those tax laws, at least at the Federal level, it becomes obvious that in general, the cost of fighting the zoning restrictions is rarely going to be accomplished with tax deductible dollars. A private ruling issued by the Internal Revenue Service recently illustrated just how frustrating this system can be.

The IRS ruled that an unsuccessful attempt to change the local zoning of a parcel of land owned by an individual from residential use to commercial use did not give rise to a tax deductible loss. The individual has sought to secure the change by means of a public referendum known as a declaration of policy, but the voters refused to approve the change. No loss deduction was allowed because the individual had no basis or value in the intangible assets against which to claim an abandonment loss.

Adding insult to injury, since a business expense is not allowable for attempts to influence legislation, public policy dictated that a tax deduction also be denied.

Fortunately, the zoning picture is not quite as bleak as it might first appear. The expenses of challenging the zoning on your business property, or acquiring a zoning variance to permit business expansion or even obtaining zoning for the property required for another studio are not merely money down the drain. The tax law does recognize such expenses and, once in a while, even permits the expense to be currently deducted rather than capitalized and written off over the life of the underlying property.

Legal fees, for example, are a legitimate business expense for most recording or sound business operations. Even legal fees connected with an action to reduce the amount of a special assessment on a home recording studio can be currently deducted. Similarly, the successful prosecution of a suit to invalidate a municipal ordinance prohibiting the operation of a home recording studio business resulted in an immediate tax deduction for legal expenses.

However, the successful prosecution of a suit to invalidate an ordinance prohibiting the expansion of a studio's business or the unsuccessful challenge of a municipally established building line that adversely affected one studio's business property were ruled to be capital expenditures by the courts.

At the present time, those expenses incurred in challenging or securing zoning for your sound studio can be broken down into currently deduct-

6

ible, legitimate "ordinary and necessary" business expenses, those that are capital in nature requiring that they be written off over the life of the property and those which are non-deductible. Thanks to the complexities of our tax laws, there is no cut-and-dried formula for determining which is which. Like legal expenses, cost in lobbying for zoning changes or even bribing government officials can fall into all three categories depending upon the circumstances.

A current tax deduction is allowed for certain expenses related to appearances before and communications with any legislative body, a legislative committee or even an individual legislator. Of course, when legislation is involved, it must be of "direct interest" to the studio owner. It is not of direct interest to the owner merely because it may affect business in general; however, if it affects the owner's trade or business it is of direct interest to him even though it also affects other taxpayers or business in general.

Two limitations to that lobbying expense deduction are included in the tax rules: 1) no deduction is allowed for any amount paid or incurred for participating or intervening in any political campaign and 2) no tax deduction is allowed for expenditures to influence the general public over any specific legislative proposal, election or referendum.

Our tax rules do permit a lobbying expense deduction for all expenses directly connected with appearances, submissions of statements or the sending of communications to most legislative or government bodies. However, neither direct nor indirect contributions to political candidates or parties are tax deductible as business expenses.

Similarly, any bribe paid to any public official or government employee is also non-deductible. If the bribe does not violate local law or is not contrary to local policies, it may be a legitimate tax deduction. The burden, as in fraud case, of proving that the payment was a bribe rests with the government.

Perhaps the best way of illustrating what are current expenses and those which must be capitalized and deducted over the life of the underlying property is to look at the pre-opening expenses of a business.

There is usually a lapse of time between the decision to establish a business and the beginning of business operations. During this period, the individual or a group of individuals involved may incur considerable expense in preparation for a start-up of business. Such expenditures, called "pre-opening" expenses by our lawmakers, could be for advertising and promotion, training of employees, lining up suppliers and contracts for merchandise or goods and legal and accounting services in acquiring the proper state and local licenses and setting up the system of books and records. Whether these "pre-opening" expenses can be treated as currently deductible business expenses or capital expenditures may depend upon whether they were incurred before or after the business operations actually began.

If the expense is incurred after business operations begin, it is usually tax deductible. If the expense is incurred before business operations begin, it is usually capitalized and may be amor-

8 db September/October 1987

tized over a period of at least sixty months.

Expenses, especially legal expenses, related to having property zoned to accommodate the operation of the sound or music business could be best compared to "pre-opening" expenses and, thus, must be capitalized. Fighting to retain zoning or, in some cases, obtain a variance needed to expand existing operations would usually be labeled as expenses "ordinary and necessary" to the active conduct of an on-going trade or business and could currently be deducted on the annual income tax return. But not always.

Zoning changes that increase the value of the property beyond the taxable year have been ruled to be capital in nature and related expenses were required to be capitalized by the courts.

A federal appellate court has held that expenditures made by a savings and loan association in opening four branch banks were capital expenditures. In deciding this case, the court chose not to follow a decision by another federal appellate court that had permitted a current deduction for the establishment of a branch office for a bank. That court ruled that the branch office did not create a separate and distinct asset of the bank but, rather, constituted expansion of an existing business into new markets because the branch had no value apart from its parent.

Obviously, capitalizing zoning-related expenses does not mean that they are wasted. Those capitalizing expenses can, after all, be depreciated or amortized. At worst, if labeled an intangible asset, the related expenses will be used to reduce any profits realized when the property is eventually sold.

The best of a bad situation occurs when the owner is permitted to currently deduct zoning-related expenses. As mentioned, most zoning-related expenses are comparable to "pre-opening" expenses. What, however, is the status of expenses incurred by an already operating studio expanding or moving to a new location? The courts are split on this question.

In fact, in at least one case, litigation expenses incurred by a partnership in rezoning land prior to its development for sale constituted pre-opening business expenses that were not currently deductible. According to the court, at the time the expenses were incurred, the partnership was not actually in the trade or business of developing land for sale.

All of which brings up the matter of claiming a tax loss for an unsuccessful attempt to secure zoning changes.

Our tax rules clearly state that the expenses of unsuccessful attempts to acquire a business or investment, such as legal fees for drafting purchase agreements, may be deducted as losses. But expenses relating to decisions as to whether to enter into such transactions or the cost of decision-related audits, cannot be similarly deducted.

All of which leaves the unwary sound or music studio owner at a loss about these zoning costs. The IRS disagrees with the courts, the courts disagree with each other and the poor soul is left to attempt to get the best tax treatment possible for his or her zoning-related expenses. Did we really do this to ourselves? **db**
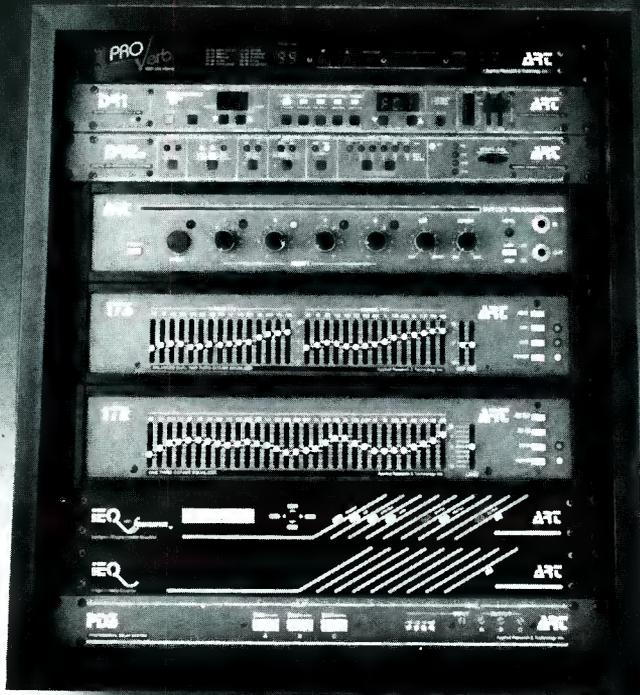
Join us for the biggest AES convention ever
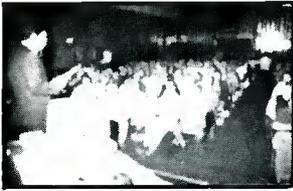
Attend sessions and workshops

See new products

Hear what the trend-setters say

Know the industry

Talk to the audio experts

Visit New York, host city for the 83rd

Mingle with colleagues
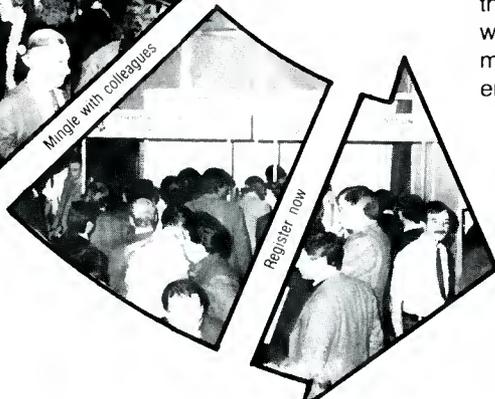
Register now

AES 83rd CONVENTION
1987 October 16–19
New York Hilton Hotel • New York Sheraton Centre •

Where the Audio Action Will Be...

Your opportunity to be part of a challenging four-day program that is the vanguard of audio engineering for the coming years

- The New York City scene will capture the vibrance of the fast-changing audio industry.

- Technical sessions and workshops with the world's trend-setters in audio will set the pattern for technological change.

- A major exhibition will span two city blocks—the place to plan for tomorrow's needs.

Be sure to take part in what promises to be 1987's most dynamic gathering of audio experts and manufacturers. Chairman Randy Hoffner and the capable convention committee are organizing a wide range of papers and workshops, a roster of distinguished speakers, and an exhibit space in two major midtown Manhattan hotels, the New York Hilton and Sheraton Centre.

Planned technical sessions and workshops include these topics:

Advances in CD Technology, Digital Recording: Professional and Audio-Video Applications of R-DAT, Digital Processing of Audio Signals, Transducers in the Digital Era, Acoustics/Psychoacoustics, Audio Measurements in the Digital Domain, Broadcast Audio Systems and Technology, The Impact of Electronic Music on Professional Audio, Advances in Sound Reinforcement Applications and Technology, Visual Monitoring and Measurement of Audio, Recording Studio Operations, Digital and Stereophonic Advances in Motion Picture Sound, Remote Audio Pickup and Miking for Broadcast and Sound Reinforcement, and Sound in the Theater and Performing Arts

Not only will you learn about the latest technological advances in these vital areas, but you will be able to see, hear, and test state-of-the-art equipment at the exhibit booths and in the demonstration rooms. Technical tours in the New York area will provide even more exposure to the most up-to-date equipment in use, and a social program is planned for relaxation and entertainment.

Plan now to attend the AES 83rd. Early registration will assure you a place at one of the most exciting technical events of the year.

For further information, please contact:

**AUDIO ENGINEERING SOCIETY, INC.
60 E. 42nd St., Rm. 2520, New York, NY 10165-0075 USA. Telephone (212) 661-8528, telex AES 620298 UW, Fax (212) 682-0477.**

Recording Techniques

BRUCE BARTLETT

DOING A MIXDOWN

● It's time to perform a mixdown. You take a seat behind the mixing console and grab the controls. A multi-track tape recorder plays the sounds of instruments and voices, which you combine and manipulate to create a sonic experience.

Specifically, you balance track levels; add compression, EQ, reverb, and effects; and control the placement of instruments between stereo speakers. After setting record levels and perfecting the mix, you record it onto a 2-track master tape.

This article will describe typical procedures for a multi-track mixdown. It's a complex, highly creative process.

The signal flow in the console during mixdown is shown in *Figure 1*. The signals from the tape tracks enter the console line inputs via the mic/line selector in each input module. While monitoring channels 1 and 2, you add EQ, reverb, and effects to the tracks; mix them, and pan them between channels 1 and 2. These channels feed a 2-track tape recorder. The tape made on that machine is the final product.

Before the mixdown session, you may want to remove the out-takes from the multi-track tape and splice them together on a separate reel. Then put one foot of paper leader between each of the master takes (keeper takes). Write new tape logs indicating the reels' contents.

CONSOLE SETUP

To begin, connect console buses 1 and 2 to tracks 1 and 2 of the 2-track recorder you will be using to record the mixdown.

Zero or neutralize the console by setting all controls to "0," "off," or "flat." That's to establish a point of reference and to avoid surprises later on.

Tape a designation strip of paper leader tape along the front of the console to write down the names of the instrument(s) each fader affects. Keep this strip with the multi-track

Figure 1. Signal paths in a multi-channel console during mixdown.
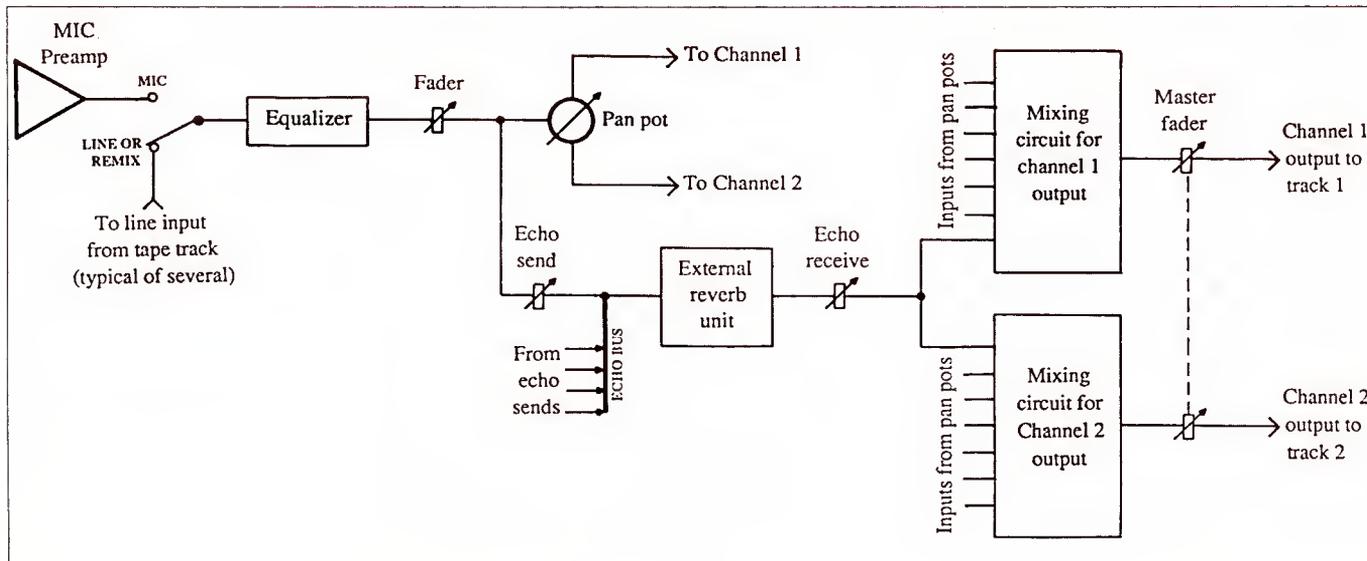
master tape so you can use it each time the master is played.

Flip the input-selector switch on each input to the appropriate position so the tape tracks will play through the console.

Since you're mixing to two-channel stereo, monitor only channels 1 and 2 (the 2-track mix bus), with the monitor pan pots set to the extreme left and right. Assign each track to channel 1 (left), channel 2 (right), or both (for panning between left and right.)

CLEANING UP THE MASTER TAPE

Turn up the master fader and play the multi-track tape. Listen to each track alone and "clean it up" by erasing unwanted noises or out-takes. You may want to erase entire tracks or segments that don't add to the song.

If a noise occurs just before the musician starts playing, erasing the noise may accidentally erase the musical part. This can be prevented as follows: Turn the tape upside down by reversing the reels, then find the track of the desired instrument playing backwards. Play the tape section which came just after the noise. You'll hear it playing in reverse. Just after the reverse part ends, punch that track into record mode, erasing the noise. That way you avoid erasing part of the musical line.

EQUIPMENT SETUP

Now you're ready to patch in signal processors. Compressors are connected between the access jacks in the desired input module, or between tape-track outputs and console tape inputs. Reverb or delay units are patched to the echo (or auxiliary) send and receive jacks. Set the processors to the desired preliminary settings.

Clean, degauss, and align the multi-track and 2-track machines.

PRELIMINARY PANNING

Set the pan pot for each recorded track to place its sonic image in the desired location between the pair of monitor speakers. For ease of record cutting, the bass, kick drum, and lead vocal should go to the center (pan pot set straight up). Other instruments can go equally to left or right, or to half-left and half-right. Try to achieve a stereo stage that is well balanced from left to right (as in *Figure 2*). Pan similar-sounding instruments to opposite sides.

You may want to pan extreme left and right tracks slightly toward the center; this makes record-cutting easier and keeps the tracks from sounding too isolated in space.

When panning instruments, you can create a unique stereo image, or create the performers' point of view, or create the audience's point of view. Typically, rock drums are panned for the player's perspective; jazz drums are panned for the audience's perspective.

If stereo imaging is intended to be realistic (say, for a jazz combo), then the reproduced ensemble should simulate the spatial layout of the live ensemble. If you're sitting in an audience listening to a jazz quartet, you might hear drums on the left, piano on the right, bass in the middle, and sax slightly right. The drums and piano are not point sources, but are somewhat spread out. If spatial realism is the goal, you should hear the same ensemble layout between your speakers. Often the piano and drums are spread all the way between speakers—an interesting effect, but unrealistic.

DESIGN CENTER

On a mixing console, near each

fader, is a colored spot or darkened area marking the fader's design center. This point of the fader travel is typically 10 to 12dB below the maximum setting. When all faders are placed at design center, this optimizes headroom and gain in each mixer stage and provides maximum signal-to-noise ratio.

Set the master faders and sub-master faders about 3/4 up, at design center.

PRELIMINARY EQUALIZATION

Listen to each track alone and set the EQ for the desired tonal balance. Don't spend too much time with EQ at this stage, because the EQ that sounds right on each instrument heard alone seldom sounds right when all the instruments are mixed together.

SETTING BALANCES

Now you're ready to mix. The first step is to set all the input-module faders to achieve a pleasing loudness balance among tracks.

Dick Rosmini suggests this method of setting balances for pop music: Set the kick-drum level to -10VU on the VU meters. Turn up the monitor level until the kick drum is as loud as you like to hear it, then leave the monitor level alone. Bring up the other tracks one at a time and mix them relative to the kick drum. For example, first bring up the kick drum, then add bass and balance the two together. Next add drums and balance them with the kick drum and bass. Then add guitars, keyboards, and vocals.

Here's another method of setting balances for country music, where the vocal is most prominent: Set the lead vocal level to peak at -5 VU. Bring up the monitor level so that the vocal is as loud as you like to hear it, then leave the monitor level alone.

Figure 2. An example of image placement between speakers.
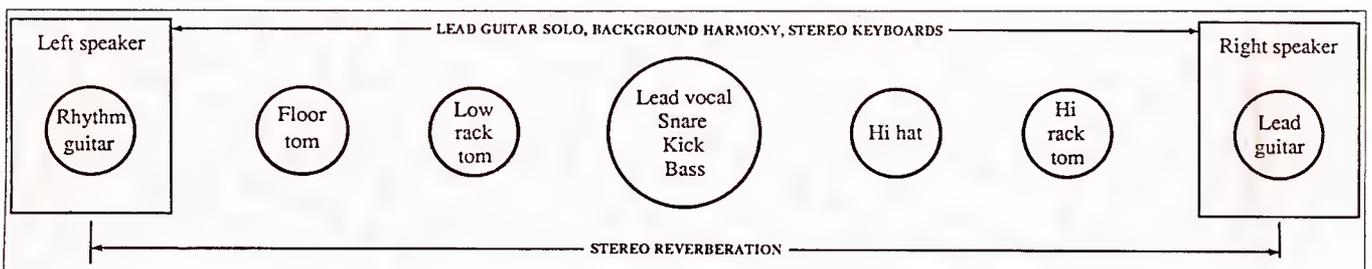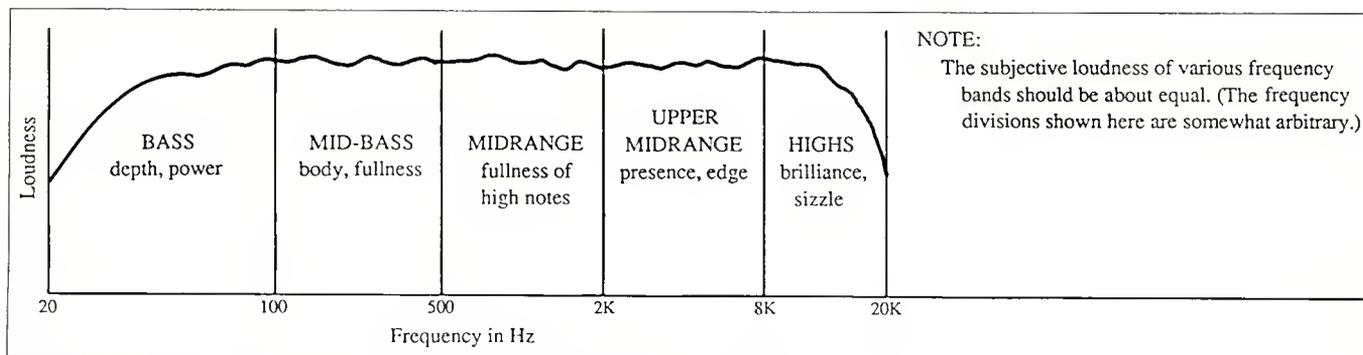
Figure 3. Loudness versus frequency of a good-sounding pop recording.

Bring in the other tracks one at a time and mix them relative to the vocal track.

As an alternative, you may want to set all the instruments and vocals equally loud, then turn up the most important tracks and turn down background instruments.

When the mix is right, everything can be heard clearly, yet nothing is obtrusive. The most important instruments or voices are loudest; less-important parts are in the background. Note that there's a wide latitude for musical interpretation and personal taste in making a mix.

Sometimes you don't want everything to be clearly audible. In rare occasions you may want to mix in certain tracks very subtly for a subconscious effect.

Mixing is a dynamic process. You continuously change the mix to highlight certain instruments according to the demands of the music. To reduce tape noise, mute all tracks that have nothing playing at the moment. Unmute these tracks just before their instruments start playing.

Monitor frequently in mono to judge the singer/ensemble balance or soloist/ensemble balance.

If the VU meters are pinned, that indicates you want to monitor more loudly. Just turn the monitors up, and turn all the faders down until you're peaking around 0VU. If the VU meters are barely moving, that shows that the monitors are too loud. Turn down the monitor power amp and slowly bring up the faders. Try to establish your own consistent listening level for a 0VU level.

To test your mix, occasionally play the monitors very quietly, and see if you can hear everything. Switch from large monitors to small, and make sure nothing is missing.

EQUALIZATION

During or after setting balances, set the EQ for each track for the desired tone quality, when all tracks are mixed together. If an instrument or voice sounds too bassy, turn down the low-frequency EQ. If a track needs more definition or presence, boost the upper-midrange EQ (the exact frequency depends on the instrument). Remove colorations by dipping the appropriate frequencies. Filter out noises below the frequency range of each instrument.

Use EQ to make a pleasing blend. When several instruments are heard together, they sometimes "crowd" each other in the frequency spectrum. That is, it may be difficult to distinguish the instruments by tonal differences. But by equalizing various instruments at different frequencies, you can make their timbres distinct, which results in a more pleasing blend. This procedure also evens out the contribution of each frequency band to the total spectrum, yielding a mix that is tonally well balanced (as shown in *Figure 3*).

Do EQ cut as well as boost. Boosting EQ reduces headroom; cutting doesn't.

EFFECTS

The recorded sound may be too "flat" or neutral—lacking character or color. You can make your recordings more of a creative production by employing special effects such as equalization, echo, reverberation, doubling, chorus, flanging, compression, or stereo effects.

Set the echo-receive or effects-receive controls about half-way up. Adjust the echo-send and effects-send knobs for each track for the desired results. Bass and kick drum usually

get little or no reverberation so that they retain their clarity.

If tracks are totally isolated, it's hard to achieve the illusion that all the instruments are playing in the same room at the same time. You need some crosstalk or correlation between channels. Some right-channel information should leak into the left channel, and *vice-versa*. Stereo reverberation can accomplish this crosstalk. So can a delayed signal panned to the opposite channel a track is panned to. Panning extreme left or right tracks slightly toward center may help, especially in recordings of duets.

You may want some tracks to be unlocalized. Backup choruses and strings should be spread out rather than appearing as point sources. Stereo keyboard sounds can wander between speakers. To give a lead-guitar solo a fat, spacious sound, use a stereo chorus. Or send its signal through a delay unit, pan the direct sound hard left and pan the delayed sound hard right.

You also should create some front-to-back depth. That is, some instruments should sound close or up front, while others should sound farther away. You achieve depth by mic'ing instruments at different distances, and by using varied amounts of reverberation on each instrument. The higher the ratio of reverberent sound to direct sound, the more distant the track sounds. Set the pre/post switch on the reverb send to "pre" to move instruments closer and farther as you move the fader.

THE MIXING PROCESS

When you mix, your attention scans the inputs, briefly listening to each instrument in turn, and to the mix as a whole. Take your hands off the console and listen. If you hear something

you don't like, fix it. Is the vocal too tubby? Roll off the bass on the vocal track. Is the kick drum too quiet? Turn it up. Is the lead-guitar solo too dead? Turn up its echo send.

If level changes are required during the mixdown, mark on the faders the settings for each change. You might bring out a solo, then pull the fader back down after the solo. If you make a temporary adjustment up, later make a complementary adjustment down.

Make a cue sheet that notes the mixer changes required at various tape-counter times. For example:

1:10 Bring up lead-guitar solo to +3dB, back to -2dB at 1:49.

2:42 Add +6dB at 12kHz to synthesizer bell effect.

3:05 Start fade, out at 3:15.

Play the multi-track tape several times to perfect and practice the mix.

As you're adjusting the mix, set the input faders to achieve a 0VU recording level (+3VU maximum) on the meters for buses 1 and 2. Try to keep the submaster and master faders at design center.

PRODUCTION

Set the balances, EQ, and effects to sound like records you've heard through the monitors you're using. It's a good idea to play a record with tunes like those you're recording to hear a typical mix. Ask to hear records having the kind of sounds the producer desires. Try to figure out what techniques were used to create those sounds.

Also try to translate the producer's sound-quality descriptions into control settings. If the producer asks for a "warmer" sound on a particular instrument, turn up the low frequencies. If the lead guitar needs to be "fatter," try a stereo chorus on the guitar track. If the producer wants the vocal to be more "spacious," try adding reverb, and so on.

The mix must be appropriate for the style of music. For example, a mix that's right for rock music usually won't work for country music. Rock mixes typically have the drums way up front and the vocals only slightly louder than the accompaniment. Country mixes, on the other hand, have the vocals loudest; with the drums used just as "seasoning" in the background. This distinction is lessening as country music is approach-

ing a pop sound. Rock guitars usually sound bright; jazz guitars sound mellow.

If a realistic, natural sound is desired, adjust the controls to create the illusion of live musicians playing in front of you. To do this you must be familiar with the sound of real instruments. Manipulate the recorded tracks until they sound like your memory of the real thing.

KEEPING THE MIX CLEAN AND CLEAR

A "clean mix" is one that is uncluttered, free of excess instrumentation. This is achieved by arranging the music so that similar parts don't overlap. Usually, the fewer the instruments, the clearer the sound. Mix selectively, so that not too many instruments are heard at the same time.

In a clear-sounding recording, instruments do not "crowd" or mask each other's sound. They are separate and distinct, and blend well. Clarity arises when instruments occupy different areas of the frequency spectrum. For example, low frequencies are provided by the bass; mid-bass might be emphasized by the keyboards; upper midrange may be provided by lead guitar, and highs are filled in by the cymbals.

Rhythm guitar often occupies the same frequency range as piano, so they tend to mask each other's sound. You can increase clarity by boosting the guitar at, say, 2kHz, and boosting the piano around 7kHz.

Clarity also can be enhanced by delaying reverb-send signals about 30 to 70 milliseconds. This removes the onset of reverberation from the direct sound, helping to clarify the sound.

CALIBRATION TONES

Calibration tones should be recorded on the 1/4-inch master tape just before recording the mixes. Record the following tones on both channels simultaneously with NO noise reduction (20 seconds each):

1. 1kHz at 0VU.

2. 1kHz, 15kHz, 10kHz, 100Hz and 50Hz at 0VU for 15 in./sec. or -10VU for 7 1/2 in./sec.

3. If Dolby-A is used, record an encoded Dolby tone at 0VU, followed by an encoded 1kHz tone at 0VU. Dolby-A tones should be generated by each track's encoder.

4. If dbx Type 1 is used, record an encoded 1kHz tone at 0VU. If a zero offset is used, note the offset level (e.g. 0VU program = -3VU on tape).

The duplicating engineer or record-mastering engineer will use the 15kHz tone to align the repro head, the 1kHz 0-VU tone to set overall level and channel balance, and the other tones to set playback EQ. Then his or her tape machine will play back the same tonal balance and stereo balance that you recorded during mixdown.

If you don't have access to a multi-frequency generator, just put on a 1kHz tone or a sine-wave synthesizer note (2 octaves above middle C) at 0VU, both channels.

RECORDING THE MIX

When you're satisfied with the mix, sound quality, and recording levels, slate the tape and record the mix on your two-track machine. An especially difficult mix can be recorded a section at a time, and the sections can be edited together.

You may want to fade out the end of the tune by slowly pulling down the master fader. The slower the song, the slower the fade should be. Start the fade relatively quickly, then slow down as you fade. The mixdown is complete.

Some engineers record several mixes of the same tune and choose the best one.

After a few days, listen to the mix — perhaps on car speakers, a boom box, or a home system. The time lapse between mixdown and listening will allow you to hear with fresh ears. See if there's anything you want to change.

Eventually you'll have your finished product. It's amazing how the long hours of work with lots of complex equipment have concentrated into that little tape. But it's been fun. You have created a craftsman-like product you can be proud of. When played, it will re-create a musical experience in the ears and mind of the listener — no small achievement. **db**

Ad Ventures

BRIAN BATTLES

● Ah-ha! You turned to this page expecting a column on audio processors, right? I don't blame you, since that's what I said I'd be writing about, but I changed my mind. We'll continue the signal processor stuff in the next issue. At the moment, however, I want to depart from my original plan because it has come to me that there are a few topics that need more urgent attention.

I have just received a letter from a reader, Mr. Dean Heinbuch of Okolona, Mississippi. Dean pointed out that I would be doing many neophyte radio commercial producers a great service by clarifying certain specific technical aspects of this activity.

When you submit a radio commercial to a station, it should be in 1/4-inch, half- or full-track format, at 7.5 in./sec., without noise reduction. You should use 5-inch reels with large hubs (also called NAB hubs). Small hub reels, such as those found on 5- and 7-inch reels of tape sold at consumer electronics stores such as Radio Shack, don't work very well on broadcast open-reel tape decks. This is because the professional machines are set up for larger reels (usually 10.5 inches), and the difference in torque characteristics of the smaller hubs often cause serious problems with consistent tape speed, tension and spilling in fast wind modes. There are many production houses, professional audio dealers and mail-order companies that can supply you with empty large hub 5-inch reels in plain white boxes at a relatively low cost.

As far as the actual tape is concerned, my personal favorite is Ampex 456, with Scotch 226 a close second. Actually, any brand of premium audio mastering tape will do quite well. Major manufacturers such as Agfa-Gevaert, Maxell, Fuji, Memorex, BASF, etc. all manufacture very good quality recording media. Whichever brand you choose, your most economical move is to purchase it in bulk, that is, by the case on "pancakes," which are 2500-foot spools wound on a hub without a reel. To use the tape, you have to simply unscrew and separate the flanges of a metal 10.5-inch reel, place one on the left-hand spindle, carefully drop the pancake on the flange, put the other flange on top, and use your reel locks to tighten it down. (Some folks who are just performing simple dubbing work don't put a flange on top, but I dare you to try shuttling tape back and forth, fast winding, "rocking" for

Circle 21 on Reader Service Card   *See us at AES Booth 161*

www.americanradiohistory.com

www.americanradiohistory.com

edits, and so forth without a top flange. Get ready for a lapful of brown spaghetti.) Then use an empty takeup reel on the right-hand spindle while recording, and when you are done taping, you will have a now full takeup reel wound tails out, which is the proper way to store recordings. This prevents print-through, and protects the tape from the stress induced by rewinding.

(Also note that you should leave your own video cassette tapes un-rewound as well, even though movie rental houses often require customers to rewind tapes before returning them. This foolish practice is maintained simply for the convenience of the next rental customer. By the way, don't worry about whether you store audio cassettes rewound or not; since they have material recorded on both sides, they are subject to print-through no matter which end is out. Just avoid rewinding them if you don't expect to play them for a few days so that they don't start to stretch.)

You can submit commercials to stations tails or heads out. While tails out is the recording industry standard, there are lazy production techni-cians at many stations who hate to have to rewind a reel before they dub it to a cartridge. This can delay their arrival at the local Happy Hour by up to thirty extra seconds, so be considerate.

Do you need to put reference tones on the tape? Only if you feel like it. Most station personnel competently set the dubbing levels by playing the tape through and watching the VU meters, but if you want to be sure that they know what they're getting (in case your brand of tape is different from what they usually get, or if your program material is especially strange, a 1KHz tone at 0dB at the head is fine. Make a note on the box so they'll know it's there).

Use an ample amount of leader at the head and tail. I can't count the number of times I have cursed some stupid production house for shipping me a sixty-second commercial on a sixty-one second tape with no leader. I have even gotten ads on those little three-inch reels like the ones on the self-destructing tape recorder at the beginning of *Mission: Impossible*. And, believe it or not, occasionally some birdbrain will submit a spot on cassette. Please, folks, keep the bulk eraser away from your skull! Only the client should need a cassette, since he or she may wish to hear the commercial before it airs, and probably doesn't own a reel-to-reel machine.

The question of stereo vs. mono has again arisen. Pay close attention: the majority of radio stations will be playing your ad back over the air from a monophonic cartridge. You can never go wrong with mono spots. If, however, your extravaganza absolutely demands stereo to do it justice, always listen to your final mix in bridged mono. This will alert you to any phase or level problems before it hits the airwaves. (See *Ad Ventures* in the previous issue.) Never allow a moment on the tape to go by when there is only a signal in one channel (such as a two-voice commercial with one person on the far left and the other on the far right). It won't work. There are several reasons:

1) The station's open reel deck may have a peculiar head configuration or alignment problem that will cause just one side to be transferred to the cartridge, or it may pick up both channels simultaneously in mono, meaning that half the signal at a given point is merely hiss.

2) A radio station's heavy-handed compressor/limiters will pump up the "blank" spaces in one channel which sounds horrible in stereo and unlistenable in mono.

3) Even disregarding the first two reasons, you'll lose at least 3dB of perceived loudness at the receiving end. If you must have stereo, keep the audio panned away from the extremes, and always mix the voices directly in the middle (notable exception: special effects, such as "cocktail party" background voices, etc.). Whenever possible, I suggest you call the individual stations' Production Director first and find out what preference they have.

Dean also asks who owns the copyright to a commercial. My understanding is that this type of composition legally constitutes a "work for hire," and is therefore the property of the client (provided his check doesn't bounce).

In actual practice, I generally sell my commercials to the client outright, since my huge ego assures me that I'll always be able to think of something better, but if your idea is really hot, you might want to try to resell it elsewhere. (That means at least a few

hundred miles away from your original client's market, you greedy sneak.) You can probably throw in some kind of contractual clause assigning the rights to the client only for a specific length of time or for use only in a given market, but this legal stuff is what we pay lawyers for. Maybe Kent Klavens can help us out on this one.

Do you need a contract? Call me a sucker, but my standard operating procedure is a handshake and a deposit up front. (Sorry, Kent.) Unless you have reason to suspect that your client is liable to go south on you, I don't believe a big formal deal is always necessary. If you think some turkey is going to stiff you, take your offer elsewhere. The only major exception is in the case of a long term arrangement, such as if you are going to be producing somebody's ads for a year, or if you want to be held on some kind of retainer. Again, consult an attorney for this heavy stuff.

In most cases you can use pre-recorded, copyrighted, and/or published material in your spots, so long as the station(s) it appears on is a card-carrying, dues-paying member of ASCAP, BMI, SESAC, etc. You see, the stations are already assessed a fee for utilizing published musical works (i.e., playin' them hits), so you hop on for the ride. If you want to re-record a song in your own style, or with new lyrics, arrangements, alterations and so forth, I would say you should pick up your phone and ring up the song's publisher. Some artists are rightfully fussy about who clowns around with their masterpieces, and they do have some say in how they are used. Nightmares abound: imagine someone rewriting Led Zeppelin's classic for a locksmith shop commercial, (*There's a lady who's sure/Burglars will get her gold/And she's buying a spare key at Evan's.*)

Allow me to reiterate my pragmatic philosophy. Radio commercials are not supposed to be grandiose works of art; their job is to get a message across to a casual listener. Creativity is the key. Take this from a guy who's been nominated for a Clio, a BOLI, a Big Apple award, a NYMRAD, and more—as long as you adhere to the basic standards of good quality audio production and common sense, you'll be in business.

TALKBACK MIC

Thanks to Dean Heinbuch of Okolona, Mississippi for the letter that prompted this issue's content...Hello to ace attorney John McLaughlin of Enfield, Connecticut...Thanks to John Weeks of Gulf Breeze, Florida (sure sounds refreshing) for his terrific demo tape and fine letter...Congratulations to a couple of fellow CareerTrackers: our newly-hired Product Development maven, Winsor White (my boss), and our newly-promoted Publications Director, Delynn Copley (his boss)...Kevin White of Putnam, Connecticut—I love your tape...Patrick Cullie of Coupe Studios in Boulder, Colorado, you always come through with top-notch sound effects on a moment's notice (now how about some voice-over work?)...Dr. Rick Brinkman and Dr. Rick Kirschner of Ashland, Oregon, if naturopathic medicine ever fails you, open a production house...Why aren't there any ladies running commercial production operations?...Dennis Daniel of Long Island, New York, I owe you a belated congratulations for your Clio win (that's my kind of protege)...Howard Stern of New York, New York, why the #@%&! don't you ever call or write anymore, now that you're so *+#@% famous? ...Take a moment to press your ears up against the latest album by Chris Daniels and the Kings...Lou Heckler of Fort Meyers, Florida just could be television's most overlooked commercial talent...Bert Berdis, you gave me your card, call me so we can work together...Carl Henry and keyboard whiz Tommy Hyer may be hooking up again in Connecticut...Where are Bill Quinn, Mark Crumb, Klyph Johnson, Robbie Evert and Dainis Roman when you need 'em?...Greetings to John DiBella of WYSP in Philly—lots of great press on you lately...And give a big chorus of boos to the chowderheads in Washington who want to pass that imbecilic anti-copying legislation that will notch out the music in the middle of the music (I'm referring to House bill HR-1384 and Senate bill S-506). If that one goes over, I'll stick to my radio while the record stores file for Chapter 13...*Keep those tapes and letters coming, folks.* **db**

www.americanradiohistory.com

COREY DAVIDSON

Freedom and Control

Creative Audio Recording Services (CARS) is a New York based pre- and post-production recording facility owned and operated by Shelton Leigh Palmer.

CARS IS A REFLECTION OF SHELTON LEIGH PALMER'S philosophy as a composer, sound designer, producer, engineer and business man. Unlike many other studios, CARS has been designed around a true hierarchy of control that imposes absolutely no restrictions on a client's desires. CARS, like the proverbial computer itself, is a machine without a purpose and does nothing until it is told what to do. Once it is told, the instructions are carried out to the letter. This is not perfection, but it does bring this studio that much closer to becoming a true extension of the mind.

SUPER EDITS

When I asked Shelly why he has made the move to a full-blown tapeless studio, he immediately booted up the Synclavier System and proceeded to demonstrate a mock recording/production session. I was listening to a piece that he and his staff had recently completed. Suddenly, I was bombarded with an array of edits that were being executed so quickly that it made me wonder, for a brief moment, if this was a trick. It certainly wasn't; it really is possible to take a minute fraction of a word, sound, note or beat and splice it anywhere in the piece and listen to the new idea, all in a matter of seconds, never losing the original version. On top of all this editing power and the ability to go direct-to-disk, the system is a vast sound library with instantaneous total recall and one of, if not the most complete synthesis devices available in the world today. Shelly describes the studio, "This room is unique in a lot of ways, it's really three rooms in one. It is a music production room; there is room for 20 live musicians. It is a great pre-production room, bursting at the seams with one of every class of synthesizer available in the world today (no exaggeration.) It is a regular analog 24-track re-

cording room with an analog 4-track and analog 2-track as well. There is a PCM F1 digital mastering machine and 1630 format Sony digital pre-mastering machine for CD and a collection of the most current video gear as well. All of the aforementioned equipment comprises the normal stuff."

What does he mean by 'normal stuff? Shelly explains, "Any of the stuff I just described to you, you can get in virtually any $125.00 an hour recording studio. What you're looking at on this side (the area that houses the Synclavier system) is basically a 64 voice Synclavier with 64 voices of polyphonic sampling, 64 voices of FM synthesis, and 16 tracks of direct-to-disk recording. The sequencer hosts 200-tracks with 32 megabytes of RAM and 750 megabytes of hard disk storage. The combined sampling time is approximately 8.5 hours." Hours!? "Yes. Eight and a half hours of stereo sampling time that can be configured in any way and assigned to tracks so I can take 8.5 hours of stereo samples, put them on 200 different tracks, and edit a dance mix with my little mouse that will scare the hell out of you. All the edits would be non-destructive because you don't keep them unless you love them."

Besides the technical prowess of the Synclavier, one might wonder about the attractiveness of such a system in a commercial environment. At this point in time there is no universal storage medium, so how does one come to a decision when looking for a cost effective way of satisfying the clientele?

TAPELESS RECORDING

Shelly elaborates on this subject, "The theory of tapeless recording has been around for years. The tapeless studio is a logical extension of the computer era that we are in. What has made it impractical is the very high cost of random access memory and the very high cost of digital storage. They are predicting magnetic disk drives or hard drives that will be 750 megabytes on a 5-inch, half-height drive for under $1000.00 by the end of 1988. Now those

---

Corey Davidson is the Technical Editor of db Magazine.

Listen to what engineers in 47% of all recording studios have already heard.* And what they haven't.
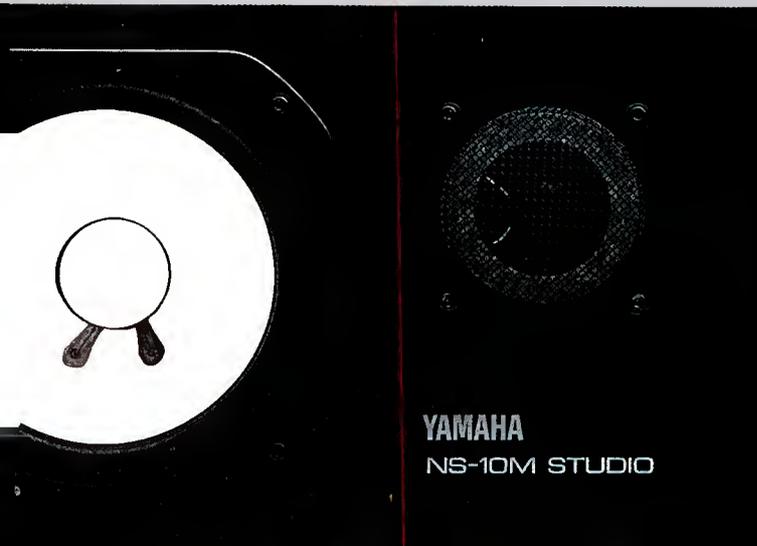
YAMAHA
NS-10M STUDIO

YAMAHA
NS-10M STUDIO

What we're going to tell you about the new NS10M Studio reference monitor may sound familiar, and for good reason.

The NS10M Studio is based on our legendary NS10M which, judging from its popularity in recording studios, delivers the near-field acoustic imaging that most engineers have demanded.

So rather than listen to competitive monitors to improve the NS10M, we listened to professionals like you.

And ended up retaining the best aspects of the NS10M's performance, while enhancing others.

That means you can expect the same smooth frequency response. The same high-power handling capability. And the same ability to take on the stresses of a longer duty cycle. All while maintaining accurate spatial definition without inducing listener fatigue.

Listening to what engineers needed also meant making refinements designed specifically for the studio environment.

Like connector terminals that accept large-diameter speaker cable for optimum signal quality. A 3.5cm dome tweeter with built-in acoustic damping tailored for near-field monitoring. And a horizontal configuration so the NS10M Studio never gets in your way.

And because it takes a pro to better service a pro, the NS10M Studio is sold exclusively through authorized Yamaha Professional Audio dealers.

The NS10M Studio.

Proof that at Yamaha, we listen to professionals as much as professionals listen to Yamaha.

Yamaha Music Corporation, Professional Audio Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S 3R1.

*1987 MIX Magazine Annual Recording Industry Directory

Frequency response remains exceptionally smooth in the new NS10M Studio, from 60Hz to 20kHz.

⊛ **YAMAHA**®
Engineering Imagination™
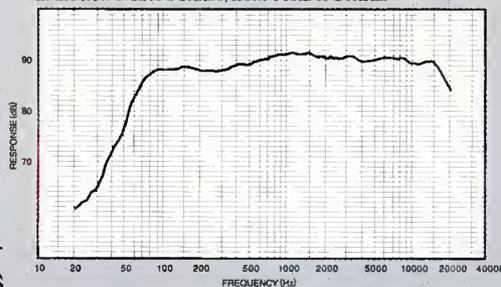
Figure 1. Shelly Palmer at the console in Control Room A.
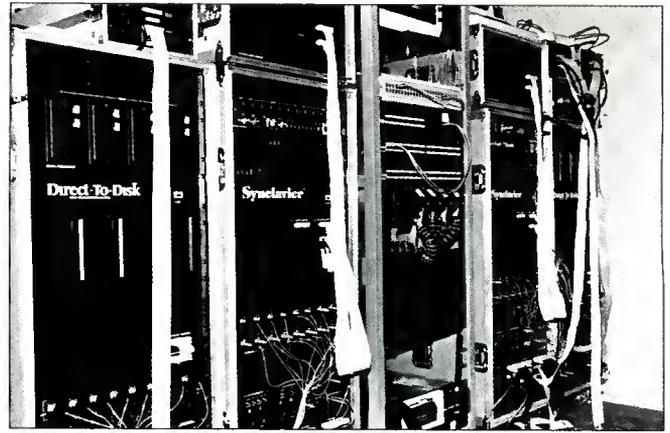
Figure 2. The Synclavier wall in the machine room.

are very significant advances because less than a year ago 10 megabytes in a full height drive ran about $1000.00. The advances in magnetic storage mediums are in the spotlight. The RAM and hard disk-technologies will probably become as pervasive as 2-inch recording tape is right now. I don't know whether or not the Synclavier system will be the system that wins the race for 'universal system', however, the Synclavier system is the first system of this kind that has ever been commercially viable. You can actually make money with this system if you know how to own and use it. To be a mixing engineer you need to know how to mix. To be a record engineer you need to be an engineer/producer/synth programmer. A record engineer even has to have a handle on computers. If you have an SSL, you have a computer."

CARS is an unusually flexible facility that can cater to virtually any kind of session. The key to a successful room does not depend entirely on the equipment list. Shelly stresses the following, "In order to fully fly this room you need to be a competent engineer, a competent synthesist-programmer, a competent computer programmer...being a composer wouldn't hurt you at all. You need to bring a lot to the party in order to get a lot out of the party. This room, were you to use all of its facilities, could synchronize 24 tracks of tape to 1-inch video. You could use it in a playback situation with 20 live musicians plus have 1000 oscillators sounding simultaneously all totally under computer control on independent tracks that would all be locked to one SMPTE time code and one sync word coming out of a master sync generator. That all might sound ridiculous and academic, but what it all boils down to is that you could score a feature film here in literally half the time that it would take to do anywhere else. You could score a commercial in very short order at a much higher sonic quality with 10 times the flexibility."

In a studio such as this, there is rarely an instance where any other outside facility is needed. Shelly says, "We might have to go outside for special things, such as video Montage or an animation stand, that aren't out of the ordinary realm of doing business. If someone brought in a really complex edit decision list for their TV show, we might want to run down their 1-inch on a video bay. Other than an instance such as the one I just mentioned, there is no need to go outside for anything pertaining to audio work."

FLEXIBILITY

In realizing a commercial product, flexibility will offer new slants on old ideas as well as creating new ones. The CARS approach is to offer the producer many windows by which one might view a single idea. Shelly played me his work palette from a Gain Detergent ad. Separate phrases were given their own locations in memory so that restructuring of entire sentences could instantly be achieved. This was his simplest example, yet it proved to be quite illustrative. It went something like this:

1) You can see it
2) You can smell it
3) You can feel it
4) So try new sunshine fresh Gain
5) And gain the feeling of a fresher clean
6) With new Gain
7) You get a fresher smelling clean
8) That gets out tough dirt

These lines were played back in all sorts of combinations until it became hilarious. All changes were made so fast that if it weren't for the fact that I could see Shelly hitting the buttons, I would have thought it to be a finished product.

Shelly clarifies, "Every line of voice-over, every word if you want, can be put on a separate track and slid independently real fast. I can now type any one of those cues by recalling it. For instance, I can recall line 7 which starts at 23 seconds, 5 frames, 48 sub-frames. If you want line 7 to come in 5 frames earlier, the mouse can grab line 7 and drag it over to the position desired (Shelly executes this as he is talking) or another way to relocate the line is to highlight it and punch-in the new location (He taps the numbers in). Done. Slipping and sliding is accomplished as if you were reaching out and grabbing it with your hands." At this point, Shelly cranked out the entire Gain Detergent piece complete with music, which was done with an acoustic orchestra, sound effects, and the various lines of narration all being juggled like pins, never dropping a one.

Shelly adds, "A sound event can be placed in real-time, it can be placed to SMPTE number, so you can watch the picture and work the mouse or watch the picture and play the keypad when you want these sounds to come up, or you can type in their location. All events are controllable not just in time and location but in sonic parameters as

Figure 3A. In this photo and the one adjoining, Greg Smith and Lisa Tusaro in Control Room B.

Figure 3B. Greg Smith is a composer and Lisa Tusaro an Executive Producer. They work for Shelton Leigh Palmer.

well. Pitch, speed, vibrato, chorusing and all forms of signal processing can be shaped, all in memory. Basically, anything you can do to a synthesizer or a sampled sound can be done to micrometer accuracy on the Synclavier. If someone brought us a piece of 1/4-inch for one of the lines, and it didn't fit because it was taken wild, we would be able to use the pitch wheel to shape the voiceover so that it would fit the picture. We have thousands of digital sound effects on line most of which are stored on PCM F1 digital audio and video tape with time code on the address track, analog audio on the audio track and digital audio on the digital track so that we can find them quickly. There is a log that is referred to for locating. We just type in the time code number, throw on the video tape and boom, it gets there. If we know, for instance, that we are doing an ocean front spot, we might load up a pile of things like waves, seagulls, etc. to have it ready in anticipation of a client's requests. Or, for example, if one brought in a hundred footsteps and when editing, the visual wasn't right with those footsteps, we hit two buttons and now they've got new footsteps. The Synclavier is a sound editor's delight, not to mention the music production capabilities."

COMPUTERS VERSUS "LIVE?"

Shelly has been submerged in synthesis since the inception of the synthesizer, however, his love and understanding of acoustic music is reflected by the continuing use of live musicians in his studio. He shares his views on the synthesizer versus the acoustic musician dilemma, "I've had serious synthesizers since the early seventies. I had Oberheim 8-Voices when the time was right, I had Moog System IIs when the time was right and this went on and on, always keeping up with what was considered to be state-of-the-art at the time. I never used any of those instruments for anything other than what they were intended. Some months ago we did the entire Bayer Aspirin campaign and spots for PAN AM. They were both demanding projects in the sense that many natural instrument sounds and unusual sound effects were needed. I did those pieces entirely on the Synclavier. At the initial listening sessions with the clients, I suggested that we redo the pieces with acoustic instruments. They thought that the sessions already were done that way!"

Shelly adds, "This does not change my decision to use acoustic instruments when the time is right. There is no cost savings using synthesizers over acoustic musicians. The room we are sitting in is worth well over a million and a half dollars and that is just the equipment. You have to have every piece of equipment that is in this room to effectively copy what an acoustic musician can do for $75.00 an hour. Do you know how many 75s go into 1.5 million dollars? I can tell you that a significant number of spots could be done acoustically. The synthesizer is an instrument in its own right and should never be used to cop acoustic instruments. Music is an emotional communicator and those emotions are conveyed non-verbally. Sometimes you can use a comb with wax paper to get a point across and you don't need the London Philharmonic. So the sounds you use are far less important than the way that you play them. You can score a horror movie with an anvil, a hammer and a reverb chamber and scare the hell out of everybody. The question is...'are you a musician?', not...'what are you using?' The tools are just tools."

CARS

Shelly Palmer's studio is not really a music production company facility anymore. He has diversified into two distinctively different companies. Creative Audio Services is a studio that is open to the public. CARS is a studio that has been built backwards. Shelly explains, "I didn't put my personal taste into CARS and the things that I like are not necessarily in evidence around here. Things that I hate are conspicuously missing. I figured that anyone that has ever used a studio hates the same stuff. Some of those things are having to dial an operator before you get an outside line, or not having a quiet place to make a phone call. I like to make sure that there are menus for every kind of restaurant that is locally available for my clients, and that those menus are organized in a cohesive and intelligent fashion. I hate having to scrounge for a talkback button. I hate having a 20 minute set-up time for a telephone patch so the telephone patch is always connected. I hate soda machines so I have a refrigerator filled with soda. I hate having to worry about sonic quality so I maintain daily alignments, MRL across the board to the client's specifications. I hate down time so I have two and three of everything. Things that we don't have two and three of are either patchable, rentable, or getable instantly."

"At CARS, clients get top-flight engineering, people who really understand post-production and people who really know the power of the room. Every engineer that works here is a competent synthesizer programmer. Some of our engineers are exceptional synthesizer programmers and exceptional musicians on top of that. If the bass drum isn't punchy enough, we have ways to take it off the tape and trigger new bass drum sounds. We have MIDI drum replacement off multi-track tape, MIDI instrument replacement, voltage and pitch followers, anything that you can bring us can be dealt with. If you needed strings or brass (real live strings or brass) added to your rhythm section, we can do that in this room. There is a level service here that far supersedes any straight mixing facility."

SHELTON LEIGH PALMER AND CO.

In an attempt to understand the nature of the commercial business, I asked Shelly if he could explain his role as composer/producer/etc. Much to our surprise, the issue became one of communicative skills and an understanding of human nature. Shelly comments, "As a composer and producer in advertising, every job is a science project because musically, most jobs that we do don't even require a fourth grade musical education. Creatively they require something completely different. Politically they require something completely different. Music for advertising, music for motion pictures, music that you have to sell for a living, is completely different in every way than the music that you write for yourself. The only thing that is similar between music for oneself as opposed to music for a living is that they both use notes as the medium for communication. My clients walk in and they have a job for me. They might ask me to write something from scratch, they might ask me to plagiarize something without getting them into copyright problems. You name it, I've been asked to do it. If a man walks into your studio and says, 'I'd like you to write something for me that sounds like the title song from Flashdance,' you don't throw him out On the other hand you can't write the title song from Flashdance because it has already been written. I have a slew of versions of 'Chariots Of Fire' motifs that have different grooves, different orchestrations, and different melody lines and yet the same emotional communication is made. Last year I had a major client come in with a Weather Report (a progressive, avant-garde, electric jazz group) album. His copyrighter wrote a sing-songy poem to accompany this esoteric music that went like this: WE CUT THE FRUIT, WE CUT IT FRESH, WE CUT THE FRUIT, THE BEST FRUIT YET. The writer asked me, 'Can't you write a melody to this music?' Meanwhile...despite the arduous nature of this request, I wrote the spot. This kind of thing happens often, people ask you for outlandish stuff, and the art is being able to take the most outrageous requests and turn them into something that, at the very least, doesn't offend you musically. That might sound a little strange, but my clients do not have the same reasons for using music that, say, Mick Jagger does. The commercial client uses music to enhance their sales environment and to make people want to buy their product. By the same token, a film director might want an audience to feel scared...to buy into that suspension of disbelief. It is no different. The fact that they're not selling a product doesn't mean that they're not selling something."

I asked Shelly to reveal the process(es) by which he goes about investigating the target market for a particular product. He recounted some earlier sessions, "My song for Seagram's mixers comes to mind. I was approached with specific requests. They needed a concept, and a song, and they wanted people that were 35 years and older to dig it. There are conventions of music which a commercial house, such as this one, understands and utilizes. Most people have watched 18,000 hours of television by the time they are 16 years old. That figure is closer to 30,000 by the time they're 25. So they know everything there is to know about listening to music. They know from watching TV, when the happy part comes, you have happy music. When the sad part comes, you have sad music. We use those conventions in our research and development work in the studio. As a composer, I take all of my knowledge of chord progressions, melodic and harmonic laws, cliches, many genres of music, and things that I know to have worked in the past, stir them all into the pot, and integrate them as they are needed. We do a tremendous amount of marketing research. If you want to sell something to someone who is 45 years old, you might say to yourself, 'Well...these are people who are not going to respond very well to *Raiders of the Lost Ark* because it reminds them of something from when they were kids, and yet not done as well.' So you try and evaluate what the level of experience of the eventual target audience will be. What's classy to a 40 year old is not necessarily classy to a 20 year old. Classy, to a 13 year old, might be something Madonna is wearing. Classy, to a 20 year old, might be something Princess Di is wearing. Sophisticated music for a 40 year old might be swing. Sophisticated music for a 13 year old might be Brian Ferry's music. One needs to really think about these things. You can't just assume that you know these things. You could be wrong. Just as you could be right, you could be wrong. You look at their buying habits, what they're wearing, eating, driving, etc. People respond on an emotional level based upon their entire experience. Here, at my company, we pay to get copies of all the research on all the music that we do. There is a very specific hard-core aspect to writing music for film and advertising."

We were interested in the sequence of events surrounding a single project. Shelly describes the procedure, "Generally we go to the client and look at a story board first. Sometimes it is a script. Most of the time, if it is a finished film, there will be a competition. In fact, 70 to 80 percent of the work we do is based upon competitive demos that we provide. The idea behind a competitive demo is to get the job any way that you can. People used to think of demos as 4 or 8-track recordings that were piano and voice demos. It is impossible to distinguish a Shelton Leigh Palmer and Co. demo from a Shelton Leigh Palmer and Co. final. There is no difference. We do everything as finals because the concepts may change, the frame counts may change, the boards may change, and/or they won't shoot it the way that it looks. Basically we leave nothing to the imagination of the clients because we have the technology and the facilities to do that. The job is reading the people. Human interaction is what our business side is all about. The irony is that we try very hard to maintain a level of musicianship that we are very proud of. It is hard to do that because clients are most often looking

EQUIPMENT LIST

Studio A
Control room A: 30x30 feet
Studio A: 18x35 feet

Synclavier Enhanced Digital Music System
Hardware configuration: 200-track digital memory recorder. 32 megabytes RAM. 750 megabytes Winchester disk drives. 32 voice polyphonic sampling, 32 voice FM synthesis, 128 voice resynthesis. 16 tracks of direct-to-disk 100k sampling. SMPTE option, 8-track by 16-channel MIDI option, external time processor option and high speed processor.

Synclavier software: Presently running Release "N". Including: Script, Polyphonic Direct-To-Disk, Sample-To-Disk, Sample-To-Memory, Resynthesis, FM Synthesis and Music Printing.

Yamaha DX-7 FM synthesizer

Yamaha TX-816 FM synthesizers

E-mu Emulator II digital sampling keyboard

Voyetra-8 (2) analog synthesizers (voltage control or MIDI)

ARP 2600 analog synthesizer (voltage controlled)

Moog System II analog synthesizer (voltage controlled)

Moog Minimoog analog synthesizer (voltage controlled or MIDI)

Lyricon Wind Driver (voltage control or MIDI)

Apple Macintosh software: Op-Code DX-7 Patch Editor, Op-Code DX/TX Library, Op-Code Sequencer, Op-Code Cue.

IBM PC software: Octave Plateau Sequencer Plus, The Master Click Program PC.

Audio & Video Recorders, Mixers and Synchronizers
MCI JH-538/38C SMPTE automated mixing console. 38 inputs, 32 outputs inline mixing console with 6 sends and 12 automated returns. The console features Disk MIX II, Winchester hard drive disk based SMPTE automation.

Synclavier 200-track/16-track direct-to-disk

MCI JH-24, 24-track analog recorder/reproducer

Otari 12I 1/2-inch 4-track analog recorder/reproducer

Nakamichi MR-1 audio cassette recorder/reproducer

Teac audio cassette recorder/reproducer

JVC 8250/8200 off-line video editing/playback/layback

JVC 850 video editing deck

Adams-Smith 2600 synchronizer system with edit controller

Westlake BBSM-12 monitors

Yamaha NS-10M monitors

Auratone monitors

Crown Microtech 1200 power amps

Fostex T-20 headphones

Neumann, Beyer, AKG, Sennheiser and Shure microphones

Studio B
Control room B: 15x16 feet
Vocal booth: 8x5

Synthesizer complement and control systems are an exact clone of Studio A's equipment.

Audio & Video Recorders, Mixers and Synchronizers
Sound Workshop 34B. 32 inputs, 24 outputs. Fully automated with ARMS Disk Mix II, SMPTE time code disk based automation.

Synclavier 200-track/16-track direct-to-disk

Otari 12C 2-track

Nakamichi MR-1 cassette deck

Adams-Smith 2600 synchronizer

JVC 8250 video playback

Yamaha NS-10M monitors

Crown Microtech 1200 power amps

Fostex T-20 headphones

Neumann, Beyer, AKG, Sennheiser and Shure microphones

Machine Room
Machine room is tied-in to both control rooms, offering transfers and dubs in all audio and video formats.

Sony BVH-3100 1-inch type C video recorder/editor

JVC CR-850 3/4-inch U-Matic video recorder/editor

Panasonic 6810 1/2-inch VHS hi-fi video recorder

Sony BVW-40 Betacam video recorder

Sony AF 8mm video recorder

Multi-track Magnetics #106 35mm/16mm dubber

Nagra 4.2 (pilot or center track time code)

Otari 1/4-inch 2-track

Otari 1/2-inch 4-track

Nakamichi MR-1 audio cassette deck

Adams-Smith 2600 synchronizers

Adams-Smith SMPTE time code generator/reader

Adams-Smith character inserter

Outboard Gear
(2) Tube Tech PE-1A tube equalizers

(2) Orban 672-A equalizers

(2) Drawmer dual gate DS-210 gates

(2) Valley People Dynamite gates

(2) Lexicon PCM 42 digital delay

(2) Delta Lab ADM 1024 digital delay

Lexicon PCM 70 digital effects processor

Lexicon PCM 60 digital reverb

(5) Yamaha SPX-90 digital effects processor/reverb

(2) Yamaha REV-7 digital effects processor/reverb

(3) dbx 160X compressor/limiter

(1) Urei 1178 compressor/limiter

MXR pitch transposer

Roland SVC-350 vocoder

MX1 and Expert control voltage/MIDI converters ■

to water down materials. There are two recurring notions that most often wind up to be to the clients detriment. One is: A guy comes in and says, 'I want it to be the meanest, incredible, newest, most outrageous thing you've ever heard in your life...just like that AT&T spot.' Excuse me, but how could it be brand new if it is just like the AT&T spot? The second dilemma is: 'That rock and roll is really good but do you think you can calm it down?' So, 15 people in the room have succeeded in watering down the rock and roll. The fact is that my mother hates rock and roll. She will still consider this to be rock and roll. On the other hand, my 20 year old brother, who loves rock and roll, will not consider this rock and roll because it is too watered down and wimpy. You've lost my mother no matter what because she hates music that has a groove. And now you've lost my brother who was predisposed to like it but because you watered it down so much, it's meaningless. What has been accomplished here? Either commit or don't! If you're going to do something with a screaming Van Halen type guitar solo, then at least have the guts to leave it in and leave it loud. Let it be real. If you're afraid of it and back it down to a light whisper in the mix, all you will be accomplishing is the loss of your target audience. This phenomenon happens a lot in country music. Many advertising people think that if you add a harmonica and an acoustic guitar, it's country. People who really like country music hear it as garbage. People who hate country music will hate it because it's got a guitar and a harmonica. So what has been accomplished? This is a major argument that occurs on a regular basis. We fight for things like this because we want our creations to be ultimately effective. Last year, major advertising agencies spent over 250 million dollars airing music that I wrote to sell their products. If that many companies are going to spend that kind of money to air my music to sell their products, it had better work. The politics of the job is to get everybody to accept the fact that music is a tool when properly applied."

IN CONCLUSION

There are times when the fine line between philosophy and technology gets ever so much finer. The last two decades have proven to be the most prolific in the history of the electronic age. The falling price of advancing technologies coupled with astounding breakthroughs in LSI (Large Scale Integration) and digital power have caused many individuals to speculate on the future of the recording industry. Shelly once again offers an educated and experienced point of view, "One of the things that is going to happen is that the industry will come full circle as technology advances. In the 50s, when Les Paul was working with his little 1-inch, 8-track machine, you might have gone to his studio for the engineer who was not only an engineer but was an engineer/producer/sound consultant/technician/everything. Then the studio business changed. You brought your own engineer and rented the room. Now we are flipping all that back around. Machines don't create mixes, people do. Machines don't make music, people do." **db**

Circle 28 on Reader Service Card

See us at AES Booth 202

2 to 8 trk
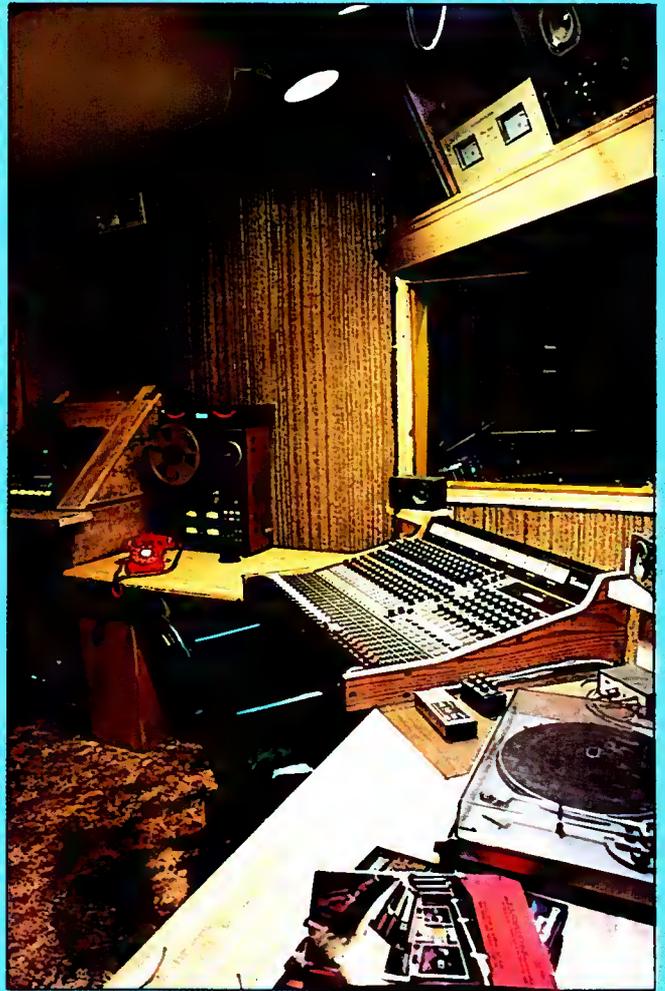
RICK SHRIVER

Atmosound:
A Construction Story

No big budgets, but a desire for a good studio. So, go do it yourself. So that is what they went and did.

A FEW YEARS BACK WE SET OUT TO CONSTRUCT AN EIGHT-track recording studio "from the ground up," as they say. Like scores of others, we also sought to accomplish this on a limited budget, but in fact, we had no real budget at all!

"So what?," we hear you saying. Obviously our results were gratifying. Would I be writing this if it were a dismal failure?

We believe our results might interest others who are embarking on similar ventures. The design methodologies employed are in keeping with recognized acoustic theory. When combined with some cost-saving techniques, the outcome can be a fully affordable recording facility which is attractive, functional and has features mostly found in the big leagues.
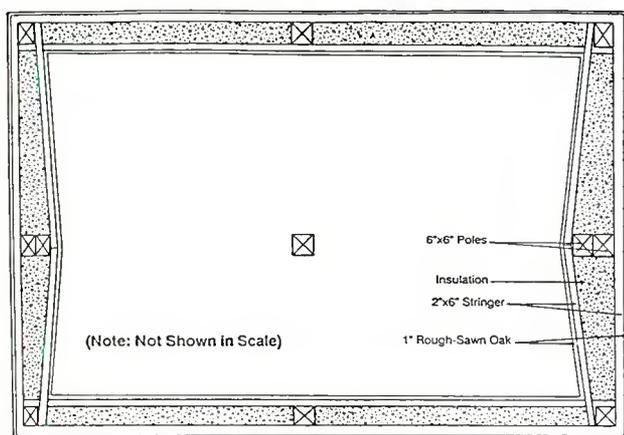
Figure 1. Angling of interior walls. Note an additional set of poles along the sidewall.

Our structural design is "pole-type" building, set upon a concrete slab. It is essentially a fairly roomy two-car garage. This construction method is simple enough to be successfully carried out by the home handyman type. Other advantages are economy and ready adaptation to features desired in a studio application.

In order to break up the parallel surfaces inside, we sloped the ceiling and angled the side walls. The ceiling's highest point is 12 feet, and slopes down to eight feet. Angling the walls was accomplished by setting an additional set of poles along the side walls (*Figure 1*). The frame for the ceiling is attached directly to the roof joists (*Figure 2*). Setting the building on a slab had obvious advantages over a joist-type floor. Furthermore, we could cut the slab into

Photos by Rick Shriver and Jeff Mercer

sections which provided more isolation between rooms, as well as to discourage cracking.

We elected to use one quarter of the building for the control room which resulted in an "L" shaped studio area. Another quarter of the space was treated with hardwood floors to provide a "live" area. The remaining half of the building is carpeted.

The inside surfaces of outside walls are rough-sawn oak. The vertically hung boards are randomly spaced (one-half inch to one and one-half inches). The result is that the cavity between outside walls and inside walls becomes something of a Helmholz absorber. This insulated space varies in depth from nine to fifteen inches along the side walls, providing broad-band absorption.

Walls between the control room and studio are constructed of staggered double sets of studding. Attached to this are layers of builders board, "masonite" and gypsum wallboard. The cavity is, of course, insulated. Surface treatment in the control room is a backless type of carpet, intended for hanging rather than laying. The studio side is painted wallboard.

The control room windows are double layers of half-inch glass, set into a cork-lined frame. This is surprisingly easy to build and provides excellent isolation (*Figure 3*).

The heating plant is located "outside" the studio. We poured another concrete pad four-feet square, and attached an enclosure to one of the rear corners of the

Figure 2. The ceiling frame showing the attachment to the roof joists.

Figure 3. A side view of the control room window construction.

building. Insulated ducts carry heated air into the control room and studio.

Now, you may be thinking that this is beginning to sound as if more than someone operating with "no budget" might hope for. I must confess, proximity to materials and infinite patience are prerequisites for the success of this endeavor.

Nevertheless, we will present here some of the "circumstances" that have made this project accomplishable for us. First, the material for exterior and interior walls, rough-sawn oak, is available locally at saw mills for less than twenty-five cents per square foot.

We purchased the oak flooring directly from a factory located in the midwest. It was "second" run, meaning it was checked and irregular in places. The factory representative advised that we order twice what we would need

Figure 4. A cutaway view of the room interior showing the fabric barrier between the insulation and the room.
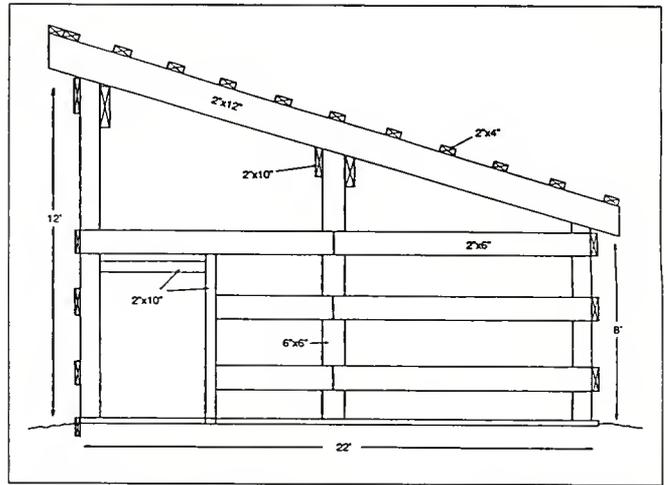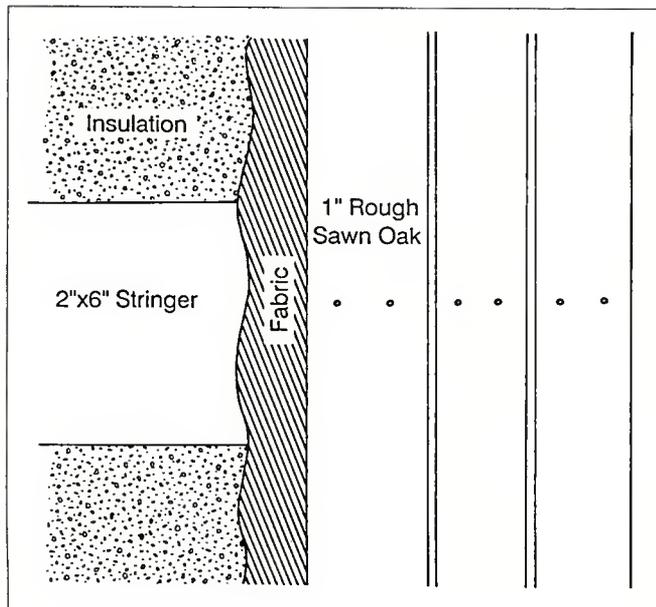
Figure 5. The framing plan for the "load in/out" side of the studio.

to cover that area. Even with that, the total cost of the materials was under $50.00. After having completed the project, we feel that buying twice the amount of flooring was necessary. We used more than three-quarters of the wood, and for the price, it was a good investment.

The carpet which covers two walls of the control room is far less expensive than backed carpet. This is only the pile, with no jute or rubber. Since it has no backing, it is much lighter and easier to hang. We found this at a local carpet outlet. The carpet was used on the walls upon which the monitors are located, so that side of the room is more dead than the rear of the room.

All the insulation we used in the exterior walls was purchased directly from the factory. The excess trimmed
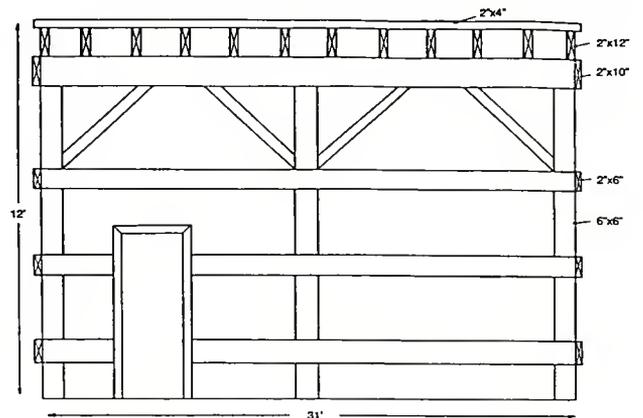
Figure 6. The framing plan of the front of the studio.

from rolls of glass fiber is baled into half-ton bundles and sold. It is more difficult to work with, but the savings make it worth the hassle. It is also necessary to place a fabric barrier between the insulation and the room interior, to prevent the glass fibers from becoming airborne *(Figure 4).*

Windows for the exterior of the building were purchased from a factory outlet locally. We were able to find vinyl-clad triple-glazed windows (earth-tone, no less) for about fifty percent of the retail price. Again, these are "blemished" and may have cracks in the vinyl or other
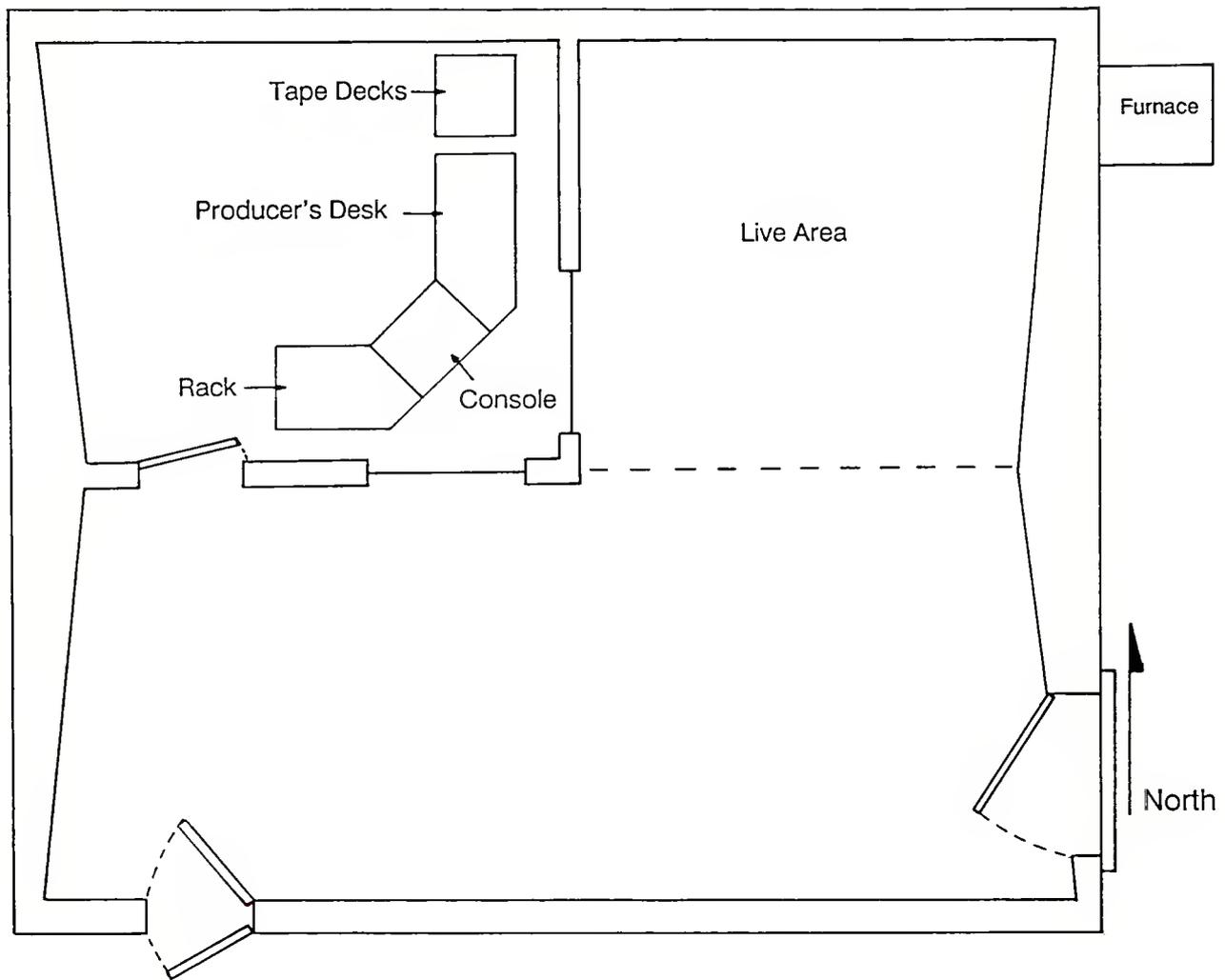
Figure 7. The studio floor plan.

minor defects. We found them to be more than adequate for our purposes.

We found shielded cable in the form of snake ends and other random length excess cable pieces from an OEM assembler. This was used for cable runs between studio and control room. Finally, we watched the auction listings in our local paper closely. Thus, we were able to locate a furnace, interior doors, furnishings and some excellent pieces of used gear.

The concrete finishing was contracted out, but everything else was fairly easily done on weekends and evenings with friends. The total project cost for the building was about $6,000, not including equipment. The room is free of ringing and resonances as a result of the angled surfaces and absorptive wall cavities. The "live" area is sonically bright due to its hardwood floor and wallboard surfaces. The control room is deadened by use of carpet on two walls, while the two with slotted-absorber characteristics are just slightly more reflective. Isolation from room to room, and from the outside is very good.

A part of what makes the design work is also our rural location. The barn-like appearance of Atmosound suits the environment. Our clients enjoy the relaxed atmos-phere and are pleased with the quality which narrow-gauge eight-track recording can offer the budget-conscious recordist.

The equipment arsenal at Atmosound includes:

Consoles: Carvin MX 1688, Biamp 1221, Tascam Model II

Tape Decks: Tascam 32, Tascam 38, Tascam 3340, various cassette and two-track

Microphones: AKG, Electro-Voice, Sennheiser, Shure, Sony

Monitoring: JBL, Fostex, driven by Phase Linear

Outboard: dbx, Lexicon, Yamaha SPX90, graphic EQ

Extras: console piano, drum kit, guitars, basses, synths, Gaines Audio patch bays.

Rick Shriver has offered to provide additional information to anyone interested in specifics about the factories and businesses that Atmosound was created from. Drop a line to : Rick Shriver, c/o db Magazine, 1120 Old Country Road, Plainview, NY 11803.   db

GUS SKINAS

A Digital Road Show

With the large concentration of studios in Nashville, Tennessee, Sony decided to bring their digital wares there, set it all up, and show what they could do.

THIS PAST JUNE, SONY PROFESSIONAL AUDIO BROUGHT its equipment and its engineering expertise to Nashville to host a digital audio open house. Our purpose was to demonstrate the depth of the DASH system of recording and to show how practical, versatile and advantageous digital audio can be.

While a complete system was on display, from recording to compact disc mastering, a particularly crucial part of our demonstration was the process of dual 24-track recording, made possible by interfacing two Sony PCM-3324 multi-track recorders. This option of locking up two 24-track machines is unique and offers a wide range of recording possibilities that cannot be found in a single multi-track set-up. As you may remember, it played a key role in the bi-coastal satellite recording session with Stevie Wonder and Nile Rodgers last March, and it was also a capability that sparked much interest among the attendees from the Nashville music community at our open house.

Our Nashville demonstration emphasized a handful of key points about this process, in some cases to dispel misconceptions, but in most cases to explain advantages that many people are simply not aware of, not just in Nashville, but in the recording industry as a whole.

Those producers and engineers who have had to synchronize two video decks or two analog 24-track machines may be leery of interfacing equipment. Experience has taught them that a series of headaches may be waiting for them along that route. When locking up with SMPTE, machines are always slewing to stay in the correct time frame. For this reason, when working in the analog audio domain, the audio phase is never the same on the two machines. Another disconcerting variable can be the ballis

tics. Even when interfacing two identical machines, this can be a problem. When dealing with machines from different manufacturers, the machine ballistics are different and lock-up can take even longer. These difficulties can cause an understandable amount of trepidation for those who don't want complex electronics to bog down the creative recording process.

When locking up two PCM-3324s, however, SMPTE is not involved. Instead, the machines' master clocks and digital-to-audio converters are locked to the same crystal. All channels output samples at the same time. There is zero phase shift.

The design of the tracks on the PCM-3324s is crucial to synchronization. In addition to the 24 digital audio recording tracks, each machine has one time code channel track, two analog tracks and one control track. It is the internal control track that makes the striping of SMPTE unnecessary. This means that interfacing is simple and reliable. With minimal set-up time, the producer can enjoy all the advantages of both digital sound and 48-track recording.

Interfacing ease can also be applied to video editing systems to facilitate the increasing demand for high-quality audio-for-video production. Built-in resolving capabilities allow the PCM-3324 set-up to be connected with editors from a variety of manufacturers. Once again, the lock-up is simple and allows the producer to concentrate on creative considerations.

A dramatic side benefit of the PCM-3324's control track is the capability for electronic editing between two 3324s. This capability offers great ease of operation and is more powerful than razor-blade editing. The ability to edit one track at a time was a feature that generated a great deal of interest and comment at the Nashville demonstration. Single-track electronic editing allows you to move sounds around with great freedom when performing fly-ins.

Gus Skinas is the Digital Audio Product Manager, Sony Professional Audio.

Figure 1. Cary Fischer delivers opening remarks to the Nashville audience.

Figure 2. Author Gus Skinas demonstrates the Sony PCM-3402.

At our Nashville demonstration, one PCM-3324 was the master machine, containing the multi-track master recording, and the other was the slave, containing the source tape. We found the chorus on the master tape where we wanted to insert the fly-in and aligned the scrub wheel to the desired downbeat. It should be pointed out that this was done ergonomically. There was no need to spend time punching a series of buttons. Just go to the insertion spot, turn the scrub wheel, cue it up and boom, you're there.

Next, we moved over to the slave machine and cued the source sound in the same manner. Then we pushed a button to lock the two machines together, told the machines that the selected spot was the place where we wanted to go into record, and then executed an auto-record. A fly-in that would not have been possible with razor editing was accomplished in a very short time.

To dramatize the exact synchronization of the two 3324s during this demonstration, we fitted a large rubber band over the wheels of both machines, like a bicycle chain. By tying the machines physically, as well as electronically, we were able to show how perfectly the source and master tapes corresponded to each other.

While electronic editing is an attractive option, razor-blade editing is a viable method with the PCM-3324 as well. At the Nashville demonstration, a rumor we were able to dispel was that the 3324 cannot record over razor-blade edits. We successfully demonstrated that this operation can be performed with ease.

The synchronization between PCM-3324s that facilitates 48-track recording and electronic editing was also an essential element in the recent satellite recording session joining Stevie Wonder in Los Angeles with Nile Rodgers in New York. Two 3324s were used at the New York end of that event to allow us to simultaneously synchronize and bounce tracks.

When the master recording in New York was transmitted via satellite to Los Angeles and then beamed back with Stevie Wonder's added harmonica playing, there was a delay of approximately half a second by the time the sig-

nal had completed its cross-country round trip. That delayed signal was recorded onto a second, slave machine.

During the next pass, when Stevie Wonder added another track, we quickly offset the second machine so that we could record the new track while digitally bouncing Stevie's previous track to the tape on the first, master machine. Every time we did a new overdub, we shifted the offset and bounced the last overdub to the master. This was possible because the 3324 can be precisely offset, its resolution is accurate to the millisecond.

A recent refinement on display in Nashville was an IEEE 488 computer control bus that enhances the system by allowing users to perform more complicated edits. Through the control bus, digital audio signals can be electronically re-routed inside the machine, and cross fades can be set on individual channels from one to 370 milliseconds. Transport and synchronizing functions can now be controlled through this bus.

Perhaps the most important purpose of the dual 24-track demonstration was to show producers, engineers and recording artists how they can take advantage of the system's capabilities, particularly in the area of electronic editing. We have found that once people start working with this set-up, they see how they can improve their recordings.

As far as applications go, the Sony philosophy is 24/48 tracks. The flexibility is much greater when you approach multi-track recording in this way. The PCM-3324s work as a 48-track set-up when they are locked up. They also work as a digital editing system between two 24-track machines. Additionally, they can be run as two separate 24-track digital recorders. Another benefit is that the dual 24-track system offers the ability to make back-up copies, a necessary step when recording in any studio. If you are not able to do this in-house, then you would have to rent an extra machine or take your tape somewhere else to record a safety. Two digital multi-track machines working in tandem provide more options and more flexibility than any one single multi-track recorder. **db**

SARAH STEIN

A Look at Digital in Nashville

A HANDFUL OF NASHVILLE'S APPROXIMATELY TWO hundred recording studios have achieved international recognition during the past decade, but one, Sixteenth Avenue Sound, has accomplished this in less than one year of operation. Built last year by Mike Poston, and open since December, 1986, the all-digital "new kid in town" is fast becoming an industry leader, having hosted not only a variety of country and contemporary Christian acts, but also pop acts from as far away as London.

The client list already reads like a Who's Who of Country Music, boasting such notables as Reba McEntire, Eddie Rabbitt, Gary Morris, Roseanne Cash and Crystal Gayle. However, as studio president Mike Poston quickly points out, "We're certainly not limited to one style of music." The facility's very first session was with pop superstar Steve Winwood; he has since returned. Pop producer David Foster, working along with Tim DuBois and Scott Hendricks, used the studio for a cut on the soundtrack of the Michael J. Fox movie, *The Secret of My Success*; producer Brown Bannister has produced both Kenny Rogers and gospel songstress Amy Grant there. Famed British producer Paul Samwell-Smith (best known for his work with the Yardbirds and Cat Stevens) recently chose the studio to mix a new album for RCA artist Mark Germino. Frank Filipetti, who co-produced and engineered the latest album by James Taylor, was at the board and thoroughly enjoyed his stay at Sixteenth Avenue. Up and coming rock stars, White Lace, are due in next month. What a start!

What's behind the studio's rise? The broad-based musical backgrounds and personalities of its staff are at least partly responsible. Mike Poston, a leading studio designer and one of Nashville's foremost proponents of digital recording, traces his musical roots to jazz and the classics. His musical training is in piano. He also received exten-

sive training in electronics and acoustics in the military which led to a four-year stint as a studio maintenance engineer. Eventually, he decided to lay down the screwdrivers and soldering irons, and work in the middle of the record-making process as an engineer. He did just that. Before building Sixteenth Avenue Sound, he'd turned knobs for musical giants representing a wide variety of musical styles — Chet Atkins, George Benson, Woody Herman, Kenny Rogers, Roger Whittaker, and many more.

Despite the fact that Poston's days are now filled with the business of running a studio, he carefully maintains those aesthetic leanings which got him into music in the first place. "It's important to always keep a sense of musicianship when you are dealing every day with producers and artists," he says. "It's part of making them comfortable, making them know you can relate to whatever sound they're after. Listening to music — *all* kinds of music — is as important a part of my professional development as reading a balance sheet or understanding the capabilities of a digital recorder. And doing all of those things is what I enjoy most."

Poston's business partner, producer/songwriter Byron Hill, has an international reputation, having produced recordings for EMI (Germany) and Warner Bros. (France) as well as Mercury, Polydor, Ariola and Capitol Records here in the U.S. His songs have been recorded by Ed Bruce, Ray Charles, Johnny Lee, Kenny Rogers, Anne Murray, George Strait and others.

In staffing the studio, Poston sought out people who were similarly broad-ranged in their musical tastes; he believes that young minds can contribute fresh and progressive ideas to both the business and the clientele. Consequently, all on his staff are under thirty years of age. All have college degrees or specific formal training for the positions that they hold. The thirty-nine-year-old Poston believes that the youthfulness of his staff may be a real drawing card in attracting and holding those clients whose music is bought primarily by younger listeners.

Figure 1. Superstar Steve Winwood (L), engineer Tom Lord-Alge at the board, and studio president Mike Poston (standing) in the Sixteenth Avenue Sound control room.

Photos are by Sarah Stein
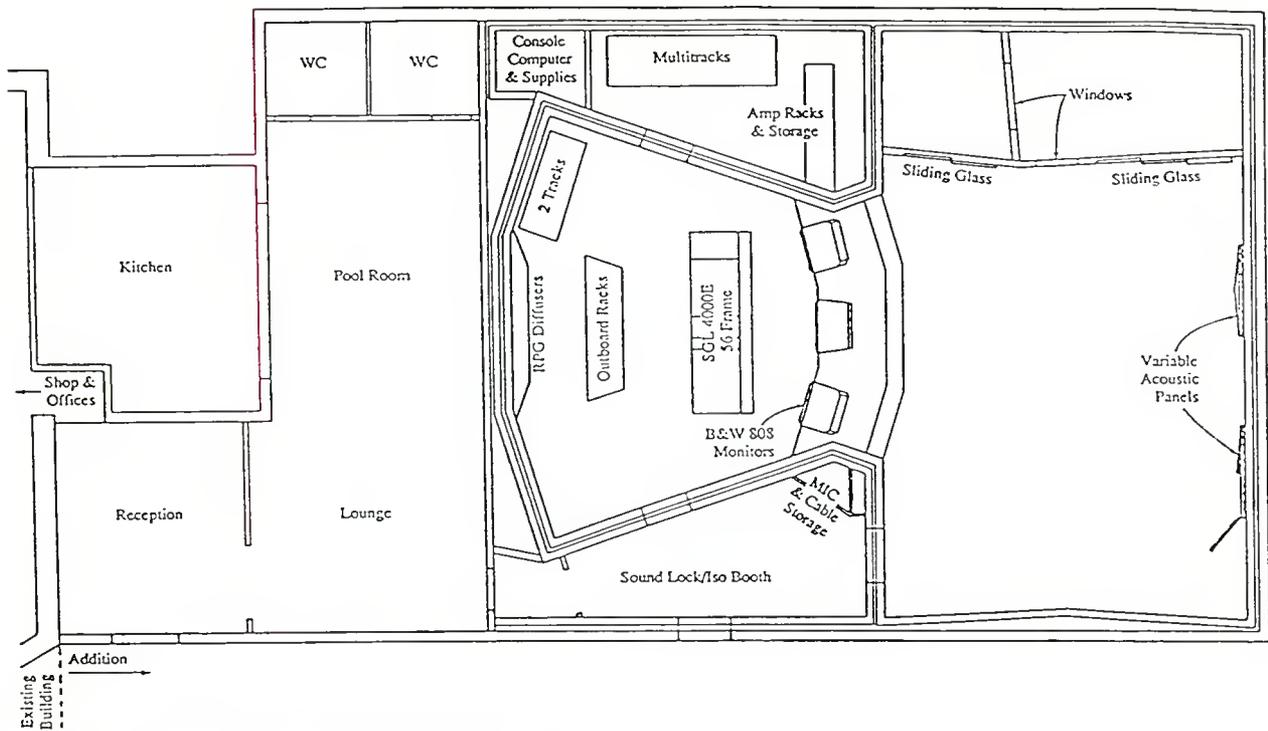
Figure 2. The Sixteenth Avenue Studio's floor plan.

Of course, the physical and acoustic qualities of the studio itself are other factors which attract Sixteenth Avenue Sound's diverse clientele. According to Poston, the studio is "one of the two livest rooms in Nashville," and that liveness draws those producers who want to make it an integral part of their records. Brown Bannister (Kenny Rogers and Amy Grant), Rodney Crowell (Roseanne Cash), Richard Landis (Eddie Rabbitt) and Mark Wright (Gary Chapman) are among the producers (and their artists) who have built that liveness into records at Sixteenth Avenue Sound. Poston, a veteran designer and builder of over thirty recording studios, achieved this liveness by installing a large amount of hardwood construction in both the studio and control room. He adds, "Most people know that it's much easier to build a room too live and then pull it back a little than it is to build one too absorbent and try to make it live."

Figure 3. Famed British producer Paul Samwell-Smith and engineer Frank Filipetti working on Mark Germino's RCA album.

Another physical factor which Poston finds especially attractive to clients is its unusually large control room. He observed, "Studios are usually chosen by those who must spend long hours in the control room. It's just good business and artistic sense to make those people as comfortable as possible. Getting away from the 'cave-like' atmosphere and giving people room to move, plenty of it, are major contributors to that comfort." Sixteenth Avenue Sound's control room is approximately five-hundred square feet, almost as large as the studio proper. Also, there is a machine room of nearly two-hundred square feet built to one side of the control room. The control room was built with the expectation that more and more music of the future would be created right in the control room. Poston declared, "The size has paid off over and over. Recently, at a Kenny Rogers session here, we had Shane Keister and his massive keyboard setup, including the Synclavier; Keith Thomas with nearly as many keyboards; and the engineer, Jeff Balding, who had three large racks of his own equipment. And no one felt cramped in the situation!" Control room size may also have been a factor in attracting Steve Winwood, whose personal studio in London is also noted for its large control room. Sixteenth Avenue has even hosted sessions where everyone but the vocalist is in the control room. Naturally, the arrangement makes for great communication.

Poston observed, "I have seen a great deal of change in producers over the past ten years, and I aim to make my studio responsive to those changes. For one thing, recording in Nashville takes more time than it used to. Producers are feeling more pressure to control the technical end of a record. As recently as ten years ago in Nashville, many producers were relying so heavily on the genius of this city's fabulous musicians, that the technical end of a record rarely came into play. I, for example, became an engineer during a period when we were cutting eight demos in three hours. In contrast, L.A. producer David Foster, who was at the studio a few weeks ago to record

Restless Heart's song for the film *The Secret of My Success*, seemed not to get annoyed or even care if the engineer had to spend an hour getting the sound on a synthesizer. Ten years ago, an engineer wasn't allowed an hour to get a sound on anything. But David was willing to let Jeff Balding take an hour to get his technical part correct, and then take another hour to find the right sound to blend in with the rest of the music and that seemed to fit, and that everybody thought was magic.

"Another case in point was an April session on Crystal Gayle, which Jim Ed Norman produced with Eric Prestige engineering. We spent the first day getting the drummer set up and getting all the drum sounds down. The rhythm portion is much more complex than it was back in the '70s, before so much electronics came into play. Back then, I did sessions where I dedicated two tracks to the drums. Paul Liam, the drummer who was here for both Crystal Gayle and Kenny Rogers' sessions, had two huge electronic racks and it required eighteen faders on the console just to get him operating. It took five or six hours to get him set up and everything plugged in and functioning, and then we started working on sound."

To accommodate the needs of such producers, Poston says that a studio must offer block booking as a matter of course. Many Nashville studios today still charge solely on a per-hour basis, a practice that really doesn't allow the client to relax and work at his own creative pace. Poston's studio first quotes a daily rate and, on request, quotes an hourly rate. Also, since his studio offers digital recording exclusively, there are no extra charges for its use.

The studio is equipped with an SSL 400E 48-input console with Total Recall, which Poston chose for its user friendliness and worldwide acceptance. Other important gear in addition to the Mitsubishi X-850, are Lexicon's most advanced software-based digital effects processor,

---

We asked Mike Poston to share his views on studio design. Mike proceeded to explain the thoughts that he has pertaining to audio/acoustic design and how these notions relate to the creative process.

"Sixteenth Avenue Sound has employed the basic LEDE (live-end, dead-end) design theory with some minor yet important variations. Most people in the industry agree that one of the most important goals of the LEDE concept is to absorb any first reflections that might come from the monitor-end of the room in order to eliminate phase distortion. In the '70s the trend was to have extremely hard front surfaces and very absorbent rears. A few months ago, Tom Hidley, proponent of the LEDE design, gave a seminar. At that seminar he stated that he now realizes, as the result of extensive testing, that the absorption of *first* reflections is much more desirable. This means that the front-end (live-end) no longer requires as hard a surface as was prescribed before. My control room probably doesn't meet the SYN AUD CON specifications to the letter. I'm utilizing absorption of first reflections, a hardened front-end trapezoidal shape, and the decoupling of the monitors from all the surfaces by suspending them with isolators. The soffit front in the control room is strictly cosmetic. The rear of the room utilizes RPG diffusers.

We were curious about changes in room design that might have been made upon the acoustician's visit. Mike explained, "I was the acoustician and the room has never

---

been measured. Many proclaimed acousticians have been in here and have been very pleased (no negative comments) by the sounds." We wanted to know if the sheer size and availability of space had given Mike the leeway to acoustically shape the room. Mike responded, "Yes. The availability of space lends itself to very basic, fundamental theory and practice of good acoustics and design. If you have a lot of cubic volume, you get into less trouble. I've got about 22 feet between the front and rear wall. I would have liked to have about 24 feet in order to get closer to 20-25Hz wavelengths. I didn't quite attain that due to space limitations. In a room that size (Sixteenth Avenue's control room), the most trouble that you're going to have is below 100Hz so I have taken steps to minimize these problems. The fact that I have a deep room helps to alleviate some low-end problems. The distance between floor and ceiling is about 11 feet. The ceiling is on a 60 degree slope from front to rear. About 3/4 of the way back in the room there is a 2-foot wide slot in the ceiling that goes up another 10 feet. This serves as a low-mid trap. There are a couple of skylights way up in the ceiling. Even though the ceiling is a hard material with a soft covering over it, the vertical walls up in the slot are nothing but fabric, and up over the top of the control room is a huge trap. If one were to speak in terms of percentages of volume, there is around 35 percent of the control room's total space up over the top of the ceiling. This trap-space wards off the build-up of low-end information in the room. You can walk all around the room, in any corner, and there is no build-up of bottom-end, whatsoever."

We were interested in knowing how well the console satisfies client's demands, and how the digital technology enhances the production level of his facility. Mike claimed, "I like the console mainly because of the ergonomic factors. My clients like this console and I prefer to please them. My console, by the very nature of its design, reduces the burden of technology and the onus of the recording process. *Technology should be so good that no one hears it.* The artist who is about to record and is wearing headphones should not be able to hear a tape machine start up. *The technology should be so good that it sounds live.* Cue systems are far too often neglected. If artists do not have the right kind of references, they cannot perform. Studios need to pay much more attention to their cue systems. At this studio we have overspent on our cue system. I don't ever want my cue to hinder a performance. An artist can have it any which way. The way it should be. The *feel* must be right."

We asked Mike to elaborate on what he calls *feel*. He explained, "It is important that the acoustics are as close to correct as they can be, but what's more important than acoustics is *feel*. People should not get too hung up in the perfection of ideal acoustics. As soon as you put up a couple of near-field monitors and three people in the room, you've blown all that perfection out the window. Today, with so much recording going on in the control room (such as large racks of synthesizers stacked to the ceiling), the acoustic environment needs to be re-defined. Again, the availability of space in the control room plays a big role both ergonomically and acoustically."
C. D.

A Conversation with Jeff Balding: Freelance engineer

We caught up with Jeff at another studio for a telephone interview during his spare moments between mixes for the soon to be released, Gary Chapman album for RCA records.

Jeff told us, "This is Gary Chapman's debut album. Coincidentally, some of the tracks on this record were done at Sixteenth Avenue Sound in Nashville. We have been moving this project to various studios." We asked Jeff if there was anything out of the ordinary regarding his recent dealings. He informed us, "Some of the basics (drums) were cut at Gary Chapman's house, in his living room, which has 12-foot high ceilings." The next obvious question for Jeff was, "What kind of gear did you bring to Gary's house?" Jeff said, "Well...you're going to laugh at this. I own quite a lot of preamps, EQs, compressors, and an array of monitors that I carry around with me. I even carry around my own Monster Cable for mic lines and interfacing my gear with a given studio's equipment."

We were particularly curious about Jeff's work at Sixteenth Avenue Sound. He gave us an account of events in Nashville, "My involvement at Sixteenth Avenue was specifically as an engineer on the most recent Kenny Rogers album. We did all the basics and some of the overdubs there. Sonically there is something special at Sixteenth. It's one of those things that you don't necessarily analyze, especially when you just know that it's right. Environmentally the vibe is incredible. The control room is very *open* due to the unusually high ceiling and the skylights that go up even higher than the ceiling. Not only did I hear well in there, but I was very relaxed, too. The extra room in the control room allowed me to get my gear inside, comfortably. My job, on the sessions at Sixteenth Avenue, was to get sounds that were of the right *feel* for the type of music we were recording. I used my own modified Langevin tube preamps, Massenberg preamps, EQs and limiter, B&B EQ, ABI EQ, Teletronix limiter, and Pultec EQs. We cut the drum sounds through my preamps. I usually bypass the studio console. I'm a purist and find that I get the right results when I use my methods. I often run the mics through Monster Cable, into my preamps, into my EQs, and straight into the tape machines. Everything except for the grouping instruments was done that way. All the basics were cut totally bypassing the console. We even did some of Kenny Rogers' lead vocals straight to tape. Mike Poston was very accommodating and understanding of my methods. He went out of his way to ensure that I was properly interfaced to his studio. Mike appreciates this kind of approach. His engineers built cables and connectors that could adapt my equipment to Sixteenth's. For me and the kind work that I do, a studio has to be more than state of the art. There are factors that go beyond the realm of physics that often yield amazing results. Mike Poston seems to understand this very well."
C.D.

---

the 480L, using the same LARC head as the 224XL; AMS DMX-15S and RMX-16; Lexicon PCM-70 (2); PCM-42 (3); limiters, compressors and gates from Valley People, Drawmer and dbx; and a Studer A820 with both half-inch and quarter-inch heads. The main monitors are B&W 808s powered by Perreau amplifiers from New Zealand. B&W speakers have long had the reputation for being the world reference standard for monitoring classical music in the studio.

What are Poston's plans for the future of Sixteenth Avenue Sound? "First of all, we're doing great so far, so I'd like to continue what we've been doing. Also, I want to attract other types of music that lend themselves particularly well to digital recording," he says. Poston would like to see more recording of classical music in Nashville, and plans to present the studio to producers of classical music in the near future. "Considering the vast amount of digital recording in the classical field, and the relatively low cost of recording in Nashville as compared with other music centers, this would be an ideal place for any quality-conscious, but budget-conscious, classical artist to record," he concluded. **db**

DREW DANIELS

Motion Picture Sound 1987: Dawn of a New Era— The Mann Village Theater

Herewith a report and editorial opinion on the installation of a superior new motion-picture theater sound system using Monster Cable.

YOU WANT ME TO DO WHAT ON SATURDAY?

I GUESS I'M A TREKKIE, SO I AGREED TO SPEND A SUNNY Saturday morning for the sake of Science and I took a couple of Trekkie friends and trekked down to Mann's Village Theater in Westwood, (a suburb of UCLA?) in west Los Angeles, for a special screening of *Star Trek IV—The Voyage Home*. At eight in the morning on Saturday, I found, you can actually drive a car fourteen miles down the San Diego Freeway without wearing out your clutch in stop-and-go, bumper-to-bumper traffic, an impossible feat during the work week.

What kind of masochists, I wondered, would get up early on Saturday to see a movie that had been out for months? Except for me, of course, having been commissioned as it were to play investigative reporter. I don't like to get up on Saturday before the sunlight pours through the shutters and impinges on my unconsciousness through leaden eyelids.

A VERITABLE WHO'S WHO OF AUDIO

As I dropped my friends at the end of the long line and drove past it around the block to an underground parking lot, I noticed that everyone in the L.A. audio and motion picture sound scenes seemed to be there in line. There were numerous heavyweight audio consultants and designers, many audio engineers, film sound professionals, and of course the manufacturers representing the various components that went into the theater's sound system, all of whom were to say "a few words" about their delight in being part of the installation.

Once inside, we were all treated to free Coke and candy provided by the Coca-Cola Co. and M&M Mars, and there was a big table with coffee and doughnuts. A bag lady who got in line outside managed to collect about 20 pounds of candy and most of the wire samples that Monster Cable had hung on the end seats of each aisle.

THEY DON'T BUILD 'EM LIKE THEY USED TO

The Mann Village Theater was built in 1929 and until a few years ago when it was purchased and renovated by Mann Theater Corporation, it sported a FOX logo on the tower above the roof. The distinctive tower of the theater has been seen in many films and TV commercials. The theater itself is big but not unusual. The room seats 1500 people, there is a balcony that looks to have about 300 of the total seats, the 70 mm format screen is about as large as that in any large movie theater I have seen.

THE SOUND EQUIPMENT

The sound system consists of five biamplified JBL 4675A theater systems (4508 LF enclosure with a pair of 2225H woofers, 2360A Bi-Radial horn and 2445J driver) built into the "Lucasfilm wall" behind the screen (mind

Figure 1. The THX crossover and Dolby rack.
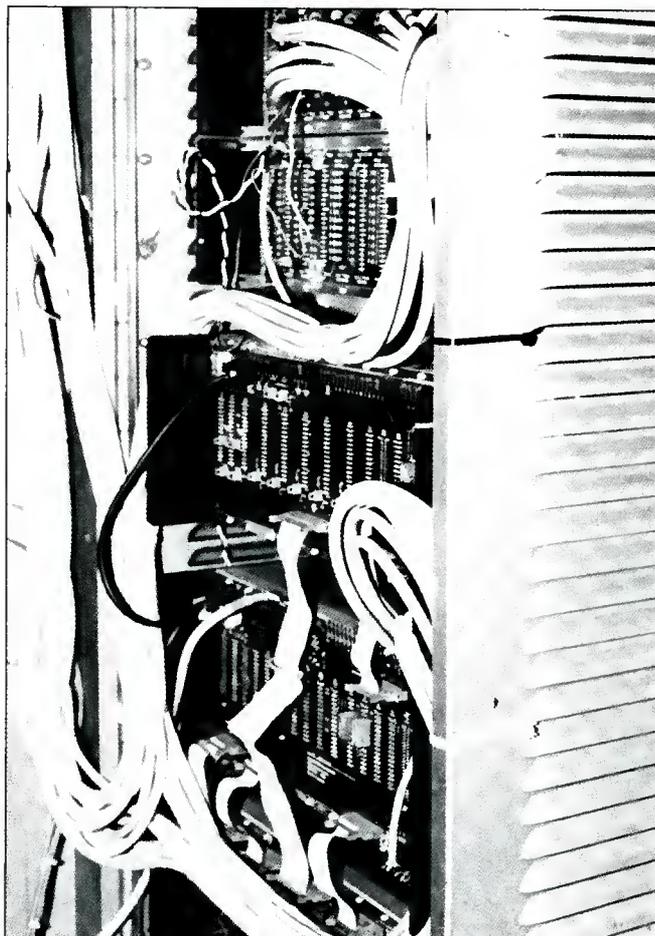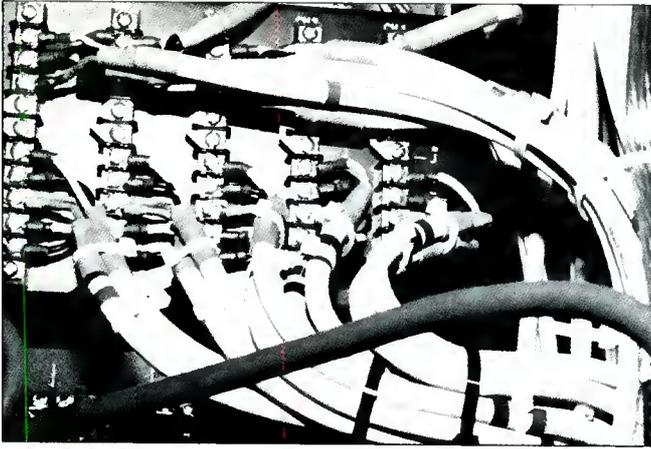
Figure 2. A close up view of the rack in Figure 1.

Figure 4. A close up view of the amp rack in Figure 3.

as did film sound pioneers, the benefits of flush mounting loudspeakers).

Some older readers may recall the Altec Lansing 210 and 410 cabinets that were supplied with *wings* that bolted onto the sides, forming a virtual wall. There are two Kintek KT90 powered subwoofers, eight Cerwin-Vega folded-horn type subwoofers, and twenty-two Bose 801 full-range loudspeakers used as surrounds. The JBL screen systems and the Cerwin-Vega subs are driven by BGW 750E amplifiers, while the Bose surrounds ap-

Figure 3. The amplifier rack.

peared to be driven by older consumer-style Bose 1801 amps (with VU meters).

THE LONG AND SHORT OF IT

The Monster Cable portion of the installation consists of twelve 250-foot runs of M1 loudspeaker cable between the BGW 750E amps located in the projection booth, and speaker systems behind and below the screen.

Ten runs for the five biamped JBL screen systems and two runs for two series-parallel wired groups of Cerwin-Vega Subwoofers. There is over 1500 feet of M1000 audio signal cable connecting the 70 mm six-track magnetic and 35 mm stereo optical heads of the Norelco AA-II 70/35 mm projectors to the Dolby SR-equipped, Dolby CP200 Stereo Processors, the Lucasfilm THX Electronic Crossover Network, and the BGW 750E power amplifiers. There is one run of 250 feet of the M1000 cable from the Dolby CP200's subwoofer output to the powered Kintek KT90 subwoofer systems behind the screen. There are 3000 feet of standard Monster Cable (10-gauge zip cord style) connecting the Bose 801 surround loudspeakers.

The Monster Cable press release also points out the use of Monster Cable proprietary 24 carat *hard gold* plated to rigid military specifications terminations, such as their "Prolink" XLR, 1/4-inch phone plugs and "X-terminator" expanding-shaft, locking banana connectors and gold lugs, all utilizing silver content solder, "for maximum contact area, maximum contact pressure, minimum contact resistance and higher current capability."

Monster cable's press release calls the installation "a sonic breakthrough of Monstrous proportions...." Notice the capital "M" in "Monstrous."

As luck would have it, I had been to the same theater a few months before to see the same movie. What an opportunity, I thought, for a first hand audition of the re-wired system, with the same system in its pre-wired condition still fresh in my mind.

A little background on Lucasfilm THX installations will help put this whole story into perspective. It is worth noting that a Lucasfilm THX theater system franchise includes a manual on sound system installation and operation and semi-annual inspection and calibration visits from a Lucasfilm Theater Operations division engineer,

db September/October 1987 41
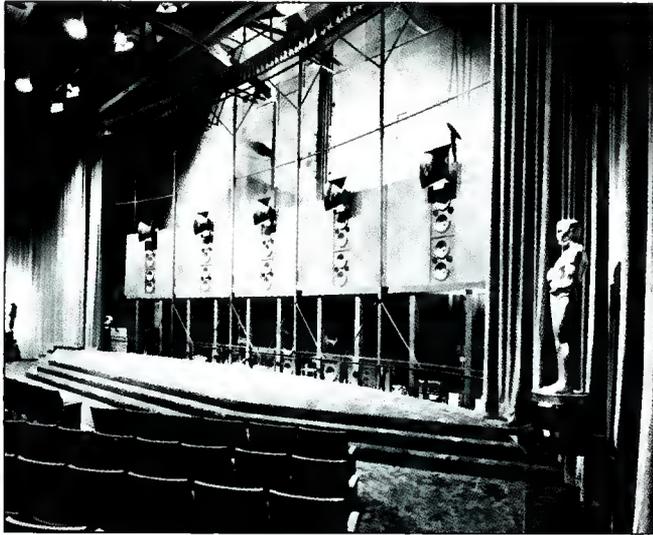
Figure 5. The theater's sound system.

all of which are expensive albeit not in view of what it means to ticket sales, a fact to which I can attest, being one of those people who look for the THX logo first when thinking about going to a movie I've been told has a decent sound track.

Ralph Winter, the Producer of *Star Trek IV—The Voyage Home*, was lavish in his praise of the Monster Cable installation, saying the same kinds of things many movie producers and film composers have said over the years; it makes their creative efforts worthwhile when their sound product is presented to the audience the way they had hoped it would be presented. I remember composer Lalo Schifrin (of Mission Impossible fame) railing on an AES Convention audience about ten years ago, about how he had had to forgo certain instruments or orchestration because of the limitations of theater sound systems and that he felt it was an imposition on his creativity. One of the best reasons to standardize on theater sound or for that matter speaker systems of most kinds, is that it gives the listener the opportunity to hear what the artist or producer intended. The only problem is a lot of listeners already have equipment that performs better than the original production equipment, so it begs the question, shouldn't film scoring stages have THX systems? Shouldn't recording studios throw away those console-top monitors that have bad frequency response below 80 Hz and above 8 kHz?

DO YOU WANT MY OPINION?

The movie experience was great—Trekkie's paradise. To be among an audience of engineers when Scotty addressed the Macintosh "computer," and every one of them roared. The movie sound was great—clearly among the best I have ever heard. The sound track of *Star Trek IV—The Voyage Home* is excellent, although subtle. There are not a lot of obvious gratuitous sound effects thrown in to startle the listener. The motion effects for things like the bus and the helicopter are just right, but I found the sounds of the moving space ship, shuttles and alien probe to be too general and effusive. The low bass rumbles lacked definition insofar as it applies to the kind of sounds within the range of human experience which I think are needed to define what you are hearing in the absence of knowledge of real space ship sounds. As we all know, sound doesn't travel in the vacuum of space, the effects are just so the audience won't fall asleep during space travel scenes.

I can say unequivocally that the reproduction of the sound track was greatly improved over what it had been before the Monster Cable installation.

EDITORIAL

Now that I have stated that last bit unequivocally, let's examine the improvement. I believe that the actual mechanisms for the improvement are the wire, the connections and terminations, and the care with which the cable installation was done, although perhaps not for the reasons you might expect.

The loudspeaker wire, specifically, is a heavy, small gauge wire. Monster Cable informed me over the phone that the wire gauge is between 10 and 11 which equates roughly to about 50 amperes current carrying capacity at room temperature. The wire has been carefully terminated with high-quality connectors that fit tightly and have low contact resistance. In addition to the basic characteristics of the wire, the earnest technicians who installed the wire were obviously very careful, as the photos show. Wire gauge (resistance) is the predominant characteristic in speaker cable. The question is how predominant.

The signal cables are, to be sure, of very high quality construction, and have excellent insulation and a very good shield, probably a 99% or better coverage shield. Monster Cable said that the M1000 cable's parallel capacitance was 151 picofarads per meter or 46 picofarads per foot. This is not a high capacitance compared to say, the old industry standard Belden 8451, but com-

Figure 6. The equivalent electrical circuit of an unshielded cable.

NOTES:
1. Inductance (small for short cables)
2. Dielectric resistance (very small)
3. Conductor resistance is predominant, with magnitude much greater than inductance or capacitance

NOTES:
1. Inner conductor-to-shield capacitance (large)
2. Inner conductor capacitance (significant)
3. Conductor resistance (small compared to load)
4. Inductance (small for short cables)
5. Inner cable capacitance is predominant, with magnitude far more significant than resistance or inductance

Figure 7. The equivalent electrical circuit of balanced-line, shielded signal cable.

pared to Teac cable at 14 picofarads per foot, it certainly is. Capacitance is the predominant characteristic in signal cable.

HOW PREDOMINANT?

In the case of signal cable, and I am defining *signal cable* as those cables in an audio system not connected to loudspeakers, capacitance is of such a magnitude that real problems are encountered when long runs of wire are used to connect components whose input and output impedances are not low. The capacitance of 100 feet of cable is 4.6 nanofarads or 0 .0000000046 farads. Being conservative and using 10,000 ohms as the amplifier input impedance, we find that by calculating f3 for the resulting filter circuit with f3 = 1 / 6.28 R C the value is 3460 Hz. The high end will droop 6 dB every octave beyond that and will be down about 12 dB at 14 kHz. This shows that lots of high end boost will be needed from the graphic equalizer in the Dolby CP200. Obviously boost was added, the loss was fixed, and the sound reflected those facts. Sound is, after all, the ultimate criterion for determining whether the system is working right.

In the case of the speaker cable, there are no gross effects due to anything but resistance, and these take the form of changes in damping factor for the amp-cable-speaker circuit, and of course power lost in the cable as a function of the ratio of wire resistance and speaker load resistance. For example, suppose an amplifier has a damping factor of 1000 with an 8-ohm load. This simply means the ratio of resistances between amplifier and load is 1000:1 so the amplifier's output resistance must be 0 .008 ohm. Ten-gauge wire has one ohm of resistance per 1000 feet, so a 250-foot length of the stuff has a resistance of 0 .5 ohm. Since the resistance of the wire does nothing to aid loudspeaker operation, it must be considered an increase in the amplifier's output resistance. Now, dividing 0.508 ohm into 4 ohms we have a damping factor of 7.87 instead of 1000, quite a difference; a 99.2 percent loss of damping factor. Here is a paragraph from the Monster Cable press release that accompanied the event:

"The M1 loudspeaker cable is the result of advanced R & D into controlling the electromagnetic fields generated by audio signals to realize perfection in a loudspeaker cable. "Microfiber™" dielectric construction is an intricate process whereby each conductor is individually wound with a special fibrous insulation, allowing audio signals to travel faster and cleaner, reducing signal losses, eliminating intertransient background noise, increasing transient response clarity, detail and dimensionality, and delivering tighter, deeper and more extended bass that listeners can feel. Other sonic benefits are less energy loss, greater dynamic impact, extended and smooth natural response, and lower distortion. The M1's new winding configuration utilizes multiple wire gauges for various frequency bands which are uniquely combined in "grouped networks", precision wound around an exclusive "magnetic flux tube core" for dramatically improved imaging, dimensionality, and sound stage."

What about exotic things like 1/4-wave antenna radiation you ask? Just consider the size of an antenna needed; a 20 kHz signal has a wavelength of over 9.3 miles and would therefor not radiate much from an antenna less than two miles long. What about propagation delay in wire due to signal frequency or skin effect you ask? Well to brush up on my old engineering information I looked up skin effect in an engineering book *Reference Data For Radio Engineers* published by ITT Sams Books, and an article in the April issue of *Powertechnics Magazine*, a publication dealing with high-power electromagnetic devices and circuits, and skin effect in wire, doesn't manifest itself much below 50 kHz or so, and at that, only takes the form of added wire resistance. Monster cable told me that the delays, which they themselves have so far failed to measure, are on the order of picoseconds (trillionths of a second) which translates into frequencies of from 10 GHz (short communications microwave radio signals a few inches long) to 1 THz (long wave infrared). I don't know how you, as an audio engineer might view this information, but it seems to me we're talking about audio from D.C. to light!

I have a bone to pick with a small group within the audio community. I lose patience with those who haven't bothered to learn their basic physics and electricity but will still stand face to face with those who have and argue in non sequiturs. Those who are so easily led by techno-elitists into the no-man's land of electropolitics where, if you're not a yes man ("sure, of course, I hear it too"), your critical ears lose credibility. Well folks, to paraphrase Woody Allen paraphrasing Groucho Marx paraphrasing Freud's *Wit and Wisdom*, if ever there was a club I wouldn't want to be member of because it would make me one of them, it's the golden eared elitists. Gold is great for protection against corrosion, but just as bad as tin for ears.

I have a golden-eared engineer friend who swears he can hear differences in wire, so he prepared to A-B test two wires of identical gauge but different physical construction, a test I have repeated. These happened to be

what I will refer to as an esoteric cable of great cost, and heavy zip cord. He built a switch box to switch between the two different wire samples, but then was dismayed to find that the switch box made bigger differences in the sound than did the wires. Belden makes a nice, single conductor gray vinyl-jacketed 4-gauge battery jumper cable that has hundreds of tiny strands and so is usably flexible despite its ungainly size. I use two one meter lengths Monster Cable between each of my two mono power amps and my speakers at home, but because it is a 10-gauge wire, and to be quite honest, I can't hear the wire or its contribution or degradation compared to a meter of 16-gauge zip cord. My playback system speakers have a frequency response uniformity of plus 0.7 dB to -2.2 dB from 18 Hz to 24 kHz through a 120 degree horizontal angle in the direct field (sine sweep) and a 1/3 octave pink noise uniformity of +/- 0 dB from 20 Hz to 20 kHz (the limits of the analyzer) in the reverberant field of the room. What's more, pumping a 10 kHz or 100 kHz square wave through these two kinds of wires and then altering driving and load impedances, there are no observable differences in the output of the wires as viewed on a Tektronix 2.5 gigahertz oscilloscope or on a Hewlett-Packard RF spectrum analyzer.

THE CHALLENGE

If there really is anything to all this nonsense and fuss over wire, let one of the manufacturers making outrageous claims come forward and produce some hard science to support the claims. I would like to see just one oscilloscope photo that might give reason for pause, just a single shred of real physical evidence that shows that wire can impart magic qualities to music from loudspeakers, e.g. accuracy or sonic transparency, imaging, dimensionality, and wider sound stage. I really want to know how wire winding techniques can extend bass. I am particularly interested in how a wire design can make signals travel faster or how it can eliminate noise or reduce distortion. I am even mildly curious about how audio group delay can be affected by the internal construction of wire.

There is a simple experiment you can do that proves the fact that the human ear is not sensitive enough or is at best ill-equipped to hear some of the subtle differences audiophiles argue about. Take a tuning fork and listen to it carefully, rapidly alternating between your left and right ear. You will notice that your two ears don't even hear the same pitch as being the same most of the time. Your left ear may hear the fork as flat or sharp compared to your right ear. What's worse, a few minutes later, the perception will likely reverse — the right ear hearing the fork as flat and vice-versa and so on. The normal continuous shifts in your blood pressure will affect your hearing. Have you ever wondered how you could suddenly feel ambivalent about a piece of music or a particular recording one day that you had appreciated the day before? Your moods affect your hearing. In fact, I submit, even for the best trained and most objective of us, the human hearing is subject to variations of such magnitude as to render it useless as a quantification tool. Our hearing is really only useful as a qualifier of our immediate auditory perceptions.

The truth is that outside of wire and connection resistance, all the fancy construction and packaging of speaker cable is nothing more than cosmetic. If your amplifier is really sending 10 megahertz signals through the cable to the speaker, you should have it repaired. **db**

www.americanradiohistory.com

Len Feldman

Lab Report

SONY MXP-2016 Post-Production/Broadcast Mixing Console

GENERAL INFORMATION

The MXP-2016 console that we tested in our lab is a version of the MXP-2000 Broadcast/Post Production series of audio consoles developed by the professional division of Sony Corporation. Consoles in this series can be ordered with a wide variety of modules. For example, you could order mic or line inputs, and transformer coupled or transformerless inputs, etc. Since plug-in modules are used, Sony is able to customize a console in this series to specific customer requirements. The console that was configured for us was really sort of a "hybrid" in that some of the stereo input modules had transformer line in-

puts while others were transformerless. Still other inputs had transformer coupled line-plus-mic inputs while others had transformerless mic-plus-line inputs. There were also some mono modules with active line/line inputs. The MXP-2000 Series also has Audio and VCA grouping capabilities as well as an optional Dynamics Module that I'll discuss shortly. All of these types of modules were fitted to our sample console for evaluation purposes. Though we were not supplied any, Sony also offers optional Editor Interface cards for use with a whole family of Sony Editors as well as for some competitive models.
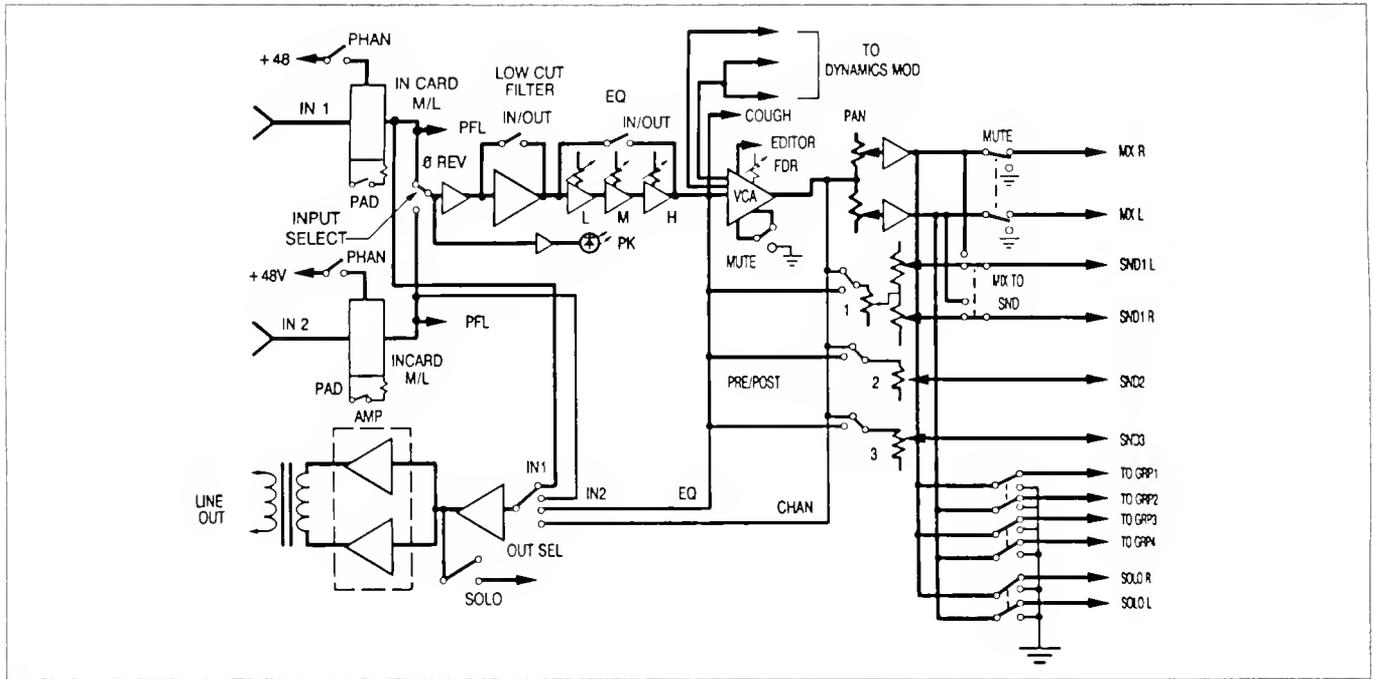
Figure 1. A block diagram of the MXP-2016 signal routing.

family of Sony Editors as well as for some competitive models.

The MXP-2016 console that we tested is assembled in a simple but extremely strong and rigid frame. It incorporates a single ribbon flexible harness; all other connections being made by means of printed circuits. This arrangement allows any module to be inserted into any slot. All of the audio switches in the console have precious metal contacts, as do all connector contacts. Potentiometers and fader controls are conductive plastic types. Jumper modules within the modules provide the user with a wide choice of logic and signal flow alternatives.

The power supply for the console is supplied separately, in its own housing and can be positioned at some distance from the console itself. The supply contains no switching circuits and therefore produces negligible amounts of mechanical or electrical noise. Adequate cooling is supplied by convection.

Aside from the major features already mentioned, the console features separate input gain controls, built-in phantom power for microphones, switchable attenuators (20dB) for microphone inputs, three-band equalizers with sweepable mid-frequency, three auxiliary "Sends" (two mono and one stereo), audio or VCA grouping, optional four channel dynamics controller, peak audio level indicators, built-in reverse talkback facilities, in place SOLO operation, a built-in programmable clock/timer and secondary voltage regulation on each card.

Two basic console frames are available, designated as MXP-2016 and MXP-2016P. Both of these frames have 20-module capability and differ only in their output metering arrangements. The MXP-2016 that we tested incorporates VU meters while the alternative MXP-2016P has Peak Program Meters that meet BBC specifications. In there basic consoles, three of the 20 available slots are used for those modules that are mandatory to the system: a Monitor module, a Master module and a Communications module. The remaining slots can be fitted with such combinations of Input/Output, Group, or Dynamics modules that meet the user's needs.

CONTROLS AND MODULE FEATURES

The master module features a separation switch that allows independent level control of a second stereo output. Also included are auxiliary mix (Send) bus master level controls, Rehearse/On Air logic switch in, and the ability to assign signals to the dynamics processor, if it is available in the particular configuration. Controls on this module include level controls for three AUX mix (send) outputs, mute switches for each of these "Sends," an overall fader control, a Stereo level control with its aforementioned Separation switch and the On-Air/Rehearse switches.

The Monitor Module controls the routing of monitor and meter signal outputs from the console. In addition to the external outputs, the module provides separate switching and level controls for the control room and studio monitors. Level controls are also provided for the Mono signals, Mix A, Mix B, Sends and the SOLO bus. A headphone jack is also found on this module and it can be used for monitoring control room audio.

The third required module, the Communications module, provides talkback between the console operator and the studio or such other destinations that may be needed by the user. This module also incorporates a "Slate" oscillator for generating "Take" markers, as well as pink and white noise generators and a second test oscillator. The noise generators and oscillators are used for test and calibration purposes. Major Communications module features include an adjustable (from 15Hz to 15kHz) reference tone, tone level and frequency controls that are detented at 0dB and 1kHz, selectable white or pink noise sources, a warble tone, talkback/PFL level control, oscillator routing switches and user configurable talkback switches.

Figure 2. The control layout, I/O and stereo modules of the console.
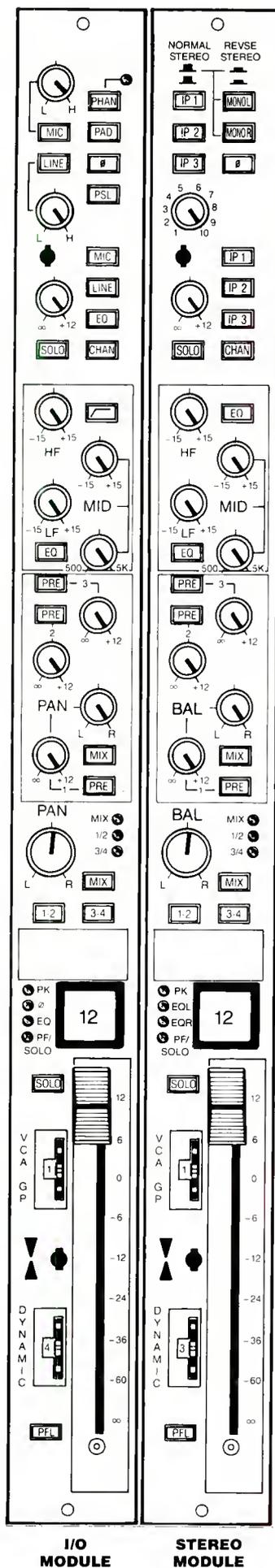
INPUT/OUTPUT MODULE CONFIGURATIONS

Two types of Input/Output modules are available for the console: monophonic I/O or Stereo Input Modules. A console can be equipped with all of either type or any combination of both types. Monophonic modules can have transformer balanced or electronically balanced line inputs; transformer balanced or electronically balanced microphone inputs. The Stereo input module accepts line inputs only.

Major features of the monophonic I/O module include: Direct output, one stereo and two mono sends with pre-fader/post fader selector, ability for signals to be assigned to any one of four audio Groups or to any one of four VCA Groups on the Group modules, a switchable 48 volt phantom power supply (effective for Mic inputs only), a Channel Mute Switch and the ability to reverse audio phase.

Major features of the Stereo Input module include: stereo input selection from three sources, a stereo three-band equalizer with mid-frequency variable from 150Hz to 5kHz, ability to assign signals to a Dynamic processor, if one is available in the console, ability to assign signals to Groups 1 and 2 or 3 and 4, or direct to a stereo mix in a Group module, ability to assign signals to any one of four VCA groups in a Group module, selectable mono left, mono right and reverse stereo functions and reversible audio phase.

Optional Group modules provide both audio and VCA grouping functions. The standardized console system incorporates four Group modules of fixed configuration. Group module features include one Return channel with PFL and SOLO functions, one stereo and two mono "Sends" with pre-fader/post-fader selection, a three band equalizer with variable mid-frequency from 150Hz to 5kHz, ability to assign the equalizer to either Group or Return, a Group Mute switch, a peak indicator and the ability to assign output signals to a dynamic processor.

The Dynamics module, also available optionally, is used to provide the console with four compressor/limiters, each with separate adjustable thresholds. This is a fixed-configuration module, and only one Dynamics module can be fitted to the console.

OTHER OPTIONAL EQUIPMENT

In addition to the modules already described, other options are available for the console. One of these is an Editor Interface that provides a means of affecting control from most popular types of editors. This type of option is particularly useful in television post-production work since it allows audio to follow video in accordance with the video edit decision list.

Finally, optional Relay cards can be added to any number of I/O modules. These can be programmed so as to provide either automatic PFL when the I/O module Fader is set at it full down position, or Reverse Talkback facilities to whichever stations the user wishes to address.

A block diagram showing the basic Input/Output signal flow is shown in *Figure 1*. Illustrations of the monophonic I/O module control layout as well as of the control layout found on the Stereo modules are shown in *Figure 2. Figure*
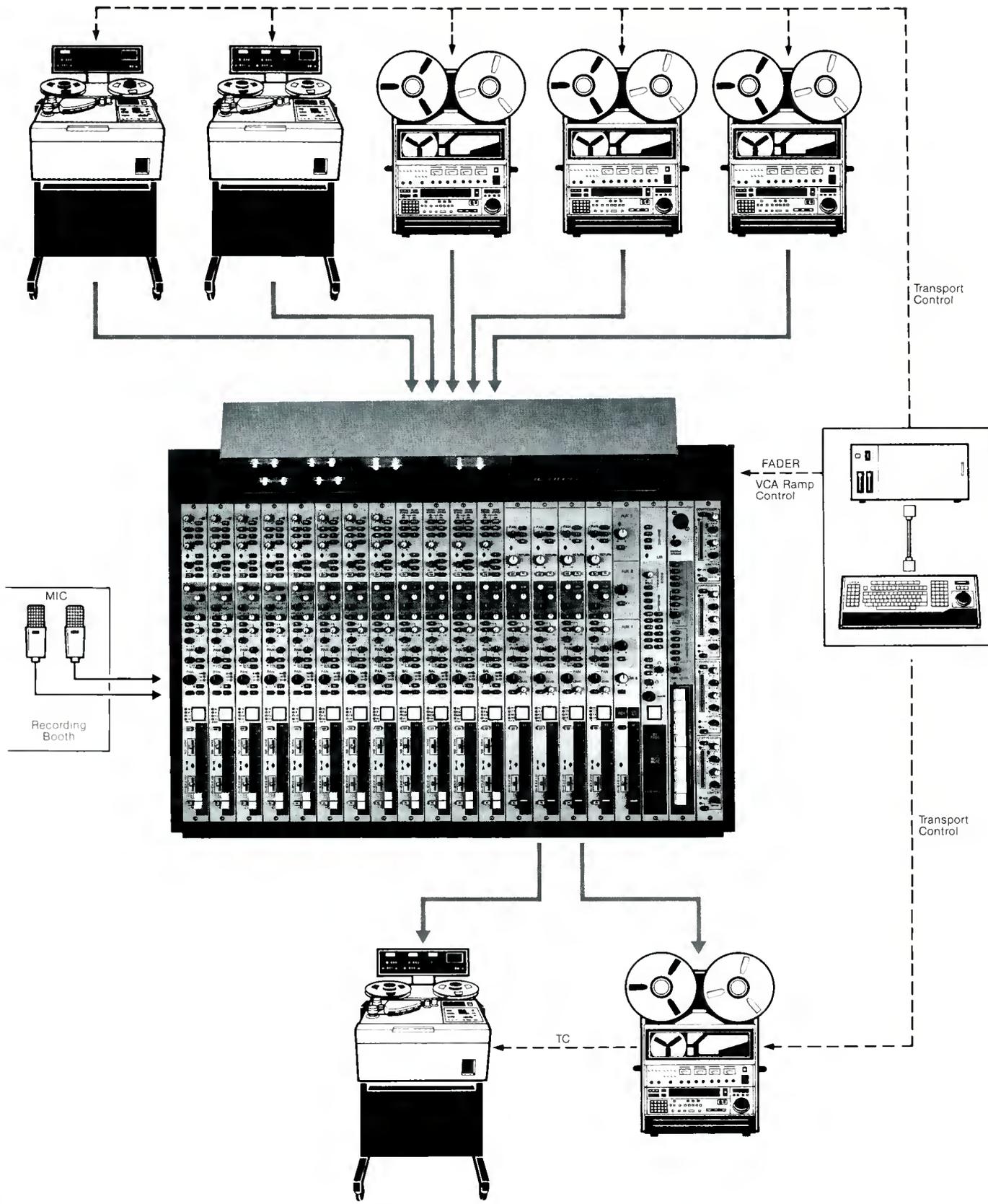
Figure 3. A typical video post production setup, using the MXP-2016 console.
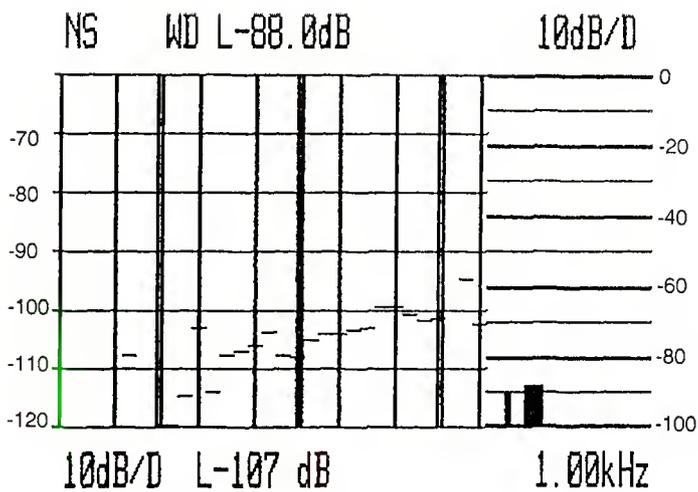
Figure 4. Signal to noise analysis of a stereo module.
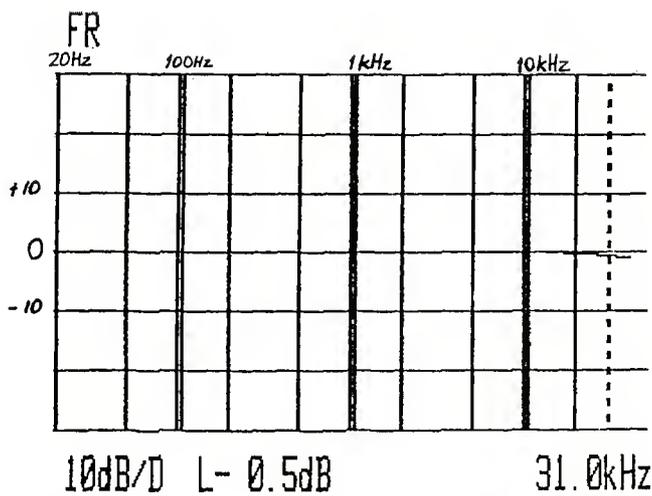
Figure 5. Frequency response of a stereo module.

3 shows how a typical console might be configured and interfaced with other requirements in a video post-production environment, while *Figure 4* shows the kind of setup that might be used in a typical broadcast studio environment.

LABORATORY MEASUREMENTS

Results of our laboratory measurements of the Sony 2016 Console are tabulated in the VITAL STATISTICS chart at the end of this report. The versatility of the console, as configured for our tests, was so great that it was practically impossible to measure audio performance for every available signal path. We did, however, perform a sufficient number of measurements to give you a pretty good idea of how each module type performs and how well signals are handled from any input to any of the available group or master outputs. Measurements were also made of the capabilities of the Dynamics (compressor/limiter) Module. Crosstalk within a given stereo module was measured, as was crosstalk from one module to another.

It should be understood that our console configuration was something of a hybrid, in that we had both transformer-coupled and transformerless stereo, mono line

in/line out and monophonic modules as well as transformer coupled and transformerless mic/line input modules. Normally, you would probably configure a console either for transformer coupling or for transformerless operation throughout. In all cases, our measurements reported in the VITAL STATISTICS chart are "worst case" numbers. Differences between results obtained via the transformer coupled modules and those obtained via the transformerless modules were virtually the same.

We measured the performance of the stereo modules first, feeding their signals to the master module. Summing headroom was 27.5dB while noise floor, referenced to 0dBm, was exactly -88dB as claimed by Sony. An analysis of the residual noise content is shown In *Figure 4*. Frequency response for this signal path was flat to well beyond 20kHz, as shown in the graph of *Figure 5*. SMPTE-IM distortion at nominal output level measured 0.04% or slightly better than the 0.05% claimed. THD at mid-frequencies, using this same signal route, was 0.013% or very slightly higher than the specified 0.01%. Actually, what we measured was really THD + Noise, since no band limiting filter was used while making this measurement, so some of the reading may actually be attributed to random noise contributions rather than to actual harmonic distortion products. Crosstalk from left to right channels within

Figure 6. Group module s/n analysis.

Figure 7. I/O module s/n analysis.

10dB/D   L-18.4dB   R+19.0dB   20Hz
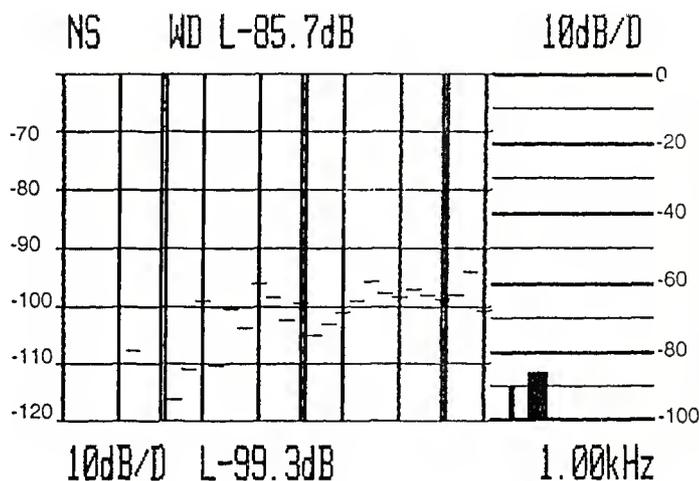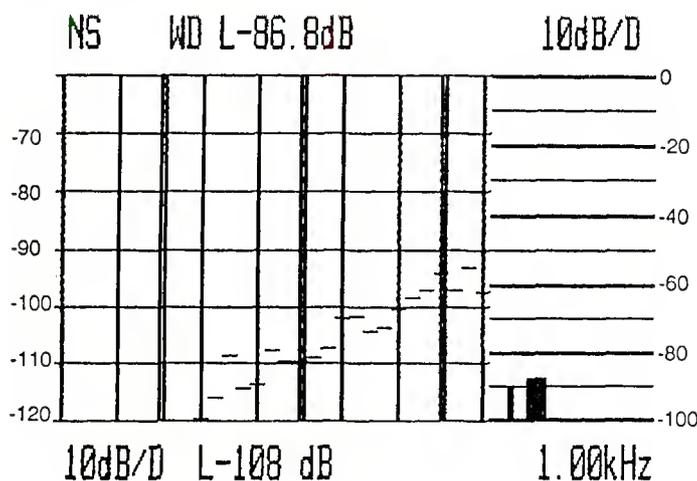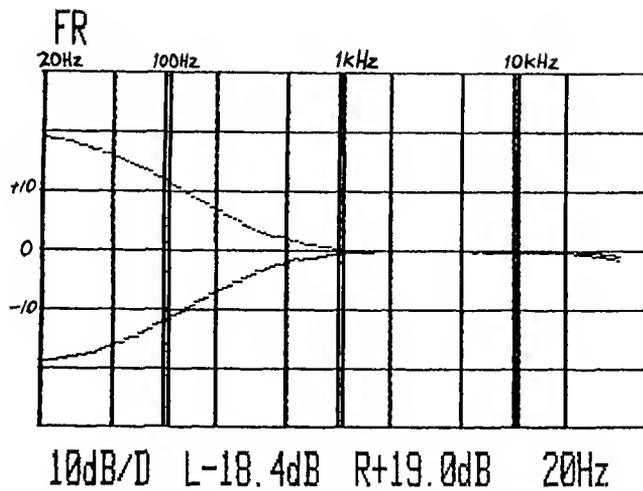
Figure 8. *The low frequency equalization range of a stereo module.*

10dB/D   L-12.8dB   R+14.0dB   130Hz

Figure 9A. *The range of mid-frequency eq. The parametric control varies center frequency at 130 Hz.*

a given stereo module measured a very satisfactory 72.9dB as against 70dB claimed by the manufacturer.

Routing signals via the Group modules, we measured an available headroom of just under 31dB, with a maximum output level capability of 28dBu before obvious clipping occurred. THD at nominal output levels was 0.015%, while SMPTE IM measured 0.04% The noise floor for this signal routing scheme measured -86.3dB referred to 0dBm, as shown in the S/N analysis of *Figure 6.*

The monitor system module was measured next, using line input levels. Noise floor via this system measured 85.7dB below 0dBm nominal level while maximum input level measured 28dBu. The gain control exhibited a range of from +13 to -12.5dB. Signal-to-noise analysis for this signal routing is shown in the graph of *Figure 7.*

The equalization stages found in the various modules were measured separately and results are shown in the graphs of *Figures 8, 9A, 9B* and *10.* The mid-frequency EQ control is actually a parametric equalizer stage in that you can vary its center frequency as well as the amount of boost or cut that it provides. *Figure 9A* shows the maximum boost and cut range of this EQ stage at its lowest center frequency: about 130Hz. *Figure 9B* shows maximum boost and cut range at the highest center frequency

of this stage: above 5kHz. Maximum boost and cut range, in dB, is shown below all four of these graphs.

We checked out the performance of the internal local oscillator. The oscillator can be tuned from about 150Hz to 15kHz. At mid-frequencies, THD for this oscillator measured well below the 0.05% specified, while at 15kHz, THD + Noise measured slightly higher: around 0.06%. Locally generated "pink noise" and "white noise" signals are also available from the mandatory Communications Module. Spectral distribution of the white and pink noise signals is shown in the logarithmically swept spectrum analyzer 'scope photo of *Figure 11.* The horizontally oriented noise display is the white noise output while the downward sloping display represents the pink noise output. The sweep in *Figure 11* extends from 20Hz to 20,000Hz.

In order to show how the dynamics module works, we switched the spectrum analyzer to its non-sweeping mode. In that configuration, the analyzer displays the amplitude of a single frequency—in this case a 1kHz output signal. As the trace moves across from left to right, we increased the input to the system in increments of 10dB. The uppermost "staircase" of *Figure 12* represents the resulting output when no limiting or compression is applied. The middle "staircase" shows what happens when hard lim-

Figure 9B. *The range of mid-frequency eq. The parametric control varies center frequency at 5.7kHz.*

Figure 10. *High frequency equalization range.*

10dB/D   L-15.2dB   R+14.2dB   5.70kHz

10dB/D   L-16.8dB   R+15.7dB   20.0kHz
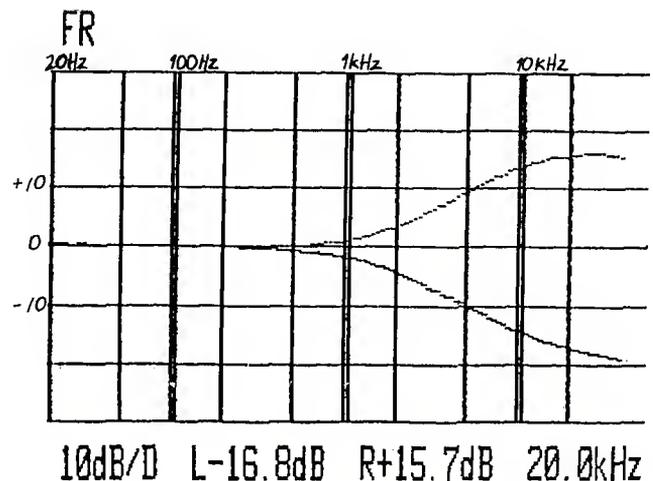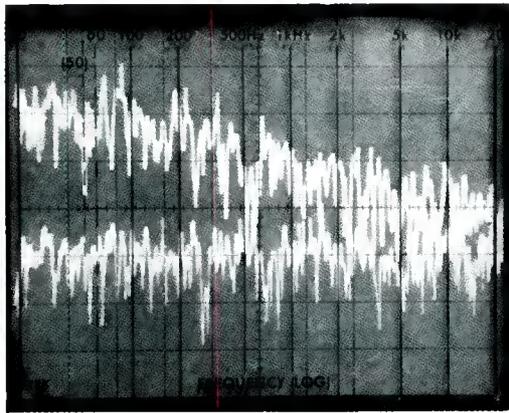
Figure 11. The pink and white noise spectrum produced by the communications module.
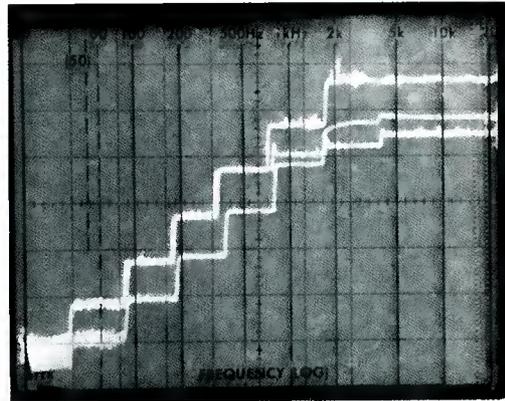
Figure 12. These voltage "steps" show the effect of compression and limiting. The upper trace shows neither.

iting is applied via the Dynamics module, while the remaining "staircase" shows how output voltage varies when maximum compression is applied. Note that in the case of both limiting and compression, linearity remains very active until the preset threshold is reached. Beyond that point, the compression ratio that we used (the maximum available) was 20:1. That means that for an input increase of 20dB, the output will shows an increase in level of only 1dB. Normally, you would probably never use such extreme levels of compression or limiting, but we did so simply to illustrate the capabilities of the Dynamics module.

No matter what combination of signal routing we used, crosstalk between any two modules was never less than 70dB, the value specified by Sony in their published specifications. The last element of the system that we measured was the microphone preamp section, selected as an alternate input on one of the supplied I/O (mono) modules. The equivalent input noise via the mic input measured exactly -126dB below 0dBm, as claimed by the manufacturer. Overall frequency response via the microphone preamplifier input was almost as flat and as wideband as the response we had measured for the high-level inputs. Response varied by no more than 0.3dB from 20Hz to 20,000Hz. Headroom was a very impressive 33dB. THD of the mic preamp module alone was 0.01%, while SMPTE IM measured 0.04%.

COMMENTS

Time did not permit us to really explore the full capabilities of this well designed console, but during the few days when the 2016 was in our lab we could readily appreciate the incredible versatility that has been engineered into these systems. The fact is that you can practically customize this system to meet your very own specific needs, using off-the-shelf modules in any arrangement you please. The owner's manual leaves nothing to chance or to your imagination. It is a good example of how an owner's

manual for such a complex piece of equipment should be written. Installation is likely to take some time since all inputs and outputs are made via 45-pin connectors that your technicians will have to wire up in accordance with diagrams supplied. A bag full of these connectors along with handsome shell covers for them is included as is a kit of tools you will need for the job. Of course, you'll need your own soldering irons! Had we been required to do this wiring ourselves in order to test the console, we never would have made deadline for this report.

Fortunately, the people at Sony, recognizing our time constraints, wired up enough connectors for us to do the measurements and evaluations reported here. They terminated the cables they supplied with handy standard banana plugs that fit right into our test equipment with no trouble at all. Don't expect Sony's technicians to do the same for you, however—unless you are willing to pay much more than the 19K dollars that this console costs. Even at that, if you are looking to re-equip your radio or TV broadcast studio with a state of the art mixing and post-production console you'll find that in the long run, the MXP-2016 will easily justify its cost. Perhaps the best news of all regarding this console is the fact that signal passed through it sounded clean and accurate, with no audible evidence of "muddying" or any other forms of audible distortion.

For all its versatility, I suspect that if you've had any experience at all with mixing consoles you will be able to master all the features of this one in less time than you think. Signal flow logic is excellent, faders are as smooth and noise free as any we've ever used, and other controls and switches are ideally located just where you want them to be for ease of access. Just in case a 20-module console is not quite enough for your needs, Sony also offers their MXP-2036 with—you guessed it—a capacity of twice as many signal handling modules at a cost of—you guessed right again, about twice as much as the cost of the MXP-2016.

VITAL STATISTICS

PROFESSIONAL MIXING CONSOLE

MAKE & MODEL: Sony MXP-2016

SPECIFICATION	MFR'S CLAIM	db MEASURED
MIC PREAMP		
Input Impedance	1.2K ohms @ 1 kHz	Confirmed
Equiv. Input Noise	-126 dB	-126 dB
Frequency Response	20Hz to 20 kHz, within 0.5 dB	20 Hz - 20 kHz within 0.3 dB
IM Distortion	0.05%	0.04%
THD + Noise	0.01%	0.01%
Headroom, Mic Input	31 dB	33 dB
GROUP MODULE		
Summing Bus Headroom	31 dB	30.5 dB
Noise Floor	-88 dBu	-86.3 dBu
Nominal Output Level	10 dBm	----
Nominal Out. Impedance	50 ohms	Confirmed
Max. Output Level	+28 dBu	+28 dBu
IM Distortion	0.05%	0.04%
THD	0.01%	0.015%
STEREO OUTPUT MODULE		
Summing Bus Headroom	26 dB	28 dB
Noise Floor	-88 dBu	-88 dBu
Nominal Output Level	0 dBm	----
Nominal Out. Impedance	50 ohms	Confirmed
Max. Output Level	28 dBu	28 dBu
IM Distortion	0.05%	09.04%
THD	0.01%	0.013%
Crosstalk	-70 dB @ 16 kHz	-72.9 dB
MONITOR SYSTEM (LINE INPUT)		
Input Impedance	10K ohm (Bal.)	Confirmed
Gain Range	+ 12 dB	+ 13,-12.5 dB
Nominal Input Level	0 dB	----
Max. Input Level	+28 dBu	+28 dBu
Noise Floor	-90 dBu	-85.7 dBu
EQUALIZATION		
Low Frequency	±15 dB @ 20 Hz	+19,-18.4 dB
Mid Frequency	±15 dB (.5-5 kHz)	See Figs.9A,B
High Frequency	±15 dB @ 20 kHz	15.7,-16.8 dB
IM Distortion	0.001%	0.0015%
THD	0.05%	0.06%
INTERNAL OSCILLATOR THD	0.05%,20Hz to 20 kHz	Confirmed
OVERALL CROSSTALK	70 dB,20 Hz-16 kHz	71 dB
POWER REQUIRED	100-240V, 50/60 Hz, 0.44 KVA	
CONSOLE DIMENSIONS	12-3/4" H x 23-1/2" D x 33-5/8" W	
CONSOLE WEIGHT	120 lbs.	
APPROX. PRICE	$19,420.00 (With Dynamics Module)	

New Products

LAVALIER MICROPHONE

● Shure Brothers Inc. of Evanston, Illinois has introduced a professional-quality unidirectional condenser lavalier microphone (SM84) for broadcast and sound reinforcement applications. Some of the situations where the use of the SM84 is vital are noisy studio and outdoor environments, multiple lavalier microphone formats with two or more guests, and talk shows with live audiences. Shure modified the performance in its widely-used SM83 Omnidirectional Lavalier Condenser Microphone by developing a super-cardioid pickup pattern to reject unwanted peripheral sounds, while retaining the specially-tailored frequency response to overcome the
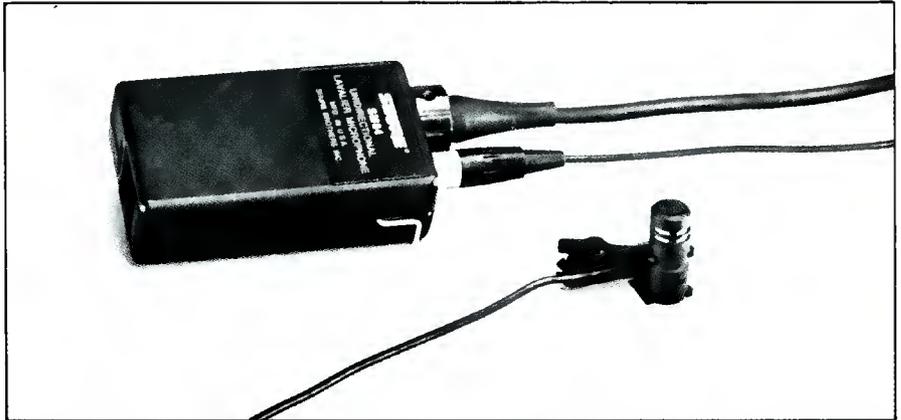
'chest resonance' phenomenon. The SM84 is suitable for applications requiring wide frequency response, low distortion and RF susceptibility, and reliable operation over a wide range of temperature and humidity extremes.

Mfr.- Shure Brothers Inc.
Price- $300.00

Circle 70 on Reader Service Card

EXTENDED RANGE SPEAKERS

● Electro-Voice, Inc. has developed two Extended Range™ two-way speaker systems, the SH-1502ER (pictured left) and SH-1512ER (pictured right). Both models feature the DH2010A titanium-diaphragm which is a high-frequency driver. The DH2010A delivers flat response to 20,000Hz, thus giving the SH-1502ER and SH-1512ER 10-15dB more output above 15,000Hz than competitive systems. The low-frequency section of both enclosures is powered by a specially designed EVG 15-inch woofer which uses a flat-wire aluminum voice coil for greater efficiency and has a long-term power handling capacity of 200 watts. The SH-1502ER has an optimally vented, horn-loaded woofer section for increased projection and bass response down to 62Hz (-3dB), while SH-1512ER offers an optimally vented direct-radiator woofer section for even more extended bass response to 55Hz (-3dB). Both high-frequency sections use the Time-Path(TM) phasing plug and a 90 degree by 40 degree constant-directivity horn for uniform coverage throughout the listening area. Both cabinets employ EV's Road-Wood(TM) construction for strength

and offer abuse-resistant black carpet covering, heavy-duty steel corners, carrying handles and massive rubber feet. The SH-1502ER and SH-1512ER are covered by a five-year warranty.

Mfr.- Electro-Voice, Inc.
Price- $483.35 (SH 1502ER)
$508.35 (SH 1512ER)
Circle 71 on Reader Service Card

INTERFACE CARD

● MicroAudio announced the introduction of the PC 280 interface card; an IBM PC compatible card which allows interfacing of the entire MicroAudio line of products to the IBM PC and compatible computers. The PC 280 card reads information from and sends information to as many as 16 EQ PODs, the stand-alone blank panelled 1/3-octave equalizer. Multiple EQ PODs can be addressed and EQ settings changed by programmable sequential time code. The PC 280 card allows the operator to read RTA and EQ data from the MicroAudio 2800, store that information on a disk and provide hard copy for specification verification.

Mfr.- MicroAudio

Price- $395.00 (with hardware and software)

Circle 72 on Reader Service Card

POWER AMPLIFIER

● Altec Lansing Corporation announced a new power amplifier, the model 9444A Anniversary Series. The 9444A is a dual channel model with each channel delivering 300 watts of continuous average power into 4 ohms or 200 watts into 8 ohms, and in bridge mode, the 9444A can deliver more than 600 watts at typically 0.025 percent distortion. Each channel is independently protected against temperature extremes, excessive output voltage and phase shift, radio frequency interference and short-circuited loads. Accessory sockets for each channel accommodate plug-in transformers, and provide bipolar 15 VDC to power future plug-in electronic modules. The level controls are rear mounted to avoid "accidental" changes. True output balancing transformers (models 15524A and 15525A) for 300 watt and 600 watt applications are available, along with a new 300 watt autoformer (model 15567A).

Mfr.- Altec Lansing Corporation

Price- $900.00
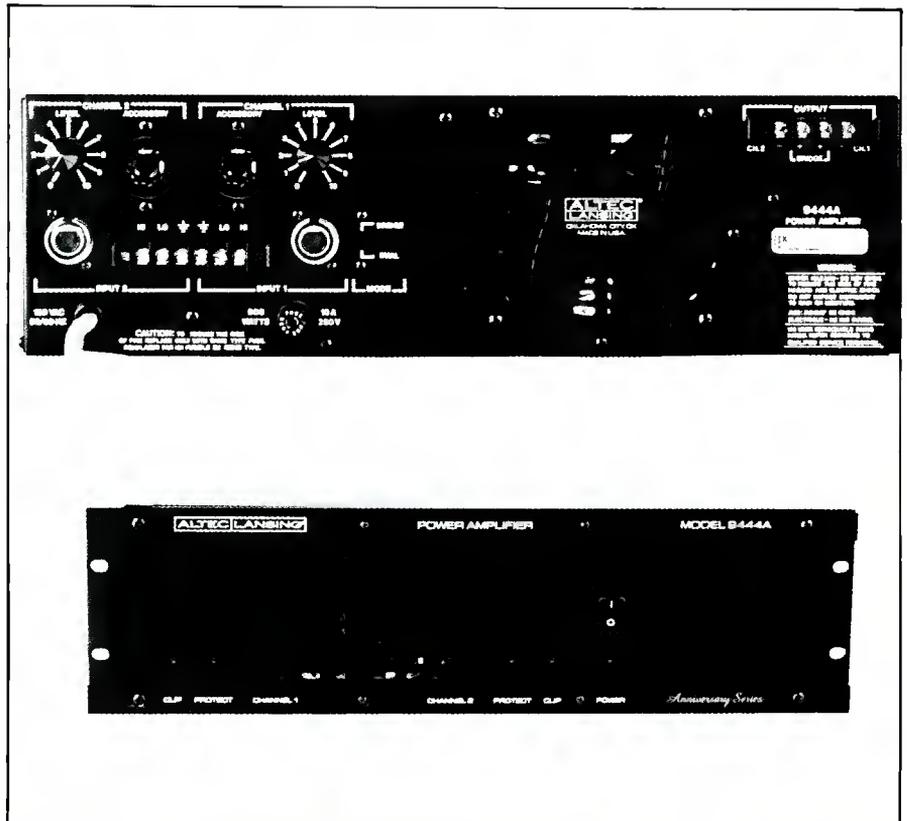
Circle 73 on Reader Service Card

WIRELESS MICROPHONES

• HM Electronics, Inc. has introduced a new generation of wireless microphones designed expressly for the church, theatre and professional entertainment markets. The 50 Series represents a new concept in wireless microphones from HME, such as Dual-Frequency Body-Pac and a Switching Diversity Receiver. HME's new NRX-II™ noise-reduction system provides crisp, clear audio, and is optimized for wireless mic applications, rather than for tape recording processing. Other features being introduced are mic-mute and power switch lock outs, and operator selectable RF frequency selection on the body-pac system.

Mfr.- HM Electronics, Inc.
Price- $1095.00 (with body-pac)
$1110.00 (hand held)
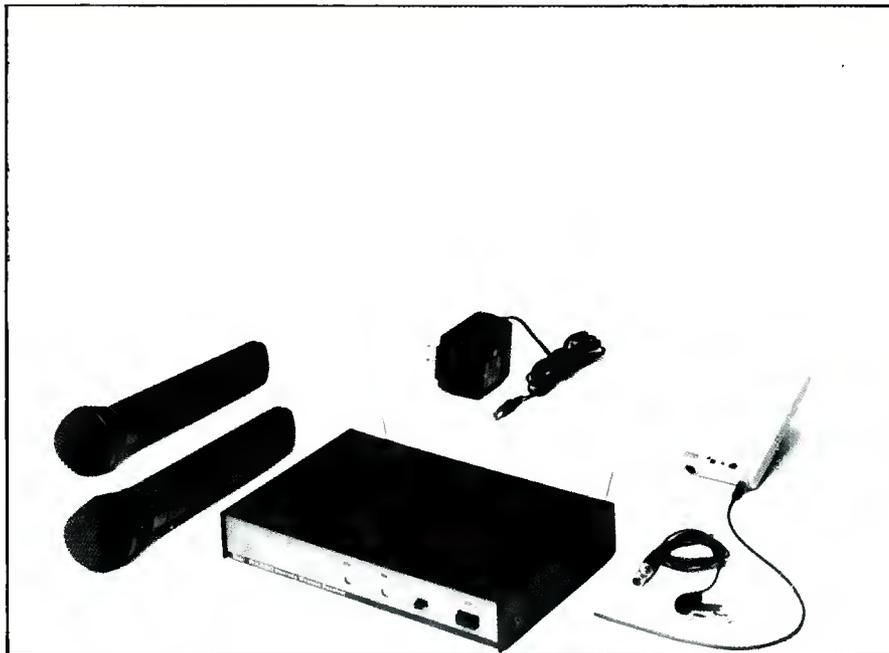
Circle 74 on Reader Service Card

COMPRESSOR

• Valley International, Inc. has added the Comander to their 800 series modular audio signal processing line. Proprietary Symmetrical Release Coupling circuitry allows the Comander to compress the audio signal for precise dynamic range control with complete freedom from noise level recovery, due to the unit's interactive expander. Linear Integration Detection allows the unit's detector to emulate the response of the human ear in order to maintain correct musical relationships in the processed material. To ensure accurate processing of the entire audio spectrum Peak Reversion Correction circuitry compensates for discrimination against low frequencies to eliminate "pumping" and "breathing." The Comander is effective for multiple microphone processing applications, in addition to the normal functions of compressing mixed program material for increased loudness, tightening or altering drum sounds, and controlling electric guitar dynamics. The Comander is available in two versions, the 817 H and the 817 V, to complement the two rack mount systems available for the 800 series equipment.

Mfr.- Valley International, Inc.
Price- $420.00
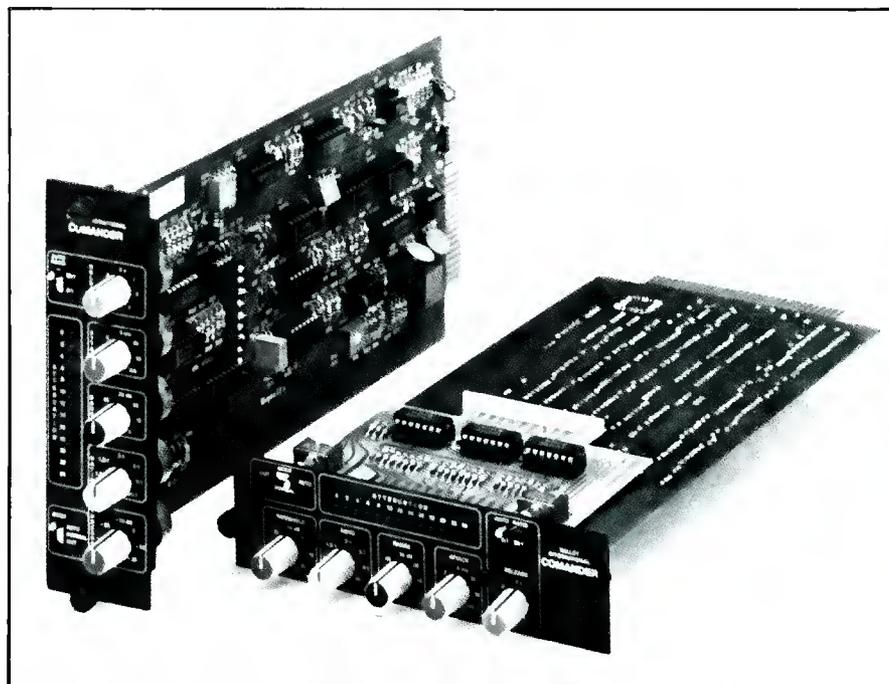
Circle 75 on Reader Service Card

4-TRACK CASSETTE/MIXER

• Fostex Corporation of America has announced that the suggested retail price of their X-30 4-track cassette/mixer has recently been reduced. Fostex wants to attract the entry-level customer because the X-30 represents a leap forward in terms of ease-of-use. The X-30 controls are designed so that the user knows at a glance what the status of each position is. The unit also features both Dolby B and C noise reduction, a 4x2 dedicated sub-mixer for overdubbing and bouncing tracks and a "rehearsal/take" function with the optional remote foot control, Model 8051.

Mfr.- Fostex
Price- $499.00
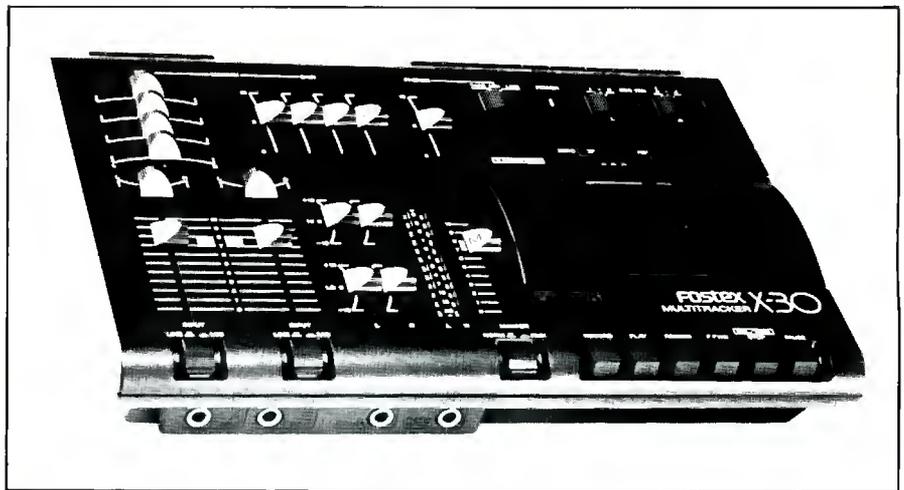
Circle 76 on Reader Service Card

CONTROLLER/EDITOR

• Adams-Smith announced that both the 2600 CC Compact Controller and the 2600 A/V computerized audio-for-video editor can now control Adams-Smith's model 2600 EE Event Executive module. An Event Executive module can provide both 2600 CC systems and 2600 A/V installations with extremely flexible and accurate on/off triggering of studio devices such as digital delays, cart machines and talent cue beepers or lights. The number, duration and timing of talent cueing outputs are all user-adjustable. The Event Executive provides 12 momentary outputs, 6 additional momentary overlay outputs and 6 continuous outputs. All outputs can be triggered with 1/100-frame accuracy. The Event Executive can store up to 120 event addresses in non-volatile memory. With an Event Executive module, a Compact Controller can now store and sequence up to 60 pairs of 1/100-frame-accurate punch-in/punch-out addresses. Outputs can be enabled/disabled, and referenced to any transport in the system. Event addresses can be captured on the fly from incoming time code, or manually entered or trimmed via the Compact Controller's numeric keypad. The 2600 A/V audio editor provides even greater utilization of the Event Executive module. Address capturing, entering and trimming can all be accomplished via the 2600 A/V's keyboard. The 2600 A/V uses the Event Executive as a general purpose interface, and output group assignment and talent cueing set-up are menu-driven via pop-up windows.

Mfr.- Adams-Smith
Price- $2175.00

Circle 77 on Reader Service Card

Buyers' Guide

Consoles and Mixers

ALLEN & HEATH BRENELL USA LTD (AHB)

SR series of mixers designed for sound reinforcement and 2- and 4-track recording. Available in 8, 12, 16, 24 and 32 input configurations. All models include 4-band EQ and 4 auxiliary sends, and stereo and mono outputs.
Price: SR16 (16 inputs)- $2,300.00
     SR416 (16 inputs)- $3,100.00
     SR424 (24 inputs)- $4,150.00
     SR432 (32 inputs)- $6,200.00

SRM series of onstage monitor mixers available in 18x6 and 24x8 configurations. All models include a passive splitter system and comprehensive engineering section. Extensive use of patch and insert points are used to optimize individual musician's mixes.
Price: SRM186 (18 input/6 output)- $3,900.00
     SRM248 (24 input/8 output)- $5,400.00

System 8 mixers are designed for 8- and 16-track recording and sound reinforcement. Available in 16 and 24 input configurations, and an 8 input expander. All models contain full 16 channel tape monitoring, and post fader direct outputs.
Price: 1616-D Mk III- $5,400.00
     2416-D Mk III- $6,800.00

Studio 12 production mixer includes 6 mic/line input channels as well as 6 stereo line input channels. External fader controlled start/stop functions are available on stereo input channels. Up to 24 input sources can be permanently connected to the console.
Price: $5,800.00

CMC is a series of microprocessor controlled multi-track consoles designed for first generation electronic music recording. It is available as the CMC 24 (24x16x2 or up to 40x2) and the CMC 32 (32x16x2 or up to 56x2). Bus assignment and muting are controlled from an on board computer or under advanced control by external software.
Price: CMC-24 Mk II- $7,600.00
     CMC-32 Mk II- $9,800.00

CMPTE allows external control of the CMC series of mixers. Included is a SMPTE time code generator and reader. It allows control of up to 2046 events on the CMC consoles. Also acts as a SMPTE to MIDI converter and an event programmer. Punch in/out can be controlled on certain tape machines.
Price: $980.00

ALTEC LANSING CORPORATION

1689A is a mixer/preamplifier with 2 balanced inputs (with gain adjustments allowing input signal levels ranging from microphone to line level), and bass, treble and master volume controls. The output is transformer balanced and provides +18dBm. Frequency response is ±1dB, 20Hz to 20kHz with distortion of less than 0.2 percent THD. Dimensions are 1.75x19x8, and weight is 7.5 lbs.
Price: $736.00

1699A is a mixer/preamplifier with 6 balanced inputs (with gain adjustments allowing input signal levels ranging from microphone to line level, and master volume control. The output is transformer balanced and provides +18dBm. Frequency response is ±1dB, 20Hz to 20 kHz with distortion of less than 0.2 percent THD. Dimensions are 5.25x19x8, and weight is 12 lbs.
Price: $1,244.00

1692A mixer/preamplifier provides 6 balanced inputs (with gain adjustments allowing input signal levels ranging from microphone to line level). Each input has its output switchable to either or both of the two mixing channels. Bass, treble and master volume controls are provided on each mixing channel. The outputs are transformer balanced and provide + 18dBm. Phantom power is available on all inputs. Dimensions are 5.25x19x8, and weight is 13 lbs.
Price: $1,668.00

1674C and 1678C automatic microphone mixers provide 4 and 8 inputs respectively. Units may be stacked in both parallel and master/slave configurations to provide up to 80 inputs. Using external interfacing circuitry, large systems with as many as 128 inputs can be achieved. In all configurations, true automatic mixing is provided. Auto-

multi-track recording. Logic outputs indicate the gain status of each channel and may be used to control speaker switching or "Mix minus one" reinforcement systems. Dimensions of both models are 3.5x19x12.5. Weight is 18 lbs. for the 1674C, and 16 lbs. for the 1678C.
Price: $2,244.00 (1674C)
     $3,376.00 (1678C)
231A mixing console has 12 inputs expandable to a total of 44 inputs by using multiple 231EM 8 channel extenders. Each input features both microphone and line level inputs and 4-knob EQ. Phantom power is available on the microphone inputs. Four sub-mix channels, 2 auxiliary mix channels and an EFX channel are provided. The main outputs are stereo with a mono sub-mix output. Outputs from all input channels and all sub-mix channels are also available. A patch panel assures the maximum possible flexibility to the user. Dimensions are 28.5x29x9.5 (231A) and 17x29x9.5 (231EM). Weight is 49 lbs. (231A) and 33 lbs. (231EM).
Price: $5,072.00 (231A)
     $2,640.00 (231EM)

AMEK SYSTEMS AND CONTROLS
Amek APC1000 is available in standard formats of 32, 48, 64, 80, 96 and 120 inputs. Features include Recall, GLM Moving Fader System, and complete Plasma metering. Console is very narrow due to many switch functions being put into software enabling resetting from SMPTE.
Price: $140,000.00 to $500,000.00
Amek G2520 is available in standard formats of 56 and 40 inputs. Options are integral digital grouping cards that allow fitting MasterMix or Arms, and GLM Moving Fader Automation. Standard is Plasma metering and in-line monitor.
Price: $100,000.00 to $250,000.00
Amek Angela is available in standard formats including 28, 36 and 51 input chassis. It is in-line monitor type with full 24- or 48-track routing available. Features include 4-band EQ with swept mids and Q divide, high and low pass filters, and extensive patchfield facilities.
Price: $44,000.00 to $90,000.00
Amek BCII is a small-frame audio console for either portable broadcast or edit bay type applications. It is available with a large variety of input and output modules. Modules available are mono mic/line, stereo line, mono or stereo groups, and mono or stereo outputs.
Price: $11,000.00 to $50,000.00
Amek Classic is a general purpose console primarily for use in broadcast production applications. It features 4-band parametric EQ and sweep filters per module, 8 buses, 2 stereo buses, optional VCA faders with D.C. subgrouping, and small width.
Price: $45,000.00 to 180,000.00
TAC SR9000 is a sound reinforcement console. Standard format is 40 inputs with 16 mono sub-groups, a stereo output bus, 16x8 output matrix, 8 independent mute groups, 8 optional VCA groups, and a total of 16 auxiliary sends.
Price: $65,000.00 to $85,000.00
TAC Scorpion is available in a wide variety of frame sizes, configurations, and module types and is suitable for both recording and sound reinforcement. Frame sizes are 8, 16, 24 or 32 tracks, with input configurations of 16, 24, 32 or 40 inputs.
Price: $7,000.00 to $23,500.00
TAC Matchless is a full 24-bus/24-track console that is in-line monitor type. Features include 4-band EQ with selectable high and low frequency points, swept mids with Q divide control, 2 programmable mute groups and 8 auxiliary sends.
Price: $24,000.00 to $30,000.00

AMR (Audio Media Research) —*See our ad on page 19*
64 is a six channel recording mixer. Features include balanced XLR mic inputs, 1/4-inch line input and patch point, 3-band EQ with sweepable mid-range, auxiliary send, pan, output assign switch, overload LED, input gain and fader. Other features include on-board 4 channel monitor mixer, headphone output with level, left, right and monitor level controls. Rack mountable. Dimensions are 2.5x17x17.25, and weight is 16 lbs.
Price: $599.50
42 is a four channel recording mixer. Channel features include 1/4-inch line/mic inputs, 1/4-inch tape in and out jacks, mic/line-tape select switch, input gain control, two-band shelving EQ, auxiliary send, pan, peak reading overload LED, and fader. Master features include L/R master fader, auxiliary return and monitor faders, stereo graphic equalizer, LED arrays for L&R outputs, headphone output with level control. Rack mountable. Dimensions are 2.5x17x12.25, and weight is 9 lbs.
Price: $349.50

AUDIO-TECHNICA U.S., INC. — *See our ad on page 17*

AT4462 portable field production mixer has mic/line inputs, 2 stereo plus 2 pannable single channels (6 balanced inputs). Mic/line outputs: 2, L/R or dual mono. Modu-Comm™ IFB system: Lo-cut and 20dB pad, each input, Stereo limiter, Cue, each input control. Dimensions are 3.31x8.38x7.38, and weight is 4.63 lbs.
Price: $1295.00

BIAMP SYSTEMS

Legend is a recording, broadcast and live reinforcement console. Features include up to 32 inputs and up to 24 outputs, 3-band EQ (all sweepable with true shelving), full metering and 48 V phantom power. Dimensions (12 input) are 8.25x23.5x29.25.
Price: $5799.00 (for 12 in/8 out)

28 series console has high slew rate and low distortion with up to 32 inputs mixing to 8 submasters, left, right and mono outputs. Features include 14 segment dual color fluorescent metering, 3-band EQ with sweepable midrange, 48 V phantom power. Dimensions are 5.38x35.5x25.
Price: $3529.00 (for 16 channels)

Rackmax is a 16 input rack mount mixer. Features include 3 sends per channel, stereo main output, or mono output with two submasters, 48 V phantom power switchable on each channel. Integral digital reverb with 16 programs and digital readout and control optional. 10 rack spaces high and 3 inches deep.
Price: $2,329.00 (with reverb)

Advantage One is an 8 input, single rack space microphone mixer. Each channel has pad switch, trim and level controls. Output section includes two sweepable notch filters, switchable rumble filter, bass and treble controls, built-in limiter and main level control. 48 V phantom power optional.
Price: $749.00

CALREC AUDIO LIMITED (Calrec by AMS)

UA8000 music console recording/mixing (film version available). 32, 48, 64, 72 channel frame sizes available. Twice the number of input channels available on mixdown. 32 output groups, 2 stereo outputs, 24 auxiliary buses, 9 master group faders, full automation of both large and small faders, 'TASC' automation includes 8 Mega Bytes battery supported RAM, machine control, mix merge - all accurate to one tenth of a frame, 4-band parametric EQ in addition to compressor/limiter/expander/gate per channel. 48 channel version, dimensions are 4.42x3.5x10.75 feet.
Price: Available upon request

Digitally assignable console with "Total Instant Reset" ™ is a current version primarily for broadcast, video/film production. Control surface may include up to 128 faders assignable to up to 128 audio channels located in racks some distance away. Any fader may be assigned to any channel, any group output or recording group. 4 band parametric and compressor/limiter/expander/gate also assignable. 24 or 32 output groups. Fader width on control surface is 1-inch.
Price: Available upon request

Minimixer-portable, A.C./battery powered mixer is for recording and broadcast. Up to 16 channels plus optional compressor/limiters. Channel, group, and output insert system (pre or post faders). 2 group or stereo A and B faders with PFL. 4 auxiliary controls pre/post fader per channel and 4 auxiliary output controls. Mono master fader. 3-band EQ in addition to HF/LF filters per channel. Dimensions are 12.25x19x8.6.
Price: $9,500.00

Note: Calrec Audio can build any mixing system to any specification. Prices available upon request.

CARVIN CORPORATION — *See our ad on page 21*

MX2488 is a recording/performance console, 24x8x2 configuration. Features include 8-track studio ctrl. ctr.-tape playback, 3-band parametric EQ, complete cue mixing, 4 auxiliary buses, 2 effects returns, patch jacks and direct outputs, solo and mute all input and output channels. Phantom power. Dimensions are 9x46x29, and weight is 115 lbs.
Price: $3,995.00

MX1688 is a recording/performance console, 16x8x2 configuration. Features include 8-track studio ctrl. ctr.-tape playback, 3-band parametric EQ, complete cue mixing, 4 auxiliary buses, 2 effects returns, patch jacks and direct outputs, solo and mute all input and output channels. Phantom power. Dimensions are 9x36x29, and weight is 80 lbs.
Price: $2,995.00

MX1644EQ is a 16x4x2x1 recording/performance console. Features include 4-track studio ctrl. ctr. -2 monitor mixes, 4 band channel EQ, 4 auxiliary buses, internal reverb, 2 effects returns, 4-band graphic EQ, phantom power supply. Dimensions are 9x36x29, and weight is 70 lbs.
Price: $1,895.00

MX22 series consoles, in 6 to 24 channels, are performance consoles. Features include 400 watts RMS power, 12, 16, and 24 available non-powered, XLR balanced inputs and outputs, channel patching, mic/line switching, 3-band channel EQ, 2 monitor sends and phantom power.
Price: $849.00 to $1,899.00

DOD ELECTRONICS CORPORATION

R-855 stereo mixer is 4-input and rack mounted. Features include pan pots, a headphone output, master level control, effects send and receive loop, clipping indicator, up to 48dB of gain and one-rack space high. Mic, instrument, and line level inputs. Auxiliary inputs allow bridging another R-855 mixer or inputs from other sources. Dimensions are 1.75x19x8, and weight is 4.5 lbs.
Price: $269.95
         $299.95 (XLR version)

ELECTRO-VOICE, INC. *— See our ad on page 3*

8400 Series (8408/8416/8424/8432) includes 8, 16, 24 or 32 input channels and stereo tape input, 4 subgroups, balanced inputs/outputs, stereo main out with independent mono sum, 1 monitor send, 2 auxiliary sends, 3-band EQ, 48 V phantom power, input and output "solo."
Price: $3,210.00 (8408)
         $4,185.00 (8416)
         $6,160.00 (8424)
         $7,700.00 (8432)
8200 Series (8208/8212/8216) includes 8, 12 and 16 input channels, balanced inputs/outputs, stereo main out with independent mono sum, 1 monitor send, 2 auxiliary sends, 3-band EQ, 48 V phantom power, input and output "solo."
Price: $2,140.00 (8208)
         $2,580.00 (8212)
         $3,165.00 (8216)
EVT 5200 Series II (5208II/5212II/5216II) includes 8, 12 and 16 input channels, balanced inputs/unbalanced outputs, 3-band EQ, 1 monitor send/1 effects send, stereo output with independent mono sum, 48 V phantom power.
Price: $990.00   (5208II)
         $1,195.00 (5212II)
         $1,530.00 (5216II)

FOSTEX *— See our ad on page 5*

450-8 is an 8-track recording mixer with parametric EQ, 8 inputs, 4-channel bus, stereo bus, mono bus, switchable phantom power on each channel, and in-line monitoring.
Price: $1,095.00
450-16 is a 16-track recording mixer with parametric EQ, 4-channel bus, stereo, mono, and solo buses, in-line monitoring, and switchable phantom powering on each channel.
Price: $1,995.00
2050 is a 10x2 line level mixer with gain and pan for each channel, headphone jack with volume control, front panel priority jacks, and rack mountability.
Price: $260.00
260 Multitracker is a 4-track cassette mixer/recorder with 6 inputs. It has independent stereo bus, 2 mono buses, 3.75 in./sec. tape speed, Dolby C, parametric EQ, and true rolling punch-ins.
Price: $1,095.00
160 Multitracker is a 4-track cassette mixer/recorder with 4 channel simultaneous recording and accessory patch points.
Price: $795.00
250 AV Multitracker is a 4-track cassette mixer/recorder specifically designed for slide show synchronization. It allows for 4-track simultaneous recording.
Price: $1,300.00
X-30 is a 4-track cassette mixer with Dolby B and C noise reduction. The mixer section is 4x2 dedicated sub-mixer for overdubbing and bouncing tracks.
Price: $499.00
460 is a multi-track cassette mixer capable of synchronization with video recorders. The mixing section contains 8 inputs, 4 bus outputs, dedicated stereo mixer for the 4-channel bus, selectable monitoring, switchable LED bar graph metering and accessible patch points for flexible system interface. The recorder section features true 2-speed transport (separate record/EQ circuits for 1.87 and 3.75 in./sec.), Dolby B and C noise reduction, 2-position autolocate, search to zero, auto repeat and SMPTE/EBU synchronization capability.
Price: $2,495.00

FURMAN SOUND, INC.

MM-4A rack mount mixer is a 4-input by 1-output rack mount mixer that fits into 1.75 inches of rack space. Includes effects send bus with return, low cut buttons, auxiliary inputs, master, and headphone amp with front-panel jack and volume control. Available with balanced inputs and 48 V phantom powering.
Price: $335.00
MM-8A rack mount mixer is the same as the MM-4A except it has two main outputs and a pan pot on each input channel.
Price: $395.00

GOTHAM AUDIO CORPORATION — *See our ad on page 16*

AD 062 Multi-mixer offers 4 to 16 input modules available in 3 versions: mic/line, stereo line or dual auxiliary. Features include P & G long or short stroke faders and 3-band EQ, 2 group outputs plus combined mono output, full talkback and communication facilities, battery powering for remote operation or a.c. powering for studio use. Options include stereo compressor/limiter module. All inputs and outputs are XLR. Provides powering for 48 V phantom or 12 V T-powered microphones. Weight is 24.6 lbs.
Price: $8,500.00 (depending upon configuration)
AD 145 Pico is a portable mixer with 4 to 8 mic/line inputs. Each input has high-pass filter and 3-band EQ. PFL and pan pots are standard. Features include 2-channel output with VU meters and switchable monitoring, battery powering or a.c. powering for studio use. All inputs and outputs use XLR connectors. 19-inch rack mount and desktop versions available for dubbing and video edit suites. Weight is 13.4 lbs.
Price: $4,000 to $6,000 (depending upon configuration)
EMT 10.08.2 is a multi-track, multi-output console for studio or on-location use. Configurable for 1 to 30 inputs and up to 16 outputs in addition to stereo. Input modules have 3-band EQ, high-pass filter, PFL and pan pots. PPM metering standard on all outputs. Many options and accessories available.
Price: $10,000.00 to $40,000.00 (depending on configuration)

HILL AUDIO INC.

Multimix can be used in these configurations: 16x4x2x1, 12x4x2x1, or 16x2x1. For recording, broadcast or sound reinforcement, the unit is an 8 space, semi-modular rack mount mixer. Features include 48 V phantom power, direct outputs on all channels, 3-band EQ, 2 auxiliary sends or send-returns for each channel, 100mm faders and the power supply is rack mountable. Weight is 35 lbs.
Price: $2,299.00
Soundmix is a semi-modular, multi-purpose console. Features include 4-band EQ, 2 pre-fade auxiliary sends and 2 post-fade auxiliary sends, 4 auxiliary returns, 100mm faders (Alps or Noble), 48 V phantom power, direct outputs on all channels and subgroups, insert points on all channels, subgroups and master outputs. Available configurations are: 24x4x2x1, 16x4x2x1. Dimensions are 4x41x24.5 (24 channel), and weight is 75 lbs. and 4x32x24.5 (16 channel), and weight is 55 lbs.
Price: $4,449.00 (24 input w/Alps faders)
       $4,099.00 (" " w/Noble faders)
       $3,485.00 (16 input w/Alps faders)
       $3,199.00 (" " w/Noble faders)
Stagemix is a 12x6 rack mount monitor console featuring a built-in mic splitter using parallel XLRs, transformer balanced group outputs, 3-band EQ on all inputs and 4-band EQ on all outputs at different center frequencies giving 6 bands of EQ control, 12 segment LED group displays, PFL and AFL function on all outputs. Fits in an 8 space rack and is 4 inches deep. Weight is 35 lbs.
Price: $2,899.00
Concept series 2200; 3200, 4400, 5400, 6400, 8400 are modular consoles available in almost any configuration. Features include 6 fixed frequency active filters at 60, 150, 500, 1.5k, 4.5k, and 12.5kHz plus 1 high-Q filter sweepable from 50 to 5kHz and adjustable from -24dB to +6dB. The 2200 and 3200 come with 8 auxiliary sends, 100mm Alps faders and are available in 8 or 16 bus. The 2200 is also available with an 8x8 matrix. The 4400, 5400, 6400 and 8400 have "EQ plus," 12 auxiliary sends, optional D.C. subgroups, 2 programmable mute systems, true solo-in-place, and are available in 8, 12, 16, or 24 bus and up to 48 tape returns.
Price: Available upon request

HM ELECTRONICS, INC.

MX55 is a 4-channel stereo mixer that has one mic, one line and two phono inputs with a cross-fader. Tape monitor function may be switched in and out. Features include preset guide for gain settings, cue/program headphone monitor, tape monitor and talkover mic. Dimensions are 5.25x19x7.4, and weight is 8.1 lbs.
Price: $384.00

MX77 is a 4-channel equalized stereo mixer that has one mic, two line and two phone inputs with cross-fader, 3-band graphic equalizer and output selection. Tape monitor may be switched in and out. Features include preset guides for gain settings, cue/program headphone monitor and talkover mic. Dimensions are 5.25x19x6.3, and weight is 9.6 lbs.
Price: $494.00

MX99 is a 4-channel equalized stereo mixer with 5 bands of graphic equalization and signal processor circuitry (both bypassable.) Features include 4 channel inputs, cross-fader between two phono inputs, preset guides for gain settings, cue/program headphone monitor and line/phono selection switch. Dimensions are 8.75x19x3.95, and weight is 9.6 lbs.
Price: $534.00

MX1 is a 6-channel equalized stereo mixer with 6 channels of mixing with 9 selectable inputs: 3 phono inputs, 3 mic inputs and 3 line inputs. The main output features a "pan" control for stereo balancing. Dimensions are 8.75x19x3.3, and weight is 9.8 lbs.
Price: $749.00

MX56 is a 4-channel stereo powered mixer that combines the MX55 mixer and the PA120 power amplifier. Features include 1 talkover mic, cross-fader between 2 phono inputs, line and tape monitor inputs and preset guides for gain settings. Dimensions are 5.25x19x11.75, and weight is 18 lbs.
Price: $860.00

MX81 is a 6-channel equalized stereo mixer with 3 mics, 3 phonos, 2 lines, 2 tapes and 1 compact disc provide flexibility in input sources. Stereo balancing for each channel, signal processor loop, DJ mic with pan, bass and treble controls. Dimensions are 8.75x19x5, and weight is 11.9 lbs.
Price: $899.00

MX10 is an 8-channel stereo recording mixer with 8 channel inputs with 11 selectable sources, individually controlled channel input attenuators, pan controls, tone controls and high-pass filters. Both signal processor sends can be used simultaneously. Dimensions are 8.75x19x5, and weight is 12.3 lbs.
Price: $950.00

INNOVATIVE ELECTRONIC DESIGNS, INC.

IED 4000 Series automatic mixer is a mixing system that can be custom tailored to fit any application. Each of the four inputs on the card may be individually customized by combing a 150M mic preamp or a 100L line preamp with a 110C compressor, a 110V voltage controlled amplifier, a 120P programmable gain control, a 132 voltage controlled digital attenuator, or with a fixed gain amplifier.
Prices and dimensions are available upon request.

KLARK-TEKNIK ELECTRONICS, INC.

DDA "S" series consoles are available in 16, 24, and 32 input frames with 4-groups or 8x2 rackmount configurations. Features include 4-band EQ with hi-pass on inputs, 4 auxiliary sends (switchable pre/post), 4 auxiliary returns, talkback, oscillator, stereo, mono, and headphone outputs, (2) 2-track returns, and electronically balanced inputs and outputs.
Price: $4,500.00 (8x2)
         $4,500.00 (8x4x2)
         $6,250.00 (16x4x2)
         $8,250.00 (24x4x2)
         $11,250.00 (32x4x2)

DDA S-PA series consoles are available in 16, 24, 32, inputs with 4-bus out configurations. Features include 4x4 matrix, stereo, pre/post mono outputs, 4-band EQ with hi-pass filter on input, 8 auxiliary sends with 3-band EQ, 4 auxiliary returns with 3-band EQ, oscillator and talkback outputs, injection points, electronically balanced in and out.
Price: $8,275.00 (16x4x2)
         $11,000.00 (24x4x2)
         $13,500.00 (32x4x2)

DDA S-Monitor Series offers 16, 24, 32 input frames with 8 bus outputs. Features include stereo outputs, mono (pre/post) outputs. Other features include 4-band EQ with hi-pass filter on input, 3-band EQ on outputs, 4 auxiliary sends with 3-band EQ, 4 auxiliary returns, oscillator and talkback outputs.
Price: $8,275.00 (16x4x2)
         $11,000.00 (24x4x2)
         $13,500.00 (32x4x2)

DDA "D" Series consoles offers 32, 48, 56 module frames with choice of 4-input modules (stereo, standard, theater, 8-way matrix), 3-output modules (recording, PA, 8-way matrix). Features include dual mic inputs, gnd. lift, 8 auxiliary sends with 3-band EQ, direct outputs, 5 LED signal presence meters, multiple earth grounding and quasi-differential mix buses.
Price: from $14,855.00 to $28,330.00

*Modifications, dimensions and further pricing upon request.

DDA AMR-24 Series consoles offers a choice of 36x24 split bus in 110-inch and 122-inch frames. Features include 5-band EQ on input, 4-band EQ on output/return, 60 returns to mix with EQ available. Other features include 8 auxiliary sends, automation ready, TTL patchbay, master status switching, facilities for (2) 24-track returns, ultra-low crosstalk and noise.

Price: Dimensions:
$57,650.00 (36x24x2)   41x110x45.5
$60,000.00 (36x24x2)   41x122x45.5

DDA DCM-32 series consoles come in 40 or 56 in/out module frames. Features include in-line design featuring central computer control with SMPTE (optional MIDI) interface, split EQ/filter package, 10 auxiliary sends, master status switching.

Price and dimensions available upon request.

MITSUBISHI PRO AUDIO GROUP

SuperStar recording console has dual in-line I/O modules. Features include 44 to 84 inputs, 64 centrally assigned mixing buses, 16 auxiliary send buses, 2 stereo outputs, modular bolt together aircraft frame, field expandable. Other features include optional meter overbridge for peripheral and in-line devices, VU or 60 segment LED bar-graph meters, selectable top panel plug-in equalizers, selectable top panel plug-in preamplifiers, selectable plug-in VCA, audio VCA, automated and 'intelligent digital faders', Compumix PC automation (20 Mbyte), Compumix IV automation (80 Mbyte).
Price: from $139,000.00 to $370,000.00

Westar 8000 recording console has dual in-line modules. Features include 20 to 52 inputs, 24 mixing buses, 8 auxiliary send buses, 2 stereo outputs, modular field expandable bolt together aircraft frame, VU or 60 segment LED bar-graph meters, selectable top panel plug-in equalizers, selectable top panel plug-in preamplifiers, selectable plug-in VCA, audio VCA automated and 'intelligent digital faders,' Compumix PC automation (20 Mbyte), Compumix IV automation (80 Mbyte).
Price: from $57,000.00 to $220,000.00

Westar 8300 film re-recording console has film re-recording input module, 16 to 72 inputs, 8 or 16 or 24 mixing buses, 10 auxiliary send buses, 3 channel pan bus, 2 channel pan bus, film monitor system with 8x4 to 24x8 matrix select systems with dedicated monitor format buttons, recorder and bus/film pushbutton control panel(s) 8 to 24 tracks. Other features include re-assign, transfer key, and mono and stereo composite modules. Multi-track pre-dub input modules. Modular bolt together frame, VU or LED meters. Selectable top panel plug-in equalizers, selectable top panel plug-in preamplifiers. Selectable plug-in VCA. Audio, VCA, automated, and 'intelligent digital faders.' Compumix IV film automation, 85 Mbyte, 1 to 4 sections.
Price: from $89,000.00 to $600,000.00

NEVE INCORPORATED

V Series console multi-track recording console for music recording and video post production. Available in 36, 48, or 60 channels. Features include independently assignable patch section allowing flexibility of insertion positions. 200 segment plasma meters with VU and PPM characteristics. Provision for automated control of the insert in/out, EQ in/out, path cut and A or B master mute switching using Necam 96 events controller. Eight mono/four stereo auxiliaries Integral Necam 96 studio system controller in console center section. Console status control allowing master, split and individual strip status changeover. Solo in-place, after-pan listen and prefade listen with latching, interlocking and momentary action solo switch options.

Necam 96 console automation system compliments the V Series consoles. Features include controls up to 96 faders. Up to 99 snapshots of fader and mute settings can be stored for instant call up. Touch a fader and control is instantly restored to the fader. 96 keeps a pass as a virtual mix for review or update. With auto merge, merge off line and intelligent rollback.

8232 multi-track recording console designed for 24-track recording and mixdown has 32 input channels and 24 mixing buses. Stepless high and low pass filters with slope of 12dB per octave. Continuously variable 4-band EQ with switchable shelving or peaking on upper and lower bands. Four mono and one stereo auxiliary outputs and each may be programmed to receive signal from either multi-track or mix-down paths.

Digital Transfer Console (DTC) provides a digital stereo mixing and processing chain with 'snap shot' automation of all parameters under either manual or SMPTE control. The DTC has two stereo digital inputs accepting either Sony PCM 1610/30 or AES/EBU formats with automatic sensing of pre-emphasis and one stereo analog input. A delay facility allows option of 'zero attack time' dynamics. Metering includes high-resolution instantaneous reading bargraphs and a separate digital bargraph for metering of both digital and analog signals.

51 Series consoles comprise a range of versatile multiple-application audio consoles for radio, television and film program production including multi-track recording facilities. The range consists of four types of consoles, each available in different configurations and numbers of input channels and groups.

542 Range comprise a range of small, compact audio mixing consoles designed for recording or broadcast applications. With 6 or 8 input channels, and two playback inputs, the consoles provide two main stereo program outputs with a mono facility, 2 auxiliary outputs and a comprehensive stereo/mono monitoring system on associated headset or external loudspeakers.

Note: All Neve product pricing is available upon request.

PEAVEY ELECTRONICS

MS-2421 has 24 input channels, effects loop, stereo/mono output, built-in reverb, built-in delay, built-in electronic crossover, 3-band EQ with sweepable midrange, two monitor sends, phantom power. This console is designed for sound reinforcement. Dimensions are 8.13x48.5x29.25.
Price: $2,699.50

MS-1621 is the same except 16 input channels. Dimensions are 8.063x36.25x29.25.
Price: $2,099.50

MD-II-16 has 16 input channels, stereo/mono output, built-in reverb, effects send and return, 3-band EQ with sweepable midrange, monitor send, phantom power. Designed for sound reinforcement. Dimensions are 5x32.75x25.75.
Price: $1,149.50

MD-II-12 is same except 12 input channels. Dimensions are 5x27x25.75.
Price: $949.50

Mark III-16 sound reinforcement console has 16 input channels, 4-band EQ, 2 monitor sends, stereo/mono output, 2 effects sends and built-in reverb. Flight case included. Dimensions are 29x35.63x6.75.
Price: $1,799.50

Mark IV-24 sound reinforcement console has 24 input channels, 4-outputs, mono output, 4-band EQ, 2 monitor sends, effects send, intercom/talkback, 24 V phantom power and built in reverb. Console is in its own flight case. Dimensions are 6.75x50.38x29.
Price: $2,999.00

Mark IV-24 monitor console has 24 input channels, 8 mix outputs, 4-band EQ, intercom/talkback, and built-in "Y" mic splitter. Flight case is included. Dimensions are 7x29.13x54.06.
Price: $3,299.00

701R rack-mount sound reinforcement mixer has 7 input channels, stereo output, 4-band EQ, effects send, monitor send, built-in reverb, and mono output. Dimensions are 12.31x19x3.63.
Price: $649.50

PROFESSIONAL SOUND CORPORATION

MX4S location recording console has 4 inputs and 2 outputs, battery or a.c., phantom or AB mic powering, slate mic, talkback, phase reverse each channel, 2 bands of EQ, noise is -125.4dB at 68dB gain, and weight is 18 lbs. with batteries. Dimensions are 3.6x13x14.2.
Price: $3,300.00

UMX6 location recording console has 6 inputs and 2 outputs, battery or a.c., phantom or AB mic powering, copper RF shielding, military spec. components, gold contact connectors, Jensen input transformers, talkback, weather seals, noise is -125.4dB at 86dB gain, and weight is 24.6 lbs. Dimensions are 5.75x14x15.5.
Price: $6,580.00

Sonosax SXS location recording console has 6 to 10 inputs, 2 outputs, auxiliary send, tape return, parametric EQ, adjustable limiter each input, Penny & Giles faders, battery or a.c., battery life more than twenty hours, noise is -129.2dB at 85dB gain, and weight is 15-19 lbs. Dimensions are 2.8x11.3-17x12.6.
Price: $7,600.00 to $10,000.00

Sonosax SXT location recording console has 10 to 32 inputs, 2 outputs, 4 auxiliary, optional VCA or stereo input, compressor option each input (VCA version only), may be automated, communication module, military spec. components, noise is -131.5dB at 85dB gain, and weight is 35-70 lbs. Dimensions are 3.5x19-57x19.
Price: $17,750 to $60,350.00

Sonosax SX-PR broadcast/eng mixer has 2, 4, or 6 inputs, 2 outputs, 48 V phantom or AB powering, military spec. components, modular construction (expandable to 6 inputs), balanced transformerless inputs, battery powered, extremely portable, noise is -129.2dB at 85dB gain, and weight is 3 lbs. Dimensions are 2x8-13x7.
Price: $2,400.00 to 3,900.00

RAMSA PANASONIC

WR-8428 post production/recording console, with its 28 input channel mainframe, provides a total of 56 inputs. Choice of stereo and mono input modules. Multi-pin connector allows simultaneous use of two 24-track recorders. Matrix module provides four 8 by 1 matrix outputs. Accommodates Dolby surround mixing. Dimensions are 9.63x58.13x31, and weight is 500 lbs.
Price: $19,000.00

WR-8616 post production/recording console consists of a 16 input channel mainframe. Choice of stereo and mono inputs. Basic or tape monitor group outputs. Six remote transport control switches. Extensive metering facilities. Dimensions are 10.44x35.83x29.72, and weight is 114 lbs.
Price: $9,400.00

WR-T820 recording console has 20 channel inputs capable of monitoring tape returns simultaneously with mic or line sources. 8 group outputs that address a 16-track recorder without repatching. Direct left/right assign. Stereo solo in place. Discrete studio and control room outputs. Extensive metering facilities. Dimensions are 11.13x42.13x31.88, and weight is 150 lbs.
Price: $6,950.00

WR-S series stereo mixing consoles offer 6, 10 or 14 mono inputs on each respective model. 2 channels on each mixer have stereo line and phono inputs. Each electronically balanced mic/line input features 48 V phantom power, 3-band sweepable mid range EQ and three send circuits for effects and monitoring. LED metering on all outputs and optional rack mount kit is available for the WR-S208.

Model:	Dimensions:	Weight:	Price:
WR-S208 (8 inputs)	5.88x16.94x20.75	33 lbs	$1,295.00
WR-S212 (12 inputs)	5.88x25.63x20.75	40 lbs	$1,895.00
WR-S216 (16 inputs)	5.88x30.56x20.75	47 lbs	$2,195.00

WR-8210A recording console has 10 inputs, 4 group outputs, 48 V phantom power on all input channels, left/right outputs, tape recorder sub mix inputs to monitor tape or echo returns. LED metering direct outputs and insertion points on all inputs, stereo effects returns. Dimensions are 5.81x24.28x20.63, and weight is 36 lbs.
Price: $2,280.00

WR-8112 and WR-8118 sound reinforcement/recording consoles offer 18 and 12 channel inputs respectively, 4 group outputs, 2 stereo output and 1 mono master output. 48 V phantom power, 3 band sweepable midrange EQ, selectable tape monitor switch for overdubbing, 3 sends and solo on all channels.

Model:	Dimensions:	Weight:	Price:
WR-8112 (12 inputs)	5.81x24.28x20.63	37 lbs	$2,650.00
WR-8118 (18 inputs)	5.81x35.38x20.63	58 lbs	$3,600.00

WR-133 portable audio mixer has 8 electronically balanced mic/line inputs, balanced left/right stereo and mono outputs, phono inputs on channels 1-4. 2 channel sends, VU metering. Rack mountable. Dimensions are 6.31x18.25x16.13, and weight is 26 lbs.
Price: $1,100.00

WR-M10 multiple source audio mixer has 4 electronically balanced mono input channels containing a variable compressor circuit, midrange equalization, effect send and channel on/off switch. There are 2 inputs, each capable of selecting 3 pre-wired stereo line sources and an RIAA phono input. Mono master controls overall level of mono section. Mono priority circuit attenuates the stereo input when a signal appears at a mono input. Micro switches on the stereo input faders allow remote transport control. Electronically balanced main output with hi/lo EQ. 2 mono outputs. 1 pre-fader. 1 post-fader. Dimensions are 6.81x17.44x6.81, and weight is 13.2 lbs.
Price: $795.00

RANE CORPORATION

MP24 program mixer is for sound reinforcement (disco) applications. Features include 9 stereo inputs (3-phono, 6-line). Master, booth, zone and light trigger outputs. 4 stereo input mixing buses. Defeatable crossfade. Cue, master EQ and mic EQ circuits, effects loops. Dimensions are 7x19x5.25.
Price: $1,099.00

SM26 splitter/mixer is for sound reinforcement. There are master stereo inputs and outputs, 6 mono inputs and 6 mono outputs with mix/pan controls on each. Operates as 6 into 2 mixer, 2 into 6 splitter or 6-in/6-out line amplifier or level matcher. Dimensions are 1.75x19x5.25.
Price: $349.00

HM42 headphone mixer has 4 stereo line inputs that mix into two stereo headphone amps, all with separate level controls. For monitoring of multiple keyboards, drum machines and other sources. Dimensions are 1.75x19x5.25.
Price: $329.00

SECK   —*See our ad on page 39*

62 is a sound reinforcement/performance console. The configuration is 6 in/stereo out with fully balanced inputs. Features include 3-band EQ with sweep midrange, 4 auxiliary sends, 2 pre fade, 2 post fade, stereo solo bus for in place soloing, insert points on each input, EQ on the auxiliary returns and portable. Dimensions are 1.9x18.2x14.5, and weight is 11 lbs.

122 is the same as model 62 but with 12 inputs/stereo outputs. Dimensions are 1.9x18.2x23.2, and weight is 18 lbs.

242 is the same as model 62 but with 24 inputs/stereo outputs. Dimensions are 1.9x18.2x41.5, and weight is 40 lbs.

1282 is a recording/performance console. The configuration is 12 into 8 into 2 with 12 input in-line monitor section. Each input is fully balanced with mic, line and tape inputs. 3 band EQ with sweepable midrange. Stereo solo bus-facility for 6 auxiliary sends at mix down. 4 auxiliary returns with EQ insert points on all inputs and subgroups. Averaging or peak reading metering. Communications section including talk to tape and talk to fold back feature. Portable. Dimensions are 1.9x18.2x30.8, and weight is 30 lbs.

1882 is the same as the model 1282 but with 18 inputs into 8 into 2 with 18 input in-line monitor. Dimensions are 1.9x18.2x39.2, and weight is 38 lbs.

SENNHEISER ELECTRONIC

M-8 professional portable mixer is an 8-channel mixer for ENG/EFP. The standard model (special 6 or 12 channel versions are available) consists of 8 input modules, and master, talkback, powering and display modules. Each channel module consists of a gain selector (5 steps 10dB each), fine gain 0-20dB, switchable auxiliary output (pre EQ, post EQ, post fader) with level control, PFL (locking), panpot, bass cut filter (30Hz, 80Hz, 140Hz) 18dB/Oct., switchable equalizer for bass and treble, midrange infinitely variable in frequency (150Hz-7000Hz), LED overload indicator, and Penny and Giles faders.
Price: $12,655.00

SHURE BROTHERS INC. *— See our ad on Cover IV*

Audiomaster 1200 Powermixer is a 6-input, 1-output 200 watt sound reinforcement mixer. Expandable up to 10 channels, rack-mountable. Each channel has individual input attenuation, overload LED, 2-band EQ, reverb send, and simultaneous low-Z and high-Z inputs. Features include external device loop, monitor EQ, and limiter. Options include matching speakers, road case. Dimensions are 7.5x19x13.5, and weight is 27 lbs.
Price: $930.00

FP51 gated compressor-mixer is a portable 4-input, 1-output mixer for broadcast, recording, and sound reinforcement. True average-responding compressor has 40 dB range, adjustable response rate, and a unique gated memory function. Features include phantom power, tone oscillator, and triple-function VU meter. Fully mic/line switchable and transformer-coupled, powered by a.c. or built-in battery pack. Dimensions are 3.13x12.22x9.03, and weight is 6 lbs 1 oz.
Price: $940.00

FP42 stereo microphone mixer is a portable 4-input, 2-output mixer for broadcast, recording, and sound reinforcement. Inputs are transformer-coupled, mic/line switchable with active gain controls, low-cut filters, detented pan pots. Outputs (left and right) are transformer-coupled, with mic/line and mono/stereo switches. Features include phantom power, pull-pot cuing system, tone oscillator, limiter, dual VU meters, and a.c. or battery operation. Dimensions are 3.13x12.22x9.03, and weight is 6 lbs 8 oz.
Price: $750.00

FP32 stereo engineering mixer is a lightweight, 3 input, 2 output stereo mixer for electronic news gathering and field production. All inputs and outputs are transformer-coupled XLR-type, mic/line switchable. This rugged unit features active gain controls, detented input pan pots, phantom power, adjustable limiter, dual VU meters, slate microphone and tone. Runs 6 hours on two 9 V alkaline batteries. Shoulder strap and carrying case included. Dimensions are 2.31x7.25x6, and weight is 2.5 lbs.
Price: $1,300.00

FP31 engineering mixer is a lightweight, 3-input, 1-output mixer for electronic news gathering and field production. Fully transformer-coupled and mic/line switchable. Features include phantom power, slate microphone and tone, selectable low-cut filters, adjustable limiter and VU meter, and 1kHz test tone. Runs 8 hours on (2) 9 V alkaline batteries. Dimensions are 1.88x6.31x5.31, and weight is 2.2 lbs.
Price: $900.00

M267 is a portable microphone mixer with 4 inputs, 1 output for broadcast, recording, and sound reinforcement. All channels are fully transformer coupled and switchable for balanced mic/line level operation. Features include adjustable peak limiter, phantom power, active gain controls, tone oscillator, and built-in battery pack, along with multi-range VU meter and a mix bus jack for stacking units. Dimensions are 2.97x12.16x9, and weight is 5.125 lbs.
Price: $475.00

M268 is a portable 5-input, 1-output mixer for sound reinforcement, recording, and audio-visual applications. All inputs and outputs are fully transformer-coupled with active gain controls. 4-inputs accept either high-Z or low-Z microphones, and one input is for high-level auxiliary sources. Features include 30 Vd.c. phantom power and a mix bus jack for stacking units. Dimensions are 2.97x12.16x9, and weight is 5.125 lbs.
Price: $257.00

SOLID STATE LOGIC

SL 4000 E series master studio system is a 32-72 input recording console featuring the SSL G series studio computer and total recall computer, and the SSL EQ and Input cards.
Price: Available upon request

SL 5000 M series stereo broadcast console comes housed in a variety of mainframe sizes from 8-72 inputs. Designed for all broadcast applications from live radio, continuity, outside broadcasts to film and post. May be integrated with the SSL G series studio computer and total recall computer.
Price: Available upon request

SL 5000 M series film console is based on the same system architecture as the SL 5000 M broadcast console and features flexible film panning and monitoring cassettes, which handle all film post-production tasks from simple mono, to the most complicated surround-sound formats. May be integrated with the SSL G series studio computer and total recall computer.
Price: Available upon request

SSL G series studio computer is high-performance hardware featuring fast processors, vast on-board memory and high capacity disk cartridges, and optional SSL G series remote keyboard. All productions made on previous E series may be run on G series.
Price: Available upon request

SSL new EQ and input cards may be retrofitted to any SL 4000 E series console, allowing existing SSL clients to upgrade.
Price: Available upon request

SONY PROFESSIONAL AUDIO — *See our ad on page 7*

MXP-2016 is a broadcast/video post-production console. It can be configured to provide up to four group modules and 12 input modules, or up to 16 inputs without group modules. For on-air applications, an optional 'dynamics processor' is available. Dimensions are 12.75x33.63x24.5, and weight is 120 lbs.
Price: $19,420.00

MXP-2036 is a broadcast/video post-production console. Its frame accepts a maximum of 32 stereo or mono input modules, which can be assigned to any of four audio groups and four VCA groups. Dimensions are 12.75x65.5x23.5.
Price: $38,270.00

MXP-3036VF is a recording/remixing console. It has 36 inputs and 24 separate track bus assigns. Available with the console is the ADS-3000 automation system. This console series has been enhanced by a new, vacuum fluorescent bargraph metering system which provides greater accuracy and readability. Dimensions are 43.13x93.5x44.75.
Price: Available upon request

SOUNDCRAFT USA/JBL PROFESSIONAL

616 and 624 have been added to the 600 range of consoles. They offer 16 and 24 buses respectively. Additional features include access to all 6 auxiliary sends, a separate mute bus and automation interfaces. Options include stereo modules, patchbays and floorstands.
Price: begins at $9,150.00

200B and 200B/VE are consoles that offer 4 subgroups and 4 auxiliary sends. 8 effects/monitor returns and frame sizes up to 32 are standard. Options include 4-band fixed EQ or 4 band EQ with mid sweeps, stereo input modules and video editor interfaces.
Price: begins at $2,750.00

TS-12 is an in-line recording console that offers up to 36 input/output modules. 12 subgroup and 7 stereo effects returns are standard. Options include up to 16 additional effects returns and disc based automation for fader levels, channel mutes, mix mutes, auxiliary mutes and EQ in/out.
Price: begins at $27,500.00

2400 is a recording console that offers discrete 24-track routing and separate 24-track monitoring section. Separate mic and line gain controls and variable high-pass filters are standard. Optional disc based automation is available.
Price: begins at $27,450.00

TS-24 can be configured with up to 56 input/output modules. Parametric EQ, A & B mute groups and 24-track assign are standard. Options include effects return modules, stereo subgroup modules and disc based automation.
Price: begins at $41,500.00

8000 is a sound reinforcement console that offers 4-band EQ. Each band is sweepable and has 3 position bandwidth. 8 subgroups with discrete routing and 8 auxiliary buses selectable pre/off/post are standard. VCA subgrouping, LED input metering and stereo input modules are optional.
Price: begins at $23,500.00

500 and 500 Monitor are consoles that offer 4-band EQ with mid bands sweepable. The house console has 8 subgroup buses and the monitor has 12 monitor buses with 3-band EQ (mid band parametric). Matrix sends and stereo modules are optional. Frame sizes up to 40 are available.
Price: begins at $8,350.00

Series 4 has 8 stereo subgroups, 4-band fully parametric EQ and 8 auxiliary sends. 8 effects return with EQ and P&G faders are standard. 8 mute groups are available on the house version. 16 and 24 mix monitor consoles are also available.

Price: begins at $50,250.00

SPECTRA SONICS/SPECTRA SOUND
Audio control consoles are designed for signal processing tasks, in 24, 26 and 32 inputs and outputs. Multiple audio signal routing equalization, quad, stereo and mono outputs provide the full spectrum of flexibility.

Model:	Price:	Weight:
1024B-24	$42,005.00	750 lbs.
1026-26	$51,750.00	850 lbs.
1032-32	$74,710.00	900 lbs.

1100 is a line/microphone audio mixer that is designed for use in discotheques, sound reinforcement systems, broadcast studios and recording studios. Compact electronic circuitry for standard electronic rack. It will accept six line or microphone inputs and provide a monaural and an independent monitor output. Weight is 10 lbs.
Price: $815.00

SOUNDTRACS
Eric is a mixing console with up to 48 inputs for multi-track recording, video post production and film facilities. Automation features include digital routing, muting on all inputs, auxiliaries, monitors, and groups, 32 external event controllers, and optional linear and VCA fader automation. Other features include 8 auxiliary sends, in place solo, soft muting, 5-band parametric EQ, and Mosses and Mitchell patchbay. Dimensions are 48x42x144.
Price: $100,000.00 to $140,000.00

CP6800 is a recording console with up to 44 inputs. Automation features include digital routing, muting on inputs, monitors and groups, and 8 external event controllers. Standard features include 6 auxiliaries, solo in place, 4-band EQ (hi/lo shelving with switchable frequencies, and sweepable hi/lo midrange), and patchbay. Dimensions are 45.6x38.4x102.
Price: $53,000.00 to $60,000.00

CM 4400 is a recording/production console with up to 44 inputs. Features include digital routing with manual patch storage and recall, solo in place, 6 auxiliary sends, 4-band EQ (hi/lo shelving with switchable frequencies, sweepable hi/lo mid). Options include CMS-2 automation system and patchbay. Dimensions are 13.2x33.6x86.4.
Price: $19,000.00 to $34,000.00

PC MIDI is a 24x16x2 mixing console used primarily for recording, keyboard workshops, and live sound. Features include dual line inputs on each channel which may be used simultaneously, split EQ on each channel dividing EQ between input and monitor, soft muting, 16 subgroups. MIDI features include 100 muting patch combinations, external mode for outboard communication. Options include 2 effects return modules adding 8 line inputs. Dimensions are 9.6x34.8x45.6.
Price: $9,300.00 to $12,000.00

M Series mixing consoles is designed for 8-track recording and live sound reinforcement. Features include 6 auxiliaries, 4-band EQ (hi/lo shelving, sweepable hi/lo mid), 4 matrix sends, direct output on each line in. Options include up to 32 inputs, transformer balanced group and master outputs. Dimensions are 9.6x32.4x51.6.
Price: $10,335.00 to $14,000.00

MC Series is designed solely for complex monitoring applications. Features include mic/line inputs, phantom power, 4-band EQ (hi/lo shelving and sweepable hi/lo mid), 10 monitor sends, 2 auxiliary sends, 60mm fader on each input, 10 group faders, 2 auxiliary faders. Dimensions are 9.6x32.4x51.6.
Price: $11,755.00 to $16,595.00

MRX Series is designed for multi-track recording and is available in up to 3x8x2 configurations. Features include 6 auxiliaries, 4-band EQ (hi/lo shelving, sweepable hi/lo mid), insert points, direct outputs on each channel. Options include patchbay. Dimensions are 9.6x32.4x51.6.
Price: available upon request.

FME/FMX/FM Series comprises a group of modular mixing consoles designed for customized applications for multi-track recording, broadcasting, and live reinforcement. This series offers input modules for a variety of needs including mono, mono with remote, stereo including RIAA, stereo with remote, monitor with 8 sends. FME frame size fits 22 or 30 modules. FMX/FM frame size fits 14 modules (rackmountable).
Price: $3,995.00 to $10,425.00

STUDER REVOX AMERICA, INC.
Revox C279 is a compact, general purpose audio mixer with inputs for 6 balanced line/mic or unbalanced stereo line sources. Each input has gain trim, HF and LF EQ, pan/balance pot, auxiliary level, PFL, and VCA fader. Master module has LED meter, monitor speaker, talkback mic. Phono input, dbx II noise reduction, fader start available in option module.
Price: $2,699.00

Studer 900 Series is a full size production console with frame sizes for up to 56 inputs and 24 mixing buses. Features include 5 pre or post send/returns, 4-band parametric EQ, VCA fader option, and transformerless input option. Dimensions for 16-module frame are 29.5x40x37.

Price: $34,000.00

Studer 961/962 are compact consoles for broadcast, remote recording, and video editing. Frame sizes are for 14 to 20 modules. Features include stereo line inputs with or without 3-band EQ, compressor/limiter on master modules, electronic muting, FET switching, and balanced insert points. Dimensions for 961 portable in case are 20x12x21.3.

Price: $12,500.00

Studer 963 is a compact production console based on a 30mm module width. It is available with up to 40 inputs and 8 mixing buses. Features include 3-band EQ, 4 switchable pre or post send/returns, external mute interface, direct outputs for each channel, patch bay, and electronic switching. Dimensions for the 28x8x4 configuration are 63.6x40.7x33.

Price: $39,000.00

TASCAM/TEAC PRO DIVISION — *See our ad on Cover II*

M-200 series mixing consoles is a group of three consoles designed for compact high performance sound reinforcement applications or performance mixing, with some multi-track capabilities as well. Features include 4-group (bus) with separate stereo bus. Each mixer has 3-band EQ, center one parametric, 1 auxiliary or effect send plus foldback (monitor) send.

Model:	Dimensions:	Weight:	Price:
M-224	5.13x33.75x16.75	34.5 lbs	$2,395.00
M-216	5.13x25.5x16.75	26.5 lbs	$1,695.00
M-208	5.13x17.25x16.75	19.0 lbs	$1,095.00

M-600 mixing console is a multi-track recording console available in 24 or 32 input versions. All are 16 bus output with either 16 or 32 channel monitor. Features include 8 auxiliary sends, full EQ on the monitor, separate stereo bus and optional stereo input modules. Fader automation will be available. EQ is 4-band with two parametric ranges. Dimensions are 36x87x40, and weight is 350 lbs.

Price: $14,250.00 (32-input)
$13,000.00 (24-input)

M-500 series mixing consoles are multi-track recording consoles available in 12-input with eight channel monitor (M-512) or 20-input with 16 channel monitor (M-520). Both are eight bus output. Features include 4 auxiliary sends assignable pre/post, 3-band EQ, 28dB of headroom available.

Model:	Dimensions:	Weight:	Price:
M-520	9.5x43x31.5	104 lbs	$5,995.00
M-512	9.5x31.5x31.5	84 lbs	$4,395.00

M-300B series consoles is a series of consoles with true dual applications for multi-track recording and/or sound reinforcement/performance uses. M-320B is 20-input, M-312B is 12 input, M-308B is 8-input. All are 4-group (bus) plus a separate stereo bus. The M-312B and M-320B have 5 auxiliary sends, the M-308B has 3. Features include fully balanced design with connectors for -10 or +4, 3-band EQ with 2 parametric.

Model:	Dimensions:	Weight:	Price:
M-320B	9x39.0x27.25	80 lbs	$3,995.00
M-312B	9x28.5x27.25	57.5 lbs	$2,995.00
M-308B	9x23.0x27.25	61 lbs	$1,995.00

3RD GENERATION

G1682 recording console has 16 mic/line inputs, 8 bus groups, stereo mix down, send/return on each channel, group and master section. Dimensions are 8x33x36, and weight is 70 lbs.

Price: $4,999.00

G162 sound reinforcement mixer has 16 mic/line inputs, 4 auxiliary sends, stereo output. Dimensions are 5.25x20.75x30.5, and weight is 38 lbs.

Price: $1,599.00

G102 sound reinforcement mixer has 10 mic/line inputs, 4 auxiliary sends, stereo output. Dimensions are 5.25x22x20.75, and weight is 29 lbs.

Price: $1,199.00

G62 sound reinforcement mixer has 6 mic/line inputs, 2 auxiliary sends, stereo output. Dimensions are 3x17x15, and weight is 15 lbs.

Price: $659.00

TRIDENT AUDIO USA

24 has 4-band high and low mid sweepable EQ with variable high pass filter, balanced mic and line inputs with separate gain controls and phase reverse, 8 auxiliary sends with pre-post switching in pairs, 24 sub-groups with direct mix assignment, 24 monitor/FX returns with 2-band EQ and fader reverse, 4 echo returns, stereo in place solo, auto muting bus, direct outputs and separate insert send and return on each channel, 48 V phantom power, talkback facilities, balanced outputs, 24-track metering, floor stand included.

Price: 28-24-24- $19,500.00 (With patch bay-$24,500.00)
      36-24-24- $22,800.00 (With patch bay-$28,500.00)
      44-24-24- $26,100.00
      52-24-24- $29,400.00

Series 75 has 4-band high and low mid sweepable EQ with variable high pass filter, balanced mic and line inputs with separate gain controls and phase reverse, 8 auxiliary sends with pre-post switching in pairs, 24 sub-groups with direct mix assignment, 24 monitor/FX returns with 2-band EQ and fader reverse, 4 echo returns, stereo in place solo, auto muting bus, 48 V phantom power, talkback facilities, balanced outputs, 24-track metering, 364 point patch bay on 28 input frame and 510 point patch bay on 40 input frame.

Price: $29,950.00 (28-24-24)
     $37,950.00 (40-24-24)
     $39,950.00 (36-32-32, special order)

Series 80B has 4-band high and low mid sweepable EQ with hi and lo frequency 2-position shelving and 50Hz-12dB per octave hi-pass filter. Other features include transformer balanced mic and electronically balanced line inputs with separate gain controls and phase reverse, 5 auxiliary sends with pre/post switching, 24 separate bus outputs with direct mix assignment, stereo in place solo, auto mute bus, channel mute, 4 echo returns with EQ 24 monitor/FX returns with 3-band EQ, fader reverse and remix assignment, console status routing for record-overdub and remix modes, 48 V phantom power, talkback facilities, full patch bay and stand.

Price: $52,950.00 (30-24-24)
     $73,950.00 (40-24-24)
     $94,950.00 (50-24-24)

Series 80C has the same features as above with 48-track monitoring and full EQ on returns.

Price: $64,950.00 (32-24-48)
     $82,450.00 (40-24-48)
     $99,950.00 (48-24-48)
     $117,450.00 (56-24-48)

Di-An is a digitally controled analog console with complete resetability available from 40-32-32 to 56-48-48 input/output configurations.

Prices available upon request.

Series 65-8 has 4-band high and low mid sweepable EQ with variable high-pass filter, balanced mic and line inputs with separate gain controls and phase reverse, 8 auxiliary sends with pre/post switching in pairs, 8 sub-groups with direct mix assignment, 16 monitor/FX returns, 8 with 3-band EQ, 4 echo returns, stereo in place solo, auto muting bus, direct outputs and separate insert send and return on each channel, group assignment allows 16 bus routing without patching, 48 V phantom power, talkback facilities, balanced outputs, 16-track metering.

Price: $11,000.00 (16-8-2)
     $13,800.00 (24-8-2)
     $16,600.00 (32-8-2)
     $19,400.00 (40-8-2)
     $22,200.00 (48-8-2)
     $25,000.00 (56-8-2)

Series 65-16 is the same as above except 16 sub-groups with direct mix assignment.

Price: $11,700.00 (16-16-2)
     $14,900.00 (24-16-2)
     $18,100.00 (32-16-2)
     $21,300.00 (40-16-2)
     $24,500.00 (48-16-2)
     $27,700.00 (56-16-2)

WHEATSTONE CORPORATION

3208 recording console has 12-48 mic/line inputs with LED level indicators, 12-48 outputs with VU meter level indicators, 4 effects sends, electronically balanced inputs and outputs, 3-band sweepable EQ, built-in patch bay, external power supply, modular construction.
Price: $10,000.00

3224 recording console has 12-48 mic/line inputs with LED level indicators, 12-48 outputs with VU meter level indicators, electronically balanced inputs and outputs, 4 effects sends, 3-band sweepable EQ with bypass and HPF, built-in patch bay, external power supply, modular construction.
Price: $10,000.00

MTX-1080 is a sound reinforcement console with 32-52 mic/line inputs with LED level indicators, 18 outputs with VU meter level indicators, 8 effects sends/electronically balanced inputs and outputs, 4-band variable EQ, 8 programmable meter presets, modular construction, external power supply.
Price: begins at $32,000.00

MTX-88 is a sound reinforcement console with 32-52 mic/line inputs with LED level indicators, 10 outputs with VU meter level indicators, 8 effects sends/electronically balanced inputs and outputs, 3-band variable EQ, modular construction, external power supply.
Price: begins at $27,000.00

MTX-40 is a sound reinforcement console with 24 mic/line inputs with LED level indicators, 7 outputs with VU meter level indicators, 4 effects sends, electronically balanced inputs and outputs, 3 variable EQ on all inputs, modular construction, external power supply.
Price: begins at $11,350.00

M-16 is a sound reinforcement console with 16-52 mic/line inputs with LED meter level indicators, 17 outputs with VU meter level indicators, 16 monitor sends, 4 band variable EQ on all inputs, 4 programmable mute presets, modular construction, external power supply.
Price: begins at $16,000.00

YAMAHA — *See our ad on page 23*

PM 1800 is available in 16, 24, 32, or 40 input channel mainframes. Features include 6 auxiliary mixing bus sends on each input channel, selectable pre/post fader assignment, 8 group buses, 8 master mute groups, mix matrix (8x4 sub-mix structure), 4 stereo auxiliary (FX) returns, balanced differential XLR inputs, electronically balanced XLR outputs, multi-point signal monitoring LEDs in each channel for input trim and EQ, in-place solo mode, talkback facilities, built-in multi frequency test oscillator/pink noise source, 13 VU meters switchable to monitor every bus in the console.
Price: $13,500.00 (16 channels)
$16,500.00 (24 channels)
$19,500.00 (32 channels)
$23,500.00 (40 channels)

MC802/1202/1602 is available in 8, 12, and 16 input configurations. Features include electronically balanced inputs, switchable pad, continuously variable input gain control, LED indication of within 3dB of clip, 3-band EQ with shelving of highs, sweepable midrange, shelving of lows, 3 independent auxiliary sends, headphone cue system, 3 VU meters, flexible talkback facilities.
Price: $845.00 (8 channels)
$1,095.00 (12 channels)
$1,295.00 (16 channels)

DMP7 is a digital mixing processor. The sampling frequency is 44.1kHz. Effect return and data entry faders are motorized and digitally controlled. All parameters from fader positions to effects and EQ settings, are programmed and stored in memory. Up to 30 complete system configurations incorporating over 200 parameters can be stored in memory. External RAM cartridges provide extra memories.
Price: $3,995.00

KM802 is a compact 8x2 keyboard mixer with 3 post-fader sends for channels 3-8, with stereo return for each. Channels 1 and 2 have high and low EQ and continuously variable input pad. Stereo headphone monitoring is provided with an independent front panel volume control.
Price: $325.00

KM602 is a compact 6x2 keyboard mixer. Channel 1 has a switchable input pad. Channels 1-4 have a built-in stereo chorus. Other features include post fader auxiliary send and stereo auxiliary return, color-coded position markers on the faders, peak LED clipping indicators, and stereo headphone monitoring.
Price: $225.00

MV802 is an 8x2 line mixer packaged in a 19-inch rack mount cabinet. 2 independent auxiliary submix sends with stereo returns provide compatability with outboard processors. 2 MV802s can be cascaded to provide a total of 16 inputs. Other features include both balanced XLR and unbalanced 1/4-inch phone-jack stereo outputs, capability for VCA control of master volume level with the optional FC-7 foot control.
Price: $445.00

EM series (1400, 1600, 1800) is a 4, 6, or 8 input powered mixer. Each channel has both high Z phone jacks and low Z XLR inputs. Maximum power output is 150 watts at 4-ohms with 0.5 percent THD at 20Hz-20kHz. Other features include LED clip indicators, switchable 20dB pad, 3-band EQ, master graphic EQ, auxiliary outputs and built-in reverb.
Price: $595.00 (1400)
$745.00 (1600)
$895.00 (1800)

ADDRESSES

Allen & Heath Brenell, USA, Ltd.
Five Connair Rd.
Orange, CT 06477

Altec Lansing Corporation
10500 W. Reno
Oklahoma City, OK 73128

Amek Systems and Controls
Total Audio Concepts
10815 Burbank Blvd.
N. Hollywood, CA 91601

AMR (Audio Media Research)
PO Box 1230
Meridian, MS 39301

Audio-Technica U.S., Inc.
1221 Commerce Dr.
Stow, OH 44224

Biamp Systems
14270 NW Science Park
Portland, OR 97229

Calrec by AMS
PO Box 31864
Seattle, WA 98103

Carvin Corporation
1155 Industrial Ave.
Escondido, CA 92025

Connectronics-Seck
652 Glenbrook Rd.
Stamford, CT 06906

DOD Electronics Corporation
5639 S. Riley Ln.
Salt Lake City, UT 84107

Electro-Voice, Inc.
600 Cecil St.
Buchanan, MI 49107

Fostex
15431 Blackburn Ave.
Norwalk, CA 90650

Furman Sound, Inc.
30 Rich St.
Greenbrae, CA 94904

Gotham Audio Corporation
1790 Broadway
New York, NY 10019-1412

Hill Audio, Inc.
5002 N. Royal Atlanta Dr. #B
Tucker, GA 30084

HM Electronics, Inc.
PO Box 261669
San Diego, CA 92126

Innovative Electronic Designs, Inc.
9701 Taylorsville Rd.
Louisville, KY 40224

Klark-Teknik Electronics, Inc.
30 S Banfi Plaza
Farmingdale, NY 11735

Mitsubishi Pro Audio Group
225 Parkside Dr.
San Fernando, CA 91340

Neve Incorporated
Berkshire Industrial Park
Bethel, CT 06801

Peavey Electronics
711 A St.
Meridian, MS 39301

Professional Sound Corporation
Audio Services Corporation
4210 Lankershim Blvd.
N. Hollywood, CA 91602

Ramsa Panasonic
6550 Katella Ave.
Cypress, CA 90630

Rane Corporation
6510 216th SW
Mountlake Terrace, WA 98043

Sennheiser Electronic
48 W. 38th St.
New York, NY 10018

Shure
222 Hartrey
Evanston, IL 60204

Solid State Logic
Begbroke
Oxford, England 0X5 1RU

Sony Professional Audio
1600 Queen Anne Rd.
Teaneck, NJ 07666

Soundcraft USA
8500 Balboa Blvd.
Northridge, CA 91329

Soundtracs
77 Selleck St.
Stamford, CT 06902

Spectra Sonics
3750 Airport Rd.
Ogden, UT 84405

Studer Revox America, Inc.
1425 Elm Hill Pike
Nashville, TN 37210

Tascam/Teac Pro Division
7733 Telegraph Rd.
Montebello, CA 90640

3rd Generation
431 Hwy. 165
Voluntown, CT 06384

Trident Audio USA
2720 Monterey St., Suite 403
Torrance, CA 90503

Wheatstone Corporation
6720 VIP Pkwy.
Syracuse, NY 13211

Yamaha Combo Division
6600 Orangethorpe Ave.
Buena Park, CA 90620

Equalizers

ADA SIGNAL PROCESSORS, INC.

MQ-1 is a programmable 2/3-octave stereo equalizer and has 99 memory selections and full MIDI implementation. MIDI technology includes System Exclusive for program and parameter control, system link-up for up and down loading program storage, MIDI program mapping, MIDI channel select, and exclusive MIDI addressable front panel security lock-out system. Other features are Constant-Q filtering, 12dB boost/cut on 2/3-octave ISO centers, 102dB minimum EIN, transformerless balanced inputs, battery backed memory, and LED intensity indicators for a visual indication of the EQ curve display.

Price: $699.95

AKAI PROFESSIONAL

EX85P is a 4-band equalizer with fixed shelving at 40Hz and 12kHz, and two fully parametric mid-bands. The fixed bands have 14dB of boost and cut, while the mid-bands have 18dB. Signal-to-noise is 85dB. The unit is 19-inch in length and 1/2 rackspace wide.

Price: $219.95

ALTEC LANSING CORPORATION

1651A Single Channel Octave Band Equalizer has ten minimum phase shift octave band filter sections, each with up to 12dB boost or cut. ISO center frequencies range from 31.5Hz to 16kHz. A variable 18dB per octave high-pass filter is also included. Dimensions are 3.5x19x11.25; weight is 12 lbs.

Price: $852.00

1652A Dual Channel Octave Band Equalizer has ten minimum phase shift octave band filter sections, each with up to 12dB boost or cut. ISO center frequencies range from 31.5Hz to 16kHz. A variable 18dB per octave high-pass filter is included on each channel. Dimensions are 3.5x19x11.25; weight is 13.25 lbs.

Price: $1196.00

1653A One-Third Octave Band Equalizer has 29 minimum phase shift one-third octave filter sections on ISO frequency centers ranging from 25Hz to 16kHz, 12dB of cut or boost is available in each band. Variable 18dB per octave high-pass and low-pass filters are included. Dimensions are 5.25x19x11.25; weight is 13 lbs.

Price: $1300.00

ART —*See our ad on page 10*

#171 Dual Two-Third Octave Equalizer. The electronics employ minimum phase shift active combining filters centered on 150 preferred frequencies. Switchable high pass filter. Active balanced inputs. Signal preset LED indicators.

#172 One-Third Octave Equalizer. The electronics employ minimum phase shift active combining filters centered on 150 preferred frequencies. Switchable high pass filter. Active balanced inputs. Signal preset LED indicators.

#173 Dual Two-Third Octave Equalizer, Balanced. Same features as #171 plus transformer balanced outputs.

#174 One-Third Octave Equalizer, Balanced. Same features as #172 plus transformer balanced outputs. Dimensions are (#171-#174) 3.5x19x6.25; weight is (#171-#174) 9 lbs.

Prices are: #171- $375.00
　　　　　　#172- $400.00
　　　　　　#173-174- $495.00 each

#270 Intelligent Equalizer w/Smartcurve™, Two-Third Octave. Fully programmable, digitally controlled, 120 memories. Smartcurve eliminates adjacent frequency filter interaction. Complete MIDI interface and control. Video output. Dimensions are 1.75x19x10.5; weight is 11 lbs.

Price: $595.00

#280 IEQ Satellite. Same performance features as #270 minus all front panel controls. Balanced input and output same as #270. Tamper proof satellite receives its commands via MIDI from #270 controller or appropriate synthesizer, sequencer or computer. Dimensions are 1.75x19x10.5; weight is 11 lbs.

Price: $395.00

ASHLY AUDIO, INC.

PQ-63 Mono 3-band

PQ-66 Stereo 4-band

PQ-68 Notch Filter (8 band)

These parametric equalizers can generate sharp curves to control feedback and resonances without audible side effects. Individual musical notes can be equalized if necessary. These models can also generate very broad shelving curves to trim frequency extremes with absolutely no ringing or ripple. Two models of 15dB cut/boost are available. The PQ-63 is a mono three-band, while the PQ-66 is a stereo unit with four bands per channel. The PQ-68 is a parametric notch filter which is used for feedback control. It features a built-in setup system to aid in tuning the narrow-band filters, and has the ability to cut the offending frequencies by up to 30dB.

Model:	Dimensions:	Weight:	Price:
PQ-63	1.75x19x6	8 lbs.	$399.00
PQ-66	5.25x19x6	12 lbs.	$699.00
PQ-68	5.25x19x6	12 lbs.	$649.00

GQ-215 Stereo 15-band

GQ-131 Mono 31-band

GQ-231 Stereo 31-band

Wein-Bridge filters, exhibiting true constant "Q" response with no broadening near the "flat" setting. Each GQ features custom metal-shaft faders with a saddle type knob. The GQ-215 offers two channels of 2/3-octave equalization and a fixed 40Hz subsonic filter. The GQ-131 is a mono 1/3-octave unit, featuring a subsonic filter tunable from 8Hz to 200Hz. The GQ-231 has two separate channels of 1/3-octave equalization with the same features as the GQ-131 on each. Each model in the GQ SERIES features switch-selectable cut or boost of either 6dB or 15dB. There is a three color LED level meter on both 31-band models.

Model:	Dimensions:	Weight:	Price:
GQ-215	3.5x19x6	10 lbs.	$495.00
GQ-131	3.5x19x6	10 lbs.	$539.00
GQ-231	5.25x19x6	15 lbs.	$989.00

AUDIO LOGIC

SC-31 Graphic Equalizer. Offers 31 1/3-octave, ISO centered frequency bands with 12dB of boost/cut or 6dB of boost/cut in a two rack space size. The unit features XLR, 1/4-inch r-t-s phone, and barrier strip connections, an LED level indicator, variable frequency high pass and low pass filters. Dimensions are 3.5x19x6.75; weight is 6 lbs.

Price: $499.95

SC-30 Graphic Equalizer. Offers two channels of 15 2/3-octave bands equalization. Each band has 12dB of cut or boost or a selectable range of 6dB of cut or boost in a compact two rack unit size space. The unit features XLR, 1/4-inch r-t-s phone, and barrier strip connections, an LED level indicator and variable frequency high and low pass filters. Dimensions are 3.5x19x6.75; weight is 6 lbs.

Price: $499.95

BIAMP SYSTEMS

EQ-220. Stereo 10-band graphic equalizer, ±12dB filter range, ±10dB gain range, peak indicators, balanced and unbalanced connections on 1/4-inch phone or RCA jacks, noise 90dBm, THD 0.01%, frequency response is +0, -1.0dB. Dimensions are 3.5x19x6; weight is 6 lbs.

Price: $329.00

EQ-230. Stereo 15-band graphic equalizer, 12dB filter range, 10dB gain range, tape loop-monitor system, metering, balanced-unbalanced barrier strip or XLR, 1/4-inch phone, and RCA connections, noise 90dBm, THD 0.01%, frequency response +0,-.2dB, ground lift, dimensions are 3.5x19x6; weight is 7 lbs.

Price: $549.00

EQ-290. 29-band, 1/3-octave graphic equalizer, 12dB filter range, 10dB gain range, Metering, high and low pass filters, Balanced and unbalanced barrier strip or XLR, 1/4-inch phone, and RCA connections, Noise 90dBm, THD 0.01%, fFrequency response +0,-.2dB, ground lift, dimensions are 3.5x19x6; weight is 7 lbs.

Price: $549.00

EQ-140. 4-band parametric equalizer, 16dB filter range,   -40dB notch, +2, -20dB gain range, peak indicators,0.1 to 5.5 octave Q range, balanced and unbalanced, XLR and 1/4-inch phone jacks, noise 80dBm, THD 0.008%, frequency response +0, -.1dB, ground lift, dimensions are 1.75x19x6; weight is 5 lbs.
Price: $399.00

CARVIN MFG. CORP. — *See our ad on page 21*

EQ2020 Stereo 10 band equalizer. Utilizes high quality active bandpass filters for accurate response and precise tuning over the octave range. It features 20Hz-20kHz frequency response, parametric high and low pass filters, 15dB boost/cut range, 104dB S/N (unweighted).
Price: $289.00

EQ2029 1/3-octave graphic equalizer. Has precision bandpass filters centered on standard ISO frequencies. Each band provides a full 15dB boost/cut per band without interaction between adjacent bands. It features high and low pass filters, ±1dB from 20Hz to 20kHz,0.01% THD, S/N 104dB (unweighted).
Price: $289.00

C-AUDIO

EQ30 Stereo 15 band graphic equalizer. Stereo level control, bypass switch, signal present LED, fitted with anti-tamper cover, input: 10k balanced and unbalanced, THD: 0.05%, 12dB cut and boost per band, integral 24dB per octave 20Hz sub sonic filter, maximum output: +15dB, maximum input: +15dB, noise: -70dB (eq flat).
Price: $1199.00

dbx PROFESSIONAL PRODUCTS DIVISION

905 parametric equalizer module has three variable-bandwidth EQ bands (LF, MF, HF) with wide MF overlap. Each EQ band has controls that vary the boost or cut by 15dB; the Q (width); and the frequency center. Each range has an "infinite" notch cut with an extremely narrow Q and ultimate suppression of more than -50dB. HF and LF bands have a switch for shelving the ends of the audio spectrum. A clip light shows overdriving (distortion) anywhere within the circuit. low band; 20 to 500Hz, middle band; 200 to 5kHz, high band; 800 to 20kHz. Dimensions are 5.25x1.5x9.5.
Price: $379.00

DOD ELECTRONICS CORPORATION

R 430 graphic equalizer is a dual channel 15 band graphic equalizer offering up to 12dB of boost and cut in a single rack space size. Bands are 2/3-octave ISO centered and are detented at "0dB." The unit has LED level indicators and a switchable low cut filter. XLRs available. Dimensions are 1.75x19x6.75; weight is 5.75 lbs.
Price: $319.95

R 431 graphic equalizer is a single channel, 31 band graphic equalizer offering up to 12dB of boost or cut in a single rack space size. The bands are 1/3-octave ISO centered and are detented at "0dB." The unit features an LED level indicator, a switchable low cut filter, and electronic in/out switching to eliminate transients. XLRs available. Dimensions are 1.75x19x6.75; weight is 5.75 lbs.
Price: $319.95

R 815B graphic equalizer is a single channel 15 band graphic equalizer offering up to 12dB of boost and cut. An LED level indicator and a switchable low cut filter are featured on this unit. The 15 bands are on 2/3-octave ISO centers and are detented at "0dB." XLRs are available. Dimensions are 3.5x19x6.75; weight is 5.75 lbs.
Price: $199.95

R-830 graphic equalizer is a dual channel, 15 band graphic equalizer with up to 12dB of boost or cut. Each channel has an LED level indicator, a switchable low cut filter, and input level control, and center detented sliders. Bands are 2/3-octave ISO centered and XLRs are available. Dimensions are 3.5x19x6.75; weight is 5.75 lbs.
Price: $299.95

R-831B graphic equalizer has 31 1/3-octave, ISO centered frequency bands with 12dB of boost or cut. The unit offers an LED level indicator, a switchable low cut filter and electronic in/out switching to eliminate transients. Sliders are long throw and are center detented at "0dB." XLRs are available. Dimensions are 3.5x19x6.75; weight is 5.75 lbs.
Price: $329.95

R-231 graphic equalizer is a two channel, graphic equalizer with 31 1/3-octave bands per channel. Each channel gives an LED level indicator, a switchable low cut filter, and 12dB of cut or boost per band. XLRs are optional. Dimensions are 3.5x19x6.75; weight is 5.75 lbs.

Price: $569.95

These equalizers share the following electronic specifications: Signal to Noise: greater than 90dBm; total harmonic distortion: less than 0.01%; frequency response: 18Hz to 22kHz, ±0.5dB.

ELECTRO-VOICE, INC. *— See our ad on page 3*

EVT 2230 is a 27-band, 1/3-octave graphic equalizer with ISO centered frequencies, ±12dB boost and cut, true combining filter action, switchable low and high pass filters, peak LED overload, low noise and distortion balanced inputs, floating balanced outputs, EQ in/out switch, overall gain controls, rack mount and cover included. Dimensions are 3.5x19x7; weight is 12 lbs.

Price: $642.00

EVT 2210 is a dual 10-band graphic equalizer. Preferred ISO centers, ±2dB boost and cut, peak overload LEDs, low noise and distortion, per channel in/out switch and rotary gain control. Rack mount package and cover included. Dimensions are 3.5x19x7; weight is 13 lbs.

Price: $474.00

EV 2710 is a 27-band, 1/3-octave graphic equalizer, employing Constant Range™ filters for minimal control interaction. Switchable pink-noise generator, variable 12dB/octave low pass filter, parallel XLR and barrier strip input and output connectors. Dimensions are 3.5x19x10.25; weight is 11.5 lbs.

Price: $900.00

FURMAN SOUND

GQ-31 is a compact 31-band single rack space graphic equalizer. Features include ±12dB of equalization, gain control, LED indicators for overload, EQ in, and power, as well as low cut button and ground lift switch. There is an optional balanced configuration. Dimensions are 1.75x19x8 inches, weight is 6 lbs.

Price: TBA

GQ-15 is same as GQ-31 except with two channels, each with 15 bands spaced at 2/3-octave intervals.

Price: TBA

SG-10 is a sweep graphic equalizer that combines graphic and parametric equalization. It has 10 bands, each with slider and frequency control. It may be used in 10-band mono or 5-band stereo modes. It includes input level controls, low cut filters, EQ in/bypass buttons, overload and EQ status indicators. It has both high and low level inputs and outputs. There is an optional balanced configuration. Dimensions are 3.5x19x8 inches, weight is 8 lbs.

Price: $395.00

PQ-3 is a parametric equalizer with three-band full parametrics with constant-Q equalization curves. Wide range of bandwidth and EQ adjustment: the latter from minus ∞ to +20dB. It includes input level control, EQ in button, as well as overload, EQ status, and power indicators. It has both high and low level inputs and outputs, allowing use as a preamp, optional balanced configuration. Dimensions are 1.75x19x8 inches, weight is 7 lbs.

Price: $321.00

PQ-6 is the same as the PQ-3 except two channel. Dimensions are 3.5x19x8 inches, weight is 9 lbs.

Price: $535.00

GOTHAM *— See our ad on page 16*

Neumann W 495B is a 3-band parametric equalizer with stepped controls, high and low frequency bands are shelving, mid band is variable Q peak or dip. Dimensions are 7.5x1.6x4.3 inches, weight is 2.09 lbs.

Price: $850.00

Neumann W 492 is a 5-band equalizer with continuously variable controls, low frequency cut off filter, high and low shelving controls and 2 mid band peak/dip controls. Dimensions are 7.5x1.6x4.3 inches, weight is 1.76 lbs.

Price: $735.00

Harmonia Mundi Acustica BW 102/21 is a 6-band digital equalizer with internal 32 bit floating point digital signal processing, interfaces to all digital formats. Dimensions are 5.25 high and 19 inches wide, weight is 22 lbs.

Price: $10,000.00

INDUSTRIAL RESEARCH PRODUCTS, INC.

DG-4017 TEQ™ Transversal Equalizer has 15 frequency controls, adjustable high pass filter, shelving filter with hinge points of 1, 2, 4, and 8kHz. ±10dB of boost or cut. No tuned filters to drift and ring. Minimum phase shift. Security panel. Dimensions are 1.75x19x10; weight is 12 lbs.
Price: $968.00

DG-4021 TEQ™ Transversal Equalizer has 29 1/3-octave frequency controls on ISO centers. 18dB per octave high pass filter selectable at 20, 40, or 80 Hz. 12dB per octave low pass filter selectable at 8kHz, 12kHz, or 20kHz. Switchable 10dB high frequency boost. Screwdriver slot controls. Security panel. Dimensions are 5.25x19x12; weight is 12 lbs.
Price: $982.00

DG-4022 TEQ™ Transversal Equalizer same as the DG-4021 but with rotary knob controls. Security panel optional. Dimensions are 5.25x19x12; weight is 12 lbs.
Price: $997.00

DG-4023 TEQ™ Transversal Equalizer same as model DG-4022 but with slider controls for a true graphic presentation. XLRs in addition to barrier strip. Security panel optional. Dimensions are 5.25x19x12; weight is 12 lbs.
Price: $1012.00

KLARK-TEKNIK

DN-27A Third Octave Equalizer 12dB cut and boost, 27 bands, LCR filters with precision ground ferrite cores, auto-bypass relay, 60mm faders, low noise, high slewing op amps, ±6dB gain control, ground lift, 5 year warranty. Dimensions are 5.25x19x8; weight is 17.86 lbs.
Price: $1050.00

DN-300 Third Octave Equalizer 12dB cut and boost, 30 bands, MELT circuit for zero drift of center frequency, metal shaft, oil damped faders, minimum phase, combining filters, variable high and low pass filters, auto-bypass relay, -90dBm equivalent noise, ground lift, 5 year warranty. Dimensions are 3.5x19x8; weight is 13.4 lbs.
Price: $995.00

DN-301 Third Octave Equalizer 15dB cut only, 30 bands, MELT circuit for zero drift of center frequency, metal shaft, oil damped faders, minimum phase, combining filters, variable high and low pass filters, auto-bypass relay, equivalent input noise -90dBm, ground lift, 5 year warranty. Dimensions are 3.5x19x8; weight is 13.4 lbs.
Price: $995.00

DN-332 Stereo 2/3-Octave Equalizer Subsonic filter and 16 bands with 12dB cut or boost per channel, minimum phase, combining filters, MELT circuit for zero drift of center frequency, metal shaft, oil damped faders, -90dBm equivalent input noise, ground lift, 5 year warranty. Dimensions are 3.5x19x8; weight is 13.4 lbs.
Price: $995.00

DN-360 Stereo Third Octave Equalizer. Subsonic filter and 30 bands of 6 or 12dB boost or cut per channel, MELT circuit for zero drift of center frequency, metal shaft, oil damped faders, minimum phase, combining filters, -90dBm equivalent input noise, ground lift, 5 year warranty. Dimensions are 5.25x19x8; weight is 15.6 lbs.
Price: $1625.00

LT SOUND — *See our ad on page 6*

PEQ-2 is a dual-channel, 4-band parametric equalizer with selectable peak/dip or shelving response on upper or lower bands, overall hard-wire bypass and individual bypass on middle two bands. The bandwidth is variable from 0.15 octave to 2 octaves. Dimensions are: 3.5x19x7.5; weight is 11 lbs.
Price: $595.00

PEQ-1 is a single-channel version of the PEQ-2. Dimensions are: 1.75x19x7.5; weight is 5 lbs.
Price: $349.00

ORBAN ASSOCIATES INC.

622B Parametric Equalizer. A two channel parametric equalizer with continuous, non-interacting control over center frequency, bandwidth, and amount of peak boost or cut. Four peaking bands per channel with "constant-Q" curves provide -40dB notching capability; individual channel and band in/out switches; GAIN control; overload lamp. Line-level balanced input and unbalanced output. Output can be balanced by addition of optional transformer. Also available in single channel as Model 622A. Dimensions are 3.5x19x5.2; weight is 10 lbs.
Price: $879.00

672A / 674A Graphic Parametric Equalizer. An 8-band reciprocal parametric EQ with convenient graphic-type controls. Continuously variable center frequency, bandwidth, and amount of boost or cut. Additional 12dB/octave high and lowpass filters tune continuously over 100:1 frequency range. Separate filter outputs from main EQ section allow filters to be used to effect electronic crossover function. Line level balanced input; unbalanced outputs can be balanced with optional transformers. Dimensions are 5.25x19x5.25.

Price: 672A- $689.00 (Weight is 11 lbs.)

Price: 674A- $1299.00 (Weight is 13 lbs.)

PEAVEY

EQ 31 1/3-octave equalizer is a 31 band graphic equalizer. Frequency Response; ±1dB 20Hz to 20kHz, distortion is 0.003% 20Hz to 20kHz, common mode rejection ratio; 36dB, input impedance; 20k ohms (balanced and unbalanced), output impedance; 100 ohms (unbalanced), 160 ohms (balanced), filter frequencies; 20, 25, 31.6, 40, 50, 63, 80, 100, 125, 160, 200, 250, 316, 400, 500, 630, 800, 1k, 1.25k, 1.6k, 2k, 2.5k, 3.16k, 4k, 5k, 6.3k, 8k, 10k, 12.5k, 16k, 20k.

Price: $349.50

EQ 215 stereo graphic equalizer is a dual 15-band 2/3-octave equalizer. Frequency Response; ±1dB 20Hz to 20khz, distortion; 0.003% 20Hz to 20kHz, common mode rejection ratio; 36dB, input impedance; 20K ohms (balanced and unbalanced), output impedance; 100 ohms (unbalanced), 100 ohms (balanced), filter frequencies; 25, 40, 63, 100, 160, 250, 400, 630, 1k, 1.6k, 2.5k, 4k, 6.3k, 10k, 16k.

Price: $359.00

RANE CORPORATION

GE 30 Interpolating 1/3-octave graphic equalizer provides constant-Q performance on and in between ISO centers. Switchable to either +12/-15dB boost/cut or 0/-20dB cut-only mode. Switchable for active direct or transformer coupled output, with both three-pin and barrier strip connectors. 60mm faders and sweepable high and low cut filters, along with security cover. Dimensions are 3.5x19x5.25; weight is 7.5 lbs.

Price: $749.00

GE 27 1/3-octave and GE 14 dual 2/3 octave graphic equalizers, both feature constant-Q performance with 45mm sliders, built-in high/low cut filters, auto balanced/unbalanced/floating input/output, hard-wire bypass, on/off relay, capacitors, all-steel construction, RFI filters. Dimensions are 3.5x19x8.5; weight is 9 lbs.

Price: $499.00 for either model

ME 30 1/3-octave and ME15 dual 2/3-octave MicroGraphic equalizers have same Constant-Q performance as GE 27/14 except with 20mm sliders. Auto balanced/unbalanced/floating 1/4-inch input/output, switchable 6dB or 12dB boost/cut mode, built-in sub/ultra/RFI filters, glass-epoxy PCBs with 1% resistors, 5% caps, all steel construction. Dimensions are 1.75x19x5.25; weight is 5 lbs. each.

Price: ME 30- $359.00; ME 15- $369.00

RE 27 and RE 14 Realtime Equalizers. These are a GE 27 and GE 14 equalizers with a built-in matching realtime analyzer, pink-noise generator and condenser microphone with 40ft. cable included. Three-color display yields 1dB accuracy. Dimensions are 3.5x19x11; weight is 11 lbs. each.

Price: RE 27- $849.00; RE 14- $749.00

PE 15 Parametric Equalizer and Notch Filter. Five independent parametric bands, each with four-octave frequency sweep range, bandwidth range from 1.5 down to .03 (1/30th) octaves for notch capability, and boost-cut range of +15/-20dB. Bands 1 and 5 have switchable shelving, all bands have their own bypass plus an overall bypass. Auto balanced/unbalanced three-pin and 1/4-inch connectors and 20dB gain for electric instrument applications. Dimensions are 1.75x19x5.25; weight is 5 lbs.

Price: $399.00

SP 15 Studio Parametric Equalizer and Notch Filter. Similar to the PE 15, except utilizes super-low-noise, low distortion ICs and low distortion poly proplyene capacitors to yield noise and distortion performance exceeding 16-bit digital recording specifications. Boost/cut range is +12/-15dB, overall gain is 12dB, THD less than .005%, IMD less than .002%, dynamic range over 120dB. Dimensions are 1.75x19x5.25; weight is 5 lbs.

Price: $599.00

AE2000P Real-Time Analyzer with Dual 10-Band Equalizer features Differential/Comparator analyzing circuit which has a measurement accuracy to within 0.1dB. System features Automatic or Manual Scan Mode, Auto Scan rate selection, Pink Noise generator with level control, and 100 LED Real-Time display. Standard Rack Mount. Dimensions are 5.25x19x11.25; weight is 16 lbs.

Price: $799.00

TG3044 third-octave dual channel equalizer. Two independent channels of EQ and switching; Sub-sonic filter, EQ defeat, loop input and pre-EQ loop. Differential Comparator balancing system for perfect matching of output to input. XLR and 1/4-inch phone for balanced or unbalanced operation. Smooth Q design for low phase-shift. Dimensions are 5.25x19x11; weight is 16 lbs.

Price: $689.00

SPECTRA SONICS

500 microphone/program equalizer is a compact, solid state device which provides curves at eight selectable frequencies with zero insertion loss. It is designed to work with our audio amplifiers and produces a gain for 40dB and has virtually no distortion. Dimensions are 1-15/32x3-19/32x2-7/8; weight is 14 ounces.

Price: $200.00

501 microphone/program equalizer provides high and low frequency reciprocal equalization. It is a passive network, that becomes an active feedback element in conjunction with our audio amplifiers. It has two independent controls. Dimensions are 1-15/32x3-19/32x2-7/8; weight is 11 ounces.

Price: $89.00

502 Microphone/Program Equalizer is a miniature equalizer designed for console panel mounting purposes. IN conjunction with our audio amplifiers, it provides 12dB boost or cut at 15 selected frequencies with separate controls. It features ability to provide shelving curves in selectable increments. Dimensions are 1-15/32x7.75x2-7/8; weight is 1.5 lbs.

Price: $296.00

SPECTRA SOUND

1000 Graphic Equalizer two channels offer unmeasurable distortion and the lowest noise, as well as versatile and simplified operation. A switchable infrasonic filter eliminates unwanted low frequencies. It features dual LED to indicate prior to overload. Dimensions are 3.5x19x8.5; weight is 6.25 lbs.

Price: $695.00

1500 graphic equalizer is a 27-band graphic equalizer with a constant input impedance level control, switchable boost and cut range and a bypass switch. Dimensions are 3.5x19x9; weight is 8.5 lbs.

Price: $750.00

STEVEN

PEQ-3300M 31 band 1/3-octave graphic equalizer. 2.31 band EQ, 1/3-octave fine resolution, frequency control centers 20Hz to 20kHz, peak LED indicator, range LED indicator, EQ range selector switch, high pass filter circuit insert switch, level control. Dimensions are 1.75x19x7.5; weight is 6 lbs.

Price: TBA

PEQ-3400 S dual 15-band 2/3-octave graphic equalizer. Frequency control centers 25Hz to 16kHz, peak LED indicators, dual equalization range LED indicators, dual EQ range selector switches, dual high pass filter circuit insert switches, dual level controls. Dimensions are 1.75x19x7.5; weight is 6 lbs.

Price: TBA

Teac EQA-30BL is a 10 band EQ with 15dB cut/boost. Spectrum display reads both channels or is switchable for left or right channels. Features are 2 way dubbing (with or without EQ) and while listening to another source. Unit incorporates pink generator, subsonic filter, EQ defeat, separate left and right level controls and a microphone input. S/N is 104dB, Frequency response is 10Hz to 100kHz ±1dB. Optional rack mount EQA-30RM. Dimensions are 55.2x17.14x11.6; weight is 12 lbs.

Price: $399.00

PE-40 is a 4 channel 4 band parametric equalizer. Separate controls are frequency, Q (band width), and gain (cut or boost). Specifications are: High freq. 800Hz to 16kHz, mid high 500Hz to 10kHz, mid low 200Hz to 4kHz, low 40Hz to 800Hz, ±1.5dB for all frequencies. Q-1.1 to 5. S/N is 83dB. Crosstalk is 70dB. THD is 0.015%. Dimensions are 3.5x19x9; weight is 10.5 lbs.

Price: $595.00

GE-20B 10-band/2-channel graphic equalizer is a 2-channel graphic equalizer with 10 straight-line controls per channel providing 12dB of peak-dip equalization at standard 1-octave ISO center frequencies; 31.5, 63, 125, 250, 500, 1k, 4k, 8k, 16kHz. Each channel has a separate pair of 12dB per octave cutoff filters, a 31.5Hz Hi-Pass and a 16kHz Lo-Pass. Each channel has its own Normal level, Overload indicators and Input level control. An EQ button on each channel lets you bypass the EQ circuitry for A-B comparisons. The unit utilizes front panel 1/4-inch phone type input and output Terminals as well as rear panel RCA type Terminals. Output signals are available from both front and rear jacks at the same time. Dimensions are 3.5x19x8.7; weight is 9.4 lbs.

Price: $295.00

3rd GENERATION

GQ10 Graphic Equalizer. 10 band stereo at one octave spacing, EQ defeat switches on each channel, +6dB gain controls on each channel, in/out front and rear. Dimensions are 3.5x19x4; weight 9 lbs.

Price: $695.00

UREI

535 graphic equalizer has two independent channels in a compact package. Ten ISO octave centered frequency bands from 31.5Hz to 16kHz. Linear controls calibrated in dB. Gain is variable from -10dB to +20dB. Overload indicator LEDs and EQ in-out switches. Balanced, transformer isolated outputs. Input; Balanced, bridging differential amplifier. Noise; 90 dBm (15.7kHz bandwidth) with all controls set flat, output terminated with 600 ohms. Dimensions are 3.5x19x8; weight is 9.5 lbs.

Price: $596.00

533 graphic equalizer is half of the model 535 equalizer, in a half-rack package. Balanced, transformer isolated output. Dimensions are 8.5x3.5x8; weight is 6.5 lbs.

Price: $436.00

537 1/3-octave graphic equalizer is a 27-band boost and cut LC circuit filters with 12dB of boost or attenuation on ISO center frequencies. Provides up to 20dB of gain. Overload LED and EQ bypass switch. Balanced, transformer isolated output. Dimensions are 3.5x19x8; weight is 11 lbs.

Price: $1096.00

539 1/3-octave room equalization filter set is a 27-band cut only filter with minimum phase true LC networks for smooth combining response. The unit has 12dB per octave high pass and 6 or 12dB per octave low pass band-end filters, EQ bypass switch, overload indicator LED, and front panel gain adjustment. Balanced, transformer isolated output. Dimensions are 3.5x19x8; weight is 11 lbs.

Price: $1196.00

546 dual parametric equalizer has two independent, four-band parametric EQ channels, switchable to provide one band channel. Reciprocal response curve in boost and cut. Filter sections have overlapping ranges. Balanced, transformer isolated output. Bandwidth continuously variable 1/4 to 4 octaves. Boost-cut continuously variable +15 to -15dB. Bypass switch on each section. Low band; 30Hz to 330hz, low-mid band; 110Hz to 1.2kHz, high-mid band; 390Hz to 4.2kHz, high band; 1.4kHz to 15kHz, low cut; 16Hz to 800Hz, high cut; 500Hz to 25kHz. Dimensions are 5.25x19x8; weight is 13 lbs.

Price: $876.00

565T "Little Dipper" filter set features two continuously variable end filters covering 20Hz to 20kHz range. Two continuously variable notch filters covering 20Hz to 20kHz with selectable bandwidth. Balanced output. End cut filters; 18dB per octave is 60dB per decade. Low cut; continuously tunable 20Hz to 200Hz. High cut; continuously tunable 2kHz to 20kHz, both controlled by calibrated tuning dial. Notch filters; two in set, continuously tunable from 20Hz to 20kHzwith calibrated dials with vernier fine tuning controls. Notch depth; 50dB minimum. Notch width; selectable 5%, 10%, or 50% of center frequency at -3dB points. Dimensions are 5.25x19x9; weight is 13 lbs.

Price: $1386.00

5547A graphic equalizer and 5549A room equalizer. 30 bands of 1/3-octave EQ. Low nois discrete circuitry hybrid modules. Unique tracking input and output controls for automatic headroom and noise optimization. Switchable, continuously variable low and high frequency end-cut filters. XLR, 1/4-inch and barrier terminals, transformer-iso-

lated outputs and electronically balanced inputs. Range of the 5547A is ±12dB at center frequency. Range of the 5549A is 0 to -15dB at center frequency. Dimensions are 3.5x19x9.2; weight is 9.5 lbs.

Price: 5547A- $849.00

     5549A- $897.00

VALLEY INTERNATIONAL, INC.

812 Maxi-Q a fully parametric 3-band equalizer. Each of the unit's 3 frequency bands features continuously variable frequency tuning over a 7-octave range. Each band may be selected to either peaking or shelving curves, or individually bypassed. Each band offers a "Q" (bandwidth control). The unit uses series filters to eliminate filter interaction and reduce noise and distortion usually developed in the summing stage. Dimensions are nominally 1.5x5.24; weight is 15 ounces.

Price: $420.00

WHEATSTONE CORPORATION

4200B stereo parametric equalizer has 4 bands each channel two 22Hz-3kHz bands, one 100Hz-10kHz and one 180Hz-21kHz band; each with ±16dB boost/cut range, variable bandwidth from 1/6 to 2 octaves. Includes peak clip LED overload system, individual and master in/out switching, master gain control. It accepts balanced or unbalanced inputs (+22dB max); output is +20dBm (available w/optional balancing transformers). Frequency response: 20Hz-100kHz, ±.5dB; THD: .005% 20kHz BW; Dynamic range: 110dB 20kHz BW. Dimensions are 3.5 inches rackmount.

Price: $729.00

4100B mono equalizer is a single channel(mono) version of the 4200B. It includes additional high gain preamp input, allowing use as an instrument preamp. Frequency response: 20Hz-100kHz, ±.5dB; THD: 0.005% 20Hz BW; Dynamic range: 110dB 20kHz BW. Dimensions are 1.75 inches rackmount.

Price $415.00

2700B graphic equalizer is a single channel graphic equalizer w/ISO filter centers from 40Hz to 16kHz (±12dB boost/cut range); built-in continuously variable HPF. It accepts balanced or unbalanced input (+22dB max), front panel input level control included; output is +20dBm (available w/optional balancing transformer); all XLR terminations. A cut-only version (Model 2700C; -16dB cut) is available. Frequency response:30Hz-100kHz, ±.5dB; THD: .003% 20 kHz BW; Dynamic range:110dB 20kHz BW. Dimensions are 3.5 inches rackmount.

Price: $850.00

YAMAHA — *See our ad on page 23*

GQ1031B Graphic Equalizer offers a full 12dB cut or boost at any of 31 points, which are centered at ISO 1/3-octave frequencies from 20Hz to 20kHz. The channel features 31 separate active filters, and a summing network that smoothly combines the filters with minimum phase shift. Since the equalizer uses all active circuitry, there is no insertion loss, and no chance of inductive noise pickup. Other features include unbalanced (1/4-inch phone jack) and balanced (XLR) inputs and outputs. Dimensions are 1.75x19x8.75; weight is 6.6 lbs.

Price: $325.00

Q1027 Professional Series 1/3-Octave Equalizer provides 12dB of boost or cut at each of 27 points, which are centered at ISO 1/3-octave frequencies from 40Hz to 16kHz. Equalization is accomplished with 27 separate active peaking filters and a summing network that smoothly combines the filters with minimal phase shift. This unit is a true graphic equalizer whose 27 boost/cut sliders physically outline whatever frequency response curve they are creating. The output remains muted for approximately 3 to 5 seconds after power is switched ON, preventing turn-on transients or "thumps" from reaching the amplifier and speaker system. The input and output have both unbalanced and balanced 1/4-inch phone and XLR jacks. Dimensions are 3.7x19x12; weight is 17.6 lbs.

Price: $995.00

Q2031 Dual Channel 1/3-Octave Equalizer offers up to 6 or 12dB of cut or boost at any of the 31 ISO 1/3-octave frequencies from 20Hz to 20kHz. Each channel features 31 separate active filters, and a summing network that smoothly combines the filters with minimum phase shift. Each channel features electronically balanced, low impedance inputs and outputs using XLR type connectors. In addition, unbalanced, high-impedance inputs using 1/4-inch phone jacks are included for compatibility with all types of equipment. Octal sockets are provided for the installation of audio transformers when input isolation is necessary. Dimensions are 3.5x19x11.75; weight is 11.2 lbs.

Price: $625.00

Supplemental Signal Processors

ADA SIGNAL PROCESSORS, INC.

2FX digital multi-effects can produce two effects at once. There are separate controls for each effect: flanger, chorus, and digital delay. The flanger or chorus can be used simultaneously with the delay or repeat hold function. The "Patch Switching System" adds the flexibility of selecting the position of the effects in the signal processing chain. Other features include over one second of delay at 17kHz bandwidth, 10-to-1 sweep range (flanger), and a one year parts and labor warranty. DM-2 Footswitch Controller is optional.

Price: 2FX- $599.95

   DM-2- $119.00

Pitchtraq programmable pitch transposer produces all harmonizing effects within a two octave range, including harmony lines, octave shifts, synthesized textures, de-tuned chorusing, and harmonic alteration. An on-board computer allows full programming of 16 effects, including sweeps, mix, regeneration, and pitch change. In addition, ADA has loaded 16 "shadow" programs into constant memory which may be recalled at any time. Other features include 15kHz frequency response, an LED readout which displays pitch change in cents, ratio, or standard musical interval, and a self-diagnostic program which checks the unit during power-up.

Price: Pitchtraq- $599.00

   DS-4 (Footswitch)- $139.00

ALTEC LANSING CORPORATION

1620A feedback suppressor senses howlback as it begins and instantly and automatically shuts down the sound system for just a fraction of a second, only long enough to stop the feedback, then restores the sound to a point slightly below the previous operating level. Dimensions are 1.75x19x8; weight is 5 lbs.

Price: $1352.00

APHEX   *— See our ad on page 29*

Aural Exciters (various versions) work by generating additional program related harmonic detail instead of trying to equalize what is no longer there. Aphex II-Studio 201 and Broadcast 301 offer any mixture of odd and even harmonics which can be selected to interact with the program material. Commencement of harmonic generation is tunable from 700Hz to 7kHz. IM is 0.05% at maximum input and output. Frequency response is from d.c.to beyond 60kHz ± 0.25dB. Noise is 110dB below the maximum output. Features include jumper selectivity to operate at -10, 0, +4, +8dB. Dimensions are 3.5x19x6; weight is 19 lbs.

Price: $1995.00

Type C Aural Exciter 103 is a cost effective version for home and PA use. Dimensions are 1.75x17x6; weight is 6 lbs.

Price: $299.95

Type E Aural Exciter 110 is the Entertainer Exciter- 1/2 rack size, with mic and line input and output. Single channel operation. Dimensions are 1.75x8.5x8; weight is 4 lbs.

Price: $199.00

AUDIO LOGIC

PA-88 psychoacoustic processor uses 180 phase cancellation, narrow band delays and indirect frequency pre-emphasis to create a side-chain interference signal, restoring the natural presence to the original signal. The unit has two independent channels and four operating modes to optimize its operation to the program material. Dimensions are 1.75x19x6.5; weight is 5.2 lbs.

Price: $299.00

MT-44 quad noise gate is a four channel noise gate in a single rack unit space. Release time, threshold, and range are user controllable. Each gate has side chain access and keying ability. dbx VCAs are used, offering wide versatility for multiple applications. Dimensions are 1.75x19x6; weight is 4.5 lbs.

Price: $349.00

BGW SYSTEMS INC.

SPA-1 signal processing power amplifier is a subwoofer amplifier. Low frequency, 1200 watts bridging 4 ohms; precision digitized attenuators, 24dB per octave crossovers, parametric equalizer, high performance active balanced input. Dimensions are 5.25x19x13.7; weight is 41 lbs.

Price: $1949.00

SPA-3 Signal Processing Power Amplifier (3-Way) is a three channel system, MF and HF 250 watts at 8 ohms. LF 250 watts at 8 ohms, precision digitized attenuators, adjustable high pass filter, parametric equalizer, two adjustable delays, magnetic circuit breaker. Dimensions are 5.25x19x13.1; weight is 43 lbs.

Price: $2499.00

dbx PROFESSIONAL PRODUCTS DIVISION

14/10 computerized equalizer/analyzer 14 frequencies controllable; 31.5, 45, 63, 90, 125, 180, 250, 360, 550, 1kHz, 8kHz, 16kHz (one per octave above 1kHz, narrower than one per octave below 1kHz for EQ of problematic bass). 10 microprocessor memory banks, with averaging capability. Real-Time Analyzer with display of either channel or both, at two response speeds, for either line input (program) or room (mic). Calibrated microphone included. Constant-Q filters for accurate dB boosts and cuts. Control range ±12dB. Lab-quality pink-noise generator (20Hz-20kHz ±0.5dB) utilizes dbx software for 15-40 sec. automatic equalization, establishing flat response. (EQ accuracy ±1dB or less.) Dynamic range 120dB. S/N ratio 103dBv A-wtd. THD and IMD 0.03%.

Price: $1299.00

902 de-esser module "smart" de-essing operates independently of the input level, with no threshold to set. The user may choose conventional broadband attenuation or attenuate only the necessary portion of the HF range. Controls govern the amount of gain reduction as well as the frequency above which excessive HF energy shows gain reduction 0-20dB.

Price: $359.00

263X de-esser single-slider action lets you quickly set the exact amount of sibilance reduction by ear with visual confirmation from LEDs. A knob-adjustable sensitivity control targets specific sibilance frequencies and a pushbutton selects between High Frequency for performance or recording use and Broadband for mixing. Line inputs and outputs on the rear panel interface with mixers and consoles. A 1/4-inch input on the front panel with individual trim control allows high-impedance mics to be plugged directly into the 263X.

Price: $149.00

463X noise gate uses a single slider with LEDs to allow quick setting by ear of the amount and intensity of gating. An adjustable knob lets you set the threshold point where gating occurs. The gating characteristics can be instantly altered, letting you fix the noisiness and overall sound of the program material. A "Key" input allows special applications like frequency-sensitive gating and instrument synching in overdub situations. The stereo-strapping option enables two 463Xs to become a master/slave stereo pair.

Price: $149.00

904 noise gate module uses threshold and ratio controls, along with adjustable attack and release rates, which permit unusually flexible parameter settings. An attenuation limit control lets you vary the maximum amount of gain reduction, while the KEY mode allows gating of one instrument by another. The Programmed Latch Mode (PLM) circuit provides automatic threshold-programmed unmuting of solo channels, keeping out spurious noises until the solo starts, at which time the gate opens and stays open. A 10-LED display monitors gain reduction over a 60-dB range.

Price: $359.00

EVENTIDE

SP2016 effects processor/reverb full stereo, 20kHz bandwidth, 24 standard special effects programs, up to 64 user programmable presets, optional programs including channel vocoder, automatic panner and stereo synthesis, optional MIDI interface. Dimensions are 3.5x19x12.5; weight is 20.5 lbs.

Price: $6895.00

H969 ProPitch Harmonizer® has delay and pitch change presets, front panel preamplified input, flanging, dopler modes, reverse audio, repeat and more. Dimensions are 3.5x19x12; weight is 16.5 lbs.

Price: $4500.00

H949 Harmonizer features pitch change (one octave up, two down) delay, flanging, reverse audio, repeat, time reversal, random delay and time compression capability. Dimensions are 3.5x19x11.75; weight is 16.5 lbs.

Price: $3500.00

FURMAN SOUND

QN-4A is a quad noise gate with four identical, independent noise gate channels. Each features threshold, release, and depth controls, with 'Channel On' indicator. Key input jacks are provided for special effects. It employs low distortion pulse-width modulation (150kHz clock rate). Optional balanced configuration. Dimensions are 1.75x19x8; weight is 7 lbs.

Price $399.00

KLARK-TEKNIK

DN-60 third octave analyzer same frequencies as equalizers, internal pink noise, average or peak response with peak hold, 3 non-volatile memories in DN-60, averages up to 32 third octave curves, precision condenser mic included, 3 year warranty. Dimensions are 5.25x19x10; weight is 15.6 lbs.

Price: $3550.00

ROCKTRON CORPORATION   — *See our ad on page 2*

Effects for the guitar player

RX2H exciter/imager is a psychoacoustic processor which enables the user to add brightness, clarity, definition and intelligibility to audio signals. Features include a unique phase mode, which provides both frequency enhancement and phase notching. The unit will not increase noise when processing. It features HUSH II noise reduction. Dimensions facilitate standard rack mounting.

Price: $550.00

Powerplay deluxe GP is a multi-effects unit, providing digitally controlled footswitching for pre-set sounds including distortion, echo, ambience, chorus and exciter. The unit also includes automatic compression and HUSH II noise reduction. Standard 19-inch rack mount width.

Price: $799.00

Prochorus is a multi-tap delay chorus stereo processor. Six discrete time delays are assignable to left mix, right mix, center, or off. This allows up to 4095 possible combinations of tap assignments. The unit provides pitch shifting an effect similar in sound to a "harmonizing" type device.

Price: $449.00

UREI

501 sub-sonic processor is a two channel high-pass filter for removing infra-audible signals from audio program material. Two identical channels. 18dB per octave slope. Maximum output is 5 volts RMS. Distortion is 0.1% at maximum output in passband. Dimensions are 5x4.25x2.25; weight is 1.4 lbs.

Price: $99.00

562 feedback suppressor has two independently adjustable notch filters. Narrow notches for minimum sound coloration. Built in peak clipper for setup safety. High-cut and low-cut filters. Headroom indicator. Distortion is .5% THD, 30Hz-15kHz at maximum rated output. Input and output are on the rear panel barrier strip and 3-pin XLR connectors. Power through 3-wire IEC style connector. Dimensions are 1.75x19x9.75; weight is 9.5 lbs.

Price: $696.00

567 P.A. processing system contains four sweep frequency feedback suppressor notch filters, ten band graphic EQ, pink noise generator, tunable electronic crossover with level controls, and LED headroom indicator. Setup is done from front panel switches. Protection timer waits seconds after turn-on. Balanced, transformer isolated output. Headroom indicator; Four LEDs indicate 0, -10, -20dB relative to overload monitored at all critical circuit points. Graphic EQ; Ten one-octave bands. Center frequencies; Standard ISO octaves from 31.5Hz to 16kHz. Dimensions are 3.5x19x9.75; weight is 10 lbs.

Price: $936.00

950 ANCA is an ambient noise controlled amplifier. Continuously active expander precisely tracks environmental noise level and automatically adjusts system level up to 20dB past preset minimum. Controlled response time catches major noise changes yet avoids pumping or breathing. Controls are located on the front panel (screwdriver adjustments) behind security cover. LED indicators; power on and expansion disable. Dimensions are 3.5x19x7.5; weight is 9 lbs.

Price: $1096.00

WHEATSTONE CORPORATION

1500B notch filter system has five identical filter sets, each continuously variable from 52Hz-7.3kHz (0 to -16dB cut); 1/6-octave bandwidth (1/10-octave optionally available). It includes peak clip LED overload system, individual and master in/out switching. It accepts balanced or unbalanced input (+22dB max); output is +22dBm (available w/optional balancing transformer). Frequency response is 20Hz-100kHz, ±0.5dB, THD is 0.007% 20kHz BW; Dynamic range is 105dB,9 20 kHz BW. Dimension is 1.75 rackmount

Price: $387.00

ADDRESSES

ADA Signal Processors, Inc.
730 3D Edgewater Dr.
Oakland, CA 94621

AKAI Professional
IMC
1316 E. Lancaster St.
Ft. Worth, TX 76102

Altec Lansing
10500 West Reno Ave.
PO Box 26105
Oklahoma City, OK 73126

Aphex Corporation
13340 Saticoy St.
N. Hollywood, CA 92705

Applied Research and Technology
215 Tremont St.
Rochester, NY 14608

Ashly Audio, Inc.
100 Fernwood Ave.
Rochester, NY 14621

BGW Systems, Inc.
Box 5042
Hawthorne, CA 90251-5042

Biamp Systems, Inc.
PO Box 2160
Portland, OR 97208

Carvin Corporation
1155 Industrial Ave.
Escondido, CA 92025

C-Audio
Celestion International
Kuniholm Dr.- Box 521
Holliston, MA 01746

dbx Professional Products Division
71 Chapel St.
Newton, MA 02195

DOD
Audio Logic
5639 S. Riley St.
Salt Lake City, UT 84102

Electro-Voice
600 Cecil St.
Buchanan, MI 49107

Eventide, Inc.
One Alsan Way
Little Ferry, NJ 07643

Furman Sound
30 Rich St.
Greenbrae, CA 94904

Gotham Audio Corp.
1790 Broadway
New York, NY 10019-1412

Industrial Research Products
321 Bond St.
Elk Grove Village, IL 60007

Klark-Teknik
30 B Banfi Plaza
Farmingdale, NY 11735

LT Sound
Dept. D-2
PO Box 338
Stone Mountain, GA 30086

Orban Associates, Inc.
645 Bryant St.
San Francisco, CA 94107

Peavey Electronics Corp.
711 A St.
Meridian, MS 39301

Rane Corporation
6510 216th SW
Mountlake Terr., WA 98043

Rocktron Corporation
1633 Star Batt Dr.
Rochester, MI 48063

Soundcraftsmen
2200 So. Ritchey
Santa Ana, CA 92705

Spectra Sonics
Spectra Sound
3750 Airport Rd.
Ogden, UT 84405

Steven
LP Music Group
160 Belmont Ave.
Garfield, NJ 07026

Teac Corp. of America
Tascam
7733 Telegraph Rd.
Montebello, CA 90640

3rd Generation
431 Hwy. 165
Voluntown, CT 06384

UREI
JBL Professional
8500 Balboa Blvd.
Northridge, CA 91329

Valley International, Inc.
Box 40306, 2817 Erica Pl.
Nashville, TN 37204

Wheatstone Corporation
6720 VIP Parkway
Syracuse, NY 13211

Yamaha
PO Box 6600
Buena Park, CA 90622

Classified

Closing date is the
first of the
second month
preceding the date of
issue.

Rates are $1.00 per
word with $25.00
minimum. Boxed ads
are $40.00 per column
inch. db Box Numbers
are $8.50 for wording
"Dept. xx" plus $1.50
for postage and
handling.

Discounts   3x—15%
6x—30%.

ALL CLASSIFIEDS
MUST BE PREPAID.

Send copies to:
db The Sound
Engineering Magazine
1120 Old Country Rd.
Plainview, NY 11803
att: Classified Dept.

The db Index

Each index is $7.50 plus $1.00 to cover postage.

Please check the appropriate box(es):

☐ 1967-1975

☐ 1976-1985

Amount enclosed_____

NAME_____

ADDRESS_____

CITY_____STATE_____ZIP_____

VISA/MC [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

EXPIRY DATE_____ SIGNATURE_____

Now there is a complete
listing of all articles and
columns cross indexed
by Title, Author, and
Subject Matter.

1986
1980
1975
1970
1967

People, Places... & Happenings

Mitsubishi Pro Audio Group announces the appointment of **David J. Langford** as General Manager for its manufacturing/engineering division in San Fernando, California. David will oversee all manufacturing and engineering operations of the Quad Eight/Westrex division. For the past seventeen years, prior to joining MPAG, David has held manufacturing and engineering positions with Neve Electronic Holdings of Cambridge, England. According to Tore Nordahl, President of Mitsubishi Pro Audio Group, David will be charged with the reorganization and streamlining of these operations in order to prepare for the projected manufacturing output of console and film system products in 1987. David has also been appointed as a member of the Executive Committee.

Sony Professional Audio has appointed **Cary Fischer** director of market development for digital audio products, **Jerry E. Smith**, divisional vice president announced. Mr. Fischer will be responsible for planning and implementing sales and marketing programs for DASH-format recording systems and other professional digital audio products. Mr. Fischer comes to Sony from Mitsubishi Pro Audio Group where he was director of U.S. sales and technical services, and will now be headquartered in Burbank, California.

A Tidbit From **Tascam**: In Montebello, California, The Tascam division of the Teac Corporation of America chose **Star Case** to build a case for their new $40,000 ATR 80 24-track tape recorder. The Ultra Star case with a ramp was completed quickly and shipped to Tascam in California. On a factory demo at **Lion's Share Recording Studios** in Los Angeles (owned by **Kenny Rogers**), the ATR 80 was accidentally dropped six feet on its corner, from off a truck. The recorder without its case weighs over 440 lbs. The case

and the recorder lived (incidentally, it still performed to factory specifications upon testing it!) A Star touring jacket goes out to **Greg Hildebrand** (from Tascam) for this great Star Case survival story.

Master Sound Astoria is further broadening its capabilities both for digital/analog recording and in audio post-production, it is announced by MSA co-owners, Ben Rizzi and Maxine Chrein. MSA recently installed **Digital Creations' Moving Fader Automation System.** The system has inherent sonic capabilities and incorporates advantages previously known only to the VCA System. In addition, MSA has developed an interformat Patch Bay facilitating the transfer of material completely in the digital format. **David Browning,** formerly of **Regent Sound,** will head up MSA's post-production division. Browning has extensive experience in audio post work, having worked with numerous TV stations and recording artists. The completion of MSA's post-production area with the addition of Sony's new 1-inch Video machine with digital audio marks the second phase of the studio's growth.

Alpha Audio announced the opening of its expanded facility at 2049 West Broad Street in Richmond, Virginia. An extensive renovation was performed on the building currently housing the Acoustics and Automation divisions of the company, effectively doubling the size of Alpha Audio's operations in these areas. **Nick Colleran,** president of Alpha Audio, felt it necessary to add more space in order to meet the increased demands from acoustics and BOSS sales. Colleran also noted that increased visitor and client traffic was a reason for expansion; part of Alpha Audio's philosophy is strong support, and the clients feel better knowing that they have the physical plant to back up sales and sales goals.

Tom Lanik announced the formation of **North Star Audio Video Corporation** in Stamford, Connecticut. The new company will be principally involved in sales, and service of major professional audio gear to recording and broadcast facilities. Additional markets will include video production and post-production centers and commercial sound installations.

The Magnetic Tape Division of **Ampex Corporation's** six year old pack-out program with **Studer-Revox America Inc.,** Nashville, Tennessee, has been expanded to include the new 1/4-inch Studer A807 analog recorder. Since 1981, every 1/4-inch, 1/2-inch and 1-inch Studer A80 and A800 analog recorders have been packaged with a reel of **Ampex Grand Master 456 Audio Mastering Tape.** In Europe, Ampex has reached an agreement with Studer International AG to package a precision reel of Ampex 467 Digital Audio Mastering Tape, and a companion empty precision reel, with every Studer 820D 1/4-inch digital recorder delivered.

A&M has received the first **Neve Focusrite** console modules on the West Coast. In August, A&M opened its new Studio A, with other major rennovations now nearing completion. **Audio Intervisual Design,** the West Coast Focusrite representatives, delivered the new modules in January. The Focusrite modules incorporate miniaturization of extremely high performance transformers. The low source impedance of the output and the floating winding achieve independence of load and grounding. The result allows great studio flexibility while achieving a unique warmth. In addition to the Focusrite modules, AID has supplied A&M with Sony digital multi-tracks and Lynx synchronization modules.

Space Logic Design Consultants have announced their new association with architect **Alan Gordon Morris** to offer a studio interior design service under the joint working name of **Morris/Logic Architects and Designers**. They are offering high profile interior design, working with materials and components which are associated with advanced technology. Raised floors, energy-efficient lighting, stainless steel trunking and special glass panelling, are a few of the possibilities. Morris/Logic is developing special material surfaces which offer sound control as well as being visually interesting. The service is aimed at working directly with clients on professional and home studios, but would also back-up existing studio design teams where a high degree of aesthetic consideration is necessary.

Cetec Gauss, manufacturer of musicassette high-speed tape duplicating systems and equipment and professional loudspeakers, has announced the promotion of **James R. Williams** to president. Williams, who joined Cetec Gauss in 1978, has been vice president and general manager.

Williams has more than twenty years experience in all phases of the tape duplicating industry.

Tannoy Limited, manufacturers of high-quality speaker systems, has appointed **Ed Form** as Director of Engineering, responsible for all loudspeaker development and production engineering. Mr. Form takes over this responsibility from **Alex Garner**, Technical Director, who at the same time will assume direct responsibility for the marketing and engineering of Tannoy's public address and security products.

The newest form of music reproduction, **DAT**, received what may be the world's first broadcast on May 31, 1987, over WFMT radio (98.7 FM) in Chicago. Participating in this historic event were **John Briesch**, president of the **Sony Consumer Audio Division**; **Len Feldman**, senior editor of **Audio Magazine**; **Mr. Tom Jung**, president of **Digital Music Products, Inc. (DMP)**; and **Gary Shapiro**, vice president of legal affairs for the **Electronics Industry Association (EIA)**.

Douglas Finch Dickey, a key figure in the professional audio industry and senior executive at **Solid State Logic**, died on August 8, 1987, age 35, after a long illness. For over ten years Doug played a major role in SSL's development and success, first as head of SSL's professional audio team in the USA, and subsequently became increasingly involved in product specification and design. He was part of the team responsible for the SSL Stereo Video System, which has become a major influence in the production of audio for stereo television. More recently he helped guide SSL's move into the motion picture industry, and was involved in panel design and software interfaces for SSL's first digital system. He became Vice President for Design Communications in 1983 and moved from Washington D.C. to SSL's headquarters in Oxford, England in May 1986.

Now Available!

Introduction to Professional Recording Techniques by Bruce Bartlett

The collection of "Recording Techniques", as published in db Magazine

Written for novices to intermediate recording engineers, professional producers and musicians, and dedicated hobbyists, this book features the latest in recording equipment and techniques to enable you to capture a musical performance and reproduce it with quality sound for the enjoyment and inspiration of others.

Send orders to db Magazine, 1120 Old Country Road, Plainview, NY 11803

Subjects Covered:

- The Recording and Reproduction Chain
- Simple Home Recording
- Setting Up the Studio
- Microphone and Microphone Technique
- Control Room Technique
- On Location Recording
- Judging the Recording

To order your copy of INTRODUCTION TO PROFESSIONAL RECORDING TECHNIQUES, send $22.95 plus $2.00 pp. (Check or money order, U.S. funds only.)

I want Introduction to Professional Recording Techniques. I've included $22.95 + $2.00pp by check or credit card

Name_____

Address_____

City_____

State_____**Zip Code**_____

VISA/MASTERCARD SIGNATURE REQUIRED

Expiry date____ ____ ____

Signature_____

Focused.

The US690 mic puts N/DYM™ technology on the podium. Now, the most powerful innovation in dynamic microphones is available for commercial sound applications. The revolutionary N/DYM magnetic assembly means up to six dB more output—plus smooth, crisp, open sound and outstanding voice reproduction.

Typical problems of a podium mic are eliminated by the unique features of the US690. A well controlled supercardioid pattern ensures better directivity and less feedback, producing better sound in noisy environments. An effective hum-bucking coil cancels hum from lighting and other sources. Handling and mechanical noise are reduced by an effective shock mount and noiseless gooseneck. And mounting is easy with the choice of a flange mount or XLR connector.

In short, the US690 is focused on a broad range of applications where you want—and need—to be heard.

The US690—pro quality in commercial sound available only from:

University Sound.
a MARK IV company
600 CECIL STREET
BUCHANAN, MICHIGAN 49107
(616) 695-6831