Profile:
Jazz Guitarist
Pat Metheny

MODERN RECORDING & MUSIC

ICD 08560
$1.75

VOL. 6 NO. 6
MARCH 1981

Recording With GRACE SLICK

PRACTICAL ELECTRICAL

LAB REPORTS:

ATD 524 Two-Channel Bi-Amplifier

Superex Gem 7 Parametric Equalizer

Vector Research VCX-600 Cassette Recorder

HANDS-ON REPORT:

Yamaha F1040 Frequency Dividing Network

NOTES:

Evaluating Guitar Tuners

NEW PRODUCTS
RECORD REVIEWS

New realms of expression from MXR.

The Pitch Transposer is MXR's newest addition to our professional line. It is one of our most innovative products, and possibly the most revolutionary signal processor in the music industry today. It is a unique, high-quality unit which provides a cost effective and flexible package for today's creative artists.

The Pitch Transposer extends your musical boundaries by creating live instrumental and vocal harmonies. It has 4 presets which allow the artist to predetermine the intervals to be processed. Transposed intervals can be preset anywhere from an octave below to an octave above the original pitch. The chosen interval is activated by means of touch controls or a rugged footswitch. LED indicators display which of the four presets has been selected.

A mix control is provided, enabling the unit to be used in one input of a mixing console, or with musical instrument amplifiers. A regeneration control provides for the recirculation of processed signals, creating more and more notes, depending upon the selected interval. This results in multitudes of voices or instrumental chords. An entire new range of sound effects and musical textures, unattainable with any other type of signal processor, is suddenly at your fingertips.

With many other pitch transposition devices a splicing noise, or glitch, is present. The MXR Pitch Transposer renders these often offensive noises into a subtle vibrato which blends with the music, and is, in some cases, virtually inaudible. The result is a processed signal which is musical and usable.

We have been able to maintain a high level of sonic integrity in this most versatile signal processor. The frequency response of the processed signal is beyond 10 kHz, with a dynamic range exceeding 80 dB.

A micro computer based display option allows the user to read the created harmonic interval in terms of a pitch ratio, or as a musical interval (in half steps). This unique feature allows the pitch to be expressed in a language meaningful to both musicians and engineers.

We designed our Pitch Transposer as a practical musical tool for those actively involved in creative audio. It reflects our commitment to provide the highest quality signal processors with the features and performance that will satisfy the creative demands of today's musical artist. See your MXR dealer.

MXR Innovations, Inc., 740 Driving Park Ave., Rochester, New York 14613, (716) 254-2910

MXR Professional Products Group

Studiomixer

If you plan to make it BIG

A performer or recordist who doesn't have visions of progressing musically and creatively is certainly an exception to the way most musical artists think. The constant self improvement realized through hard work is normally directed toward more than just the satisfaction of being *good*. Most music people want to make it to the *BIG TIME*.

If you fit into this category, we would like to help. Recording is the medium which is going to get you there, and we are the most innovative people in the recording business today. We're **STUDIOMIXER** and our *Totally Modular* approach to mixing console design is revolutionizing the mixer business.

Before now, an expandable mixer meant adding input channels on to it. Most of the time, these input channel expansions were clumsy attempts, resulting in bolt-on input channel sections, bulky external cables, or even hand wiring. And the consideration of output expansion? *Perish the thought.* But the **STUDIOMIXER** *Totally Modular* concept is a *milestone* in mixing console design.

STUDIOMIXER allows the user to start out with as few input and output channels as are required (even just one of each) and grow from the beginning . . . up to 35 input, 8 tape output, 4 monitor, 2 effects, and Left and Right master outputs. Did we say Grow? All the **STUDIOMIXER** owner needs to do to effect this expansion is to purchase an additional module(s) of his choice when his musical and *financial* requirements dictate. A blank module is removed from the Mainframe and the new module is plugged in. All of this requires no soldering and takes about five minutes. Need we point out the obvious service advantages?

When you see and listen to our console, we think you'll agree that **STUDIOMIXER** has the highest performance specifications of any mixer in (and many far above) its price class . . . and you will be *pleasantly* surprised by its low cost.

Think about the *Totally Modular* **STUDIOMIXER** before you contemplate buying anything else. It is a choice which will stay with you for years, growing when you grow. And it will save you money by relieving you from the hassle of trying to dump your no longer adequate *old* mixer for one with the expanded capabilities and quality already built into **STUDIOMIXER**. With **STUDIOMIXER** *we* certainly won't stop you from making it to the *BIG TIME!*

For the name of your closest Studiomixer dealer, or for descriptive literature and specifications on our products, please write to Craig Bullington, National Sales Manager, Amerimex Co., Inc., PO Box 55, Atwood, California, 92601.

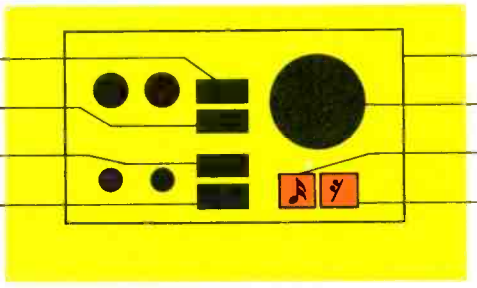
CIRCLE 83 ON READER SERVICE CARD

BOSS

Understanding Technology Series

Subject: A Non-Drummer's Guide to Writing Drum Rhythms

DR-55



It's a fact that just about all Rock music is based on the drum beat. So when you're writing or practicing, a good idea can sound awfully flat without the proper beat behind it. The BOSS Dr. Rhythm lets you write up to 16 of your own drum rhythms, and you don't have to be a drummer to do it.

Writing rhythms is done out of real time so you don't have to synchronize yourself to the machine. All you need to do is push two buttons in a certain order, and your rhythm will be played back in perfect time.

The Step method used by the Dr. Rhythm breaks each measure into 16 (or 12) steps, each step corresponding to one sixteenth note. To program a rhythm, select a sound (such as the Bass Drum) and walk your way through the measure, pressing the "Note" button on each of those steps where you want to hear the Bass Drum, and the "Rest" button on each of those steps where you don't.

Other sounds and Accents are programmed in exactly the same way except the Hi Hat which is preset to sound every eighth note, every sixteenth note, or not at all.

Once you have programmed a rhythm, it stays stored in computer memory until you change it, even when the power is turned off. The sixteen different memories available in the Dr. Rhythm can be used for variations on the same rhythm or fills and breaks so that by rotating the Program Selector from one rhythm to another, an entire percussion track can be played for multitrack recording.

Once you understand the basics, there's almost no limit to what the Dr. Rhythm can do. It can even send trigger pulses to synthesizers and sequencers. The Dr. Rhythm can be a very solid foundation for your next musical achievement.

BOSS

We Want You to Understand the Future

CIRCLE 71 ON READER SERVICE CARD

MARCH 1981
VOL. 6 NO. 6

MODERN RECORDING & MUSIC

THE FEATURES

COMING NEXT ISSUE!
All the regular features, plus something special for all you April Fools!

Cover Photo: Courtesy of RCA Records
Grace Slick and Ron Frangipane: Courtesy of RCA Records
Pat Metheny Photo: Courtesy of Warner Bros. Records

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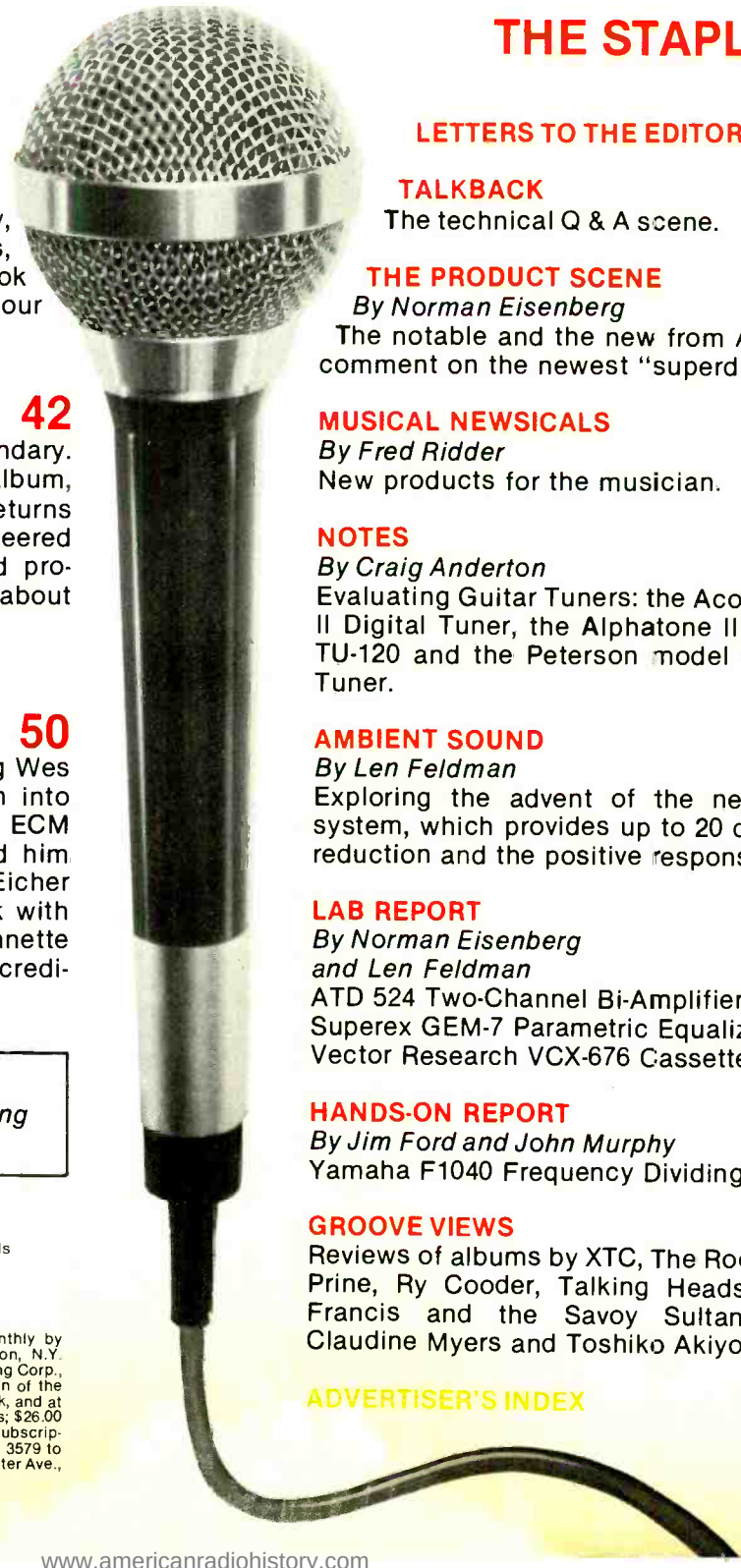

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LETTERS TO THE EDITOR

Is Quadraphonic Sound Dead?

I would like to comment regarding Len Feldman's column, "*Ambient Sound*" in the December, 1980 issue of *MR&M*, regarding the F.C.C. and quadraphonic sound. There are some points that I believe should be clarified.

I do agree with Mr. Feldman regarding the negative impact that procrastination on the part of the F.C.C. has created in the field of quadraphonic hardware and software. It is obvious the same thing is recurring again with respect to AM stereo.

I disagree with Mr. Feldman's contention that quadraphonic sound is "dead." Simply not so. The concept is still very much alive. Whether one calls it time-delay, ambience recovery, SQ, QS, or CD4, the basic was and is, to create a sound-field that more closely approximates the original performance. As you are probably aware, thousands of quadraphonic receivers and amplifiers are still in use. Our market studies indicate a majority of these systems are still in use to playback quadraphonic records and to synthesize stereo program material.

Our company manufactures a signal processor, the 'Composer,' which incorporates the TATE Directional Enhancement System. The Composer decodes SQ program material and synthesizes directional and ambient information from stereo sources. The TATE System is also used by Dolby Laboratories to create surround sound from optical stereo tracks in theaters not equipped for 70mm projection.

There are a number of specialty record labels still releasing SQ encoded discs both in the U.S. and Europe. Research in quadraphonics is still being actively pursued in England as well as several Iron Curtain countries including Hungary.

The concept of quadraphonic sound is not dead. The fact of the matter is that a great many people out in the real world are enjoying quadraphonic sound in their homes, their neighborhood movie theaters, as well as in major discos and clubs world-wide.

What is dead is the hardware as Mr. Feldman knew it. Unfortunately, the public never was truly exposed to properly demonstrated quadraphonic sound because of limitations in hardware and ignorance, in most cases, on the part of retail dealers as to how to properly demonstrate the concept. State-of-the-art hardware is available at this time . . . at least for the SQ system.

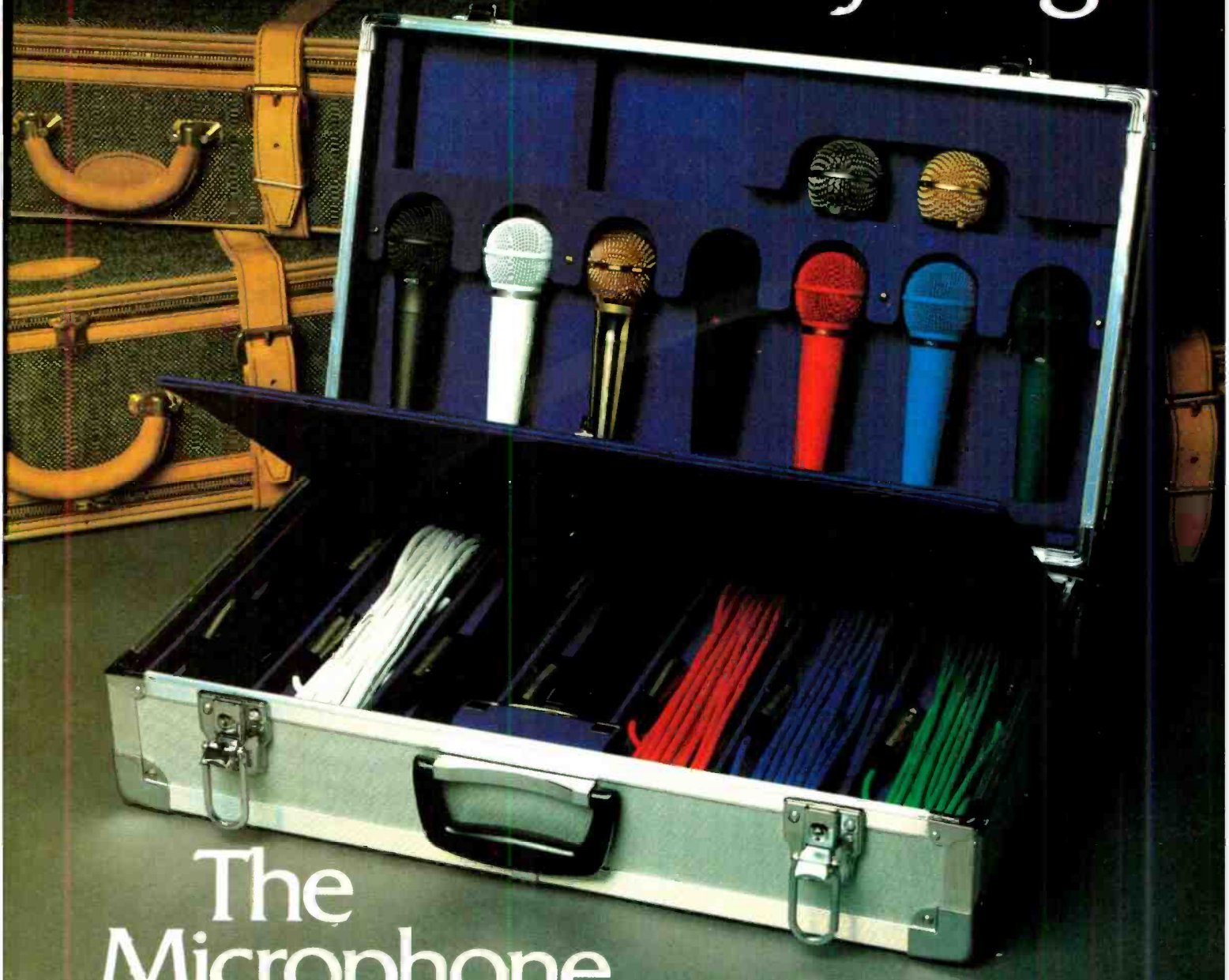
If the concept of quadraphonic sound is dead, then the owners of older hardware, time-delay units, moviegoers world-wide, and the owners of our Composer certainly aren't aware of it!

—Charles Wood
President
Audionics of Oregon
Beaverton, OR

Len Feldman replies to Mr. Wood's letter:

Perhaps "dead" was the wrong word to apply to quadraphonics, but certainly, if one compares current activity in the field of 4-channel sound with that of the early-to-mid seventies, one

For the performer who has everything.



The Microphone Wardrobe

Top artists told us what they wanted, and we listened. Our most sought-after vocal dynamic microphone, repeated in gold plate and selected matte colors. With matching cables and a professional carrying case. Vivid. Exciting. And definitely not for everyone.

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would have to conclude that if "quad" is not dead it is certainly comatose.

After all, in 1973 we were told that sales of quadraphonic hardware amounted to between 10 and 15 percent of all new stereo high fidelity component systems sold. If one were to take an accurate poll of the situation today, even including ambience-enhancement devices such as those referred to in Mr. Wood's letter, the total numbers would represent far less than a fraction of one percent of sales.

I, of all people, do not welcome the end of quadraphonics since, as Mr. Wood may or may not know, I too had an ongoing interest in the success of quadraphonics. Together with an associate, I was responsible for the introduction of one matrix quadraphonic system which was sold to the public during those early 4-channel years in the 70's.

Finally, my reference to quadraphonics in the first place was simply to provide an example of how the FCC, in its constant procrastination, can assist in the destruction of a good technical concept. Certainly, the FCC was not the sole culprit when it comes to the public's disenchantment with quadraphonics. Our own industry infighting and lack of ability to standardize one system of discs also played an important factor in the demise—pardon me, in the hibernation—of quadraphonics.

—Len Feldman
Technical Editor
Modern Recording & Music

Suggestion

I would like to reinforce a suggestion I've read about, made by one of your other readers. Before too much time passes, please make an index or indices for your magazine articles. You'll never regret it. It could be processed in a small computer by organizing your titles and subject matter in number equivalents. Use your anniversary issues for index supplements such as "Changing Times" does in December.

Your magazine is a valuable aid to researching various equipment and subject matter.

Your cost could be minimized by seeking out universities' computer science departments about forming indices. Some schools need test material and would charge little or nothing.

—Rod Baxter
Seattle, WA

Your suggestion is a good one. Perhaps one day it will come to pass. It's about time that the font of information that we really are, when taken in our entirety, (all our back issues,) be recognized and appreciated. Now we have only to realize this dream!

The Right Way

In the January 1981 issue of MR&M, *we printed a "Talkback" letter, "The Ins and Outs of Studio Life" by Mark Barnett, President of The Last Recording Studio, Inc. of Boulder, Colorado. We printed a diagram of his studio's patch bay. But we did something that was not quite right. The numbered inputs weren't changed, but we altered the* positioning *of the "ins" and "outs" in the way we laid out the diagram. We didn't mean to destroy the entire mean-*

The New UREI Power Amplifiers

The UREI Power Amplifiers have been designed to offer the critical sound professional advanced products which extend UREI quality from our low-level signal processing all the way through to our exclusive Time-Aligned™* Studio Monitors

After careful evaluation of other power amplifiers on the market, it became obvious that reliability has been reasonably achieved, but sound quality is often marginal. Our goal was to engineer a line of amplifiers that would offer the audio professional the reliability he demands *and* the sound quality he deserves.

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75 Watts RMS per channel into 8 ohms.** A compact 1-3/4" high rack mount cabinet.

Audition the UREI Power Amplifiers at your professional sound dealer and discover how good a reliable amplifier can sound.

From One Pro to Another — trust all your toughest signal processing needs to UREI.

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**All 8 ohm ratings are at 0.05% THD at a bandwidth greater than 20 Hz to 20 kHz.

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CIRCLE 96 ON READER SERVICE CARD

See your professional audio products dealer for full technical information.

8. Console In Ch. 1	9. Console Line Out Ch. 1 (left)	10. 2 tr. In Ch. 1 (left)	11. 2 tr. Out Ch. 1 (left)	12. Console Line In Ch. 1 (left)	13. Echo 1 Send	14. Echo 1 Return	15. Echo 2 Send	16. Echo 2 Return
24. Console In Ch. 2	25. Console Line Out Ch. 2 (right)	26. 2 tr. Out Ch. 2 (right)	27. 2 tr. Out Ch. 2 (right)	28. Console Line In Ch. 2 (right)	29. Reverb In	30. Reverb Out	31. Parametric Equalizer In	32. Parametric Equalizer Out
40. Ch. 3	41. Monitor Send Left	42. Monitor Preamp In (left) Aux. 1	43. Phono Out (left)	44. Preamp In Aux. 2 (left)	45. Cassette Out (left)	46. Tape Play In (left)	47. Comp./Lim. In (left)	48. Comp./Lim. Out (left)
49. Console Out Ch. 4	50. dbx Rec. In Ch. 4	51. dbx Rec. Out Ch. 4	52. 4 tr. In Ch. 4	53. 4 tr. Out Ch. 4	54. dbx Play In Ch. 4	55. dbx Play Out Ch. 4	56. Console In Ch. 4	57. Monitor Send Right	58. Monitor Preamp In (right) Aux. 1	59. Phono Out (right)	60. Preamp In Aux. 2 (right)	61. Cassette Out (right)	62. Tape Play In (right)	63. Comp./Lim. In (right)	64. Comp./Lim. Out (right)

ing of your diagram, Mark, honest we didn't. His diagram was specifically 16 wide and 4 deep for ease of patching and to limit the length of cords needed. We are printing it correctly this time, after flagellating ourselves continuously for the past few weeks. We look pretty awful, but we sure feel better now. So, here it is—the right way!

In Defense of F.C.C.

In our December 1980 issue, we published Len Feldman's "Ambient Sound" column which discussed the Federal Communications Commission's rulings on FM Quadraphonic Broadcasting. We received the following letter regarding that column.

I will grant that the F.C.C.'s historical record has been abominable in most respects, most notably the Armstrong cannibalism, but, in this case, history is definitely going to applaud its waiting on the quadraphonic FM issue. While some critics shoot fire into the wind, some of us are hard at work on alternative FM quadraphonic systems. My work in this field is a feeling of deep responsibility to mankind, because I would rather be sitting in some bar smashed, instead of eating tunafish and crackers, believe me!

Reducing FM channel spacing is primarily a political problem. We can rightly presume that once the gates of hell are opened both the public and the broadcaster will drown. All this can be prevented with my ingenious suggestion of a channel spacing of 143.25 kHz. Digital tuners will work on anything, I have found, although all the lights and bells may not blink assuringly. New designs can be mainlined to select in 71.625 kHz segments at little pain to anyone. Since only laboratory curiosities can operate adjacent channel, tuner selectivity need not change, only station spacing rules.

Selection of the GE/Zenith pilot-tone AM-subcarrier stereo system was not the great F.C.C. blunder this and other articles portend it to be. Granted, the Crosby system did have better noise figures, but SCA experience shows us that under practical conditions any subcarrier system is involved with the

triangular noise character of FM. Too, consider that the ideal noise environment would mean that difference information be transmitted as "main" program material, and "sum" information be transmitted on the subcarrier, no matter what type of subcarrier system were used. But we could not have this *ideal* system, because existing radios needed "sum" main channels!

The article also portends that an FM-subcarrier system would not have multi-path problems to the degree that the present AM-subcarrier system has. Now, boys, that is simply not true! If you don't believe that FM-subcarriers have horrible experiences with multi-path, just ask the SCA operators. Too, with the present combination of AM/FM subcarriers, both can co-exist rather well under less than ideal situations. Imagine the crosstalk nightmare with FM/FM subcarriers under severe multi-path, especially from a wideband "difference" channel into the tiny-weenie SCA channel. Thanks to reasonable crosstalk capabilities, SCA is a major industry, which few could live without! (Even here in the boonedocks, we use many SCA-originated services in our daily lives!)

Twenty years of stereo FM operations have brought out many "defects" in the present pilot-tone system. Fortunately, most of these defects can be quietly corrected or compromised positively at the transmitting end without jeopardizing a single receiver! I have addressed these many problems in my system and to the F.C.C., and I invite anyone with a different or believably better alternative to write me, asking for my support of their ideas.

Now, summarily, I ask, "How can anyone condemn the actions of the F.C.C. in the selection of the pilot-tone stereo FM system, when it stands as the most flexible radio service ever established!???"

—Charles E. Koontz
Fairfield, IL

Clear Vocal Notes

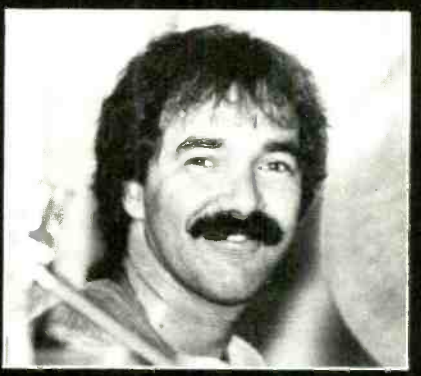
We have received another letter regarding the ongoing Gravina-Michaels controversy.

In answer to Peter Gravina's response to Chris Michaels' letter, as both a musician and a soundperson, I too have found that boosting the 2 to 4 K EQ (the presence range) often brings out or clarifies vocals quite a bit. A little experimentation with a frequency spectrum analyzer (I have an Ivie octave band analyzer) reveals substantial acoustic energy up to the 8 kHz region, especially with consonants like c,k,s,t, and z. The presence range is important for sibilance, or brilliance. Without it, vocals tend to sound muddy, mumbled or indistinct, especially in competition with guitars, drums, keyboards, and ambient stage noise levels. The normal reaction in a club situation is to attempt to compensate by increasing overall vocal volume, which can actually further complicate matters by increasing aural fatigue, inducing feedback, and causing volume wars when a soundman turns up vocals, guitarist turns up guitar, vocalist requests more monitor level, etc., etc. A little creative EQ "focusing" can sometimes do wonders for the band's sound and the audience's enjoyment.

—C. R. Irwin
Cambridge, MA

When you play Zildjians, you're playing with the best.

Steve Gadd
"My Zildjians do it all, from a subtle intricate blend in ensemble work to an incredible feeling of power when I cut loose."



Peter Erskine
"Zildjians let me express my music and project the energy I put into it."

Harvey Mason
Just like Z is the last letter in the alphabet, Zildjian is the first word in cymbals.

James Bradley Jr.
"Ain't nothing like my Zildjians. That's how it is."

Stix Hooper
"Whatever sound I hear in my head, I know there's a Zildjian cymbal that'll bring it to life."

Want to see the best cymbal set-ups in the business?

Each of the drummers in this ad and over 200 more of the world's greatest performers, show you how they match up the sounds in their heads and the Zildjians under their sticks.

All the models, sizes, and set-ups of their cymbals plus photos and biographies are in the new Zildjian Set-Up Book.

It's the first cymbal set-up book to include most drummers you know, most drummers you've heard of, and most drummers you'd like to be. And nobody could offer it but Zildjian. Because nobody but Zildjian has so many incredible drummers performing their greatest hits on their cymbals.

This is absolutely the most unique and most complete reference book of its kind ever published. No matter what style of music you play on your drums, you've just got to have it. Send $4.00 to cover postage and handling to Zildjian, P.O. Box 198, Dept. 5A, Accord, MA 02018. Or pick one up at the Zildjian dealer nearest you.

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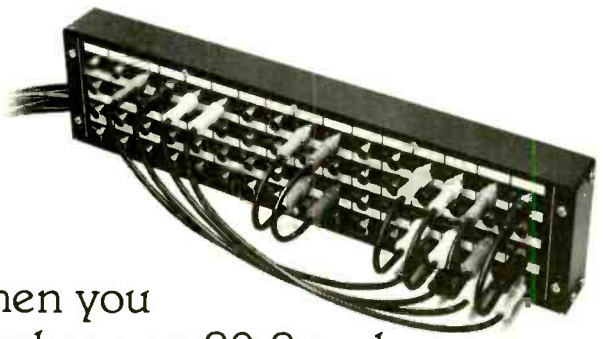
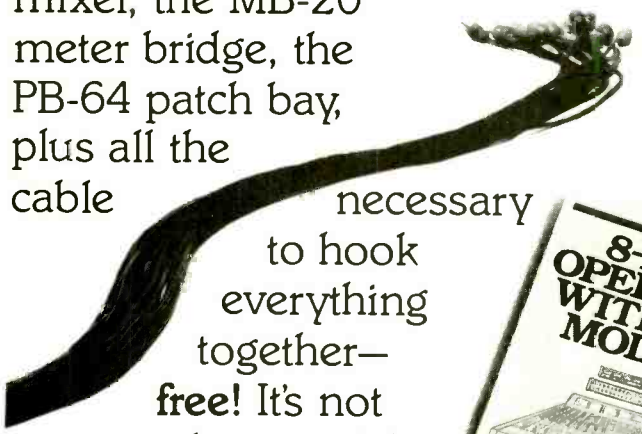
MAKE PATCHWORK PAY OFF.

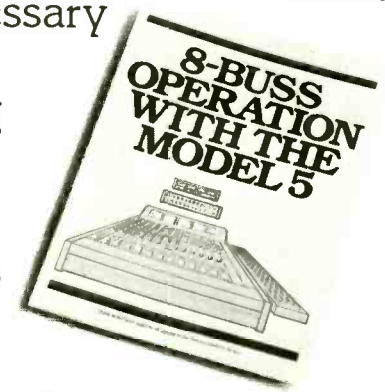
Dollar for dollar and spec for spec this is the best buy in an 8-track multi-channel recording rig. Period. The 80-8 is the most popular 8-track in the world, and the results produced on it are a matter of record. Sometimes gold. The Model-5B with new IC's and color coded knobs. is the perfect companion mixer. Together, you'll have the most functional, economical 8-track hardware package you can buy.

RIGHT NOW!



When you purchase an 80-8 and Model-5B, between January 1, 1981 and April 30, 1981, you get the Model-1 monitor mixer, the MB-20 meter bridge, the PB-64 patch bay, plus all the cable necessary to hook everything together—**free!** It's not just ordinary cable, either—it's TEAC's exclusive low capacitance cable—the same high quality cable recommended for all Tascam Series systems interface.





Be sure to contact us or your Tascam Series dealer for details on this special limited offer. He'll show you the 8-buss operation brochure we prepared that takes you step-by-step through the most flexible, functional and economical 8-track recording system available. Now, more than ever, patchwork pays off.

GET MORE THAN $800 WORTH OF GEAR -- FREE!

TASCAM STUDIO SERIES

TEAC Production Products Group

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TALK BACK

"Talkback" questions are answered by professional engineers, many of whose names you have probably seen listed on the credits of major pop albums. Their techniques are their own and might very well differ from another's. Thus, an answer in "Talkback" is certainly not necessarily the last word.

We welcome all questions on the subject of recording, although the large volume of questions received precludes our being able to answer them all. If you feel that we are skirting any issues, fire a letter off to the editor right away. "Talkback" is the Modern Recording & Music *reader's technical forum.*

The Case of the Honking CAT

When we last left Gordon... he was probably reading John Simonton's response to his Talkback question ("Alternatives for a Synthesizer Sorehead," February 1981, page 20). Having given him ample time to digest Mr. Simonton's kind response, we herewith publish Carmine Bonanno's response to the same question. Both gentlemen have come to the same conclusion—the butler didn't do it.

This problem sounds interesting. Since I own both a CAT SRM and a Teac A2340SX, I tried setting up a few patches to see if I could reproduce the same effect of overload on only a few notes. These are my results:

First, I set up the SRM with the filter wide open (F^c up all of the way) and the high C note held down. I tuned the square waves on both oscillators for zero beating and then set the VU meters for O dB with the SRM plugged into the auxiliary input on the Teac. As I played different notes, the oscillators stayed in tune and the VU meter never overloaded. Now, I slightly detuned the oscillators for a slow beating. The result was that the VU meter moved right along with the beating. At certain points the meter overloaded and at other points it fell to the minimum reading.

To understand why this happens, refer to Figure 1, which shows the composite waveform resulting from two typical square waves ± 1V each, beating together. If the waveforms are slightly out of phase, a waveform as shown in Figure A results. The volume perceived by your ear or the VU meter depends upon how long the wave is at the + 2 V or − 2 V points, since the time it stays at the zero point corresponds to no signal being present. In part B, both square waves are exactly 180° out of phase and cancel each other out so that no output is heard. In part C, both square waves are exactly in phase so that they add at their peaks and a square wave of twice the amplitude of either one results.

What might be happening in the case of the mysterious peaks, is that the phase relationship between the oscillators is such that this summation effect begins to cause problems. It is possible that the problem would occur only in the lower register if the CAT needs to be aligned. The symptom of a misaligned CAT is when the oscillators track for only a portion of the keyboard and then begin to beat severely as you play the other portion. If so, it should be brought in for a calibration. Now, just because the oscillators beat, doesn't mean something is wrong. If we didn't want them to beat, then we wouldn't have two of them! The way to cure the peaking, if it's caused by beating, is to either set your levels for no overload at the peak readings of beating, or to use a limiter.

The other way in which I was able to overload the meter in the lower octave range is with the filter. If the filter cutoff is set somewhere in the middle range of the keyboard, the notes above the cutoff setting will be lower in

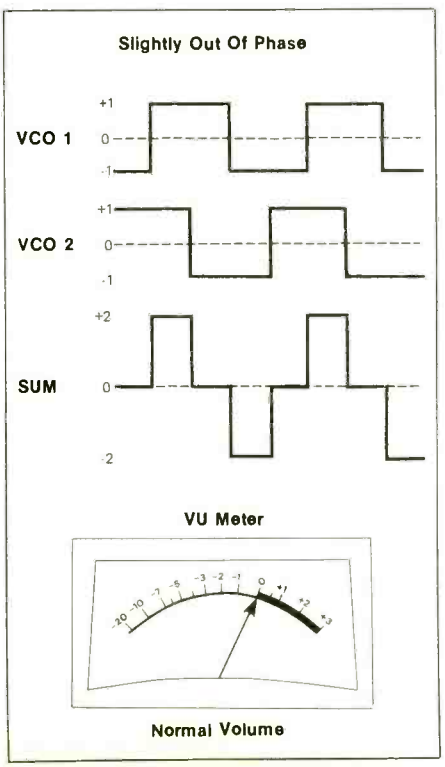


Figure 1A

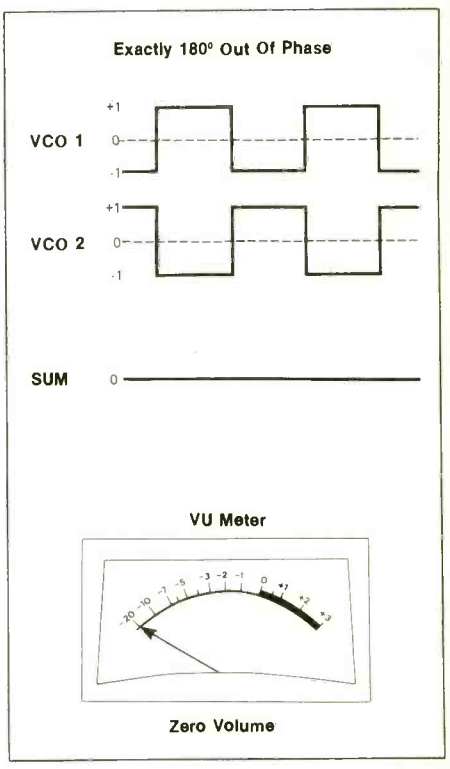


Figure 1B

volume than the notes below the cutoff. That's because the filter on a CAT rolls-off at -24 dB per octave, so at one octave above the cutoff, your level is already down by 24 dB. The way to solve this is to use the keyboard tracking control on the CAT filter section. This control allows the cutoff to follow the notes as you change them so as to uniformly filter the sound along the entire three-octave range.

In my CAT-direct-to TEAC system hookup, these were the only two ways I could get the peaking problem you mentioned. However, I'm not familiar with the Tapco 6300 or dbx 154 so I can't determine whether the equalization on these devices is causing some kind of resonant peaking in the system. You should suspect this if the problem occurs at the same frequencies on every patch setting on the SRM. There wasn't *anything* I could do to get a honking, but from the very description of the problem as a "honk," I would be inclined more towards a resonance problem in your setup. Try the CAT direct to the TEAC and see if it still happens so you can eliminate your signal processors as a possible souce of these problems and take it from there.

—Carmine Bonanno
President
Octave-Plateau Electronics, Inc.
New York, N.Y.

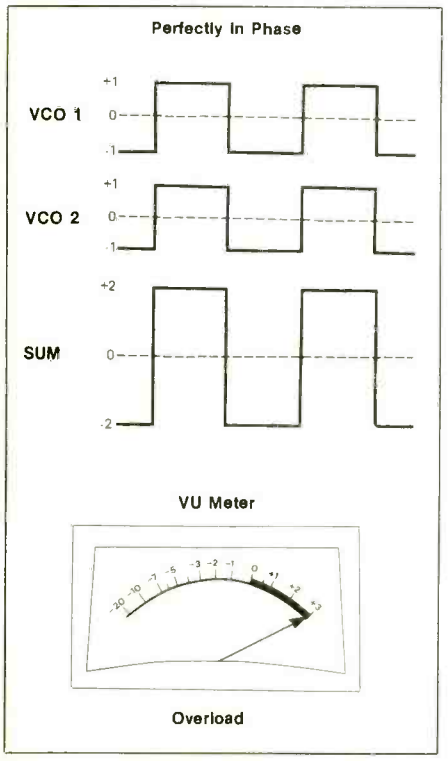


Figure 1C

Table Tennis, Anyone?

Could you please explain the process of "ping-pong" tracks?

—Robert Jampino
Schenectady, N.Y.

"Ping-ponging," or "bouncing," tracks is simply the process of recording one open track on a multi-track recorder from another. An engineer will use this technique in many instances during the production of a particular song.

Years ago, when 4-track was state of the art, you would record drums and bass, for instance, on two tracks. Then, knowing that you still had many more things to record, you would make any needed equalization or level changes to the already recorded tracks and record the mix of those tracks onto one of the other open tracks. You could then erase the two tracks which contained the original drums and bass, and use them for some other instrument. You could continue this process until you had recorded everything you needed. Obviously, as you continued to mix things together, you would have to be very careful to make sure all the balances were correct, for there could be no changes later.

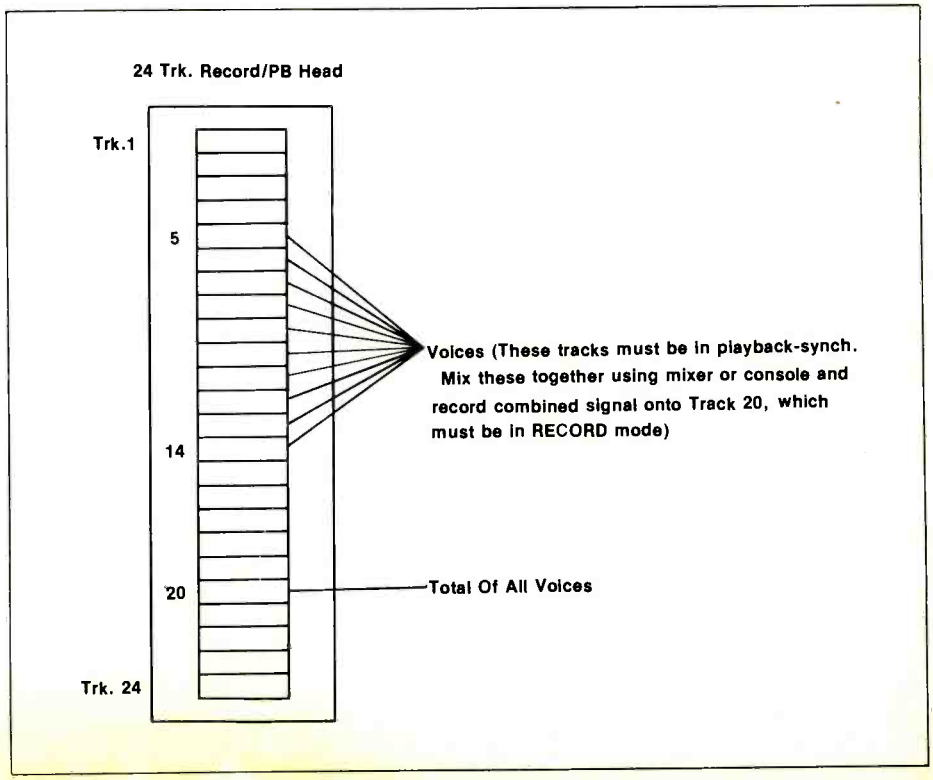
Today, with the advent of the 24-track tape recorder and various noise reduction systems, ping-ponging is easier but still necessary. Now, however, it is not so much out of a lack of tracks to record basic instruments on, but for more artistic considerations. Ten tracks of voices, for instance, could be mixed and ping-ponged to another open track. The original ten could then be erased and used for more voices or whatever else the artist wants. The ping-ponged track will then contain the sound of all ten tracks. This means that you could have the sound of hundreds of voices without ever having more than two or three people in the studio at any one time.

The whole process of ping-ponging must be done in "sync." This means that your tape recorder must have a combination record/playback head where some tracks may be in record while others can be in play at the same time. This assures that all of the music will stay synchronized with what was already recorded.

—Ron Carran
President and Chief Engineer
Minot Sound Studios
White Plains, N.Y.

Piezo Pointers

I've heard a lot about using Motorola's piezo tweeters for the high end of a sound system, but I know they should be crossed over passively (at about 8-9K) to avoid their "harsh" low end where they are crossed over. Do you have a design (or know of one) for such a



IS YOUR TAPE ERASING ITSELF EVERY TIME YOU PLAY IT?

If lately your favorite recordings sound like they're gradually unrecording, it could be the tape they're on.

You see the oxide particles on some tapes just aren't bound on very well. And when the oxide particles come off, your music could come off sounding faded and weak.

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CIRCLE 79 ON READER SERVICE CARD

crossover? Also, are the standard piezos or the 3"x 6" piezos better? Any other advice on their use?

Do you have Motorola's address and perhaps the name of the person to whom I should speak about these tweeters?

—Richard Taylor
Westminster, Md.

Motorola piezo tweeters last turned up in these pages in the February 1980 issue— Showco of Dallas, Texas, used them as part of the sound reinforcement system they provided for the Bee Gees' 1979 North American tour. James Bornhorst, Vice President, Electronics, of Showco had the following advice when he heard your questions. He highly recommended the use of the 3"x 6" version (these are the tweeters they used). James also pointed out that it is very hard to cross over these tweeters passively. It is preferable to do it electronically. The system utilized by Showco was actually a quad-amped design—bass, mid-bass, mid and high. Needless to say, a setup like this might be totally unsuited to your needs. It will be necessary for you to formulate your own system depending upon your needs, incorporating these tweeters into the existing system of components with which you now work.

Motorola's Piezo Ceramic Products Division is located at 9733 Coors Road, N.W., Albuquerque, New Mexico 87114. Contact Cheryl Iverson at 505-897-3592. She has been advised of your interest, and is awaiting your call.

Bright Ideas from Brighton

As I have had many puzzles untangled for me by readers' letters in *Modern Recording & Music*, I'd like to offer a solution for stage miking acoustic instruments, supplemental to Tom Bartlett's contribution in Talkback, September 1980 ("A Screamer From Up North," page 22).

As a professional folk rock soloist, I had pondered for many moons how to project my acoustic guitar over a large room with the rich reproduction that only microphones can provide.

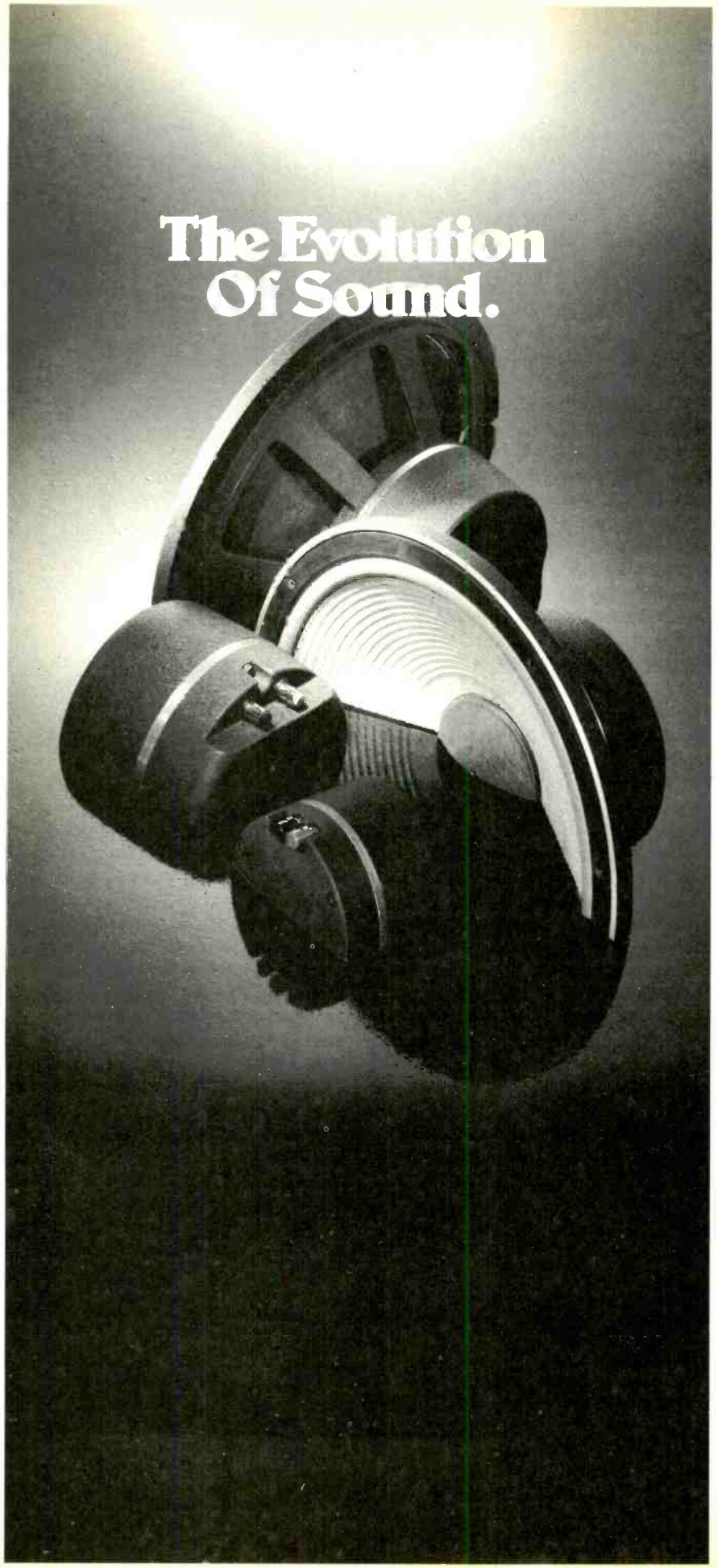
However, with stand-mounted mics the musician must remain virtually immobile (usually seated) at the microphone.

Contact transducers reproduce only the mechanical oscillations of the wood of the instruments, with no possible means of picking up the air movement which essentially makes an acoustic instrument acoustic.

I solved this problem by mounting a Superscope EC-12B omnicondenser tie-clasp mic to my guitar, centrally located in the sound hole, just underneath and parallel to the strings, surrounded with foam and attached with a bracket mounted across the sound hole. This method provides the good, rich tone only microphones can give, with the convenience and mobility of a pickup.

Although the EC-12B is somewhat more money than the EC-1 (but still under $50), I daresay the tonal quality is proportionately better.

—J. Mark Wolf
Brighton, Mich.



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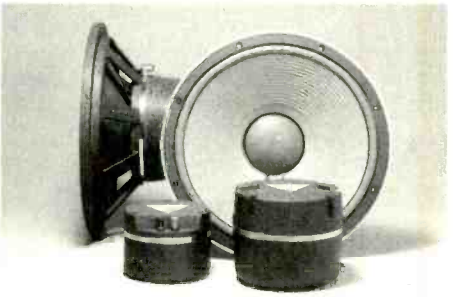

The evolution of sound begins with TAD.

TAD Technical Audio Devices

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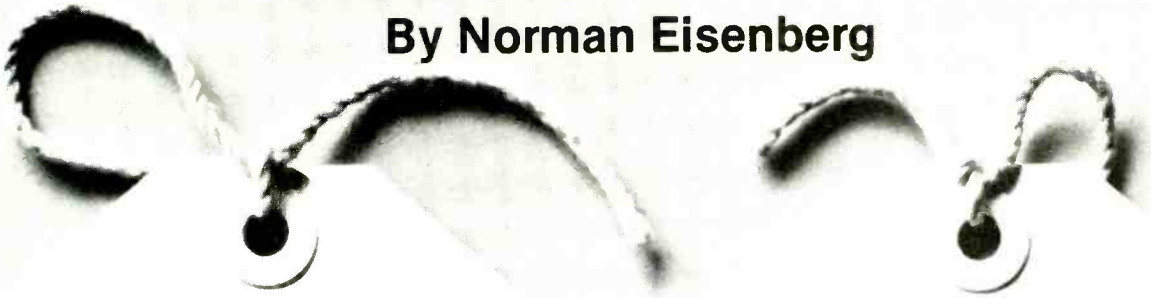
CIRCLE 93 ON READER SERVICE CARD

THE PRODUCT SCENE

By Norman Eisenberg



AES Convention
Product Review

This month's Product Scene column is exclusively devoted to items seen at the Audio Engineering Society show held at the Waldorf Astoria Hotel in New York this past November. Those items which have not been included this month will be covered in forthcoming issues.

QUANTUM PRO EQUIPMENT

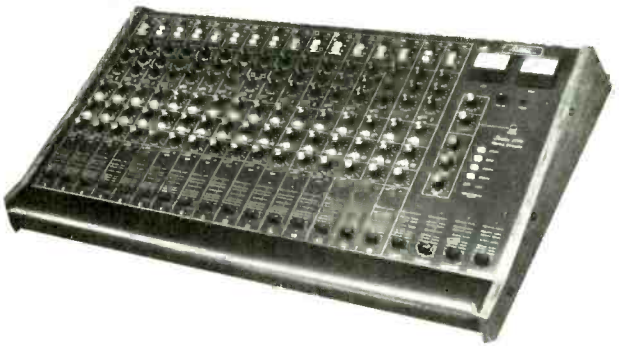
From Quantum Audio Labs of Glendale, there's word of the QM-8P and the QM-12P (eight and twelve channels, respectively) broadcast consoles. These setups are designed to do stereo or mono production work with complete EQ, overdub and remix capability. Circuitry has been designed for low distortion and high slew rate. All inputs and outputs are balanced. Input channels have EQ controls; echo, headphone and cue send; channel on and remote start; faders. Outputs may be stereo or mono. Four independent monitors with room selection control and talkback to studio muting are provided. Options available include a phantom power supply, a 108-point patchbay and an 8-channel input expander.

Quantum also has announced its model DC8-A, an 8-bit digitally controlled amplifier with 90-dB of adjustment in 256 steps. The model AD-80 is an 80-channel analog-to-digital converter designed to provide an interface between any 8-bit microprocessor or computer and any large number of analog signal voltages requiring processing. Finally, there's the model BCD-100, designed to convert the standard S-100 data buss from its two separate data-in and data-out lines to one bidirectional data buss.

CIRCLE 1 ON READER SERVICE CARD

AUDY SERIES 2000 CONSOLES

From Audy Instruments of Salem, Mass. there's news of the new Series 2000 mixing console, available in 12- or 16-channel configurations. Designed originally for their own use (Audy is a professional sound-reinforcement company as well as a manufacturer), the 2000 is now offered to the pro audio market. Audy claims the use of computer-grade circuit parts, state-of-the-art circuit design featuring low-loise and high-speed components and a physical layout that is "both logical and effortless to use." The console is said to deliver an excellent mono house mix, as well as an independent simultaneous stereo recording. Standard features include dual LED



systems for each channel; balanced transformerless inputs and outputs; input and output patch points: three-band EQ with switchable midrange; switchable pre- and post-monitor and effects sends; stacking (of all functions) for up to 32 channels; phantom powering for condenser microphones; Shure lamp socket; dust and spill protected sliders and sealed rotaries; heavy-duty flight case. Prices are $3495 for the 12-channel console; $3995 for the 16-channel version. A 2000-M monitor console with 16 inputs and 6 separate output mixes, plus other features, is priced at $6995. Audy also offers various accessories.

CIRCLE 2 ON READER SERVICE CARD

E-V MICS, SOUND REINFORCEMENT ITEMS

A new cardioid electret condenser microphone from Electro-Voice is the PL77AA, designed for vocalists. The mic is said to have extended and shaped hi-frequency response and an up-close bass boost (proximity effect).

The model CO90P, a miniature omnidirectional electret mic, is designed to be worn as a lavalier. It consists of two assemblies—the mic element and the phantom power module. It requires a phantom power supply for operation. Identical to it, but without the phantom power module is the CO90E.

Dynamic cardioids for vocalists are the PL91A and the PL80—the latter is slightly larger and is said to have a super-cardioid pattern.

E-V also is offering several speakers for sound-reinforcement and musical instrument systems, including wide-range drivers, full monitor systems, high- and low-frequency elements, horn-driver systems and the XEQ-1 electronic crossover/-equalizer which mates low- and high-frequency systems at 125 Hz. One XEQ-1 handles one stereo channel.

CIRCLE 3 ON READER SERVICE CARD

QUARTET FROM NEPTUNE

In addition to the "quintet" of products described here in our December issue, there's a new "quartet" from Neptune Electronics Inc. of Portland, Oregon. The model 341 is a single-channel parametric equalizer offering variable frequency, Q and level on each of four bands. Rack-mountable, the model 341 uses both balanced and unbalanced inputs and outputs, and permits switching EQ in or out on each of its four bands. Each band also has its own LED peak indicator.

The models 410P and the 610P are powered mixers, with four and six input channels, respectively. Both units take high and low-Z microphones, and both have built-in reverb. The 410 P has bass and treble EQ with an effects send on each input. The 610P has a built-in 5-band graphic equalizer. The power amp in each mixer is rated for 100 watts.

Finally, there's the model 611 mono mixer, available with transformer balanced inputs and line-level inputs. Features include monitor send, effects send, built-in reverb and independent output patching on each of its six channels.

CIRCLE 4 ON READER SERVICE CARD

AUDIO & DESIGN OFFERINGS

A new compressor-limiter, and a "de-esser" have been introduced by Audio & Design Recording, Inc. of Bremerton, WA. The former unit's full title is "Gemini Easy-Rider Stereo/Dual Mono Compressor-Limiter." Designed for use in recording and in broadcasting, it features an infinitely variable compression slope, ranging from very soft (1.5:1) to Limit (20:1) ratio. A switched out mode (1:1), as well as system bypass, are provided. Gain reduction is shown on a 20-segment LED bar graph. Attack times are calculated by a control that responds to program characteristics. The attack adjusts automatically to handle unexpected peaks.

The de-esser is the Scamp model S25, a module that functions as a dual mono or stereo processor. This unit splits an incoming signal into the "main" band, and the "ess" band. Controls include frequency, threshold, and depth. The Scamp S25 does not lower overall gain to do its job; rather, it attenuates only the "ess" frequencies as selected by the user within certain parameters. The two channels may be used separately, in stereo or in series offering the advantage of being able to sense at two frequencies.

CIRCLE 5 ON READER SERVICE CARD

DRUM COMPUTER

Linn Electronics of Hollywood has introduced its model LM-1 Drum Computer. The sounds produced are not synthesized but are actual drum sounds that have been digitally recorded and stored in the device's memory. These include the sounds of bass, snare, hi-hat, cabasa, tambourine, tom-toms, two congas, cowbell, clave and hand claps. All are tunable in pitch and 100 drumbeats are programmable in real time. A 13-input stereo mixer is included, as well as separate outputs. Said to have been created for musicians rather than for technicians, the LM-1 has programmable dynamics, it corrects for timing errors, and it may be synced to tape. Overall size is 21½ inches wide; 21 inches deep; 5 inches high.

CIRCLE 6 ON READER SERVICE CARD

NEW HORNS FROM COMMUNITY

Two new speaker horns have been announced by Community Light & Sound of Philadelphia. The model M80 is a flush-mount, radial mid-bass horn for use with either a 10- or 12-inch cone speaker. Developed as part of the "Boxer" series, the M80 has the same 28½-inch wide format as the Super 90 radial horns and the Boxer bass flare. This, says CL&S, makes for a tidy system unit stack, and it also assures an exact horizontal directivity match at the low-frequency crossover points.

The SQ90 is a flush-mount, radial exponential horn for high-frequency dispersion. Its unique throat design is said to maintain uniform horizontal 90-degree dispersion up to 20 kHz. Recommended crossover point for "live" sound reinforcement is above 3 kHz, although in applications where the peak SPL (at 4 feet) will be less than 110 dB, the SQ90 can be operated down to 1.5 kHz with a suitable baffle.

CIRCLE 12 ON READER SERVICE CARD

VORTEC SPEAKERS

Integrated Sound Systems of Long Island City, N.Y. has announced a comprehensive line of Vortec brand speakers, systems and components for sound-reinforcement, stage monitors, musical amplification, theaters, etc. Included are individual horns, tweeters, extended range drivers, compression driver, woofer, subwoofer, housings.

CIRCLE 13 ON READER SERVICE CARD

NEW REVERB SYSTEM

The "Master Room" XL-500 is the latest and most elaborate reverb system yet offered by MicMix Audio Products Inc. of Dallas, Texas. The XL-500 offers three operational modes in full stereo that synthesize the reverberation characteristics of a plate, "live" chamber and concert hall. Any of the three modes can be selected on either a main or remote-control unit. A wide number of variations in any mode is possible due to the control parameters built into the system. The XL-500 comes in three main parts. The main control unit is housed in a 5¼-inch rack-mount package; the remote control unit, provided as a standard feature with the system, comes with a 25-foot cable and the unit is small enough to be located on any console.

CIRCLE 14 ON READER SERVICE CARD

CONSOLES, ETC. FROM PANASONIC

Panasonic's Pro Audio Division has announced three new "Ramsa" consoles. The WR-8712 is described as a sound reinforcement console with modular construction that allows expandability from 12 to 16 inputs, along with four group outputs. Highlighted features include a 100-mm plastic conductive straight-line fader, 3-band variable frequency EQ and multiple inputs and outputs.

The WR-8812 console provides 12 to 16 inputs and four group outputs for 4- or 8-track recording. The WR-8210 offers 10 inputs and four group outputs for 4- and 8-track recording. Its sub-in section can be used for monitoring while recording, as well as to create a stereo echo send during the mixdown.

Another new Ramsa studio tool is the "Sound Localization Processor" which enables the recording engineer to "creatively control both sound source location and depth by allowing him to place up to eight channels or inputs of a master recording anywhere within the front half of the listening space in a two-speaker playback system, in addition to continuously controlling an input's movement via joystick controls.

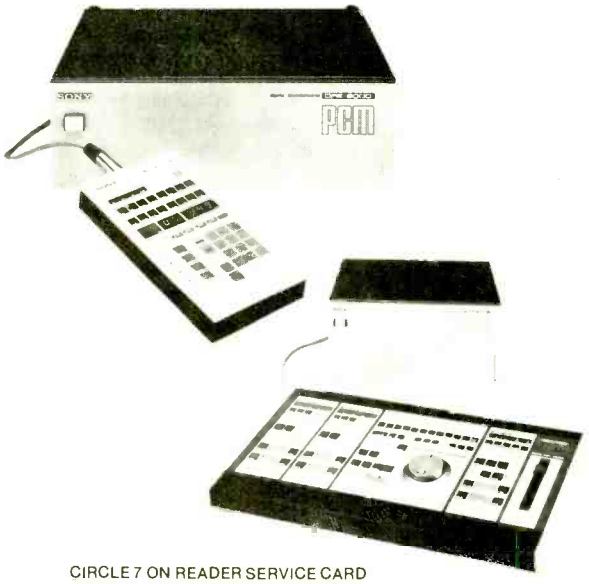
Other new Panasonic entries into the pro field include the model WM-8100 unidirectional electret condenser microphone; the SE-A stereo DC power amp; the SU-A6 stereo DC control amp; a new version of its well-known isolated-loop tape deck—this one a two-track version designed for pro recording applications; a stage monitor speaker; a twin horn system for sound reinforcement; and a low-frequency 15-inch speaker.

CIRCLE 15 ON READER SERVICE CARD

SONY SHOWS DIGITAL DEVICES

Sony's faith in the future of digital sound is evident in two new products. One is the DRE-2000, a digital reverberator with a ten-program memory, hand-held controls, four reverb modes (two echo and two delay) plus what Sony calls the "unique non-volatile memory and the unprecedented flexibility of direct interface with both analog and digital systems." This unit is priced at $15,000.

The DAE-1100 is a digital editor for tape-to-tape editing. Claimed accuracy is 362 microseconds so that the edits are "truly undetectable." The device includes cross-fade adjustments, a built-in SMPTE time code generation reader, search dial and other features that allow sequencing and combining of varied material. Price of this one is $45,000.



CIRCLE 7 ON READER SERVICE CARD

TANNOY MONITORS

New monitor speaker systems have been added to the Tannoy "family" of pro monitors, including small versions. Units differ in power-handling, sensitivity and low-frequency response. Some permit direct bi-amping. Tannoy's model X05000 (optional) is an electronic dividing network with a plug-in time delay compensated module that defines crossover voltage responses and slopes. It provides adjustable parametric EQ from 20 Hz to 200 Hz.

CIRCLE 8 ON READER SERVICE CARD

JBL PRO PRODUCTS

Three new 18-inch low-frequency loudspeakers have been introduced by JBL. The model 2240H is said to be suited to a variety of sound-reinforcement applications. The model 2245H is recommended for use in custom studio monitors and other systems requiring high sensitivity. The E155 is specifically designed for electric bass amplification.

JBL also has added two extended-range playback systems. The 4690 is a compact, two-way system. For more bass it can be used in conjunction with the model 4695 subwoofer which consists of the E155 speaker in a reflex enclosure.

CIRCLE 9 ON READER SERVICE CARD

TELEX/MAGNECORD TAPE DECKS

From Telex/Magnecord comes word of the Series 1400 open-reel tape recorder, available in speeds of $1\frac{7}{8}$, $3\frac{3}{4}$, $7\frac{1}{2}$ and 15 ips (in combinations of three highest or three lowest), and also in various head configurations. Inputs include 150-ohm microphone, balanced bridge, unbalanced bridge, mixing bridge and auxiliary bridge. Outputs include 150/600 ohm balanced, + 4 dBm, auxiliary A and B unbalanced. Reel size is up to $8\frac{1}{4}$-inch. Tape is $\frac{1}{4}$-inch. Solid-state logic transport controls are used, and one-hand cueing is offered. VU meters, one per channel, can be switched to read record, playback or bias level. Record gain controls permit mixing. Modular electronic plug-in boards and hinged transport panels permit quick, easy service access.

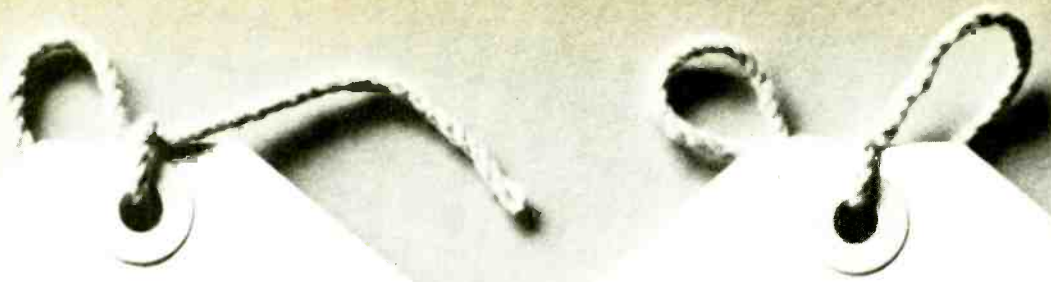
CIRCLE 10 ON READER SERVICE CARD

TWO NEW TEAC TASCAMS

New in Teac's Tascam Creative Series are the 22-2 and the 22-4 open-reel tape recorders. The 22-2 is a two-track, two-channel model with two speeds (15 and 7.5 ips), for quarter-inch tape with maximum reel size of 7 inches. Mic/line mixing is included. The deck utilizes three motors and three heads (standard half-track format).

The 22-4 is a quarter-track, four-channel deck for ¼-inch wide tape in maximum reel size of 7 inches. Speeds are 15 and 7.5 ips. This deck offers multitrack options with its built-in sync feature. It has no mic inputs; Teac or Tascam outboard mixers are recommended for this purpose.

CIRCLE 11 ON READER SERVICE CARD

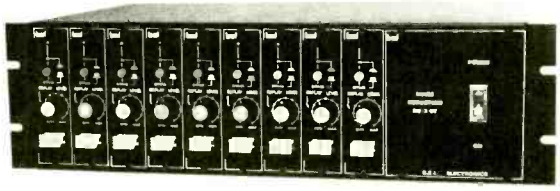


ITEMS FROM THE MIKE SHOP

The Mike Shop of Elmont, N.Y. (a division of Omnisound Ltd.) has announced several new products for the pro user. The "Great British Spring" is a six-spring reverb unit that may be used as mono-in/stereo-out; stereo-in/stereo out; or as two separate mono reverbs. It is provided in either of two ways: by itself with power supply, or with two outboard parametric equalizers. The former costs $499; the latter, $624.

Also offered is a new line of "Accessit" audio processors. Included are: a noise gate; a signal compressor; a dual mic preamp/two-channel mixer; a compander noise reduction unit; a two-band parametric equalizer; and a signal booster providing up to four isolated outputs from one input. Also available in this series are a power supply and a "Rackit" device to permit mounting any three processors side by side in a standard 19-inch rack mount.

The Mike Shop is also featuring the new BEL line of noise-reducers. The model BC3-8T is an eight-channel unit providing up to 30 dB of noise-reduction and 10 dB of added headroom. The BC3-2T is a stereo unit. Another BEL item, the BF20 Mk2 "True Stereo Flanger," operates from stereo or mono sources and features auto-panning and vibrato effects, offers three control modes (manual, envelope, auto) and can be keyed from external or internal signal sources.



The Mike Shop's last new offering (so far) is a new microphone cable called Musiflex. Claimed for this cable are better protection from electrostatic influences, highest resistance to physical abuse while also being very easy to coil and uncoil, instantly strippable and lower weight. Available in eleven colors, Musiflex is sold in lengths of 100 feet, or in rolls of 100 meters. Prices are 33 cents per foot in lengths of 100 to 200 feet; or $98.50 for the 100-meter roll.

CIRCLE 16 ON READER SERVICE CARD

NEW AUDIOARTS CONSOLES

Three new console series, designed for various systems and budget parameters, have been introduced by Audioarts Engineering of Bethany, Ct. For a modest-budget four-buss system, there's the 44 Series, available in configurations of 32 X 4 X 2; 24 X 4 X 2; and 16 X 4 X 2. Modules included input, group, output, master send and control.

The 8000 series has been engineered, explains the manufacturer, "to fill the gap between the very expensive large format consoles and those mixers not large enough to fill the demand of today's sound industry." It is offered in configurations of 32 X 8 X 2; 24 X 8 X 2; and 16 X 8 X 2. This series features eight groups, four send busses, 3-band variable EQ, stereo master, assignable returns, plug-in modular construction and full patching. A stage monitor version is available, making possible eight separate stage monitor mixers with 32, 24 and 16 input channels.

The "Wheatstone Project" consoles are described as the most complex and comprehensive control consoles available anywhere. This series is offered in four formats. One is for reinforcement, in configurations of 40 X 8 X 2; 32 X 8 X 2; and 24 X 8 X 2. Another is also for reinforcement but with additional 14 X 8 matrix mixing. A third is for stage monitor. The fourth is for recording systems; this version is available now in 8 buss, 16-track configurations. Subsequent versions will be offered for 24-buss operation.

CIRCLE 17 ON READER SERVICE CARD

MINICOM INTERCOM

A new closed-circuit, "hands free" intercom system (the PK-2 two-channel version, or the PK-1 single-channel model), has been announced by Minicom of Walnut Creek, Ca. Designed for fixed or portable communication, the Minicom offers a choice of compact speaker station or noise-attenuating headsets with noise-cancelling microphone. Each headset utilizes a dynamic mic that is boom-mounted to a single-muff or double-muff headset with its own mic off/on switch and in-line control box with adjustable mounting clip. The clip contains mic and headphone amplifiers and includes a volume control. The Speaker Station (LS-1) is a plug-in substitute for the headsets and includes amplifiers, volume control and push-to-talk switch.

CIRCLE 18 ON READER SERVICE CARD

NEW FROM DBX

Suitable for small studio applications is the dbx model 150, a new two-channel simultaneous encode/decode Type I tape noise-reduction system. The 150 is said to be optimized for use with tape transports that run at speeds of 15 and 30 ips. It is stackable for use with different multi-track formats. and it is compatible with all dbx Type I noise reduction systems.

The model 140 is a similar functioning device for Type II systems in broadcast applications. Its detector circuitry is said to be optimized for use with transmission and storage mediums having limited or irregular high-frequency response characteristics.

The 900 Series Modular Signal Processing System from dbx now includes five modules. Three of these—the de-esser, the compressor and the noise-gate—were introduced in Spring 1980. More recently, two new modules have been added. One is the 906 "Flanger +" designed to provide true full-frequency flanging without sweep limitations. The other is the model 905 parametric equalizer which provides three-band fully parametric EQ, with each band switchable for either constant Q or reciprocal filter operation. High and low bands are independently switchable from peak to shelf mode.

CIRCLE 19 ON READER SERVICE CARD

NEW SUPERDISCS

This month's unusually long product rundown may have left little space for my usually brilliant (and sometimes acerbic) comments on the audio scene. I would, though, like to remark briefly on some "super discs" that have arrived in time to meet deadline.

Telarc's offering is yet another recording of Stravinsky's *The Rite of Spring,* performed by The Cleveland Orchestra conducted by Lorin Maazel (Telarc Digital 10054). The low-frequency drum beats are spectacular, in true Telarc fashion, and the recording generally is antiseptic clean and crystal-clear. But the overall performance seems tame and lacking in the kind of dynamite drive you get from others, such as Mehta or Bernstein.

Digital mastering is featured in a CBS Mastersound album of Cello Concertos by Lalo and by Saint-Saens, both performed by cellist Yo Yo Ma and l' Orchestre National de France, again conducted by Lorin Maazel (CBS 35848). Again, the sound is impeccable, and this time the demands of the music are very amply met in artistic terms. Altogether, a most satisfying album.

A double-disc release from CBS, digitally mastered during a "live" performance at Carnegie Hall, features pianist Lazar Berman in selections by Clementi, Mozart, Beethoven, Chopin and Liszt (CBS 12M 35903). I think this is the nearest thing to having a "live" piano in your listening room. Even if you are familiar with the music, you are bound to sit up and take notice when this recording gets going.

Half-speed mastering does well for the sound of flutist Jean-Pierre Rampal in "Suite for Flute and Jazz Piano," from CBS Mastersound (HM 43233). Composer/pianist Claude Bolling also is heard, with Marcel Sabiani on drums and Max Heiguer on string bass. The "acoustic" of this disc is just right; the music tends to be stretched a little thin at times.

From dbx, there's a mixed bag this time. There are two volumes of "Sonic Fireworks," music for organ, brass and percussion played by Richard Morris and the Atlanta Brass Ensemble (Crystal Clear Records GS-2021 and GS-2022). Sonics are, as usual, most impressive; playing at times seems reflective of the strain of having done the master in real time as a direct-cut disc.

Other late dbx arrivals include a Herb Albert *et al* album (A & M SPX-3714); another containing three concertos for guitar, one with orchestra and two with strings, played by Laurindo Almeida who also composed the major work, for guitar and orchestra (Concord Concerto CC-2001); and the Carpenters in an album *Close to You* (A & M SP 4271). None of these was digitally mastered, but that dbx processing still makes for awesome dynamics and vanishing surface noise.

MUSICAL NEWSICALS

SYNTHESIZER EQUIPMENT

Blacet Music Research has just introduced an unusual synthesizer instrument in kit form, known as the Syn-Bow. This low-cost instrument is a compact 24-inches long x 2-inches wide in its redwood case. It is powered by 9-volt batteries or an external ±15 volt supply. The Syn-Bow is interesting in that it does not use a keyboard, but rather provides an Attack Sensor™ pad which controls attack time, waveshapes, loudness and duration in response to impulses of different strengths, and a Frequency Bow™, 7-inch long bar which rotates through a 300° arc to control the frequency of the note produced over a three-octave range. Conventional controls on the Syn-Bow include three controls for pulse width modulation to establish the basic sound and harmonic content, rate and depth for frequency modulation, amount of suboctave to be added to the basic sound and decay rate. The Syn-Bow is said to be particularly suited to producing bowed or blown type sounds, but will also produce plucked or struck type sounds.

CIRCLE 27 ON READER SERVICE CARD

Ampersand Technology & Art recently announced the introduction of an add-on interface unit for the Prophet 5 synthesizer which allows the synthesizer to be controlled externally by control voltage and gate signals. The Link is installed in the Prophet as a modification and terminates in a remote box having phone jacks for control voltage input and output and gate input and output for each of the five voices of Prophet. Five independent voice select switches are also provided along with inputs and outputs for unison operation. The Prophet circuitry is isolated and buffered for protection, and high-quality connector system is provided for reliable and convenient set-up of the modified Prophet system. Some of the typical controllers which would be used with the Ampersand Link-modified Prophet would include the E-mu Micro-processor keyboard, the Roland Microcomposer or polyphonic guitar synthesizers having 1 volt/octave outputs.

CIRCLE 28 ON READER SERVICE CARD

Holt Electro-Acoustic Research (HEAR), Inc. has introduced the HEAR P2V guitar synthesizer interface. The P2V is a hexaphonic pitch-to-voltage converter which is said to significantly improve the state of the art in relation to triggering speed, tracking accuracy and dynamic response. The system uses a patented hexaphonic pickup/bridge assembly which replaces the tunamatic bridge on virtually any guitar. The P2V system generates the expected pitch and gate voltages for each string, and amazingly enough provides twenty-three additional outputs per string including five extracted guitar voices, six extracted fuzz voices, two types of triggers, three additional gates, four types of envelope followers, a speed follower, a timbre voltage, and a period voltage.

CIRCLE 29 ON READER SERVICE CARD

GUITARS

Hamer Guitars, which has recently developed a reputation for building some rather fancy and unusual electric guitar models, recently announced the introduction of a new, basically straightforward instrument known as the Special. Rather than special features, the Hamer Special emphasizes playability and unmatched sound quality in its design and construction. The body of the Hamer Special is built from solid mahogany, and the hardware and electronics of the model include high-output Hamer humbucking pickups, Schaller tuning machines and a solid brass bridge. The Hamer Special is available in eight finishes, including natural, sunburst, red, green or blue transparent finishes and three new metallic finishes.

CIRCLE 30 ON READER SERVICE CARD

A new line of acoustic guitars, known as the N Series, has been added to the Vantage line of electric guitars and basses distributed by Music Technology, Incorporated. The Vantage N Series acoustics break with traditional construction methods in several ways to take advantage of modern technology. For example, the guitars are furnished in a "natural" wood finish which the manufacturer says results in better sound projection with a more balanced tonal response than conventional glossy lacquer finishes. The necks of the instruments are a fast-playing design constructed of three pieces of maple reinforced with an adjustable truss rod and feature a fingerboard crafted of Bubinga wood rather than the traditional rosewood or ebony. A

new method of joining neck to body is used which is said to significantly improve both the strength of the instrument and its sustain. The first two models offered in the Vantage N Series are both dreadnaught designs with folk and 12-string models to follow in the near future. The VN-200 is constructed with a natural spruce top and birch sides and back, while the VN-220 has a top of spruce and back and sides of high quality ash. An additional feature of both models is precision tuning machines, die-cast rotomatic machines in the case of the VN-220.

CIRCLE 31 ON READER SERVICE CARD

For the guitarist who likes to carry an instrument with him wherever he goes, Chiquita Guitar Company has introduced a unique, ultra-compact guitar which is small enough to fit under the seat of an airplane even in its hard case. The Chiquita uses a new 19-inch scale length to make possible a guitar that is only 27 inches long overall. The body of the guitar is Honduras mahogany, the fingerboard is rosewood and the guitar is equipped with a fully adjustable bridge and a humbucking pickup.

CIRCLE 32 ON READER SERVICE CARD

MUSICAL INSTRUMENT PICKUPS

FRAP is the commonly-known name of the Flat Response Audio Pickup, and FRAP has announced the introduction of an all-new, low-cost transducer+ preamp system for all acoustic stringed instruments, such as guitar, bass, violin, piano, mandolin and banjo. The new model is designated the IT-2 and replaces the popular IT Integrated Transducer. The frequency response of the one-dimensional transducer and preamp of the IT-2 has been improved over the original IT model and now extends to beyond 100 kHz. The reliability of the system has been improved by removing the FET preamp from the pickup head as in the IT and replacing it with an IC preamp in a separate case, which also has the effects of boosting the output level by a factor of five and smoothing the overall tonal balance. The transducer and black-anodized preamp case are integrally connected via a nine foot cable which may be spliced or "connectorized" without voiding the warranty. The output of the IT-2 is furnished via a ¼-inch phone plug and is of low enough impedance to feed any amplifier, mixing board or tape recorder.

Also new from FRAP are all-new, professional, studio-quality, three-dimensional pickup systems. The new pickup system is available for stringed instruments as the F-350 and for wind instruments as the W-350. These new models replace the F-200R and W-200, respectively. The preamp units for both systems are externally very similar with an on/off/battery check switch with LED indicator for battery condition, a phase reverse switch, a volume control and a twelve-position EQ switch in addition to the connectors for

transducer input and amplifier output. In the F-350 stringed instrument system, the EQ switch provides eleven degrees of bass roll-off plus flat response, while the W-350 woodwind system offers eleven EQ curves designed to compensate for sound differences between the inside of an instrument where the transducer picks up its sound and the outside of the instrument where we are used to hearing its sound. Both 350 series preamps are powered by four 9-volt batteries. The F-350 transducer is a compact unit which actually houses three separate transducers at right angles to each other to pick up vibrations in all three dimensions. The F series transducer is available for all types of acoustic guitars, pianos, violins, violas, cellos, basses, banjos, mandolins and various percussion instruments and attaches with specially formulated adhesive FRAP wax. The W series transducers are patented pressure-type transducer units and come in three mounting styles. For flute and piccolo, there are two FRAP transducers available which simply replace the cork assembly in the head of the instrument, while for brass and reed instruments there is the universal screw-mount transducer which requires the installation of a 10-32 tapped hole in the mouthpiece or barrel of the instrument. Any instrument repair shop should be able to accomplish such an installation, or FRAP will do the job for a nominal $25 charge.

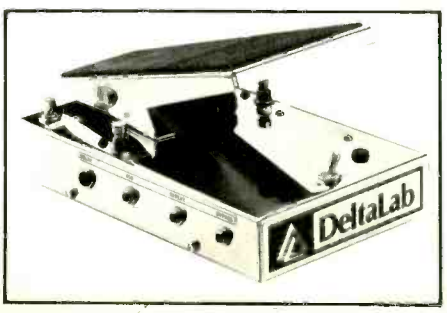
CIRCLE 33 ON READER SERVICE CARD

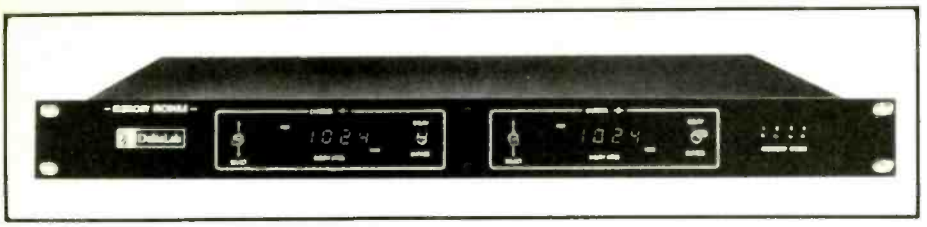
DeArmond, long a well-known name in pickups for acoustic instruments, has recently introduced a new model designed to mount in the sound hole of any flat-top guitar. The DeArmond 260 was designed to reproduce the true acoustic quality of the guitar rather than just picking up string vibrations. To do this, DeArmond utilizes a piezo magnetic sensor (PMS) system, which the company terms a breakthrough in the world of guitar pickups. The PMS system is said to have exceptional high frequency response in reproducing the sound of any bronze-or steel-strung guitar while still being a humbucking design. The DeArmond is fully shielded with a brass cover coated with a scuff-proof epoxy finish. The mounting clip for the pickup is made of spring steel and is designed to grip the sound hole of the guitar more securely than other pickup types.

CIRCLE 34 ON READER SERVICE CARD

MUSICAL INSTRUMENT ACCESSORIES

DeltaLab Research recently announced the availability of the DLB-1 Foot Pedal to be used with the company's DL-4 Time Line and DL-2 Acousticomputer digital delay lines. The DeltaLab DL-4 is a popular performance-oriented DDL which becomes even more versatile and convenient with the addition of the DLB-1 pedal. The pedal unit has footswitches to bypass the effect, to select repeat mode, VCO sweep mode, and up-delay or down-delay operation of the pedal.





The musician thus has virtually total control of the DL-4 from the remote foot pedal and will not have to change settings on the unit itself during a performance; he has full, continuously-variable control of delay over its full 1 to 512 millisecond (or up to 2½ seconds with optional memory extension units) at his toe. DeltaLab's DL-2 Acousticomputer is a much more sophisticated, two-channel delay line, and while the DLB-1 provides remote control of the same functions on the DL-2 as the DL-4, it will generally still be necessary to operate some controls on the DL-2 panel itself. The DLB-1 pedal is a photo-electric design made exclusively for DeltaLab by Morley.

CIRCLE 35 ON READER SERVICE CARD

MXR Innovations has lived up to its name with the introduction of the innovative MXR Loop Selector, which should prove invaluable to musicians who use sound modifying accessories. The Loop Selector allows the musician to switch instantaneously between two effects chains and return to a single amplifier. The device has an A-B switch section and a Y section which function independently for extra versatility. The Loop Selector requires no power source and has special circuitry to reduce switch pop to below typical system noise levels.

CIRCLE 36 ON READER SERVICE CARD

D'Andrea recently introduced a line of reasonably-priced hard-shell instrument cases under the Timberline trademark. The new cases use wooden tops and bottoms and laminated side frames for maximum protection without the weight and high price tag of conventional wooden cases. Timberline cases come in nine shapes to accommodate a variety of acoustic and electric guitars and feature foam-padded, plush-lined interiors.

CIRCLE 37 ON READER SERVICE CARD

RolandCorp US recently added a deceptively simple but very versatile line-level mixer to its Roland Rack series. The SMX-880 Line Mixer is an eight-input stereo output mixer with excellent signal-to-noise, headroom and signal handling specs. Each of the eight inputs has a ¼-inch phone jack with a switch to select -20 or +4 dB nominal input level, and a level control and pan-pot on the front panel. The two output channels have individual level controls with LED overload indicators and each also has a high-level input directly into the mix buss via 1/4-inch phone jack. The two output signals are available simultaneously on the back panel, via a ¼-inch phone jack carrying the signals in high impedance unbalanced form at either a -20 or a +4 dB level, and the front panel in low impedance form via XLR-type connectors. Typical applications of the SMX-880 Line Mixer include combining the outputs of several high-output keyboard instruments, and combining multiple special effects units.

CIRCLE 38 ON READER SERVICE CARD

A new development in guitar and electric bass strings was announced recently by Sterlingworth Music, Inc. The company's new strings are called Slicks, and they were designed to yield the sonic qualities of round-wound strings without the usual round-wound disadvantages. Sterlingworth's Slicks produce the characteristically bright and harmonically-rich sound of round-wound strings while presenting the player a special "slick" surface on the string which improves the feel of the string, and reduces the fingering noise and excessive fret wear often associated with round-wound strings. Slicks are wound on a hexagonal core wire to help eliminate loosening windings and are available in various gauges of nickel-steel, pure nickel, phosphor-bronze and 80/20 bronze for guitar and in stainless steel for electric bass.

CIRCLE 39 ON READER SERVICE CARD

Pro-Co Sound, Inc. should be known to readers of this column as the makers of the Lifelines series of premium-quality instrument cables. Pro-Co has just announced the availability of a new cable type developed by Pro-Co and Belden Corporation and manufactured by Belden on a custom basis. Pro-Co's designation for this new cable type is Pro-Co 18, indicating that it is a single-conductor, braided shield cable. This new cable uses forty-one strands of 36-gauge tinned copper wire to make up a very flexible 20-gauge center conductor. This conductor is covered with rubber insulation and a special conductive cloth tape which virtually eliminates microphonics and handling noise even at high amplifier gains. Over this inner shield layer goes a braided copper shield with 96% coverage and finally a black neoprene outer jacket for resistance to abrasion, chemicals and solvents. Pro-Co 18 is available in pre-made Lifelines cable assemblies in standard and custom lengths, and in bulk lengths for users handy with a soldering iron. Lifelines cable assemblies feature top-quality American-made connectors, encapsulated solder connections and metal bonding cement and heat shrink tubing for strain relief.

CIRCLE 40 ON READER SERVICE CARD

Don't let your speakers control your sound...

Electro-Voice stage systems put you in control.

Why should a musician allow his creativity to be limited by his speaker system? With amplifiers, pre-amps and the myriad of other state-of-the-art electronic devices available, why should a musician limit his sound by playing his equipment through a speaker system that hasn't changed in design since 1957? The answer is he shouldn't, and with Electro-Voice Stage Systems he doesn't have to. These three new instrument speaker systems let you hear all the sound your instrument is capable of producing, the way you want it to be heard, by choice not by chance.

The S18-3 lets you hear all the notes you never heard before from your keyboard or synthesizer from below 40 Hz to above 16,000 Hz. The famous EVM-18B delivers the bass. The Electro-Voice exclusive vented midrange driver delivers the midranges as efficiently as a horn, but without the typical "honky" small horn sound. The ST350A tweeter gives you clean highs over a solid 120° angle, eliminating the high-frequency "beaminess" that limits the enjoyment of your performance to the few people sitting directly in front of the speaker.

The two new bass guitar systems also incorporate the VMR™ vented midrange. It can be controlled from the front panel, thus giving the bass player total control over the midrange harmonics missing from "standard" bass enclosures. The B115-M uses a single EVM-15B in an optimally vented enclosure. The result is the tight sound preferred by many jazz bassists and studio musicians. The B215-M has two EVM-15B's for a bass sound with more "carry"; perfect for the larger venue or for the rock musician who wants more low-frequency "punch." In both cases, the VMR brings out sounds you may have heard before only on studio recordings.

All systems have identical styling. Black vinyl covered ¾" plywood construction for durability, further protected by extruded aluminum trim on all edges. A metal mesh grille screen protects the drivers from accidental abuse.

If you want to have control over your sound, these are the speakers for you. See and hear these superb instrument speaker systems at your Electro-Voice dealer.

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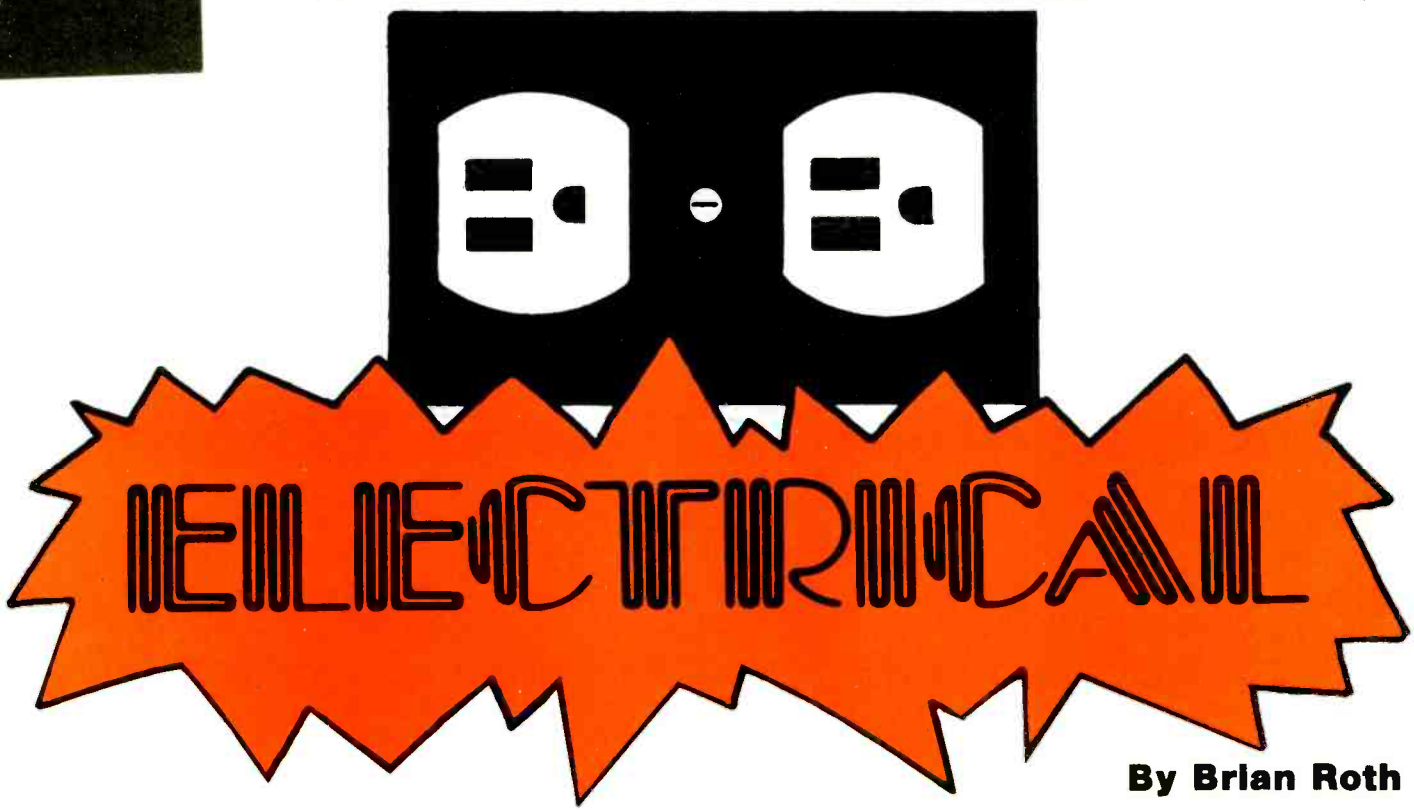
PRACTICAL



By Brian Roth

"Power," "AC," "Juice." No matter what you call it, all of our fancy sound equipment would be mere collections of metal, plastic and silicon slivers without it: electricity. Yet, this vital AC electrical power is usually taken for granted. It seems so simple—stick the plug into the wall outlet, and those little LEDs start blinking.

But, there is much more happening than meets the eye (or ear). For instance, a poorly designed electrical power system can introduce clicks and buzzes into even the best quality audio equipment. Shoddy wiring can be an *excellent* fire generator. Also, improper precautions can cause dangerous electrical shocks.

This article was written in an attempt to clear up some of the widespread misunderstanding of AC electrical distribution in audio applications. The theoretical and practical information will benefit anyone utilizing electricity in recording, sound reinforcement or even home stereo systems. (This article is not intended to make the reader a journeyman electrician; the subject is too complex to cover in this format. However, the information should help the reader when dealing with an electrician.)

But first, here are some *WARNINGS!* Standard 120 volt "house current" can be either an industrious friend *or* a murderous enemy. Even a slight electric shock is unpleasant, and shocks of greater magnitude can be lethal. *Always play it safe! Do not work on "live" circuits!*

There are many people out there in the world installing their own wiring, often in a very dubious fashion. We can't stop this activity (which is illegal in most localities), nor do we encourage the neophyte to attempt major wiring jobs. But, maybe the topics to be discussed herein will improve the quality and safety of "home brew" installations. *If you don't know what you're doing, call a licensed electrician!* The life you save could be *yours.*

When purchasing supplies for a wiring job, steer clear of bargain basement equipment. All legitimate materials for electrical power systems will have the Underwriters Laboratory (UL) symbol imprinted on them. The UL label is an assurance that the materials meet certain minimum standards for safety; it does *not* guarantee dependability over a long period of time. Thus, it is often cheaper in the long haul to spend a little more initially, and purchase the better quality brands. *Don't chintz on materials!*

After a period of time, normal wear can take its toll on even the best electrical equipment. If a power cord becomes frayed, replace it. When a wall receptacle is broken, install a new one. *Don't rig it! Fix it properly!*

[Although every attempt has been made to insure the accuracy of the information presented, neither the author nor the publishers of *Modern Recording & Music* accept *any* liability for accidents, injuries or property damage due to electrical systems installed or utilized according to the techniques to be described. We encourage you to contract the services of a licensed electrician.]

Two wire, 120-volt Power Systems: A typical wall outlet, called a "duplex receptacle," is shown in *Fig. 1.* It is designed to allow two separate pieces of

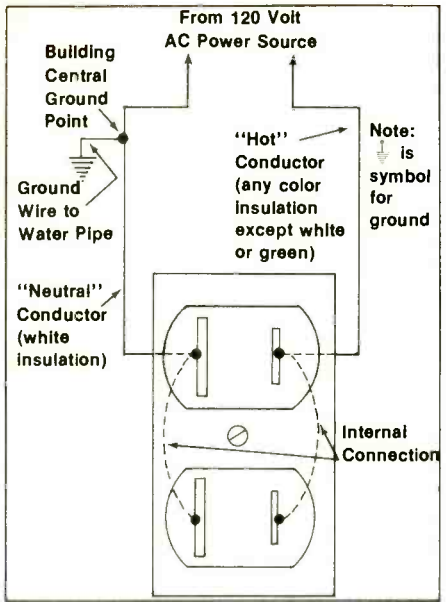


Fig. 1: Two-wire duplex receptacle connections.

equipment to be simultaneously powered. Internal wiring within the receptacle connects the two left slots together; the two right slots are similarly interconnected.

A pair of wires, insulated with plastic, routes electricity from the 120-volt AC power source (normally available at the fuse or circuit breaker panel) to the receptacle. Observe that the conductor running to the left hand slots of the outlet comes from a central ground point. This grounded wire is commonly (although not always correctly) called the "neutral conductor."

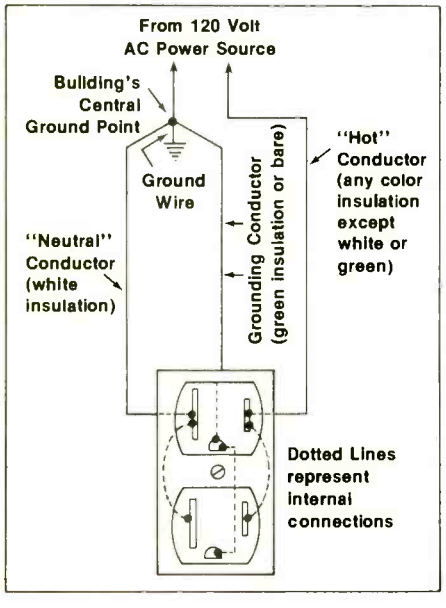


Fig. 2: Grounded duplex receptacle connection.

All of the neutral wires from every outlet, light fixture, etc. within a building ultimately connect to this central ground which in turn is connected to a large grounded wire provided by the electric company. In addition, a second wire connects this central ground point to a cold water pipe in the building (or, in some installations, a long metal stake driven into the dirt).

In proper installations, the neutral lines will *always* be covered with white insulation. The other conductor, which is 120 volts "above" the grounded wires, can be insulated by plastic of any color *except* white (or green, which is an additional reserved color we will discuss later).

The duplex receptacle shown is of a newer variety; the neutral slots are wider than the "hot" slots. Certain televisions and other appliances have a polarized power plug that can be inserted only one way into this style of outlet. Older receptacles which have two identical (short) slots will not accept a polarized plug, nor will inexpensive extension cords. This design is intended as a safety feature to reduce the chances of experiencing electrical shocks from the appliance.

"So what's that funny third pin that I see on some plugs? You know, the one I have to cut off so I can plug it into a two-prong outlet?" you ask. Well, unless you know *exactly* what you are doing, *don't remove that pin!* It is a safety feature designed to protect you.

In *Fig. 2*, a grounded duplex receptacle is shown. The third pin, like the neutral, is tied via its own independent wire to the building's central ground point. As can be seen in *Fig. 3*, this grounding conductor also connects to the metal chassis of the equipment being powered.

So why bother with the second grounded wire? Why not just tie the neutral wire to the chassis? Remember that the neutral is one of two current carrying conductors (the "hot" is the other). Although the electrical resistance of wire used in power distribution systems is very low, it is still slightly greater than zero ohms. So, if we use Ohm's law:

$$E = I \times R$$

where E is voltage, I is current in amperes and R is resistance in ohms, we can observe that some voltage drop will occur along the wire. In other words, the voltage at the end of the wire will not be the same as at the beginning.

When current flows through the neutral conductor, a small voltage drop will happen. Therefore, at the receptacle, the neutral line will *not* be at ground potential.

On the other hand, current should not normally flow through the grounding conductor. This keeps the chassis at the same potential as the central ground point.

If a short circuit should develop from the "hot" conductor to the chassis, current will flow through the grounding wire. The current flow will be great enough to blow a fuse or trip a circuit breaker. This, then, gives a pretty good indication that something is truly

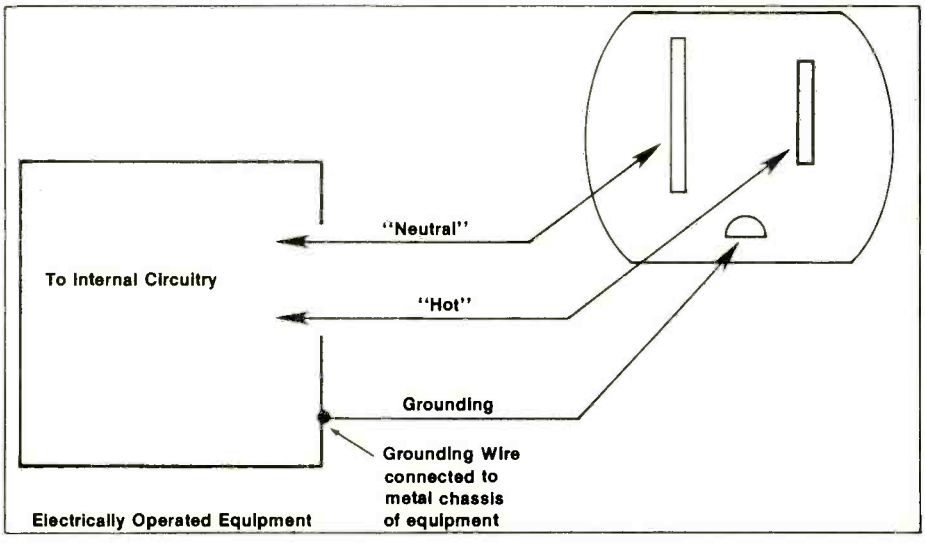


Fig. 3: The independent grounding conductor attaches to the equipment chassis or other exposed metal surfaces for protection against shock.

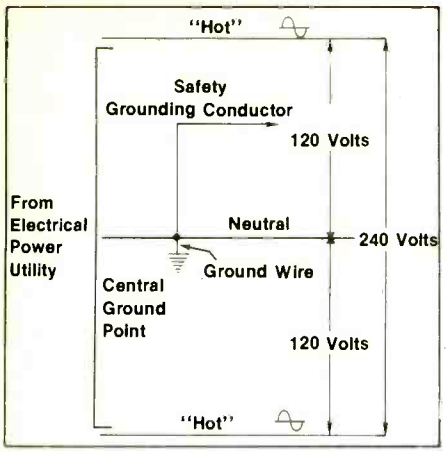


Fig. 4: The three-wire 120/240-volt wiring system.

amiss within the equipment.

When the chassis lacks the grounding connection, a short circuit will cause the equipment to also become electrically "hot." This is a dangerous condition and should explain the importance of the grounding pin.

Remember, ground and neutral are *not* the same. Grounding wires and neutral wires are not interchangeable. They *must* be independent of each other at all points in the system *except* at the central ground point.

The grounding line does not have to be insulated with plastic because it is not supposed to be a current carrying conductor; in many circumstances it can be bare. However, when it is insulated, the only acceptable color is green; no other color should be used. This will ensure positive identification of grounding wires.

"All right, smartie," you say, "if that third pin on power plugs is a safety feature, and not supposed to be snipped off, how do I plug it into a two-prong outlet?"

This dilemma can be resolved by a little plastic adapter available from your hardware store. The female side of it will accept the grounded plug while the male side has only two prongs and thus can be interfaced with older, ungrounded receptacles. A green wire or a metal tap extends from the adapter and is intended to be connected under the cover plate mounting screw on the outlet. Generally, this screw is grounded and thus will tie the third pin of the equipment's power plug to the central ground point of the building.

Be aware, however, that the cover plate screw is not always grounded. In older installations, it is possible for the screw to be "floating" which means it doesn't connect to anything. Under these circumstances, the use of a ground adapter can lull the user into a false sense of security. We will later describe how to determine if the screw is actually grounded.

120/240-volt Power Systems: Fifty years ago, the electrical power requirements of the average building were much lower than they are nowadays. A simple two-wire 120-volt (or more typically in those days, 110 volt) system was most adequate. However, as larger types of equipment came into use, the power requirements also increased. This in turn necessitated the use of larger wires to handle the current flow.

Finally, some manufacturers began producing equipment that required 240 volts for operation. The higher voltage is advantageous because the current flow through the circuit will only be one half that of a 120-volt design. This can be explained by Watt's law:

$$P = E \times I$$

where P is power in watts, E is voltage and I represents the current in amperes. So, if the voltage is doubled, the current can be halved for a given amount of power consumption.

Lower current allows the use of smaller wiring (translation: fewer greenbacks). This is one reason why many European countries are on a 240-volt system since they have to import expensive copper.

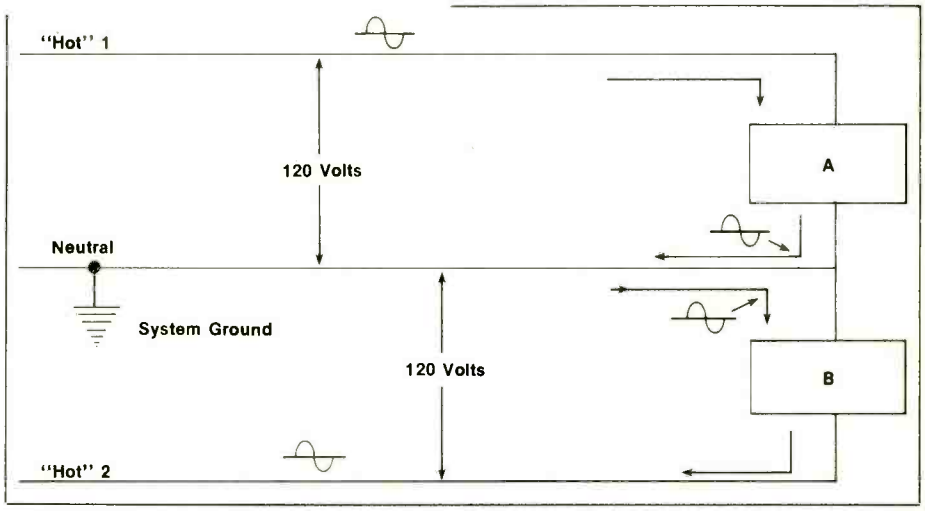


Fig. 5: When two pieces of equipment that are wired this way consume an equal amount of power, the current flow in the neutral conductor will be essentially cancelled.

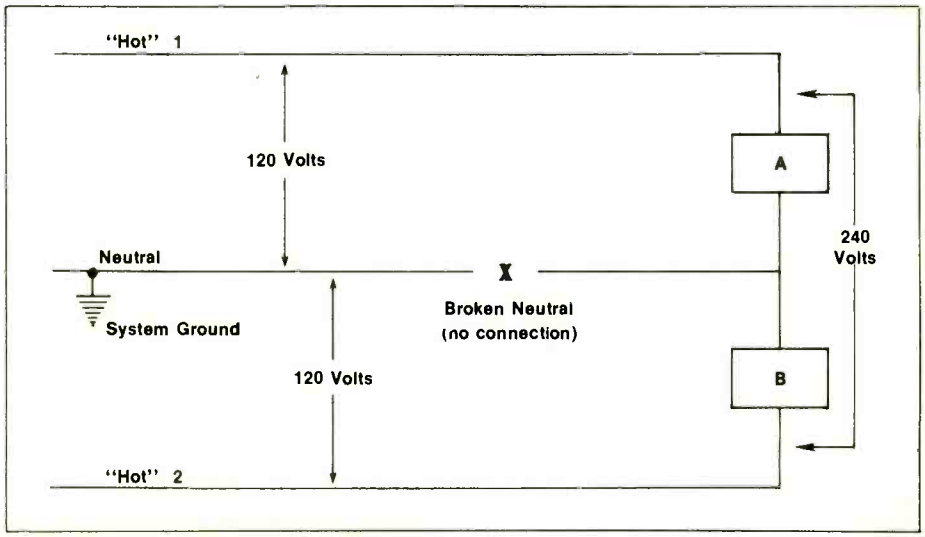


Fig. 6: The two pieces of equipment (A and B) will be connected in series across the 240-volt source if the neutral is broken or switched.

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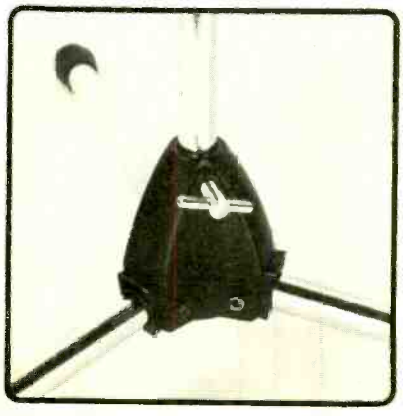
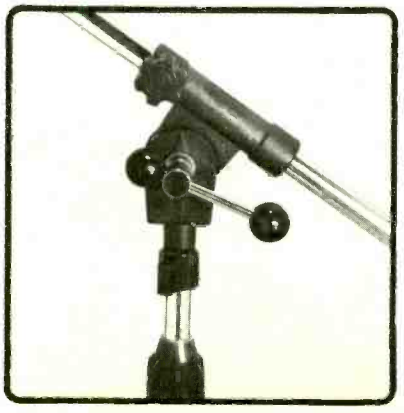


Wide-stance legs for stability . . . soft rubber feet for good isolation.



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CIRCLE 171 ON READER SERVICE CARD

In modern residential and commercial installations, both 240 volts and 120 volts are available. A rather novel wiring system was devised to provide the dual voltages.

As can be seen in *Fig. 4*, a total of three wires are utilized in a 120/240-volt system. One of these is the neutral which is grounded as described earlier. Instead of a single "hot" conductor, two are supplied; each is 120 volts "above" neutral. However, a potential difference of 240 volts exists from one "hot" to the other. This is due to the fact that the AC voltage of each is 180 degrees out of phase with the other.

Equipment requiring 120 volts is wired between one "hot" conductor and the neutral. 240-volt equipment is connected across the two "hot" conductors, and the neutral is not used.

The safety grounding conductors are tied to the central system ground point as in two-wire 120-volt distribution. They retain the same characteristics as discussed earlier.

There is another interesting advantage of the three-wire 120/240-volt arrangement. In *Fig. 5*, two pieces of equipment are being supplied 120 volts. Both have a common connection to the neutral conductor, but each is tied to a different "hot" leg.

Assume that each requires an identical amount of current for operation. Under this condition, *no* current will flow through the neutral conductor (at least in theory). Obviously, this would be a real advantage. The voltage drop caused by the neutral line would be nonexistent. Also, the neutral wire itself could be smaller than would be otherwise necessary.

Why does this occur? Remember that the voltage on each of the "hot" conductors is 180 degrees out of phase with the other. The current flowing from each piece of equipment through the neutral is equal, but opposite in phase. In this idealized example, the two currents will cancel, and no current flows in the neutral.

When this situation exists, the neutral is "balanced." Electricians strive to create this condition by carefully assigning an equal number of loads to each of the "hot" conductors arriving at the building. This is great for the average residential or commercial installation, but is *not* ideal in audio systems.

In all electrically powered equipment, a small amount of current "leaks" from the hot conductor to the chassis. This is due to the internal wiring layout in the gear and AC power line filtering circuits commonly employed. Normally, this doesn't create a safety hazard. It *can* cause hum or buzz in the audio system if the chassis of two or more devices are electrically connected. A metal equipment rack and the shields of audio cables can create this condition.

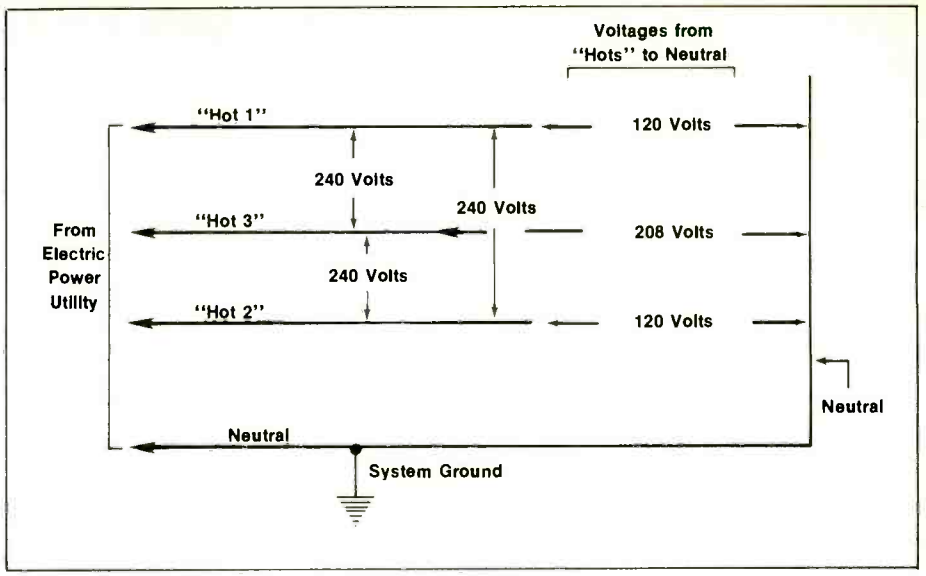

Fig. 7: The wiring of a three-phase 120/240-volt "Delta" system.

The noise problem can arise when the leakage currents appearing on the chassis of the equipment are out of phase. This will happen when both hot legs are utilized to power different equipment in the system. Current will flow through the chassis ground paths because of the potential differences.

Be aware that other problems can crunch the signal-to-noise-ratio in the system. But, it is always wise to power all of the equipment in an audio system from the same "hot" leg. This can be accomplished by connecting all of the gear to the same AC circuit. Then, one fuse or circuit breaker will protect the entire system.

Unfortunately, that becomes impractical in large P.A. systems due to the large current demands of the multiple power amplifiers. Later, will will discuss the special requirements of portable sound systems.

There is another important thing to be aware of in 120/240-volt (three wire)

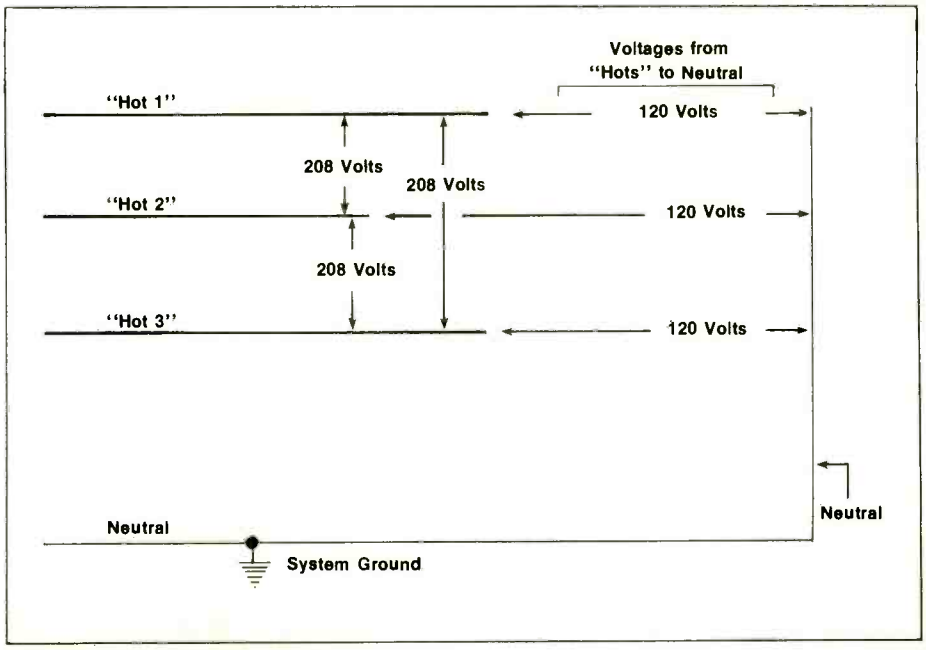

Fig. 8: The three-phase 120/208-volt "Wye" system.

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CIRCLE 161 ON READER SERVICE CARD

systems: the neutral *must* be "solid." This means that all neutral connections must be securely connected, and power on/off switches must *never* break any neutral line.

Fig. 6 shows why this is very important. It is the same as *Fig. 5* except for the fact that the neutral has been broken. Since the shared neutral conductor now goes nowhere electrically, the two pieces of gear are wired in *series* across a 240-volt source. When the power consumption of each is identical, the voltage divides equally, and 120 volts is supplied to each. But, the power consumption may *not* be the same. Then, the 240-volt potential is not equally divided. It is possible for 40 volts to appear across the AC line of "A" while the remaining 200 volts cremates "B." Other distasteful combinations are possible, of course. Moral: *Make the neutral "solid!"*

Three-Phase Power Systems: This type of arrangement is quite common in commercial buildings. It allows even the largest equipment (like your dollar guzzling air conditioner) to be connected with smaller wiring. Three-phase motors are less expensive and require less starting current than single-phase versions.

There are a number of three-phase configurations, but we will discuss the two most often encountered in audio system installations. The first of these is commonly called 120/240-volt three-phase "Delta" and is diagrammed in *Fig. 7.* Notice that there are three "hot" conductors and one neutral. "Hot 1" and "Hot 2" are 120 volts referenced to neutral. "Hot 3" is 208 volts above the neutral. At the same time, a potential difference of 240 volts exists from any one "hot" to any other.

Electrical gear that requires 120 volts for operation can be wired from either "Hot 1" or "Hot 2" to neutral. Obviously, "Hot 3" cannot be used in this situation (unless you happen to be a pyromaniac) since it will supply 208 volts to the equipment. Consequently, it is most important to identify the "Wild" 208-volt leg. Later sections will discuss just how to do this.

The other type of three-phase arrangement is often called 120/208-volt three-phase "Wye" (or simply "Y"). In *Fig. 8* we can see that each of the three "hot" legs are at a potential of 120 volts above neutral. Thus, equipment can be wired from any of the "hots" to neutral and will be supplied 120 volts.

From any one "hot" to any other, a voltage of 208 volts will appear. Large three-phase equipment will be converted to the three "hot" conductors in this fashion.

On the surface, the "Wye" arrangement appears to offer the greatest advantages. All three-phase legs are available to power standard 120-volt equipment, while heavier requirements can be handled by using three-phase equipment. But, the "Wye" configuration is not as commonly utilized as the "Delta," although it is very often found in large stage and auditorium systems. Why is this? Remember that when a lower voltage is used, more current must flow for a given amount of power consumption. So, the large three-phase equipment will draw a greater number of amperes when powered by the 120/208-volt "Wye" system. Less current will flow through the wiring if the same equipment is supplied by the 120/240 "Delta" configuration. (Obviously, the equipment must have adjustable "taps" on its power input to accommodate either of the two voltages. This is why the power specification label on the equipment will often show a dual voltage and current rating such as: "240 volts at 20 amperes, 208 volts at 25 amperes." The electrician will select the proper internal wiring configuration to accommodate the voltage available in the building.)

As discussed earlier, larger current flows require larger, and more expensive, wire. This is why the "Delta" arrangement is most universally found in commercial and industrial buildings.

On the other hand, three-phase equipment is not generally used on the stage of an auditorium. Of course, the large air conditioners on the roof will require three-phase power, but the needs *at the stage* will be for large amounts of 120-volt power to operate amplifiers, P.A. equipment, lights, etc. This is why most stages are wired for 120/208 "Wye" since all three-phase legs can be used for 120-volt requirements.

Well gang, we have reached the end of this installment. Next month, we will dive into practical discussions of the actual electrical hardware and the methods of proper installation.

In the meantime, please don't let the little bit of knowledge already presented become a dangerous thing. Play it safe so you will be back next month!

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MODEL	KEYS	VCO	VCF	EG	NOTES	DIGITAL MEMORIES
CS-5	37	1	1	1	1	N A
CS-15	37	2	2	2	1	N A
CS-20M	37	2	1	2	1	8
CS-40M	44	4	2	2	2	20

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CIRCLE 99 ON READER SERVICE CAR

Recording With GRACE SLICK

By Jeff Tamarkin

Grace Slick is one rock & roll name that just about everyone who has ever listened to the radio is sure to know. As the singer in the legendary San Francisco rock group the Jefferson Airplane, and later with the Jefferson Starship, Slick's voice soared its way through classic songs such as: "Somebody To Love," "White Rabbit," the Woodstock-era "Volunteers" and many others.

In addition to her instantly recognizable sound, Slick was always linked with controversy, and her outspokenness is nearly as well-known as her music. It was Grace who showed up at a White House party with Yippie leader Abbie Hoffman as her escort (they were refused entrance) with the intention of spiking the punch bowl with enough LSD to turn the Nixons and friends inside out.

In the 1970's, Slick experienced personal problems, including a bout with alcoholism, and eventually left the Starship to get her personal life back in order and to pursue a solo career. She did just that, and in mid-1980, Dreams, *Slick's first solo album (she recorded one called* Manhole *in the 70s, but considers it another Starship project) was released on RCA Records. It was a stylistic departure for Slick, featuring not the raunchy rock she'd become known for, but primarily easier, orchestrated soft-rock and pop songs.*

Now, Slick is back with her second solo effort, Welcome To The Wrecking Ball, *and it's a rocker this time. Slick returns with a hard-as-nails bang-up this time, and it's a record that is bound to win back the fans who remember Grace as the singer whose*

powerful piercing voice defined rock a decade ago.

Both of Grace's solo albums were produced by Ron Frangipane, a studio veteran who previously has worked with John Lennon, and Janis Ian, among others. Modern Recording & Music's *Jeff Tamarkin spoke to Slick and Frangipane in New York prior to the release of the new album.*

Modern Recording & Music: You recorded your first solo album last year, after all of those years leading the Airplane and the Starship. What were you saying in your music on *Dreams* that you didn't say with the groups?

Grace Slick: I was talking to myself a lot. In the 60s I was yelling at everybody to open up but then I did the same thing they were doing. I got fat and drunk and closed myself up. I became a moron. In the Airplane, I wasn't always close to the songs by the others. I wasn't interested in saying let's all go up in space or up against the wall. I understood what they meant and I felt it along with them, but not as strongly. Now I can answer for every line, even if it's written by somebody else. The songs were picked to go with this personality.

MR&M: When *Dreams* came out did it feel like it was a fresh start?

GS: A little bit. It felt like I was starting from scratch, but at the same time I was reminded of how long I've been around. RCA sent me the record and I looked at it and said, "This is a real record, a real jacket." I felt like a new artist. Then I realized I'd had about twenty of these.

MR&M: How is the new album different from *Dreams?*

GS: It's a rock and roll album. Scott Zito (guitarist who also played on *Dreams*) wrote all of the music and most of the lyrics. I wrote some of the lyrics. Phil Stone is playing bass. Bobby (Torello), Johnny Winter's drummer, is on it. Danny Galino is playing rhythm guitar. Scott played lead and rhythm guitars, harmonica, wrote the songs and sings, and arranged. It's basically Scott's album.

MR&M: How was Ron Frangipane's role as producer different from what it was on *Dreams?*

GS: His guidance and writing were more in evidence on the last album. These songs were written and arranged by Scott. When he sent me the tapes of the songs, he was playing the lead and rhythm guitars, drums, bass and singing.

MR&M: How much influence did you actually have in the studio when it came to making suggestions for improving the sound of the record?

GS: We all did that, as opposed to the last album, which was very structured. On *Dreams* I didn't make any comments about, say, violins, other than I did want them or I didn't want them. But I do know rock and roll, so I can sing what I'd like to hear to Scott. It was more of a group thing.

MR&M: Why did you decide to change the direction from the soft, MOR sound of *Dreams* to a harder rock album?

GS: Mainly because I'm a rock and roll singer. I'm actually more comfortable with it.

MR&M: If *Dreams* had sold more, do you think you would have repeated that formula?

GS: No, because I'm not comfortable with that. If *Dreams* had sold more, RCA might have suggested that I do Vegas or some Carnegie Hall-type places, but I don't like to do that. I'm not that kind of a singer, even though I can do it. I'd rather write it and let somebody else sing it, and I'd rather sing a guitar player's songs.

MR&M: The last time I spoke to you, when *Dreams* came out, you said your next album would be "meaner". Do you consider *Welcome to The Wrecking Ball* a meaner album than *Dreams?*

GS: It's not mean as much as it is sarcastic. I'm not being mean; I'm just being the usual jerk I've been for the last twenty years.

MR&M: What have learned about production since making *Dreams.*

GS: Not a thing. Every album I've done is different in that you deal with what is happening at the time. I couldn't relate

"My favorite interpretive singer is Mick Jagger, only because of that offhanded, jive way of phrasing. I prefer that style for myself..."

anything I did on the last album to anything I did on this album. Each song is its own production. I'm a goofball so I operate on whatever is happening at the moment and it doesn't draw on anything I've done before.

MR&M: What has happened with you personally that has gone into this album being such a change from the last one you did?

GS: I guess probably that it is clearer as I go along where the areas I feel more comfortable/effective are. Since I was a singer I figured I could sing anything, but that is not necessarily true. The voice box can sing *"Baby come back to me, I wish you wouldn't go away,"* or *"Isn't it a lovely day,"* but the personality hates it. I'd rather hear that from someone who believes what they're singing. I don't believe that. My favorite interpretive singer is Mick Jagger, only because of that offhanded, jive way of phrasing. Like when he sings, *"I'll be your knight in shining armor"** and you know he's putting you and himself on and having a good time." I prefer that style for myself, though I wouldn't for Linda Ronstadt or Rita Coolidge. I think they'd look silly trying to do that aggressive thing.

MR&M: Why did you decide on the title *Welcome To The Wrecking Ball?*

GS: I saw a wrecking ball in Houston, Texas, and from that moment, that was the concept, that battering ram feel. I get angry about what's happening, but it has to be taken with a sense of humor or else you eat yourself up with anger, and that's crazy. The concept is specific and focused.

MR&M: How did you meet Scott Zito and begin working with him?

GS: I met Scott through Ron Frangipane, the producer. I met Ron through Gene Simmons, the bass player of Kiss. The band is essentially Scott's band and he'll probably make a record with them soon.

MR&M: How has the recording process changed for you in the fifteen years you've been making records?

GS: Well, for one thing it's gone from 4 tracks to 32, but I'd rather use 16 or 8 because you don't need that many for rock and roll. The human ear can't take in all of that information from a phonograph record. "Live" it's a different story. How it's changed is that the more you do the more you know. You have more to draw on. In the beginning, with the Airplane, we didn't know as much about the machinery as the musicians today know. We were mostly interested in farting around, trying to get new sounds out of the amplifiers, rather than what's happening on the board.

MR&M: When you're in the studio singing, are you concerned with what's going on in the control room, or do you just leave it to the engineer?

GS: I'm concerned, but there's nothing I can do about it because I'm in there singing. I'm concerned with—and the engineers hate this—the mix in the earphones. It's very important because if you hear one thing and you intend for that thing not to be so loud on the record, then you're going to be singing with it and the way you're singing it is going to be different. To get an earphone mix which is as close as you think it's going to eventually sound is difficult. If you're getting the right mix, the engineer will get it, because you'll be singing with what's going down.

MR&M: What were some of the differences between recording with the Starship and doing your own albums?

GS: We don't have the money that they do, for one. So where they can take days on a song, we're on a tight schedule. There's two weeks for the basic tracks, two weeks for the overdubs and two weeks for the mixing, and that's it. Also, the songs on my album were all written by one man, so there's no question about how it's actually supposed to go.

MR&M: Do you ever listen to your old records?

GS: Only if I have to. This gal wrote a book about me for Doubleday *(Grace Slick—The Biography by Barbara Rowes)* and I had to listen to the records because she asked me what I meant when I wrote certain songs. It was interesting. If interviewers ask me about a certain song, and I have the time, I'll listen to it, or, if I want a certain sound. I like the way Jack Casady plays bass. I've still never heard a superior bass player, so I can be a shit about sounding like Jack Casady. But other than that, I don't listen to them.

MR&M: When you do hear them now, what do you think of them in retrospect?

GS: Sometimes I think, wow, that was really good. Others I think, boy, I shouldn't have done that at all. You notice things you didn't notice before.

MR&M: What do you remember about the sessions for some of the old records? What comes to mind when I say *Surrealistic Pillow?*

GS: First record, L.A. Love the studio, still my favorite for rock and roll music (RCA, Studio A in Los Angeles). Very good sound good recorded sound, good vocal sound. We didn't get in the way of the producer, so it was a well-done record. The songs were good and it was easy to do because we had been playing them "live" for a year.

MR&M: How about *After Bathing At Baxter's* (third Airplane LP)?

GS: Crazy, had a load of fun doing that album. A looney-tune record. We rode motorcycles in the studio; people were falling down having parties on the other side of the studio. It was nuts.

MR&M: *Volunteers?*

GS: That was the period when I could feel the split. Jack and Jorma didn't like the political let's-everybody-get-together-and-storm-the-White House-and-be-hippies type stuff. Paul (Kantner, guitar and vocals) did. and Marty (Balin, singer) wanted to do theatrical love songs. I would've preferred that everybody be happy and do their songs. I didn't like the dissension. I'll do my sarcastic stuff and let Paul do his political stuff, Jorma do his rhythm and blues and Marty do his love songs. Why argue about it?

MR&M: What about *Red Octopus* (second Starship LP)?

GS: Sold a lot of records. That's all I have to say about that.

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MR&M: Were there any Starship albums you did like?

GS: I liked *Freedom At Point Zero,* which I wasn't on.

MR&M: Do you expect to tour behind the new album?

GS: That depends on whether RCA wants to push a single, because if you have a new group and nobody's ever heard what it sounds like, they're not going to come to see you. They don't know if I'll be singing pop songs, reggae or what. The record company has to get behind the single and have the sucker played a lot. Then they have to foot the bill to put the band on the road. I could go out on the road with Starship, though, if I really wanted it to get heard.

MR&M: Do you really think you might do that?

GS: Probably. I know I'm going to be working on Kantner's solo album. I'm willing to go on the road with almost anybody. I'll go with the Beach Boys, I don't care. No, that's not true, but with any viable rock and roll sort of thing, yeah, eventually.

At this point, we conclude our conversation with Grace Slick and turn our attention to producer Ron Frangipane. Ron appears to be making a name for himself as the producer most sought after by artists—formerly members of "megagroups"—striking out on solo careers. Ron has provided professional guidance on both of Slick's solo efforts, and the mutual respect is evident. Speaking with Frangipane gave MR&M *the opportunity to scrutinize some of the more technical details of his most recent sessions with Slick.*

Modern Recording & Music: How did you get started in producing?

Ron Frangipane: I got started about fourteen years ago playing piano for (songwriter/arranger) Jeff Barry, and I made records with Neil Diamond and people like that. I moved into arranging from that and began writing for some major acts, such as John Lennon and Yoko Ono, Melanie, Janis Ian, and a whole batch of others. From arranging, I moved into producing some small dates. Grace and I met when I was writing some symphony charts for Gene Simmons in L.A., where she was a guest.

MR&M: Whose idea was the orchestration on *Dreams,* your's or Grace's?

RF: Grace wanted to do something totally different from anything she'd done. She loves orchestras and different color sounds and acoustic instruments. She also wanted to work "live" with a symphony orchestra, which was the way we cut *Dreams.* We recorded about sixty-five pieces, including the symphony orchestra, the rhythm instruments and Grace's voice, "live." The underpinning of that album was rock & roll, but an abstract form of it.

MR&M: Were you familiar with her past work with the Airplane and Starship?

RF: Oh yeah. The hardest thing at the early stage was to get it out of my head that I was with her.

MR&M: Was it hard for you to get rid of preconceptions you had about her so that you could establish that new sound?

RF: No, because the material was not really like the material she'd done before. We spent a lot of time talking first. Our production meetings rarely got into the the music; it was more or less conceptual. We were looking to establish her solo career so we didn't want to go back to her earlier work.

I also did the first couple of solo albums with John Lennon, and it was similar because John was establishing a solo career outside of the Beatles. The first couple of albums, everybody, including me, wanted to hear the Beatles. Nobody wanted the Beatles to be broken up. A lot of the criticism we got was based around the Beatles splitting, and not really around the work he'd done. Now with the tragedy that took place (killing of Lennon), people are starting to re-listen to those albums and they're finding that what he was saying there is very consistent with what he said near the end of his life. With Grace, by the time we finished the *Dreams* album, we were convinced that it was a hit because it was different. We found that some people agreed and some certainly didn't. With the new album, our obectives were different. We didn't want to just make an average rock & roll album, so we decided to make a hard rock album that would drill teeth. The only stylistic thing that is consistent now with Grace is constant change. I don't necessarily assume that the third album will be a rock & roll album.

MR&M: The sound of the recording itself is very consistent throughout *Welcome To The Wrecking Ball.*

RF: We spent an entire summer just trying to find the right room. We were going for something like a "live" album sound, not in the sense of "live" with a lot of echo and blare, but having that control you have in a tight studio situation where you hear things popping in and flying over your head. But we also wanted the sense of absolute performance. We chose a room in Miami (Criteria), which had dimensions that I hadn't yet seen. It was the size of a small concert hall. The ceiling was not as high as in your classic recording studio; it was maybe 15-18 feet high. We set the band up in concert configuration, as if we were performing, and we cut everying like that. It took three days to get it to sound like anything. We were miking the walls to pick up the reverberation off the walls. We were trying to let those microphones act as an audience's ears might act.

When we got back to New York to finish the album, the overdubs were done in very close-mic style, so all of the solos could be clearly dilineated. As an example, we had the drummer about five-and-a-half feet off the floor on a set of risers and we were miking underneath the risers just to hear the pulse of the bass drum. We had a shotgun mic maybe eight feet from him, way above his head, aiming down at him. So we picked up not only the direct mics with all the usual miking, but what it would sound like beneath the floor or up in the top balcony. I don't know whether we achieved our objective, but we sure got something different. The only things overdubbed were the vocals and the background vocals and the lead guitar solos, which were carefully done. We mixed a few styles there because we wanted the "live" album sound on one hand but we also wanted the sound you'd get if you were doing a clean album. We also had one drum overdub and that's it.

MR&M: How were the musicians for the album chosen?

RF: We had decided that New York studio men, while excellent at what they

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do, weren't what we wanted. We wanted real street players. So I auditioned players and listened to bands and began to cast them the way you'd cast actors. I hand-picked the people from other groups and none of them are studio musicians except Scott Zito, who is a legit rock player but has been eased into the studio by me. The others all came right out of the rock scene.

MR&M: What is it like working with Grace in the studio?

RF: She's fantastic. I didn't know what she'd be like because I'd heard things about her being difficult and temperamental in the early days. What I found was a person who is a total professional. If I'm working on a drum part or an overdub with a guitar, she'll be sitting with her notes, studying how she'd adapt her vocal. She'd say, "Well, I can't sing what I was going to sing, but I like that solo, so let me work out what I'm going to do." She's a true collaborator, and absolutely dedicated

MR&M: Were there any special setups in the studio, or special techniques?

RF: Scott played a double bank Marshall and the second guitarist was playing through different smaller amplifiers, figuring that the rhythm part had to be a little tighter. It was a series of trial-and-error with different mics. We probably used every conceivable mic that they had. Mainly, distances of mics

"The hardest thing at the early stage was getting it out of my head that I was with her."

from the band, trying to get the space. Since each song had a whole different set of dynamics, we had to work with the spacing.

MR&M: Were any effects used on Grace's voice?

RF: Yes, and when we used the effects we made sure they were very audible. The only time we'd use an effect was when we wanted it to be a true effect. We used a digital delay system, which at times would double her voice up. And we'd throw that into the echo so you'd hear the voice spinoff; an old Phil Spector technique, only he didn't use digitals. There were times when we used a little compression on the voice. Grace has, in her high range, a very piercing voice, so to accommodate this we'd take the compressor and just take the slightest edge off of whatever frequency. Some of the tunes were in keys where we didn't have that problem. And it wasn't even a problem; it was just a matter of making it more compatible to the guitars that are coming in at 160 dBs. That's an exaggeration but it felt like that. Occasionally we'd use a "live" doubling of the voice. And we'd use the Publison, which is a very elaborate delay line. And on one or two songs we used the Aphex, which is a series of interrelating compressors that add a certain delicate sense of high to the voice. It clarifies the voice a lot. In each case, we used the effects to be heard, not be hidden. She needs no help with the vocals; she ran through them like dynamite.

MR&M: Can you run through the equipment used in the studio?

RF: We used Marshall amps for the lead guitar and Fender Twin amps for the second guitar. We used a series of different bass amps, from Fender to small amps to Pignose. The drums were the drummer's set and there was very little keyboard used. As for the recording equipment in New York, we used a Studer tape machine and a Neve board, and in Miami a custom-built MCI board. The mics were Telefunkens, Neumanns and the old RCA 247s.

MR&M: Who was the engineer on the album and what was required of him?

RF: Ed Sprigg was the engineer, and Ed is a champ. His role was as vital as the producer's or the composer's. He worked arm in arm with me, Grace and Scott in creating the sense of the sound. He came to the rehearsals from the very first day and began to map out the sound with us. He had as many suggestions as a player would.

MR&M: What direction can you see going in with Grace next time?

RF: That's totally unpredictable. Some people are saying it's a soft market now, but I think that rock & roll will never die. As long as people want to listen to rock & roll, there will be another generation to make it. The problem is that it's become such a scientific market. When you go to London and listen to the radio, you find a fantastic variety of music. That's what radio should be. When your hear a rock & roll song on the AM radio now in the U.S., it's been so watered down, for the most part, that people think rock & roll is just something that has a beat and this background, but it's very slick stuff. But the real stuff still exists. So if this album is successful, I'd guess she'd go into more rock & roll. But that's a year from now. Meanwhile, we're just keeping our fingers crossed.

Producer Ron Frangipane sought to record something far beyond the average rock and roll album.

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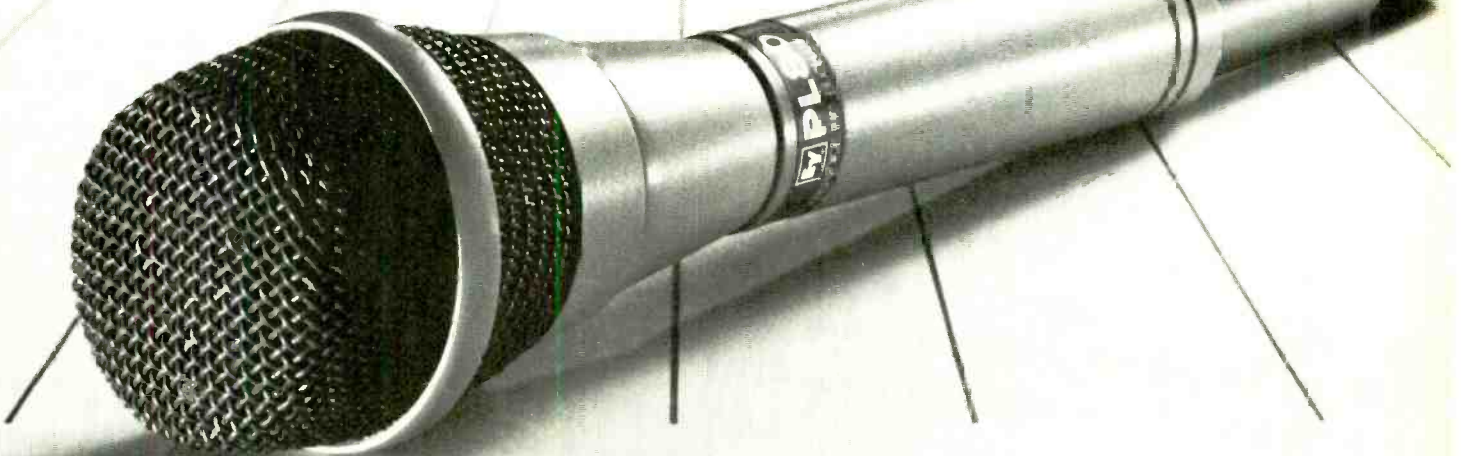

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Profile: Guitarist

PAT METHENY

by Jeff Tamarkin

When the subject of the younger crop of jazz guitarists comes up, fans seldom agree upon just who is the best. There are several names that are repeated: Al DiMeola, John McLaughlin, Larry Coryell, George Benson, Joe Pass. But one player who has been raising almost everyone's eyebrows in recent years is Pat Metheny, the 26-year-old whiz from the Midwest whose ECM albums, as well as his work with vibist Gary Burton and singer Joni Mitchell, have impressed not only critics, but fans of both jazz and rock. In fact, it seems Metheny has become the best-selling artist on the ECM label, which usually devotes itself to experimental free jazz that, in most cases, is decidedly non-commercial.

When Metheny sat down to talk with MR&M*'s Jeff Tamarkin during a recent stop in New York (Metheny tours most of the year, and says he likes nothing better than playing "live"), he was excited about his most recent recording,* 80/81, *recorded, as is most of Metheny's work, at Talent Studios in Oslo, Norway. Unlike his past efforts with the Pat Metheny Group, his solo work or his work as a sideman,* 80/81 *gave Metheny the opportunity to play with some of the musicians he grew up idolizing: bassist Charlie Haden, drummer Jack DeJohnette, and tenor saxophonists Dewey Redman and Michael Brecker. As with each of his projects,* 80/81 *finds Metheny exploring new musical directions; he is never content to repeat the same style. Pat also spoke about an upcoming duet LP that he will be doing with Lyle Mays, the Metheny Group's keyboardist. And throughout the conversation, Metheny had nothing but praise for his label, ECM, and his producer and engineer, Manfred Eicher and Jan Erik Kongshaug, respectively.*

Modern Recording & Music: When did you begin playing the guitar?

Pat Metheny: I started when I was 14, with braces on my teeth. I played be-bop.

MR&M: What attracted you to jazz, as opposed to rock and roll?

PM: I always liked rock and roll, too. I still do and I listen to a lot of rock. As far as playing, though, I was much more excited about the prospect of being an improviser. In jazz, the focus is on the individual, guys who find their own voice. That seemed real hip to me. Plus, I didn't think rock had the same depth and power as Miles (Davis) and (John) Coltrane.

MR&M: Did you take lessons?

PM: No. I was more or less self-taught. I was lucky to be around people who were older than me and were really good players. It was on-the-job training.

MR&M: How did the Pat Metheny Group come together?

PM: I had played with Gary Burton for three years, starting when I was 19. And when it came time to leave Gary, I looked at the options. I looked at the sideman gigs available and there wasn't much. Most jazz groups didn't use guitar, and if they did it was used as a color instrument. That's changed, though. Most groups now have a guitar and there are a lot of good guitar players around. I wanted my own group, and also, I had met Lyle (Mays, keyboardist) around that time, and we had a strong brotherhood. We were interested in so many of the same things. Then I met Danny (Gottlieb, drummer) and I felt close to him, so we had the nucleus of a sound. Mark (Egan, bassist) was available, so we hit the road and one thing led to the next.

MR&M: Did you develop your own sound from the start, or did you practice to records and learn other people's material first?

PM: I learned from others for the first two or three years. When I was 14 or 15 all I wanted to do was play like Wes Montgomery; he was my big hero. I could play with my thumb, sing along, play with all of his records. I was a total fanatic. I feel real good about having spent that time doing that. But I realized that there wasn't much future in being a Wes Montgomery clone. About the time I was 16 I started not to play in octaves anymore, and to play with a pick. When I was about 18 I started to develop the style I play in now.

MR&M: Most kids of 14 and 15 are into rock. Did you have other friends that were into jazz or were you the exception where you grew up?

PM: I was pretty much on my own. I had one close friend who was the other "jazzer" in my high school. I was always in bands with guys in their thirties. I guess there was this novelty factor because I was this little squirt and I could always play fast, even though, at first, it wasn't really good music. I never would've gotten a lot of the gigs I did if it was based on the way I played.

MR&M: What was your first recording experience like? Was it at all frightening?

PM: Uh-huh. I had done jingles and stuff, but the first real recording experience I had was the first record I made with Gary Burton, *Ring*, in 1974. I've had limited recording experience because I decided at that time that I wasn't going to do records as a sideman, unless it was a group I was working with or felt incredibly strong about. So I've only recorded about ten records, and seven are my own records. I don't function well as a utility. I take things very seriously; I'm so serious about music that it's just sickening.

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MR&M: Are you interested in producing anyone?

PM: I don't think so; I'm not ready for it. Besides, I've been hanging around Manfred Eicher (ECM Records producer) and the standards are incredibly high. I think about it and I'm trying to learn technical things in the studio. I did sort of produce *American Garage* by myself, which was a learning experience because I had to follow the whole project from the conception to the mastering. There were things I didn't know about and it made me appreciate ECM.

MR&M: Every ECM record sounds so clean. Is there a "secret" in the mastering or the pressing that makes the records sound so good?

PM: I think it's just because Manfred is so experienced now. In the last ten years he's probably made over 200 records. All of them are recorded well, and what's amazing is that of the 200 at least 150 are really happening musically. They're classic records. His ears are so refined; he can hear balances and details no one else seems to hear.

MR&M: What is it like working with Manfred in the studio?

PM: Every project is totally different. One thing you have to remember is that these records are done incredibly fast. There's no time for anyone to do anything except their business. *80/81* was done in a day and a half.

MR&M: And some acts take *three years* to get a sound that good!

PM: Right, plus it was mixed on the second day and finished on the third.

MR&M: How do you prepare before a recording? If you're doing a record in a day and a half, you have to know what you're doing before you go in the studio.

PM: In the case of the group, we tour so much that by the time we go in the studio, we've been playing the tunes for six months. So then it's simply a matter of getting a version of the tune that we like. There's no mystery to it at all.

MR&M: Is there a lot of trying out different sounds in the studio?

PM: See, those guys (ECM) are so quick. If you're scheduled for a 10 o'clock session, and you arrive at 9:30 to set up, by 10:10 you're playing. You don't have to sit around for eight hours while someone bangs out quarter notes on the snare drum. I hate that. I can't stand it. When we did *American Garage* that's how it was. For the first two days it was, "OK, let's hear the tom-tom. Boom, boom, boom." It took four hours just to get the piano to sound like a piano. With Manfred, it's immediately happening.

MR&M: You don't sound very interested in producing yourself again.

PM: No, I'm not.

MR&M: How much of the music is developed after you're already in the studio?

PM: It depends. For instance, *New Chautauqua* was a solo guitar record and I really didn't have much prepared. I knew I wanted to do a little of this and a little of that, but I didn't have exact tunes—except for "Hermitage" and "Daybreak." The rest was improvised. That also took a day and a half and it was the hardest I've done because all the pressure was on me. Also, the standards that were set for solo records, especially on ECM, were so high. That's another thing that's so nice about ECM: the focus is always on the music. They get a nice sound, but they don't spend a lot of time on the sound. If they don't get it while you're recording, they get it in the mix.

MR&M: It also must be nice to have a label that's not a commercially motivated label, one that tries to steer you in a

"When I was 14 or 15, all I wanted to do was play like Wes Montgomery. But I realized there wasn't much future in being a Wes Montgomery clone."

certain direction.

PM: That's true. Sometimes I'd like to do things that are a bit more commercial than they'd like me to do.

MR&M: All of your records feature different styles of music. Is that intentional, or do you just quickly change your interests?

PM: I change a lot between albums. Also, I feel it's important to keep from making the same record over and over again. A lot of people do that, especially if they have success with one.

MR&M: Do you find that your fans change as you do? For instance, someone might like *American Garage* and then find *80/81* to be so different and not like it as much.

PM: I think there are people who'll like one more than the other, but I stand behind all of the records. People might have trouble with *80/81* if they're really into the group and thought that's all I was into. They hear Jack DeJohnette and Dewey Redman go crazy and it throws them off. But others are hearing it and maybe they never heard anything like it before. So then they get hip to those guys, which is great because those guys are my heroes. Those guys, and Charlie Haden, are incredibly good musicians and they're entertaining and everything music is supposed to be.

MR&M: Before we get into some technical questions, I'm just curious what kind of music you've heard lately that you liked.

PM: My favorite group at the moment is the Police. That's the hippest stuff I've heard in a long time. And I like singers, such as Rickie Lee Jones, Linda Ronstadt, Aretha, Stephanie Mills, Dolly Parton. I like country music, and I still listen to a lot of jazz.

MR&M: What are the major differences between working (in the studio) with your group, with the players on *80/81* and by yourself?

PM: With the group, we have a specific thing in mind that we're trying to do. Lyle and I write all the music and it's much closer to songs and pop music than it is to jazz. We're playing more melodic, arranged music. So that's the difference. In the studio, we're looking to capture a performance by the group which is the definitive performance by the group. With *80/81*, the idea is to capture a moment that is electric.

□□□

MR&M: Getting to the recording process, first, why do you prefer to record in Talent Studios, in Oslo (Norway)?

PM: The studio is terrific. Also, the engineer there, Jan Erik Kongshaug, must be the greatest engineer in the world. And, any recording that needs a piano, that's the place to be because they have a German Steinway that is just unbelievable. Also, going to Oslo provides an opportunity to get away; you're not in New York, you're not at home with ringing phones. You're there to make the record for a few days. We'll spend 18 hour days in the studio. I just finished a duet record with Lyle, and we did that in five 18-hour days.

MR&M: Do you have a home studio?

PM: I have a little Teac 4-track cassette machine, which is unbelievable. And we carry around a Lexicon 224 Digital Reverb on the road. I patch that into the Teac and it sounds like Oslo.

MR&M: What guitars do you own?

PM: I have about ten, and my main one is an old Gibson ES 175, the first guitar I ever got. All the other guitars are just for special tunes.

MR&M: What about amps?

PM: Acoustic amplifiers.

MR&M: Pickups?

PM: They're stock.

MR&M: Which mics do they use at the studio in Oslo?

PM: I don't know, they change them a lot. I can't keep track. Every time I go it's a different thing. This time, to do acoustic guitar stuff, I never saw so many mics. They must've had five mics on the acoustic guitar.

MR&M: How about effects?

PM: They have their echo thing together. They use EMT plates and Lexicon Digital Reverb. They use the two of them together (EMT plate and digital reverb). They're good at knowing how to place the echo, making sure that instruments of a certain frequency and cymbals are on opposite sides, and that the echo returns are coming up on opposite sides of each other.

MR&M: Do you use any customized equipment?

PM: I work closely with the Lexicon company, I'm a big fan of their products. I've had my Prime Time [digital delay processor] slightly modified to have a sign wave in the modulation department for the voltage control oscillator. Lexicon sends the Prime Times out with a stock triangle wave. To me, that sounds a little harsh, so I've had them modify that. Other than that, everything is stock.

MR&M: Do you get involved with the mixes and the post-recording process, or would you rather just play and leave the rest up to ECM?

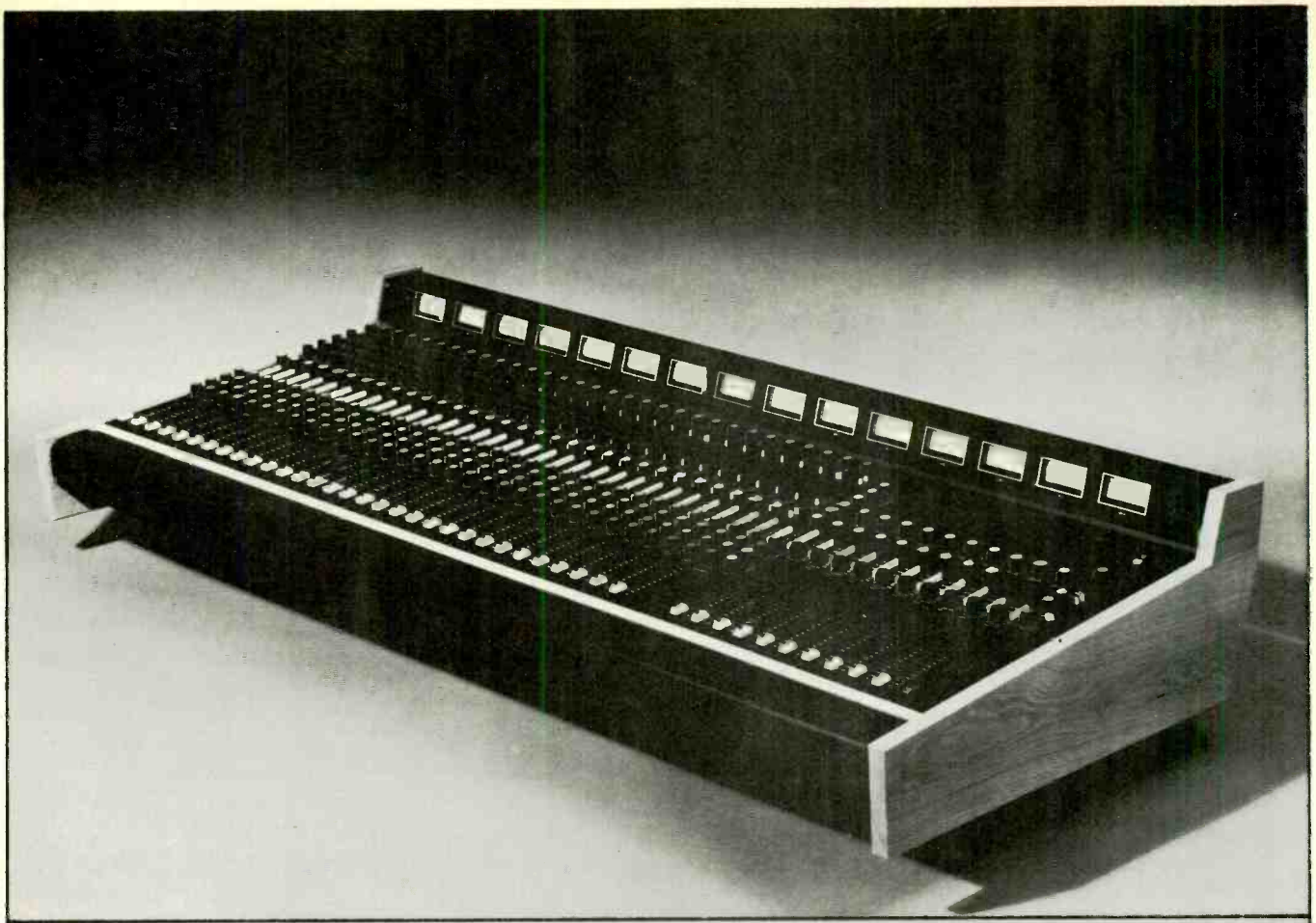
PM: I can't say enough about Manfred and Jan Erik. When we listen to the playback, they hardly have it on. I used to say, "Turn it up, it sounds tiny and thin." They'd say, "No, just listen for the notes." And that goes clear through the mix, which is done at a very low level. Then at the end, they crank it up, and *man!* On the record I did with Lyle, they finally cranked it up at the end and I was going berserk.

MR&M: That's a good approach, because someone at home might play the record at a low level and they want to hear everything that's there.

MR&M: Plus, your ears get tired. When we did *American Garage,* we had fun and we listened to everything at full blast. But you don't get a clear picture of what's on tape. Also, nobody listens to it like that.

MR&M: Are you interested in recording digitally?

PM: For all the talk about them, those (digital) recordings don't sound as good to me as most ECM recordings, or most well-recorded albums, like a Bruce Springsteen record or the new Dire Straits. [The Springsteen album, *The River,* was mixed to the Sony PCM-1600 digital recorder.] Utilizing a sophisticated recording technique is like playing a musical instrument. It doesn't matter if you get a great guitar if you can't play it.



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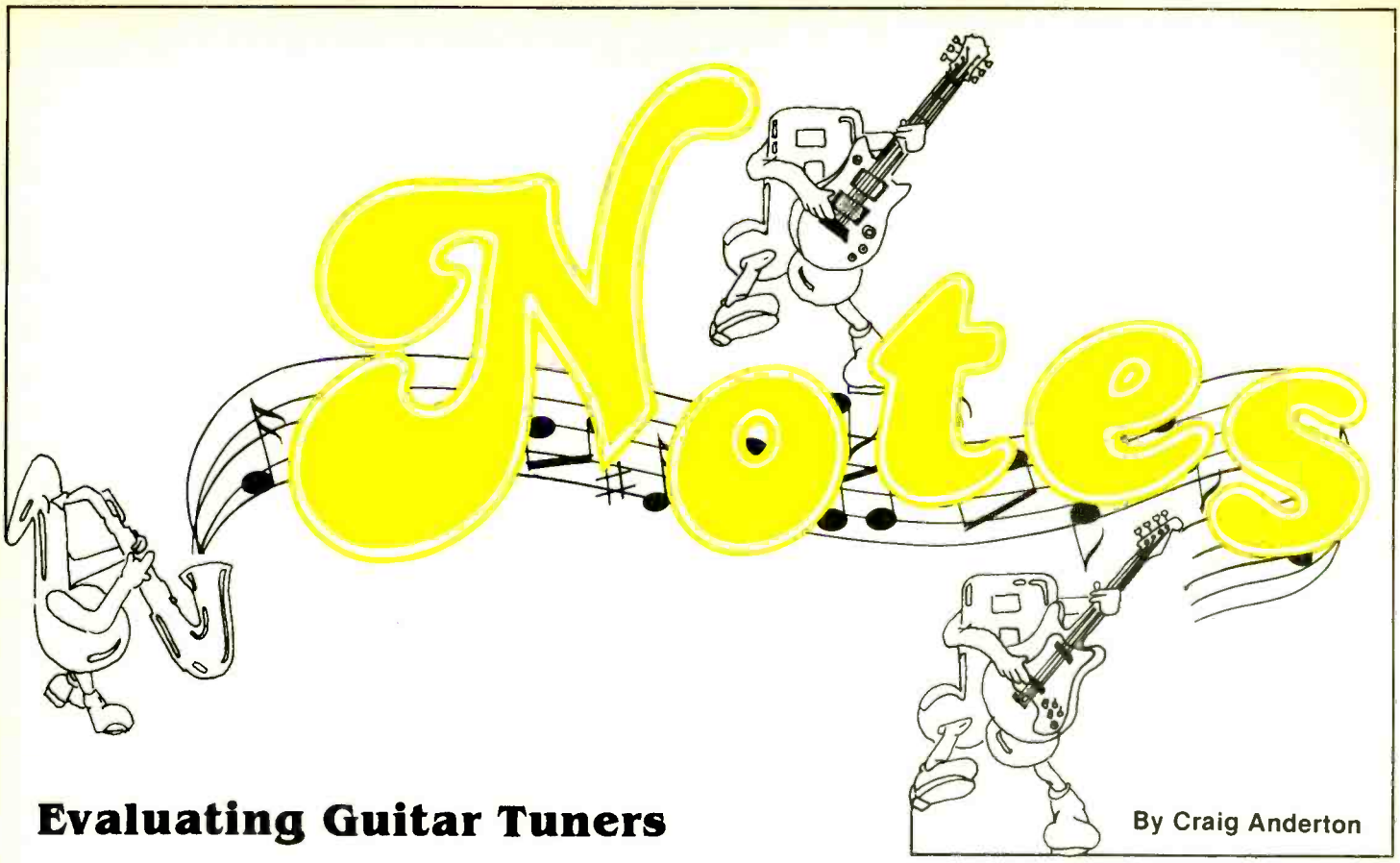


Evaluating Guitar Tuners

By Craig Anderton

The first tuner that I ever used was a tone generator type designed for tuning organs. During my touring days, I'd never go on stage without that tuner; whenever a guitar string or synthesizer oscillator went out of tune, I would meander—as nonchalantly as possible—over to the tuner, get a quick blast of the tone I needed, adjust whatever needed to be adjusted and resume playing. In the studio, I got into the habit of using the tuner to put tuning tones on all my tapes.

Buying that tuner was one of the better investments I've made; it served me well for many years, until I ended up building an improved version and that also served me well. But now, I think I just might have to break down and buy myself a new tuner . . . the models they're coming out with these days are really remarkable. How remarkable? Well, that's what this month's "Notes" is all about.

In This Corner . . .

The four tuners chosen for this report were (in alphabetical order): the Acoustyx Mark II Digital Tuner (from the Highland Corporation); the Alphatone III (by Imaginearing Audio); the Boss TU-120; and the Peterson model 420 Strobe Tuner. First we'll look at differences in design philosophy among the various tuners, then compare specific features and finally give an overall summary as to which tuner is best suited for a given application.

One general comment that applies to all tuners concerns the tuning of stringed instruments. It is necessary to pluck in a very consistent fashion—not too hard, not too soft—and mute all strings other than the one that you're tuning for best results. Picking too hard tends to create pitch changes in the string, which can result in difficult-to-interpret tuner readings. Unwanted vibrations from unmuted strings can also lead to false readings.

Tuning acoustic instruments with electronic tuners requires the use of a microphone to pick up the instrument's signal. For best results, the microphone will have to be close to the string, you will have to pick in a very consistent fashion and, also, the ambient noise level should be as low as possible.

The Acoustyx Mark II: The Acoustyx Mark II is basically a frequency counter that is optimized for use with stringed instruments. A frequency counter works by counting the actual number of cycles per second, and displaying this frequency as a numerical value. For example, if you play an A = 440 on your string, the counter would read out "440.0." The Mark II uses four ½-inch high numeric LED displays that look like the kind you'd find in a calculator, only much bigger.

Using the Mark II involves plugging into the input jack (which automatically turns on power), waiting a few seconds for the circuitry to stabilize and then plucking a note. After about ½ second, the display reads out the frequency of the string and this reading remains on display for about two seconds, after which point it fades out. This automatic fade-out feature helps conserve battery life. By plucking the string about every second or so, you get an updated reading.

However, translating frequencies into notes is not something most musicians are used to doing. So, the Mark II has a chart printed on the front panel that lists the frequencies of guitar and bass open strings. A supplemental printed

chart gives a more complete listing of which notes correspond to the frequency readings displayed by the counter.

The Alphatone III: This tuner is a variation on the frequency counter . . . quite a variation, in fact. Instead of reading out frequency directly like a standard frequency counter, the Alphatone III has two LED displays. The left-hand display reads out the actual letter name of the note (A, B, C, etc.); a supplemental dot lights up to serve as a # sign to indicate notes like G#, A#, C#, etc. These letters are displayed on a standard seven-segment numeric readout, so the B and D are a little ambiguous. Perhaps in future versions, a lower case b and d would produce more readable results.

The right-hand display has five characters that show the deviation from correct pitch; an associated HI/LO resolution switch allows you to select two different levels of accuracy.

To operate the Alphatone III, you plug into the input jack (which turns on power) and pluck a string. The left-hand display then tells you what note you're playing, while the right-hand display shows how close you are to being in tune with that note.

The Boss TU-120: The Boss TU-120 represents yet another approach, that of the "strobe" tuner. Strobe tuners include a twelve-position note selector dial that you set to the note that you wish to analyze, and a display. The display in the TU-120 consists of sixteen LEDs lined up across the front of the unit. Operation consists of plugging into the input jack (which, as in the case of the first two tuners, turns on power), and setting the note selector for the note that you wish to analyze. As you play the note on your instrument specified by the note selector, the LEDs will appear to move to the right if the note you're playing is sharp, and move to the left if your note is flat. When the LEDs remain stationary, you know that you're in tune. Note (no pun intended) that the note selector must be set to the note that you're playing; playing say, an "A" when the note selector is on "D" will give a meaningless display. A three-position octave switch gives the note selector a three-octave total range.

The Peterson Model 420 Strobe Tuner: This is the most expensive of the four, and even before you open it up you can see why—there's a wood case with Tolex covering, heavy-duty latches and enough room for a fair amount of circuitry. The model 420 is a strobe tuner, again with a note selector and display; however, unlike the Boss's LED display, the 420 has a true mechanical strobe disc. To operate the 420, you plug its line cord into a wall outlet, plug your instrument into the input, set the note selector to the note you wish to analyze, play the note and observe the strobe disc. If it appears to be rotating clockwise, then the note you're playing is sharp compared to true pitch; if it appears to be rotating counterclockwise, then you're flat. When correctly tuned, the strobe markings will appear to remain stationary. The 420 has no need for an octave switch, since the strobe disc is separated into seven bands (one for each octave covered by the 420).

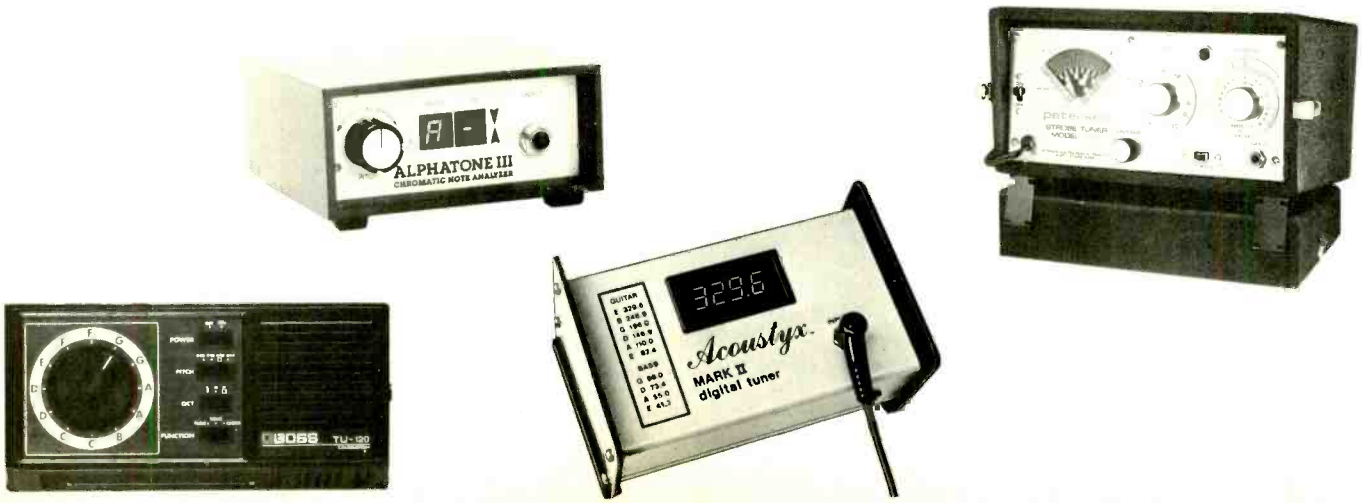
Feature-By-Feature Comparison

For this section of the review, refer to the "Tuners at a Glance" table. We'll discuss each category individually when comments are warranted. A "+" in a column indicates performance that is superior to that of the other tuners; a "—" indicates performance that is not as good as the other tuners.

Readout—Ease-of-Interpretation: I found the strobe readout on the 420 not only the easiest and most relaxing to use, but also the most visually stunning; the sight of that spinning disc is downright hypnotic! I also liked the Boss LED "strobe" readout, although it did not offer the octave differentiation of the Peterson 420 and was therefore a little more cumbersome to use. Another advantage of the Peterson display is that it is a soft, neon orange color that is very relaxing to the eye. The Alphatone III readout certainly did the job, but you had to get used to it; the first time I tried the unit out, the accuracy indicator took a little getting used to, as did a couple of the letters. Before too long, though, interpreting the readout system became second nature.

Strobe displays in general also give you instant feedback on how close you are to approaching true pitch, since every pitch adjustment you make affects the status of the display. With the Alphatone III, pitch adjustments must exceed certain thresholds in order to create a change in the right-hand pitch accuracy readout. The Acoustyx readout is extremely readable, but unfortunately does not react to instantaneous changes: you have to pluck the string each time you want an update of the frequency.

Physical Construction: Both the Alphatone III and the Acoustyx Mark II are built like tanks. My only complaint is relatively unimportant: the Alphatone's little stick-on rubber feet are not going to stay in place forever—which is probably



why Imaginearing Audio includes an extra set of two feet with the unit (they also include two extra screws in case you lose one while changing the battery).

The Peterson 420 is built like a piece of lab test equipment but, being a precision device, I don't know whether it would stand up to the abuse of life on the road quite as well as the other two tuners mentioned above. The Boss TU-120 is made of high-impact plastic; treated with care, it should last, but be careful, the plastic over the speaker is particularly flimsy.

I guess the bottom line is that if you were to drop all four tuners out of a second story window, I would bet on the Alphatone III and the Acoustyx being the survivors.

Input Sensitivity: All four units were amazingly sensitive, giving accurate readings with input signals below 10 mV peak-to-peak and coping equally well with signals up to 6 V p-p (the limit of the function generator used to test these units). These readings were all taken with sine waves, however all tuners also responded to "oddball" periodic waveforms with excellent accuracy. Only highly aperiodic waveforms, such as the waveform associated with guitar strings, caused any trouble whatsoever (and as mentioned earlier, proper picking circumvents that problem).

Power Consumption: The Acoustyx Mark II uses six "C" cells to provide the required 85 mA of current, which should give long battery life. Upon measuring the current of the Alphatone III, which is powered by a 9 V transistor radio battery, I was amazed to find a current consumption of about 90 mA! This is far more than you can reasonably expect from any type of 9 V battery, so I called Imaginearing and found out that the unit provided for test was one of their older models; newer Alphatone IIIs are being shipped with a CMOS (rather than NMOS) memory IC, which lowers current consumption to about 25 mA. I would suggest using an AC adapter with the Alphatone III when possible, and relying on the battery mostly for backup. The Boss is by far the most energy efficient, requiring only 13.3 mA from a single 9 V transistor radio battery. The Peterson 420 is AC powered; the other three tuners have provision for optional AC adapters.

Range: Both the Peterson 420 and Alphatone III cover most of the audio spectrum (eight octaves and seven octaves, respectively). The Boss covers from 130.81 to 996.76 Hz, and the Acoustyx's guaranteed range is a little over four octaves (35 Hz to 880 Hz).

Published Accuracy: The Peterson 420 offered the greatest accuracy and most stability—⅓ of a cent (there are 100 cents to a semitone), which is most impressive. The TU-120 and Alphatone III claim plus or minus 1 cent, while the Acoustyx Mark II specifies plus or minus .1 Hz accuracy.

Built-In Microphone: If you plan to tune acoustic instruments, having a built-in mic is more convenient than dragging one around with the tuner. On the other hand, an argument against built-in mics is that if you need to close mic an instrument (which can happen if you're tuning in a noisy environment), an external mic is easier to place right up close to the instrument being tuned. Both the 420 and Boss TU-120 included built-in mics. These worked fine; however, I also tried plugging a microphone into the Alphatone III and Acoustyx Mark II and obtained good results. The Alphatone III was particularly interesting to sing into, since it will read out the note you are singing, and how close it is to correct pitch.

Variable Concert Pitch: This is not always an A = 440 world, and all four tuners faced up to this fact. The Alphatone III includes a transpose switch that allows you to trim the unit to match something like an out-of-tune piano. This control has other uses: for example, when playing an A, you can rotate the transpose knob so that the left-hand display reads E (or any other key, for that matter). The readout will then transpose every note you play to the key of E. The Peterson 420 has a vernier dial that allows you to offset the pitch specified by the note selector knob up to plus or minus 50 cents. This dial is calibrated in cents and allows for extremely precise pitch settings. A = 442 and A = 435 Hz, two of the other most popular concert pitches, are directly calibrated on the unit for convenience. The ability to finely tune the 420 greatly simplifies "stretched" and unconventional tunings. The TU-120 includes a four-position pitch switch to select A = 440, 442, 443 or 444 Hz, and also includes a calibration knob to check the accuracy relative to A = 440 Hz.

The Acoustyx will read out whatever frequency you put into it; however, at concert pitches other than A = 440 the frequency vs. note chart becomes meaningless.

Silent Tuning: All four tuners allow for silent tuning, which means that you don't have to listen to any tones, just plug in and look at the readouts.

Perhaps a more important question is how easy is it to perform the silent tuning operation. With the Acoustyx and Peterson tuners, there is a single jack that accepts the instrument input. Unless you use a Y cord to feed both your amp and the tuner, you have to unplug from your amp and plug into the tuner every time you need to make an adjustment. (Incidentally, if you use an effects box that includes a "buffered out" or "direct out" jack, you can patch from one of these jacks directly into the tuner so that the tuner is permanently connected into the signal path.) The TU-120 includes paralleled input and output jacks, so that you can have the tuner connected in the instrument signal path at all times and still have an output jack available for patching to your amp. The Alphatone III goes one better by including a footswitch jack in addition to the paralleled input and output jacks. When you want to tune, depressing the footswitch allows you to mute the signal coming from the output jack that normally feeds your amp—truly "silent tuning."

Other Features: Each tuner has certain other features that are worthy of note. The TU-120 has quite a few options; one of these is a three-position switch for tune, tone or calibrate. In the "calibrate" position you can check (and adjust for) A = 440 Hz exactly. The "tone" position provides an audio output through the internal speaker of whatever tone has been selected by the note selector, and a monitor jack allows this tone to be fed to an amplifier (great for tuning up something like a school band). The "tune" position activates the strobe readout and allows for silent tuning.

We've already pretty much covered the Alphatone III's

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unique features (resolution switch and transpose control), and the Acoustyx Mark II doesn't really have any "special" features. The Peterson 420 includes two controls that specifically relate to the strobe display; an "Image Clarifier" switch adds additional filtering to provide a clear display when an instrument's upper harmonics are not in tune with the fundamental frequency, while a "Contrast" control allows you to brighten up the display if needed (this is often the case when you're in the Image Clarifier mode).

Ease of Use: To evaluate the tuners, I tried several tests. The first was getting a guitar in tune, the second was getting a bass in tune, and the third was adjusting the intonation for the guitar and bass.

I should mention that the bass and guitar were particularly tough customers for any test. The bass was custom made and includes super low output, but very high fidelity, pickups. The guitar is a Fender Telecaster with high output pickups; these accentuate the harmonics, which makes picking out the fundamental very difficult. I also used some of the tuners to adjust a G-808 guitar (the guitar that controls the Roland GR-300 synthesizer). Since synthesizers tend to magnify tuning errors, I was pleased to find that using a tuner made touch-up tuning of the GR-300 a snap.

As far as the bass and Tele were concerned, the only problems occurred with the Tele's low E string; all of the tuners gave somewhat confused readings. Using the bass pickup helped, but having disabled the guitar's tone control I had no way to roll off the treble. Had I been able to utilize the tone control, the results would most probably have been more consistent than they were.

Interestingly, the TU-120's specs would lead you to believe that it can't tune frequencies below 130 Hz. However, it is possible to interpret the display in such a way that you can tune all the way down to a bass guitar's low E string.

For tuning up instruments in the shortest possible time, the Alphatone III can't be touched. This is because you just play into the thing and it tells you what note you're playing and whether it's flat or sharp. You certainly can't get much simpler than that. Both the TU-120 and Peterson 420 needed to have their note selectors adjusted every time you wanted to tune a different note; this was somewhat time-consuming compared to the Alphatone's instant readout of whatever note you were playing.

However, for intonation adjustments I preferred the strobe tuners, particularly the Peterson. Since intonation consists of going back and forth between different octaves of the same pitch, it was not necessary to constantly change the note selector switch. Also, intonation is a pretty precise and time-consuming adjustment no matter how you look at it. And staring at a strobe is much more relaxing to me than staring at either a bunch of seven segment readouts or LEDs. I noticed that the more tuning I had to do, the more I appreciated the strobe display.

The Final Choice

As I was reviewing these tuners, I began to realize that I was not evaluating them just for the readers of *Modern Recording & Music*, I was also evaluating them to see which one *I* was going to buy! Well, I'm not going to leave you hanging as to what my final choice was. Here's how I came to my conclusion.

Acoustyx Mark II: While well-built and the least expensive of the lot, I just didn't like having to wait for the counter to update readings. Also, because this unit is designed for stringed instruments, you have to pluck every time you want an update. As a result, if you feed in a continuous tone (such as that emanating from a synthesizer VCO), the reading will lock on to one frequency and stay there. The only way to get an update in a situation like this is to pull out the input and plug it in again to simulate a "pluck."

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Peterson Model 420: I really like this tuner. I love the display, it's amazingly accurate, but unfortunately it's also priced beyond my budget. If I tuned pianos or intoned guitars for a living, this one would be my first choice and I would just accept the fact that a sophisticated piece of lab equipment does not come cheap. Maybe someday . . .

CIRCLE 24 ON READER SERVICE CARD

Boss TU-120: This strikes me as the ideal "compromise" tuner. The fact that it can generate tones, and feed these to an external amp if required, is a real plus when trying to tune up something like a big band. It would be impossible to plug each instrument to the tuner and then tune; it's much better just to broadcast a loud tone and let people tune to that. For intonation and accurate pitch adjustments, the LED strobe

Tuners at a Glance

Category	Acoustyx Mk II	Alphatone III	Boss TU-120	Peterson 420
List price	$159.95	$199.95	$199.50	$399.00
Display type	4 LED digits	2 LED displays	16 LED "strobe"	Strobe disc
Ease of interpretation	–		+	+
Construction	+	+	–	
Sensitivity	All tuners handle signals from under 10 mV p-p to over 6 V p-p			
Battery power consumption		see text	+	AC powered
Optional AC adapter	yes	yes	yes	AC powered
Range		+	–	+
Built-in mic	no	no	yes	yes
Variable pitch reference	–	+		
Silent tuning	yes	yes	yes	yes
Ease of use; silent tuning	–	+	+	–
Tone generation	no	no	yes	no
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Intonation			+	+
Continuous use				+

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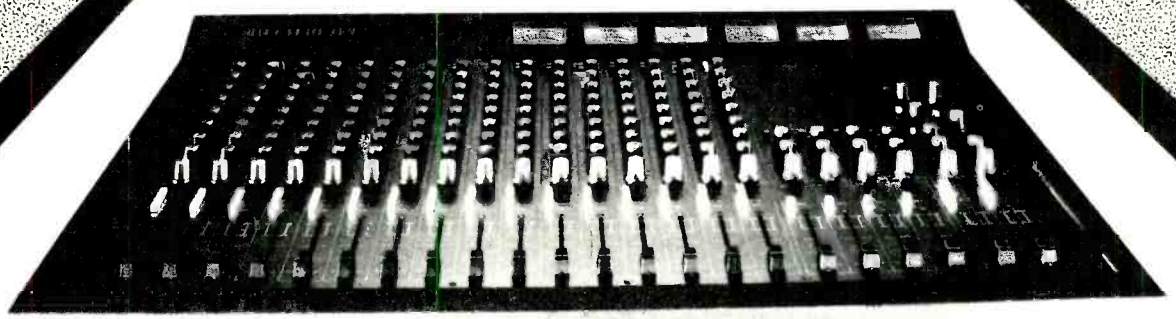

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display is a valid compromise between simpler visual indicators and something like the Peterson mechanical strobe. I also like having paralleled input/output jacks so that you can leave the tuner in the instrument signal path at all times. I'm not too enthusiastic about the case, but in all other respects this is a cost-effective tuner that gives a good account of itself.

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Alphatone III: Although I don't like the display as much as that of the Peterson 420, the Alphatone is definitely the fastest and easiest tuner to use simply because there is no note selector switch. The resolution switch is handy, too—for intonation adjustments you can select the most accurate position, while for casual, everyday tuning you can go with the lower resolution setting. I like the fact that the tuner can remain in line with the instrument; the transpose switch is very convenient. The rugged construction and small size also are points in its favor. For those of you just learning your way around the fingerboard of a guitar, the Alphatone III is amazing; play anywhere, and it will tell you what note you're playing (and whether or not your guitar neck is correctly fretted, as well).

CIRCLE 26 ON READER SERVICE CARD

All in all, for my applications I felt the Alphatone III did the best overall job for the price, so that's the one I ended up getting. However, someone working with something like a big band would probably prefer the Roland TU-120 since it can generate tones as well as analyze them. On the other hand, if I wanted to tune pianos, ran a guitar repair shop or did anything that involved massive amounts of tuning, I'd want the Peterson 420, if for no other reason than the non-eyestraining qualities of the display and the high degree of accuracy. I'd love to be able to say something more positive about the Acoustyx, but aside from its construction (which is very good), I just don't feel that a numeric frequency counter is the best way to tune strings.

Conclusion: There's one subject that I'd like to mention in closing. I'm sure that some of you will feel that your ears are plenty good, and you therefore don't need to use a tuner. Well, my ears are plenty good too, but ears get easily fatigued. Just setting the intonation for four or five guitars by ear alone is enough to make you nuts; after a while all the tones just kind of blur together, and it becomes difficult to differentiate tiny changes in frequency. A tuner eliminates that element of fatigue: I could intone guitars all day with a strobe tuner, and the last one would be just as accurate as the first one. When doing tuning solely by ear, you really have to concentrate. With a tuner, the machine does the required concentrating so that all that you have to do is adjust the strings until you get the right display.

If you think of tuning and intonation adjustments as drudge chores that must be dealt with before you can get to the good stuff—namely, playing music—you owe it to yourself to get a tuner. The time you save alone will justify its cost many times over.

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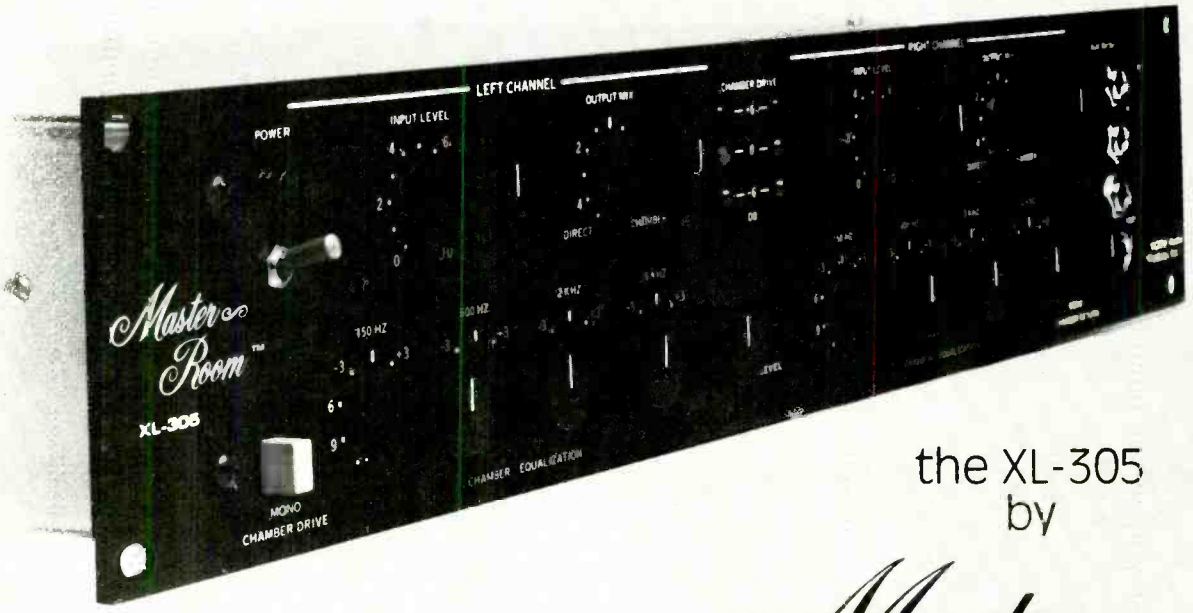

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Ambient Sound

BY LEN FELDMAN

Dolby Does It Again

Remember the first time you threw the Dolby switch on a cassette deck and suddenly that tape hiss receded into the background by what seemed then like an incredible 10 dB? It's been more than ten years since Dolby B-type noise reduction almost single-handedly turned the lowly cassette tape deck into a high-fidelity stereo component. In the past decade, Dolby B came about as close to being a "world standard" for stereo cassette decks as any privately licensed bit of technology could, and today, no self respecting deck manufacturer would dare offer a cassette deck in the over $150 price category without including Dolby or its equivalent.

In recent years, however, Dolby's dominant position in the field of noise reduction has been increasingly threatened. In this country we have seen the introduction of dbx companding—a linear compression expansion system which not only offers more than 30 dB of noise reduction but also makes it possible for ordinary cassette tapes to handle up to 90 dB or more of dynamic range. Overseas—in Europe and Japan—audio researchers have not been idle either. Telefunken developed its High-Com noise reduction system and, in cooperation with Nakamichi of Japan, perfected a consumer version of that system, High-Com II, which offers two-band compression/expansion that is still frequency selective but offers up to 20 dB of noise reduction. Somewhat similiar systems have been shown by others, such as Sanyo (with their Super D system) and Toshiba, with their ADRES system which, because of possible patent infringement problems, has been confined to the Japanese market.

Dolby, of course, has not simply been basking in glory (and royalties) all these years. Nearly two years ago, the company introduced Dolby HX, a tape recording headroom-extension system which electronically helps to counter high-frequency tape saturation problems which occur when trying to record high-level, high-frequency signals on cassette tapes. The system employs dynamically varying bias and equalization, which is controlled by the same sensing signals that are used to vary high-frequency compression or emphasis during Dolby B encoding. Unlike B, HX is a one-sided system (nothing special need be done during playback) which provides benefits during recording only. Dolby HX, however, does not further address the problem of tape hiss or noise—at least not directly (Dolby claimed that indirectly, because recordists could now record at higher levels with Dolby HX, the net result was improved signal-to-noise ratios). Furthermore, many manufacturers were reluctant to adopt Dolby HX, even though no extra licensing fee was imposed for those who already used Dolby B, because they did not like the idea of lowered bias during the recording of high-level, high-frequency passages, fearing that such lower bias might audibly increase distortion of mid-frequencies being recorded at the same time.

Enter Dolby C

At the recently held Winter Consumer Electronics Show in Las Vegas, Dolby Laboratories officially introduced its newest consumer-product noise reduction system known as Dolby C. Rumors about this new system had been flying for several months, especially so since Dolby had already explained the new system to many of their Japanese licensees who were busily preparing prototype cassette decks which incorporated the new system. Some of these companies even displayed the new decks way back in October, during the annual Audio Fair in Tokyo which I attended. By the time I returned from Japan, the technical information that I wanted concerning Dolby C was already on my desk, along with strict instructions not to publish any of the details before 1981 so that manufacturers of Dolby B equipment would be able to dispose of their current inventories without panic.

How Dolby C Noise Reduction Works

In many ways, Dolby C is similar to the earlier Dolby B and Dolby A noise reduction systems. Like those earlier systems, Dolby C is a dual-path system in which noise reduction is accomplished by means of low-level side chain. The sliding band technology of the B-type noise reduction system is used in the new system as well, but the band of frequencies over which noise reduction is effective extends downward by nearly two octaves more than in Dolby B. In Dolby B, response modification dur-

ing record and playback which leads to ultimate noise reduction becomes significant at around 1000 Hz whereas in Dolby C it becomes significant from around 250 Hz and upwards.

According to Dolby Labs, the Dolby C noise reduction system solves the problem of high-levels of compression and expansion (up to 20 dB of noise reduction is acheived) without introducing undesirable side effects such as "breathing" or so-called "pumping." This is accomplished by using two processing stages in series, each of which is called upon to supply only 10 dB of compression during recording and the same amount of expansion during playback. Each of these companding circuits operates at its own independent level. One of the circuits is sensitive to signals at about the same levels as in the older Dolby B noise reduction circuitry, while a second companding stage, a lower level stage, operates on signals of lower amplitude. Because the two stages operate in series with each other, the net effect is one of *multiplication* (which is the same as saying that the number of dBs of action is additive), so that a total of 20 dB of compression and expansion (and therefore, of noise reduction) is obtained. Because of the two-stage series arrangement, however, the signal is never subjected to the problems of a single compression or expansion action of a full 20 dB. The two-level, two-stage series configuration provides a more accurate control of the signal than would be possible with a single compander circuit, according to Dolby Laboratories.

One beneficial aspect of Dolby C, from a manufacturer's point of view, is that it can be executed initially from readily available component parts. To carry out the two-level, two-stage scheme for Dolby C noise reduction, two conventional integrated circuits (ICs) are used in a modified way. It is expected that several IC manufacturers, encouraged by licensees and by Dolby, will design and produce a single, dedicated Dolby C integrated circuit that will simplify the incorporation of C-type noise reduction in future cassette deck products.

One of the two stages in a Dolby C noise reduction arrangement can be arranged so as to provide the familiar Dolby B noise reduction characteristics at the push of a button or switch, so that cassette decks featuring Dolby C can also be fitted with Dolby B noise reduction at virtually no additional cost for compatibility with existing Dolby B type cassette recordings.

Audible Compatibility

One important consideration in the development of Dolby C noise reduction systems, according to its inventors, was the compatibility of recordings made with the new system. One of the big advantages of earlier Dolby B (and one reason why Dolby stopped at 10 dB of noise reduction initially) was the fact that it was compatible, or very nearly so, with playback of recordings that had no noise reduction encoding in them. After all, consumer versions of noise reduction did not exist for all practical purposes when Dolby was first introduced in consumer products. dbx linear companding, for example, while extremely effective when listened to through a proper dbx tape or disc decoder, sounds completely unsatisfactory if you attempt to play a dbx-encoded program without proper decoding.

With these thoughts in mind, C-type Dolby noise reduction has been designed with the premise that almost all present day cassette decks incorporate Dolby B. So, recordings made with C-type noise reduction in the future, while not reproduced perfectly or ideally, would nevertheless be listenable on stereo cassette decks equipped with Dolby type B noise reduction decoding circuitry. Reproduction would even be tolerable, according to Dolby, if Dolby C recordings were played back on lower-fidelity cassette players not equipped with any noise reduction circuitry. Dolby will be developing professional grade C-type noise reduction encoders for use in cassette duplication for the prerecorded cassette market for these reasons.

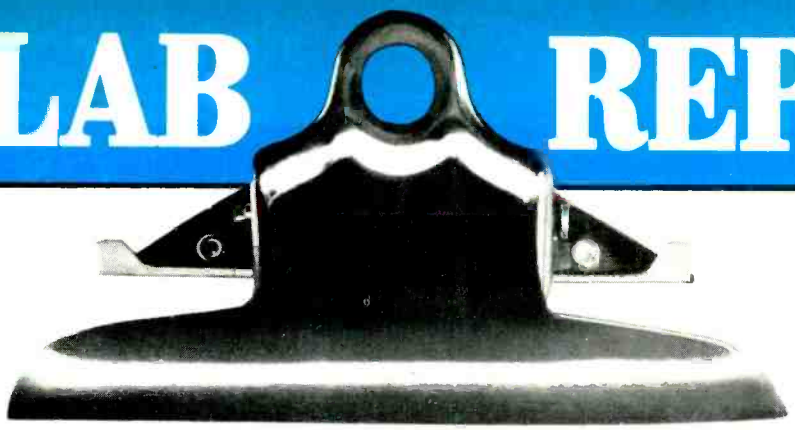
Additional Circuit Details

In addition to the two level processing circuits already mentioned, Dolby C noise reduction circuitry incorporates some additional innovations. Two of these are anti-saturation networks and special frequency skewing networks. These are carefully calculated frequency response modifications introduced during the recording process and reciprocal compensation introduced during the playback process. These additional circuits guard against possible audible side effects and also help to ensure the practicality of the system in day-to-day consumer use. Specific benefits accruing from these circuit additions include reduction of encode-decode errors, plus a reduction of upper middle and high frequency tape saturation and its side effects, such as high frequency loss and IM distortion.

While the new system can use readily available parts, its complexity is estimated by Dolby labs to be two to three times that of a conventional Dolby B circuit. According to Dolby, in order to take full advantage of the noise reduction capabilities of Dolby C, a recorder incorporating it will need a very high level of mechanical and electrical performance, including very low noise in the circuitry which surrounds the noise reduction processor. The likelihood is that the new system will first appear as a supplement to standard Dolby B noise reduction in higher-priced cassette decks only. Later, after the Dolby C circuitry is simplified by the development of specific-purpose ICs, we may expect to see the new noise reduction system appearing in somewhat lower priced cassette decks.

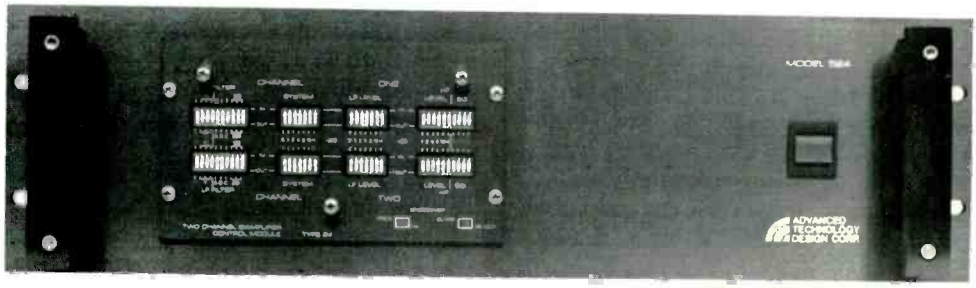
Dolby Laboratories plans to provide C-type noise reduction information and permission to produce under their existing license agreement with no increase in royalty fees imposed upon licensee-manufacturers.

While the Japanese manufacturers that I spoke with in Tokyo seemed quite cool when it came to incorporating Dolby HX into their products, their attitude was highly enthusiastic when we discussed the new Dolby C circuitry. At least a dozen of the leading companies have already indicated their intention to use the new system.



NORMAN EISENBERG AND LEN FELDMAN

Advanced Technology Design Corp. 524 Two-Channel Bi-Amplifier



General Description: The ATD 524 is actually a complete two-channel bi-amplification system. It contains, in one unit, a frequency dividing network, a high-frequency equalizer, a low-frequency filter and equalizer, a high-frequency power amplifier and a low-frequency power amplifier for each of two stereo channels. Fitted with handles and of standard rack-mount width, the 524 has a deceptively simple appearance. However, behind a large plate on the front panel is a group of micro-switches. Depending on how you set the multiple rockers on each switch, you can select from a large variety of cut-off filter characteristics, band-rejection filter characteristics and high-frequency boost-equalization characteristics to suit both the needs of speaker systems and the rooms in which they are installed.

The standard model supplied to *MR&M* for this report had a crossover frequency of 800 Hz with an 18 dB/octave slope. Other crossover frequencies and slopes are also available on special order from Advanced Technology Design Corp., as are many different models of varying power capabilities.

There are no metering features, and no gain controls in the usual sense. HF and LF level, and system level controls are all behind the plate on the front panel.

The rear of the double bi-amplifier contains ¼-inch phone jacks for left and right channel inputs. There are eight "5-way" binding posts for speaker output connections—left channel high- and low-frequency speakers, and right-channel high- and low-frequency speakers. An optional system grounding post also is provided. The unit's AC power cord is fitted with a three-prong (grounding) plug. The model 524 is obviously intended for rack installation via the standard holes at either end of the front panel. It has no "feet" and so if it is placed directly on a shelf or cabinet, some protection should be placed under it to prevent scratching the surface of the shelf or cabinet.

Test Results: The model 524 met or exceeded all of its published specs quite handily, producing well over 100 watts per channel for low frequency output, and more than 50 watts for high-frequency output, into 8-ohm loads. Driving 4-ohm loads, it produced over 158 watts for low-frequency output, and 75 watts for high-frequency output on each channel. Distortion throughout was either at spec or well below it. S/N for rated output topped the 100-dB mark, and damping factor was comfortably high at 53. Frequency response extended beyond the normal audio band.

A precision frequency response plot—actually two separate plots—is shown in *Fig. 3,* which contains the composite response of low- and high-frequency sections of the model 524. We were able to adjust input gain so that the output levels, as they appear in the response plots, would yield an overall normalized flat response over the entire audio band and beyond (the plot actually extends upward to 40 kHz and it still is virtually flat

at that frequency). Other examples of the filtering capabilities of this versatile device are illustrated in the additional composite response plots of *Fig. 4*, and the low-frequency amplifier section response which is shown in *Fig. 5*.

Fig. 4 shows the 18 dB/octave slope of a low-frequency cut-off filter which we selected to have a cut-off frequency of 80 Hz. In addition, we have also switched in a high-frequency boost characteristic whose maximum boost of about 8 dB occurs at 20 kHz in the amplifier's high-frequency section. Note that the response curves shown here are for one channel only, and that the entire combination of high- and low-frequency power amp sections is repeated within the one unit for a second channel.

Fig. 5 is a plot of the low-frequency amplifier section of one channel in which we have introduced a notch-filtering action centered at 100 Hz. We allowed the response to extend downward to the low extreme of the audio spectrum (the display extends down to 20 Hz). The notch filter characteristic, common to both the 100 Hz and the 200 Hz filters, is adjustable in 1-dB increments from 1 dB to 7 dB total attenuation.

Examination of the innards of the model 524 indicated first-rate construction using high-quality parts, and very good chassis layout.

General Info: Dimensions are 19 inches wide; 5¼ inches high; 10¾ inches deep. Weight is 28 pounds. Price: $1180.

Individual Comment by L.F.: What's a two-channel bi-amplifier? It is really four amplifiers in one. When you think about it (as I have for several years now), it's really quite surprising that no one has come up with a product of this type before. After all, bi-amplification (or even tri-amplification, for that matter), is not a new idea. But to install a bi-amped system properly has, up to now, generally required two full-range power amplifiers driven by a separate crossover component which, in some cases, follows a graphic equalizer or, at the very least, an elaborate tone-control/filter system. The model 524 combines all of that into a single, fairly compact chassis. In other words, all of the electronics needed for a stereophonic bi-amplified system are contained in this single, versatile product.

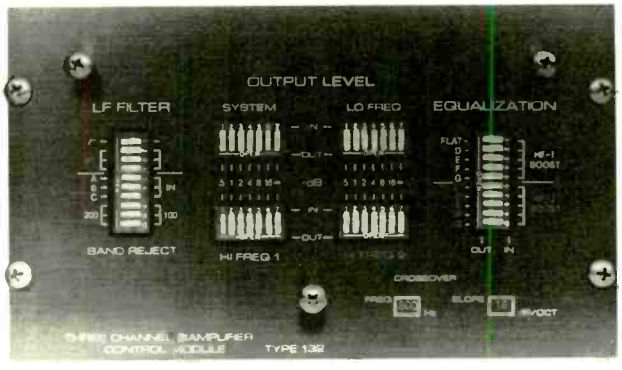


Fig. 1: ATD 524: Various filter and equalization characteristics are selected by means of mini multiple rocker switches located behind protective plate on front panel (model shown in photo is the ATD 7132).

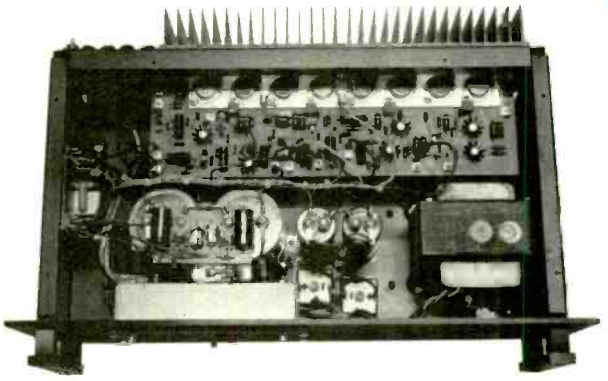


Fig. 2: ATD 524: A view of the unit's chassis.

The "Vital Statistics" for the unit are shown in our usual chart at the end of this report, and what impressed me most about this "system amplifier" was the fact that it seemed rugged enough for use in professional applications while also measuring up to the standards of a true high-fidelity amplifier in every respect. When you think about it, having four amplifiers—whose total power capability adds up to a combined value of 450 watts (at 4-ohm loads), or 300 watts (at 8-ohm loads) in

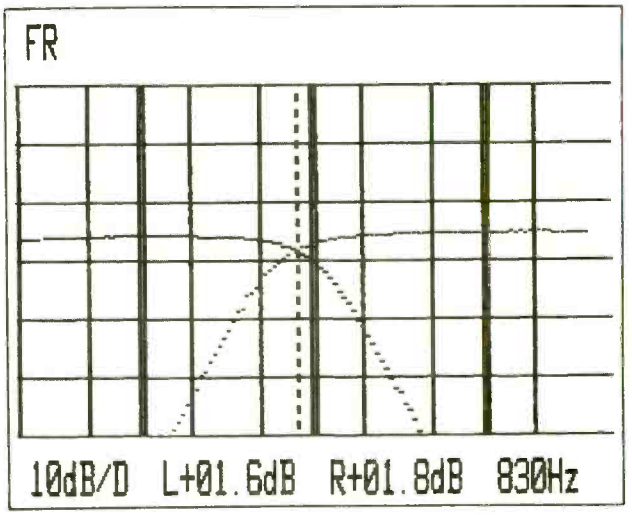


Fig. 3: ATD 524: Composite frequency response curve.

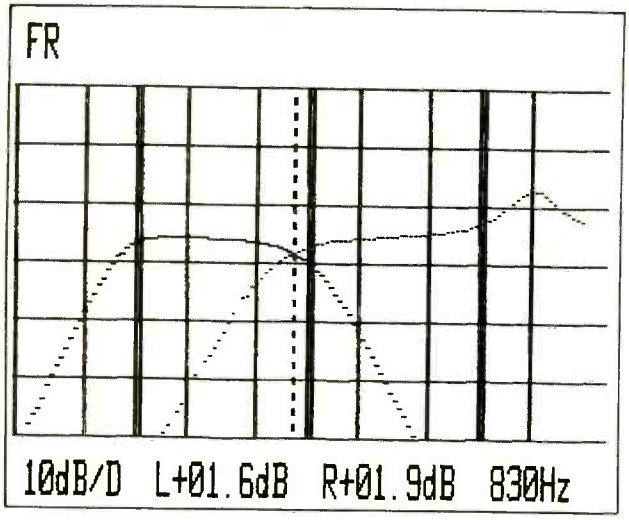


Fig. 4: ATD 524: Example of low-frequency filter and high-frequency boost action when switched in.

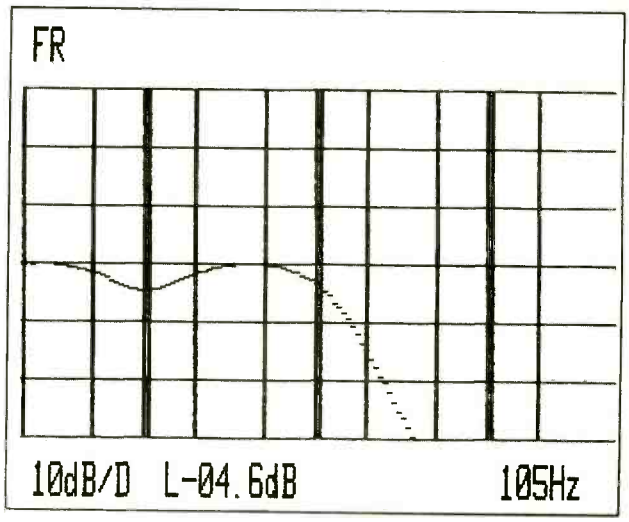


Fig. 5: ATD 524: Example of notch filter action, low-frequency section of amplifier.

a package weighing only 28 pounds, and which offers the filtering and crossover-network versatility of the model 524—is a pretty neat idea. If the price seems a bit high, you might want to compare it with the cost of the several separate components you would otherwise need to accomplish the same results.

Individual Comment by N.E.: Often, "combination products" are compromised in various ways vis-a-vis what would be available if the same functions were to be obtained in terms of separate products. In the case of the ATD 524, no serious compromising is evident at all. Indeed, if you remove that plate on the front panel (you will need something like a jeweler's screwdriver to do so; it would be a good idea if ATD supplied a proper tool with the unit), you will see no less than 68 switches (34 per channel) that may be adjusted for the various filtering, level, and EQ functions possible with this device. Understanding all the functions and possible combinations of these switches takes some time, and a careful reading of the instructions supplied with the model 524 is seriously recommended before one attempts to use the unit.

The only "compromise" implied by this unique product is its power output capability. While the wattages supplied for low- and high-frequency sections are hardly in the low-power class, it is conceivable that some applications will call for substantially more than these ratings. And one might prefer the more usual kind of equalizer. However, where these considerations do not matter, the model 524 seems like a highly recommendable product.

ATD 524 TWO-CHANNEL BI-AMPLIFIER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Continuous power for rated THD, watts	LF/HF	LF/HF
8 ohms, 1 kHz	100/50	126/72
4 ohms, 1 kHz	150/75	158/75
FTC rated power (20 Hz to 20 kHz), watts	NA	117/50
THD at rated output, 400 Hz/3 kHz		
8 ohms	0.25%/0.25%	0.06%/0.20%
4 ohms	0.25%/0.25%	0.25%/0.25%
THD at rated output, 20 Hz, 8 ohms	0.25%/NA	0.15%/NA
20 kHz, 8 ohms	NA/0.25%	NA/0.25%
IM distortion, rated output, SMPTE	0.25%	0.20%
Frequency response at 1 watt (for −1 dB)	20 Hz to 20 kHz ±0.25	*See Fig. 3*
S/N ratio re: rated output, "A" wtd	NA	103 dB
Dynamic headroom, IHF	NA	2.0 dB/2.3 dB
Damping factor at 50 Hz	NA	53/NA
Input sensitivity re: rated output	0.75 volt	1.0 V/0.67 V
Power consumption, idling/maximum	NA/675 watts	100/680 watts

CIRCLE 20 ON READER SERVICE CARD

Superex GEM-7 Parametric Equalizer

General Description: The Superex GEM-7 is a stereo parametric equalizer with functions and controls for the left channel being a mirror-image of those for the right channel. Each channel provides, broadly speaking, two frequency bands for adjustment. However, each of these two bands, within one channel, is segmented with different center frequencies. Thus, the frequency band from 30 Hz to 820 Hz has selectable center frequencies of 30, 50, 110, 300 and 820 Hz on one slider, while additional selectable frequencies of 30, 300, 600, 750 and 820 Hz are provided on another slider.

Similarly, the low-frequency band has one slider graded in frequencies of 820 Hz, 1 kHz, 1.6 kHz, 3.1 kHz and 16 kHz. A second slider for the low-frequency band has markings for 820 Hz, 3.5 kHz, 8.5 kHz, 13.5 kHz and 16 kHz.

Each slider has its associated knob controls for level (marked from −18 dB to +18 dB) and for bandwidth [marked in octaves (0.16, 0.5, 1, 1.5, and 2)].

In addition to these eight sliders and 16 knobs, there are four toggle switches for tape monitor on/off; tape record EQ on/off; tape play EQ on/off; and power on/off. The front panel, of rack-mount width, is slotted at the ends and fitted with handles. The unit may be rack-mounted or placed on its four "feet" wherever convenient.

Signal connections at the rear are phono jacks for interfacing the GEM-7 with the tape-monitor facilities of a stereo amplifier and with the line input and output jacks of a stereo tape deck.

Test Results: Most of the published specs for the Superex GEM-7 were confirmed or bettered in *MR&M*'s lab tests, but the device's claimed frequency response could not be verified. As best we could determine, this discrepancy was not due to anything inherent in the device's circuitry, but rather to the physical nature of its controls. By the same token, the claimed 36 dB of attenuation with two bands set to the same frequency could not be confirmed.

This is best understood by referring to the two 'scope pictures made in the lab while testing the GEM-7. We tried, as per *Fig. 1,* to illustrate equal amounts of boost and cut at around 800 Hz, and to show the effect of using wide bandwidth for one set of sweeps, and narrow bandwidth for another plot. The results, as seen in *Fig. 1,* are less than symmetrical even though the control settings would have indicated that they should be.

Similarly, we tried to show that if the overlapping bands were both set to the same frequency (e.g., 1.5 kHz or thereabouts), it would be possible to achieve the claimed additive effect, or a maximum level shift of 36 dB, as claimed. The best we could do was to obtain the response shown in the lower curve of *Fig. 2.*

The claimed frequency response, with controls set flat, could neither be confirmed nor denied. We suspect that if we could set all the controls flat with certainty, the claims all would be verified. However, when you are dealing with *four* tiny rotary knobs per channel, each of which must be set precisely to its *electrically* centered position with only a nominal dot inscribed on the knob and front panel to guide you, it is next to impossible to achieve a truly flat overall response curve when such is desired. A good indication of the problem can be seen by examining the upper trace of *Fig. 2.* Nominally, this curve should have been "ruler flat" since we did line up all the dots on the knobs with all the dots on the front panel. However, as may be seen, this curve has both dips and bumps. Had we been willing to tweak, and then tweak some more, we probably would have arrived at a more nearly flat response curve—but then the dots would not have lined up visually with one another.

On other counts, such as its general versatility and construction, the GEM-7 made a favorable impression.

General Info: Dimensions are 19 inches wide; 5.3 inches high; 7.4 inches deep. Weight is 11 pounds. Price: $449.95.

Joint Comment by N.E. and L.F.: While we both were favorably impressed with the built-in versatility of this four-band parametric equalizer, we also were disappointed at its apparent lack of "human engineering" (not to mention its rather minimal instruction manual). All of the needed controls are there, of course, including continuously variable center-frequency selection, boost or cut level and bandwidth. But the front panel knob sizes and their respective markings are such that it is almost impossible (at least

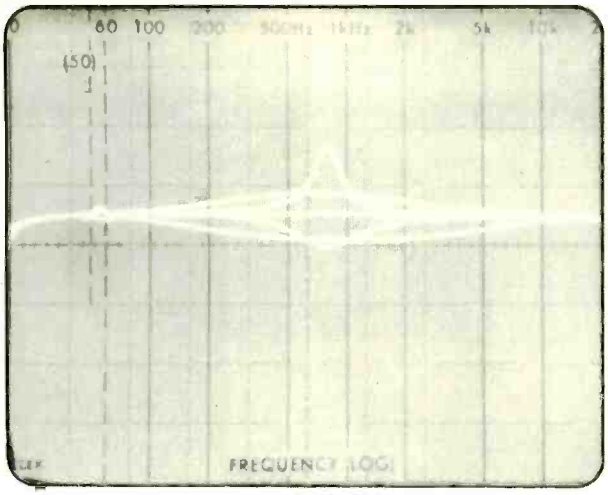


Fig. 1: Superex GEM-7: Multiple frequency response sweeps through unit illustrate variability of bandwidth of one of the four available bands.

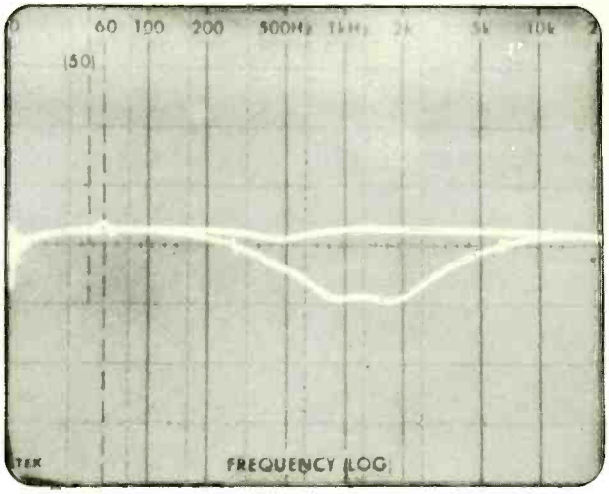


Fig. 2: Superex GEM-7: Attempting to overlap two bands (by setting frequencies equal, as noted on the front panel) did not result in a cumulative attenuation of 36 dB, as claimed, but in the curve (lower) shown here. Upper trace is reference response with controls set for "flat." (Vertical scale in both figures is 10 dB per division.)

for us) to set up the same desired overall response curve twice and have it come out the same each time. This is explained in some detail in the "Test Results" section of this report.

As a result, we feel that if you need a parametric equalizer for a one-time adjustment of a system, in which the settings, once determined, will remain fixed, you *can* set the controls—with a little effort and a good ear or some good test equipment—to achieve just about any frequency-contouring required. On the other hand, if you need a parametric equalizer for use on a more-or-less daily basis, if you plan to adjust overall response repeatedly—based on the needs of different recording artists, program material or for any of the other reasons that audio people routinely use equalizers—then the control arrangement and calibration offered here are just too inaccurate.

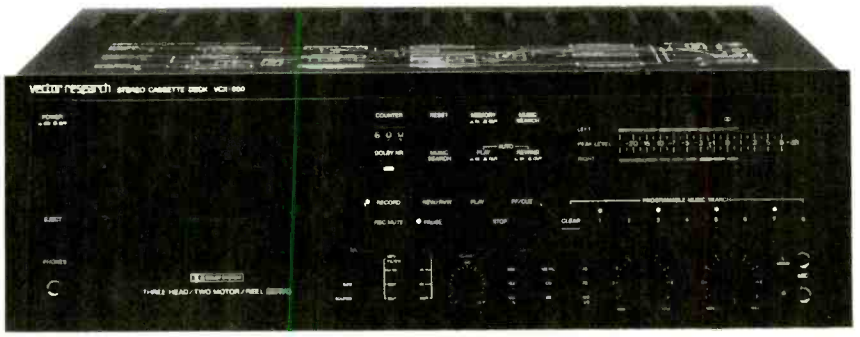
Of course, the GEM-7 is about the lowest-priced parametric equalizer we have run across, but if your need for this type of device goes beyond a single, fixed set of control settings in a permanent installation, it might be easier for you in the long run to spend a little more if you have to, so that when you do need to alter the settings you will have a good idea of where you are going without having to resort to spectrum analyzers and other expensive test equipment not likely to be found in the average studio. In short, the GEM-7 is more of a one-time stereo system accessory (and a very versatile one at that), rather than a workaday "audio tool."

SUPEREX GEM-7 PARAMETRIC EQUALIZER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency Selection	30 Hz-820Hz; 820 Hz-16 kHz paired, overlapping bands	Confirmed
Boost and cut range	± 18 dB per band (± 36 dB with two bands set to same frequency)	± 18 dB confirmed
Bandwidth	0.16 to 2.0 octaves	Confirmed
Frequency response	5 Hz to 100 kHz, ± 2.0 dB 20 Hz to 20 kHz, ± 0.5 dB	Not confirmed; see text of report
THD	< 0.01%	0.003% at 1 kHz 0.010% at 20 kHz 0.008% at 20 Hz
IMD	< 0.005%	0.003%
S/N	− 89 dBm, IHF "A" wtd	− 94 dB
Input impedance	50 K ohms	Confirmed
Output impedance	100 ohms	Nominally confirmed
Gain (flat position)	0 dB	Confirmed
Power consumption	Nominal 3 watts	2.5 watts

CIRCLE 21 ON READER SERVICE CARD

Vector Research
VCX-600 Cassette Recorder



General Description: The Vector Research VCX-600 is a stereo cassette recorder using two motors and three heads. The record and play heads are electrically separate, but since they share a common housing there is no need for azimuth alignment adjustments. Transport controls are "feather-touch" and logic-controlled, and run-in recording from the play mode is possible. Dolby NR is built in, and the deck has provisions for handling metal tape. Also featured is a programmable music search system by means of which it is possible to have the deck select up to eight different portions of a recorded cassette, provided there is an interval of at least four seconds between selections. The VCX-600 also has options for memory rewind, automatic play after rewind, automatic rewind and repeat play. Associated with the fast-forward button is a "cue" function, and with the rewind button a "review" function. In either "cue" or "review" modes the tape moves at fast speed but remains in contact with the play head so that some of the recorded signal is heard.

The cassette is loaded into a slot behind the swing-down see-through door at the left. To the left of the door are the switches for power off/on and for eject. Below them is a stereo headphone jack.

The larger portion of the front panel is divided into three main groupings. The upper portion contains the tape counter and reset button, the Dolby NR indicator, the music search indicator and the buttons for memory, music search, automatic play and automatic rewind. At the right are the signal meters, one per channel, which show peak levels in several LED segments. The LEDs up to "0" dB are colored green; above "0" dB they are colored red. The calibration reads from below −20 to +8.

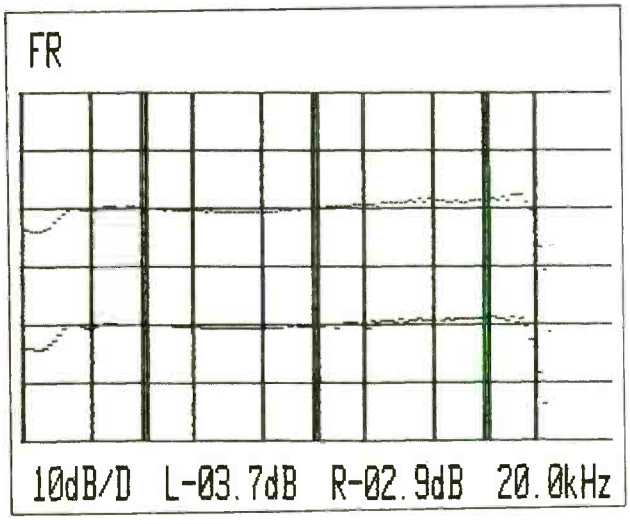


Fig. 1: Vector Research VCX-600: Record/play response frequency, at −20 dB level using TDK-AD tape.

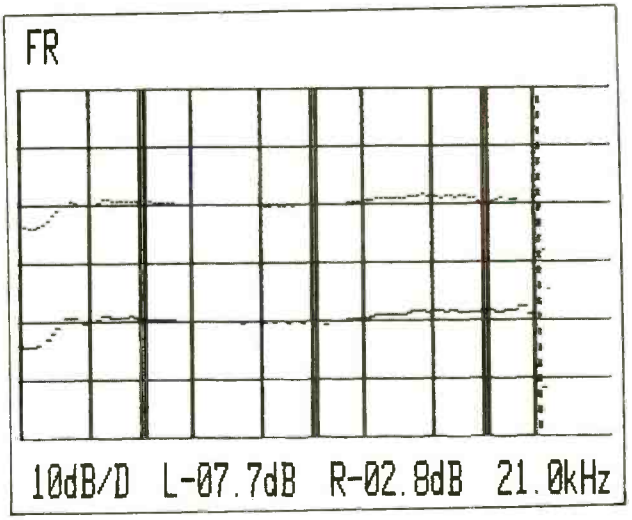


Fig. 2: Vector Research VCX-600: Record/play response, at −20 dB level, using TDK-SA tape.

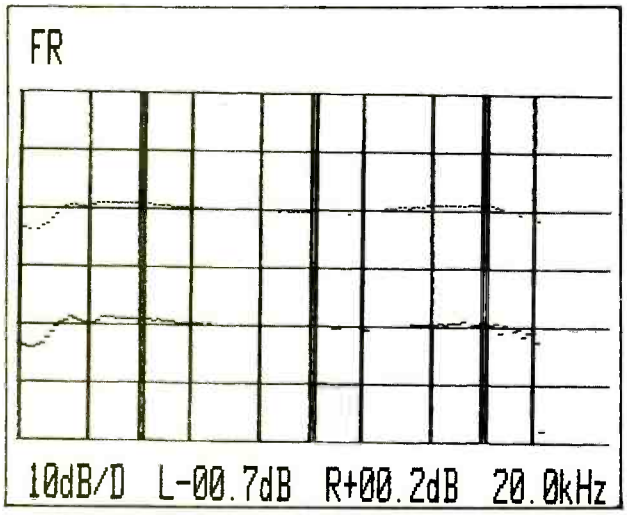


Fig. 3: Vector Research VCX-600: Record/play frequency response, at −20 dB level, TDK-MA-R tape.

The middle horizontal portion of the panel contains the transport buttons and the music search buttons of which there are eight plus a "clear" button. Included in the transport controls are switches for record mute and for pause. In order to go into rewind or fast-forward from the play mode, it is necessary first to press the stop button. However, if the rewind or fast-forward button is pressed without first hitting the stop button, and held down, the deck will provide the "review" or "cue" features, respectively.

The lower third of the panel contains various electronic controls, including: the tape/source monitor; the Dolby selector (with a position for MPX filter); separate bias and EQ switches, with a bias trim knob; the output (playback) level control (a single knob that handles both channels simultaneously); input level controls (dual-concentric knobs for both channels simultaneously, or either channel individually); and a pair of microphone jacks. The output level control handles only the line-output; it has no effect on headphone volume.

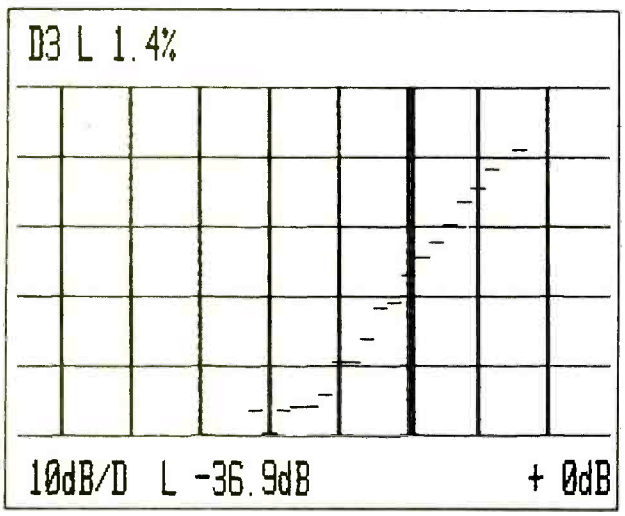


Fig. 4: Vector Research VCX-600: Third-order distortion versus record level, using TDK-AD tape.

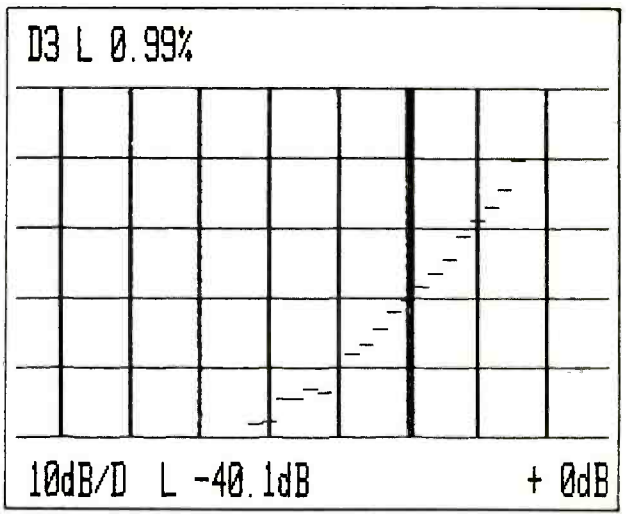


Fig. 5: Vector Research VCX-600: Third-order distortion versus record level, using TDK-SA tape.

The rear of the VCX-600 contains the line in and line out signal jacks, a socket for use with an optional remote-control accessory; the deck's AC power cord; and a fuse-holder. A block diagram of the recorder is printed on the top chassis cover. The VCX-600 is supplied in a metal case finished in black matte. Control markings in neat ivory or buff-tone are quite legible.

Test Results: *MR&M*'s response measurements of the VCX-600 exceeded specifications, as did our wow-and-flutter readings. Signal-to-noise came in a shade below spec but was close enough. More important than small numerical differences in our specs, however, is the fact that this is one of the few decks we have tested so far that actually does better with metal tape in all performance areas, not just a few. That is to say, with metal tape, the VCX-600 had wider response, higher S/N, lower distortion and more headroom than with either of the other two tapes (normal bias and high bias) used in our tests.

The procedures offered in the owner's manual for adjusting bias and recording level are extremely simple, and may be carried out by ear and by observing the deck's signal meters. They also obviously are quite effective despite their simplicity.

The "0 dB" point on the meters, by the way, is pegged here at a value of 200 nWb/meter which we regard as more realistic than the lower nWb/m values often found on cassette decks (likely intended to give an impression of a deck's having "a lot of headroom.")

Some additional word is required regarding our lab measurements with the Sound Technology model 1500A Tape Recorder Tester. Having used this instrument for several months, and received some "feedback" from readers and our own editorial staff, we have adjusted our procedures somewhat to make interpretation of the results easier to grasp.

In *Figs. 1, 2* and *3* we show the overall record/play response of the VCX-600 deck. The recording level is −20 dB (re: 0 dB at 200 nWb/m). The three response graphs show results, respectively, for tapes using normal bias (TDK-AD), high bias (TDK-SA) and metal bias (TDK-MA-R).

Note that for these graphs we allowed the tester to plot both left and right channel response. As may be seen, the cut-off points for each channel are not always quite identical. For instance, in *Fig. 1* at 20 kHz (shown in the print-out below the curves), the right channel output is down only 2.9 dB, while the left channel output is already down 3.7 dB. Actually, we consider this close enough to call the response "flat" within 3 dB out to 20 kHz for this tape, even though the accuracy of the tester shows that this statement is, strictly speaking, not quite true for the left channel. Similar slight discrepancies may be observed for the other two tapes in *Figs. 2* and *3*.

Third-order distortion versus recording level for the three kinds of tape is shown in *Figs. 4, 5* and *6*. In each case, the movable cursor was set to 0-dB recording level, and the D3 percentage shown at the upper left is the 3rd-order distortion for that recording level, using a 400-Hz tone. For example, it shows 1.4 percent for the TDK-AD samples. However, we were able to move the cursor to obtain the record level at which 3rd-order distortion reached 3 percent (maximum record level) for each tape, and those recording levels also are given in the "Vital Statistics" chart.

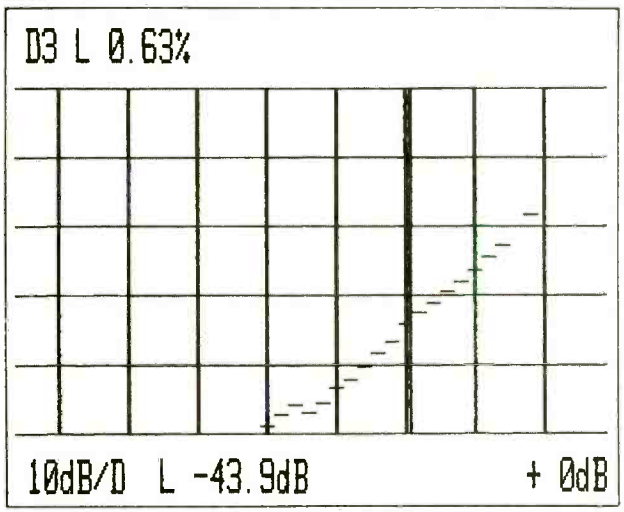
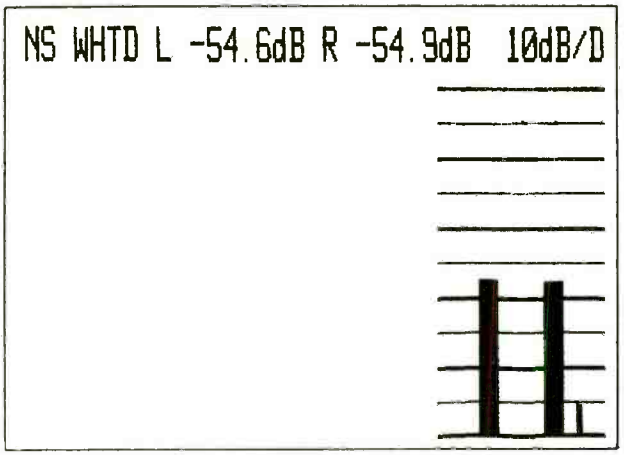
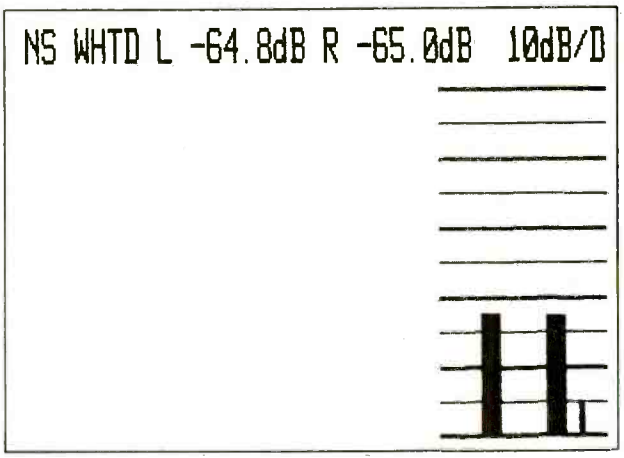


Fig. 6: Vector Research VCX-600: Third-order distortion versus record level, using TDK-MA-R tape.



(A)

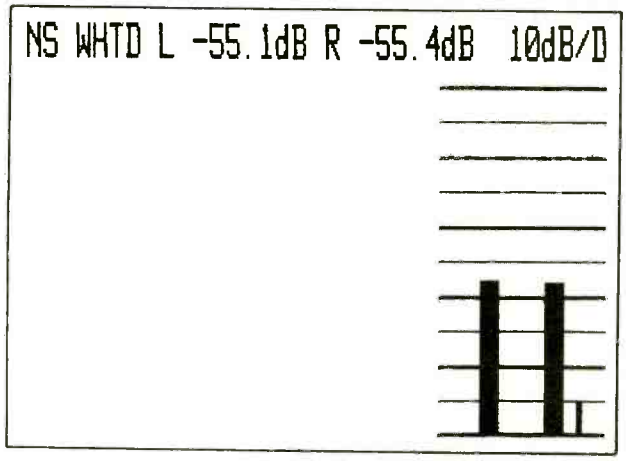


(B)

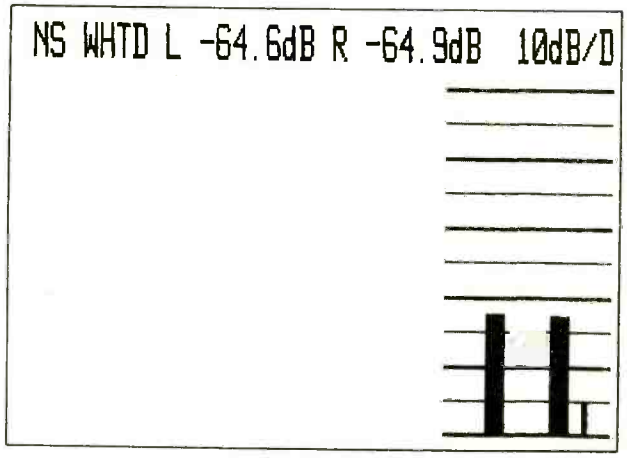
Fig. 7: Vector Research VCX-600: S/N ratio, referenced to max record level, using TDK-AD tape, with Dolby OFF (A) and Dolby ON (B).

In earlier reports in which we used our new tester, we reported signal-to-noise referenced to a standard 0-dB point on the graphic displays, but we added in the headroom in reporting the S/N figure. To avoid this seeming disparity, this month we set the reference point for each tape before taking the S/N readings, so that the S/N figures would all read *with respect to the 3-percent third-order distortion level.* So now, the printout readings in *Figs. 7, 8* and *9* all agree (except for minor averaging between left and right channels) with the final numbers we entered in the "Vital Statistics" chart. Graphic printouts are shown for all three tapes with and without Dolby turned on.

The JIS-WRMS flutter for this deck measured a low 0.051 percent, as verified by the printout shown in *Fig. 10.* Deviation from nominal speed after 70 seconds of operation measured +0.488 percent as shown in *Fig.*

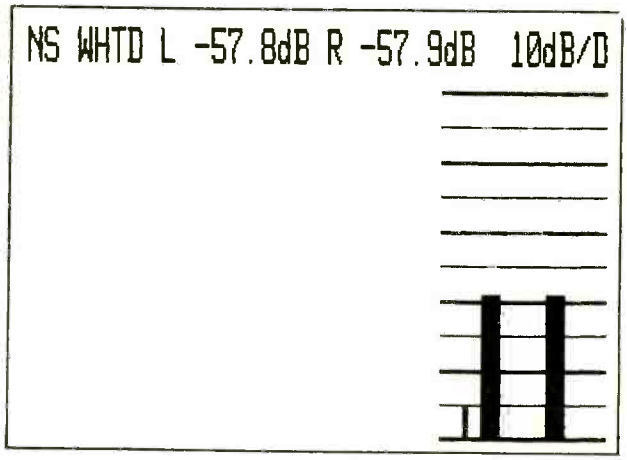


(A)

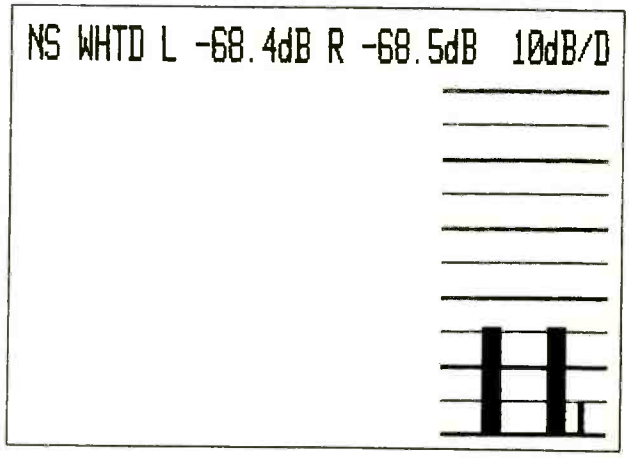


(B)

Fig. 8: Vector Research VCX-600: S/N ratio, referenced to max record level, using TDK-SA tape, with Dolby OFF (A) and Dolby ON (B).



(A)



(B)

Fig. 9: Vector Research VCX-600: S/N ratio, referenced to max record level, using TDK-MA-R tape, with Dolby OFF (A) and Dolby ON (B).

11. Note that the plot in *Fig. 11* shows that this small error tends to decrease with increased playing time, coming close to the center line of the plot which represents "zero percent" error.

General Info: Dimensions are 17⅞ inches wide; 5⅞ inches high; 14¾ inches deep. Weight is 22 pounds. Price: $750.

Individual Comment by L.F.: After you get past the many front-panel switches and lights, and after you tire of using the music-search system to locate the beginning of a selection, and after you tire of the automatic rewind and playback functions of this beautifully configured deck, it is time to consider the true virtues of the Vector Research VCX-600. And there are many, beginning with the superb specifications which we measured in the lab, and following through to the fine-bias adjustment and the simple method of doing it by ear, using random noise or some other program source for an A-B comparison between source and recorded sound.

I was especially pleased to find 0 dB corresponding to 200 nWb/meter on the deck's LED metering panel, as opposed to the practice of some deck makers who insist on calling "0 dB" the magnetization level of around 150 to 165 nWb/m (so that users will think the deck has a lot of headroom). There are, in fact, some of us who think that with the advent of better tapes, the 0-dB point might even be moved up beyond 200, to 250 nWb/m, but for now I will settle for Vector Research's choice of 200 nWb/m as a fair and realistic point. That happens to correspond to Dolby level too, making things very neat and convenient.

Note also that the deck's peak-level metering is calibrated up to +8 dB instead of the more usual +5 or +3. That, too, makes sense for a metal-capable deck in which the *true* extra headroom really exists when metal tape is used, and it is nice to be able to monitor that extra recording headroom capability on a meter that does not peg before maximum record level (for 3 percent distortion) is reached.

In use tests, I found the VCX-600 easy to operate, and capable of making excellent-sounding recordings when high-quality tape is used. In truth, with a deck of this sort it would be ill-advised to use anything but the better grades of cassette tape, since it is really the tape itself that is most likely to prove the limiting factor in determining the quality and realism of the played-back program.

Of course, I would have been content if the music-search and the auto-play features had not been included, especially if those omissions meant a significant decrease in price. Fortunately, even with these frills, the suggested retail figure of $750 does not actually seem out of line for this deck, all other benefits and virtues considered.

Individual Comment by N.E.: It took me a little time to get used to the particular kind of "fast-buttoning" incorporated in the VCX-600 deck. Habits are hard to change, I guess. That is to say, with the deck in play mode, you can't just hit fast-forward or reverse and expect it to obey those commands. Not quite. You must hit the stop button first. However, if the deck is in play mode, and you hold down the fast-forward button, the tape will be shuttled at high speed but with partial head contact so that you can monitor the tell-tale "squeals" that indicate the duration and cessation of a recorded signal. Similarly, if you hold down the reverse button (from the play mode), the tape will move at high speed in reverse and still give you the audible clues.

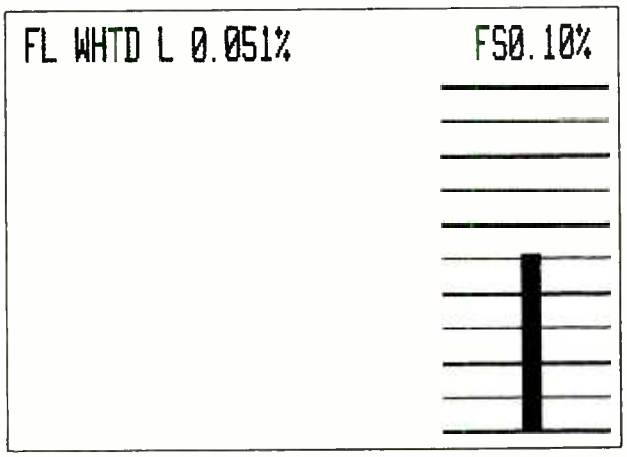


Fig. 10: Vector Research VCX-600: Flutter characteristics measured with JIS weighting, WRMS.

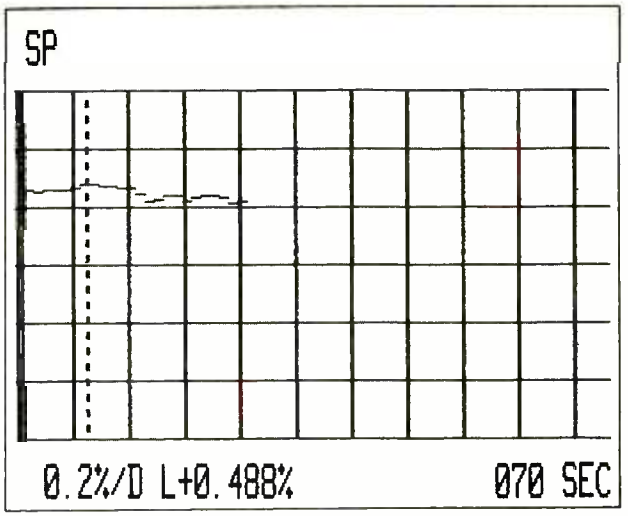


Fig. 11: Vector Research VCX-600: Speed accuracy of transport system after 70 seconds of play.

You can go into play mode or record mode from either of the fast-winds, and you can go right into record from the play mode. The logic system here works perfectly, and the transport did perform perfectly even under the kind of "noodnik" treatment I apply to tested products.

Sound of the VCX-600 is very good, with solid bass, clear middles and smooth extended highs. Dolby calibration is not provided as a user adjustment, but as far as we could tell, it had been set right at the factory. Still, it would be "comforting" to have this adjustment up front (a whole series of inside-circuit adjustments is detailed in a separate service manual which you are hereby advised to ignore unless you have had considerable technical experience in these matters).

Styling of the deck suggests a touch of the "Star Wars" type of esthetic with those many thin yellow-white lines engraved against a dull black background, and an occasional flash of color from the indicators. Headphone volume is on the low side—adequate but not overwhelming.

The VCX-600 obviously has been designed with metal tape in mind since our tests did confirm that when using metal tape, across-the-board improvements in all tested areas became evident. This could relate to the deck's inclusion of the automatic selection-search system which implies a recording bent for short numbers rather than for one long continuous musical opus. The former would suggest of course pop material; the latter, classical stuff. And it seems to be the pop recording enthusiasts who are going after the highest dB levels, especially in the high frequencies, which metal tape can provide. A classical recording buff hardly needs the interval-search feature, and a +8 for headroom may not be as relevant either.

VECTOR RESEARCH VCX-600 CASSETTE DECK: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response, normal tape	±3 dB, 30 Hz to 16 kHz	±3 dB, 29 Hz to 20 kHz
hi-bias tape	±3 dB, 30 Hz to 18 kHz	±3 dB, 27 Hz to 20 kHz
metal tape	±3 dB, 30 Hz to 20 kHz	±3 dB, 27 Hz to 20 kHz
Wow-and-flutter, WRMS	0.06%	0.051%
Speed accuracy	NA	+0.4%
S/N, re: 3% THD record level, w/o Dolby		
normal tape	56 dB	54.7 dB
hi-bias tape	NA	55.2 dB
metal tape	NA	57.8 dB
same, with Dolby		
normal tape	65 dB	64.9 dB
hi-bias tape	NA	64.7 dB
metal tape	NA	68.5 dB
Record level for 3% THD (0 dB = 200 nWb/m)		
normal tape	NA	+2.5 dB
hi-bias tape	NA	+4.0 dB
metal tape	NA	+8.0 dB
THD at 0 dB record level		
normal tape	NA	1.4%
hi-bias tape	NA	1.0%
metal tape	NA	0.63%
Line output at 0 dB	580 mV	558 mV
Headphone output level at 0 dB	NA	50 mV into 8 ohms
Mic input sensitivity for 0 dB	0.25 mV	0.37 mV
Line input sensitivity for 0 dB	60 mV	53 mV
Fast-wind time (C-60)	90 seconds	80 seconds
Bias frequency	105 kHz	Confirmed
Power consumption	50 watts	45 watts

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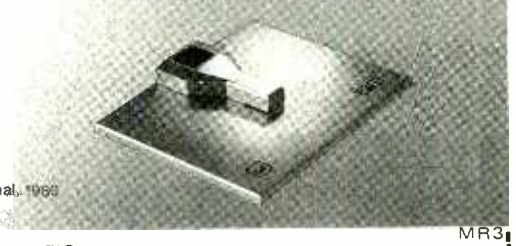

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Yamaha F1040 Frequency Dividing Network

By John Murphy and Jim Ford

We are returning our attention to electronic crossovers this month as we review Yamaha's F1040 frequency dividing network. This is a single-channel (mono) crossover which can be switched between 2, 3 and 4-way modes of operation. The unit features front panel control over both input and output signal levels as well as switches for selecting frequencies for each of the three crossover points. One very unusual feature of the F1040 is the inclusion of three front panel switches for independently selecting between 12 dB/octave and 18 dB/octave filter slopes at each crossover point. Also, this is the first crossover we've reviewed that provides guarding of the front panel controls, in this case by way of a front panel security cover.

The F1040 is contained in an elegantly styled rack mountable package (3½ inches high or "double rack width"). As with many of the Yamaha products, the front panel controls are all recessed and have an excellent "feel" to them. The F1040 is priced at $725.

General Description: The F1040 can be used as the crossover filter set for 2-way, 3-way or 4-way loudspeaker systems. The choice between these modes of operation is made at the rear of the unit via the mode selector switch which has four settings: 4-way, 3-way, 3-way-2 and 2-way. There is a two-color LED over each of the four output attenuators on the front panel that indicates which of the four outputs is used for the various modes. In the 4-way mode, all four LEDs glow red to indicate that all four outputs are in use. In the 2-way mode, the two middle LEDs glow red while the outer two glow green to indicate that only the low-mid and high-mid bands are in use. The 3-way-1 mode makes use of the three upper bands while the 3-way-2 mode employs the three lower bands. The significance of the two 3-way modes becomes clear when the crossover frequency selector switches are considered.

The three crossover frequency selectors are located on the front panel to the left of the four output attenuators. Each frequency selector is a six-position rotary switch which selects one of six discrete crossover frequencies as identified by the front panel graphics. The frequencies available on the lower crossover frequency selector are: 70, 100, 150, 220, 330 and 500 Hz. Middle crossover frequencies are: 500, 800, 1 K, 1.2 K, 1.6 K and 2 kHz. Upper crossover frequencies are: 1.2 K, 2 K, 3.3 K, 5 K, 7 K and 8 kHz. When the crossover is used in the 2-way mode, the middle frequency selector is used, so the available range of crossover frequencies is from 500 Hz to 2 kHz. In the 3-way-1 mode, the upper two frequency selectors are used since the upper three output channels are used. This means that in the 3-way-1 mode, the lower crossover frequency is adjustable over the range 500 Hz to 2 kHz, while the upper crossover can be varied over the range from 1.2 kHz to 8 kHz. In the 3-way-2 mode, the difference is that the lower two frequency selectors are used so that lower crossover point can be set from 70 Hz to 500 Hz; the upper crossover frequency then can vary over the range 500 Hz to 2 kHz. So the choice between the two 3-way modes is based on the crossover frequencies required.

Located below each of the three frequency selectors is a two-position switch which selects either 12 or 18 dB/octave filter slopes for each of the three filter pairs. (For a discussion of the relative merits of 12 versus 18 dB/octave slopes and a discussion of crossovers in general, see the "Hands-On Reports" in the August and September 1980 issues of *MR&M*.)

Located at the far left of the front panel is an input signal attenuator which is used to reduce the level of the

input signal to the crossover. When both the input and output attenuators are at maximum (0 dB attenuation) the F1040 passes the input signal at unity gain. However, because of the unit's very low output noise (about −100 dBV) −10 or −20 dBV level signals can be processed without significant degradation of noise levels. The nominal operating level of the F1040 is +4 dBV.

Directly above the input attenuator is a push-button power on/off switch. Between these two controls is a small red LED peak overload indicator that illuminates whenever input signal levels come within 3 dB of clipping.

The Yamaha crossover is quite flexible with respect to input/output signal connections. Unbalanced signal connections are made by way of ¼-inch phone jacks at the input and each output. The unit also accepts a balanced input signal and provides balanced outputs on 3-pin XLR-type connectors. The balanced signal connectors (input and output) are each provided with a ground lift switch for making or breaking the connection to pin 1. Also, the balanced connections are all transformer isolated. Above each of the output connectors is a slide switch which reverses the polarity of that balanced output; the unbalanced outputs are not affected by this switch.

There is one other slide switch on the rear panel which introduces a 40 Hz high pass filter. When this filter is engaged, frequencies below 40 Hz are attenuated at 12 dB/octave. This filter should help reduce the woofer cone excursion and modulation distortion that results when the program material is contaminated with sub-sonic noise components.

Listening Test: We consider it most important that a loudspeaker crossover divide up the audio frequency spectrum in such a way that when the individual frequency bands are recombined, the original signal is accurately reproduced. At first this may seem like a trivial or obvious requirement, but the sad truth is that many crossovers on the market today fail to meet this simple requirement.

In order to evaluate the ability of the F1040 to recreate the input audio signal when the unit's output signals are accurately recombined, we summed the four output signals using a precision summing amplifier. We then routed the "tape-out" signal from the stereo preamplifier of our reference monitoring system to the input of the crossover. The recombined output signal from the summer was then returned to the "tape in" to complete the loop. In this way we could alternately switch the crossover (and summer) in and out of the listening chain.

Listening to a popular album we could clearly tell when the crossover was switched into the listening chain. The audibility of the crossover varied depending

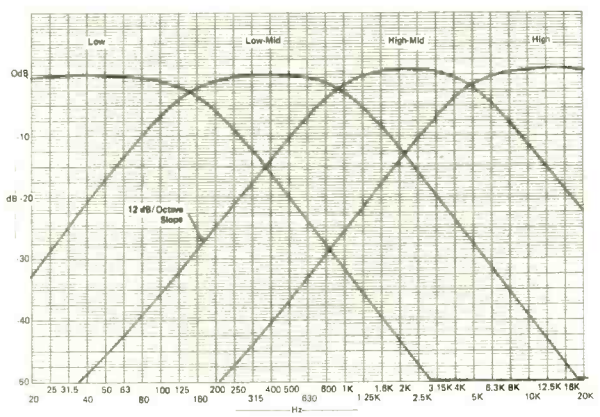

Fig. 1: Yamaha F1040: Amplitude response of the four outputs in the 12 dB/octave, 4-way mode.

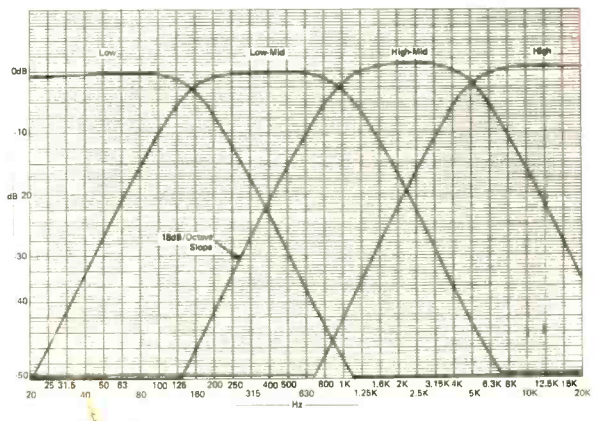

Fig. 2: Yamaha F1040: Amplitude response of the four outputs in the 18 dB/octave, 4-way mode.

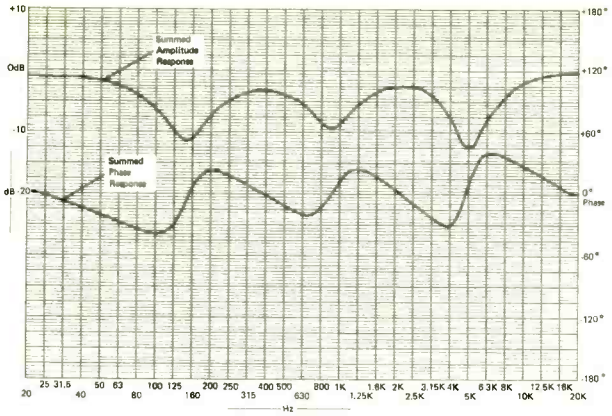

Fig. 3: Yamaha F1040: Amplitude and phase response when the four outputs are summed (12 dB/octave slopes).

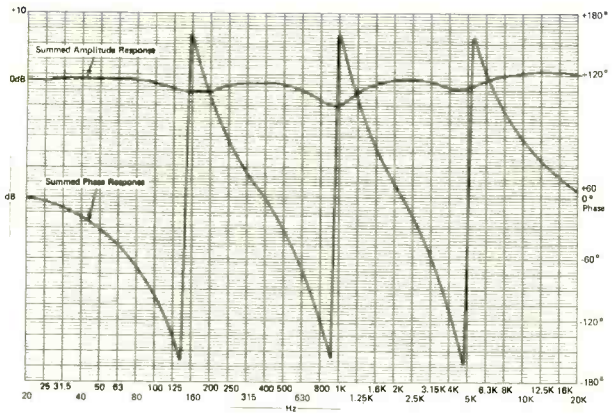

Fig. 4: Yamaha F1040: Amplitude and phase response when the four outputs are summed (18 dB/octave slopes).

on the crossover mode, filter slope and output polarity but the unit was never found to be "transparent" to the audio signal. The reason for this becomes clear when the frequency (amplitude) response of the recombined signals is examined.

Lab Test: When we brought the Yamaha crossover to the lab we performed our usual series of tests and paid special attention to the unit's summed frequency response characteristics. Our test results are summarized in the table below. We found the F1040 capable of accepting any input signal it's likely to encounter—due to the input attenuator. Even the hottest input signals can be attenuated to a level the unit can handle. The output was capable of driving a 600-ohm load to better than +25 dBV, making for a little greater headroom before clipping than most other units we've seen.

The crossover's noise levels were extremely low at about −100 dBV. With output signal levels of +10 dBV the unit's total harmonic distortion (THD) was typically less than 0.002% through the unbalanced signal connections but increased to the levels shown below (about 0.03%) when the balanced signal connections were used.

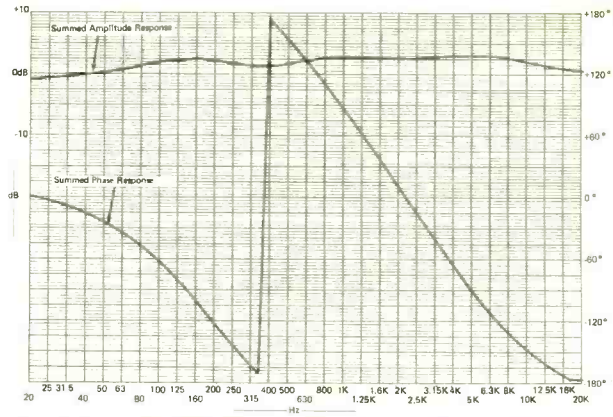

Fig. 5: Yamaha F1040: Amplitude and phase response when the four outputs are summed (12 dB/octave slopes, "Low-Mid" and "High" output polarity inverted).

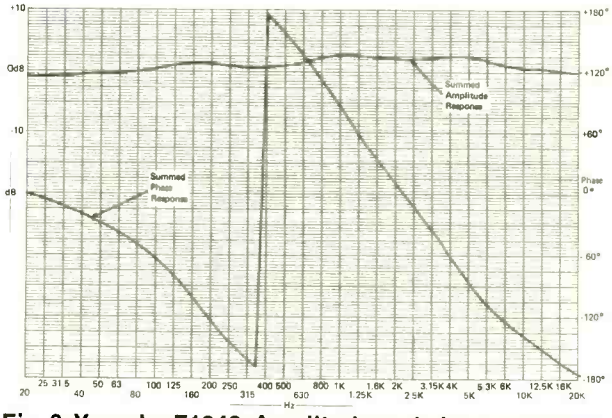

Fig. 6: Yamaha F1040: Amplitude and phase response when the four outputs are summed (18 dB/octave slopes, "Low-Mid" and "High" output polarity inverted).

The additional THD is most likely due to the transformers used for the balanced signals.

The high-frequency performance of the unit was excellent as the power bandwidth was beyond the small signal bandwidth of 70 kHz. We observed output signal velocities as high as 11 volts per microsecond, so the slew rate limit is at least this great. Having a normalized slew rate limit of 0.52 volts per microsecond per volt, this is the first crossover we've reviewed that meets the Jung criteria (normalized slew rate limit of at least 0.5[1]) for freedom from slewing induced distortion.

The frequency response through each of the four crossover outputs is shown in *Fig. 1* for the case of 12 dB/octave filter slopes and in *Fig. 2* for the case of 18 dB/octave filter slopes. When the four output signals are summed, the response is as shown in *Figs. 3* and *4* for 12

References

[1]W. G. Jung, M. L. Stephens, C. C. Todd, "An Overview of SID and TIM, Part II," *Audio*, LXIII (July 1979), 38-47.

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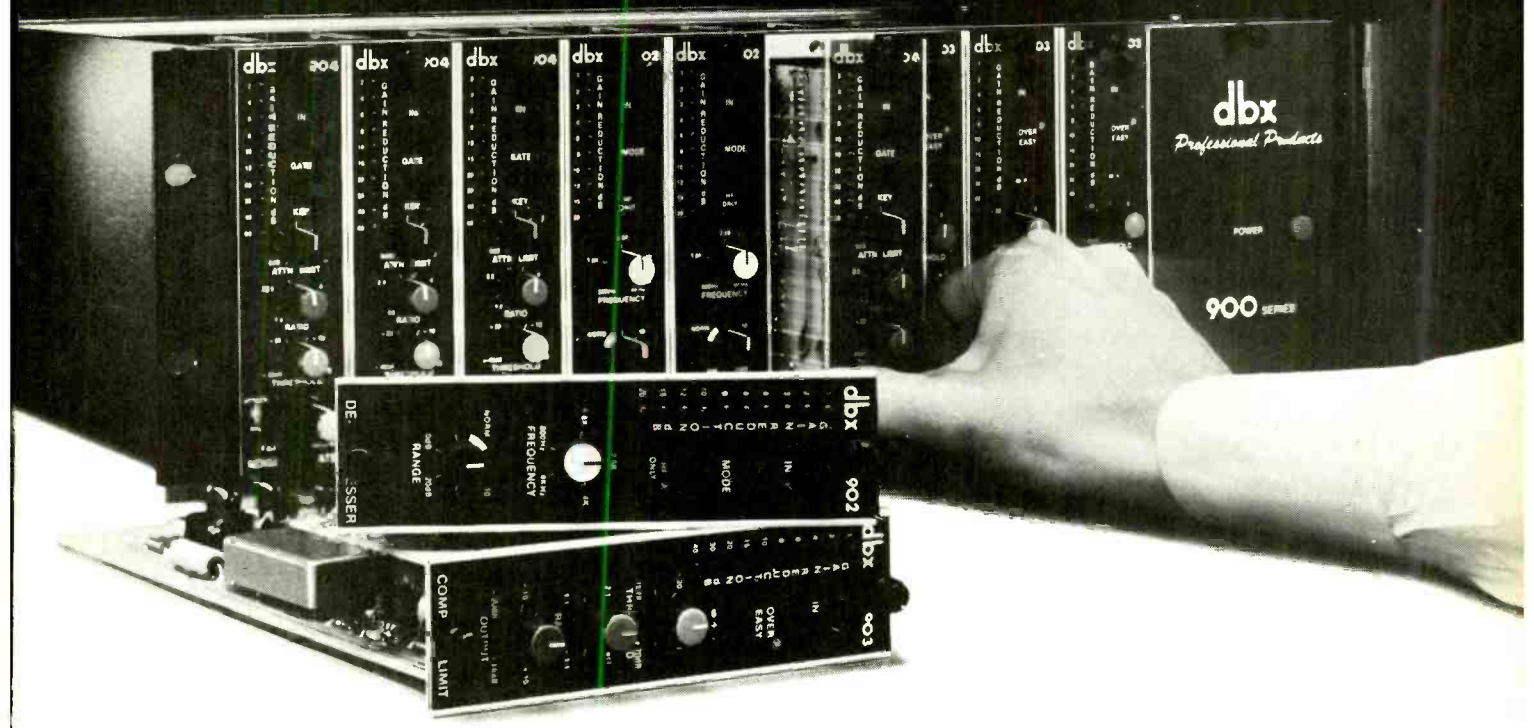

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and 18 dB/octave slopes, respectively. *Fig. 3* shows notches in the amplitude response at each crossover as expected for 12 dB/octave slopes. However, we were surprised by the amplitude response in the 18 dB/octave case *(Fig. 4)* because such filter pairs (18 dB/octave Butterworth) usually sum to provide a flat amplitude response. We assume that the dips in frequency response in *Fig. 4* are the result of misalignment of the filters. *Figs. 5* and *6* shown the best results that we could get with the F1040 in the 4-way mode. In both cases (12 and 18 dB/octave slopes) the best response was obtained by inverting the output polarity of every other output. Note the identical phase response for these two cases. In our opinion the configuration of *Fig. 6* is probably optimum for the F1040 since it provides the steeper cutoff slope of 18 dB/octave with the best amplitude and phase characteristics that can be obtained from the unit.

The owner's manual supplied by Yamaha did an adequate job of explaining the controls and features of the crossover, but left us wanting more detailed applications information.

Conclusion: We found Yamaha's F1040 frequency dividing network to be an elegantly packaged unit with a high degree of control flexibility. We observed that the unit exhibits its best performance when used with 18 dB/octave filter slopes and the polarity of alternate output signals inverted.

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LAB TEST SUMMARY

(Note: 0 dBV is referenced to .775 Vrms)

Input Output Levels

Maximum input level before clipping: depends on setting of input attenuator

Maximum output level before clipping into a 600-ohm load: +25.5 dBV

Noise Performance

(20 kHz filter, unweighted, 600-ohm source)

Noise at "Low" output:	−102.5 dBV
Noise at "Low-Mid" output:	−100.8 dBV
Noise at "High-Mid" output:	−99.6 dBV
Noise at "High" output:	−99.4 dBV

THD Performance

(+10 dBV output level)

Frequency	THD & Noise
100 Hz	0.08%
500 Hz	0.041%
2 kHz	0.024%
10 kHz	0.036%
20 kHz	0.034%

Small Signal Bandwidth (−3 dB): 4.5 Hz to 70.0 kHz

Power Bandwidth: greater than 70 kHz

Slew Rate Limit: at least 11 volts per microsecond

Normalized Slew Rate Limit: at least 0.52 volts per microsecond per volt

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GROOVE VIEWS

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POPULAR

JOHN PRINE: ***Storm Windows.*** [Barry Beckett, producer; Dick Cooper, production assistant; Greg Hamm, engineer and mixer; Steve Melton and Mary Beth McLemore, assistant engineers; recorded and mixed at Muscle Shoals Sound Studios, Sheffield, Alabama.] Asylum 6E-286.

Performance: **Back in the groove**
Recording: **Bright and crisp**

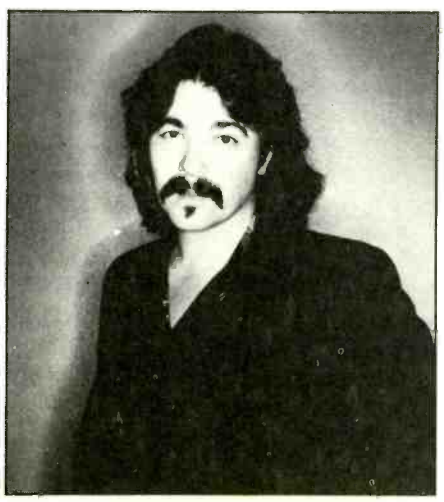
John Prine has returned to top form with this release, capturing once again the spirit of his earliest albums and his later release, *Bruised Orange.* This recording contains a heady mix of easy ballads, some doses of rockabilly and some typically Prine-y raucous good humor. Much of the material is upbeat, both philosophically and musically, with only a few traces of world-weariness that sometimes marks Prine's material.

In addition to the great sound here, the album showcases Prine's uncanny way with words. This is just fine, because none of the melodies will burn themselves into the senses; in fact, a song such as "Just Wanna Be With You" is built on the most basic and simple of all rock tunes, while some of the other compositions sound vaguely similar to earlier Prine melody lines. (No real criticism here. After all, Jackson Browne has been building a career for years with his word-pictures that use the same basic melody line).

Prine always has been a lyricist of above-average perception and intellect—witness the play on an old poster slogan, "Loose lips sink ships, shake hips/Bad tips draw spies," from a song about a former girlfriend who tells tales on her old man, while "Jake the barber's lonely daughter/Went down to her daddy's shop/She plugged herself to a barber pole/And took a little off the top" is a wry, Beatlesque image designed to bring a smile and a tear.

The nicest ballad on the album "One Red Rose," has more wonderfully evocative images— "The rain came down/On the tin roof/Hardly a sound was left/From the birthday party/The kitchen light/Fell asleep on the bedroom floor"—and the sound is so fine, with a simple melody backed by acoustic guitars and a subtle organ fill.

The sound of the album is nice, too, with a good balance struck between Prine's singing and his band's playing. His voice is captured here as it always is, with built-in grin, and the accompaniment never overpowers the material or the voice. Some notable lead guitar work by John Burns can be heard on several cuts, and the total "feel" to the album is one of earthiness, grittiness—perhaps because producer Barry Beckett heads the production for the Muscle Shoals Rhythm Section. Prine and the studio publicists maintain that most of the tracks are first takes, with only a minimum of overdubbing. If so, then this just makes the record all the more remarkable.



JOHN PRINE: In top form.

You may not find much rock and roll here—John D. Wyker's "Baby Ruth" is cut with the hardest edge of all and is the album's main rocker—but two rockabilly tracks, "Shop Talk" and "Just Wanna Be With You," move along at a pretty good clip in a good-humored sort of way. You will find two older Prine songs, too, including "I Had a Dream," which he has been performing in concert for at least 2½ years. This song has the same kind of country-rock sound as some of the material by Goose Creek Symphony or Ozark Mountain Daredevils.

There is little to fault and much to praise in *Storm Windows,* another musical/lyrical gem by one of today's best singer/songwriters.

S.R.

XTC: ***Black Sea.*** [Steve Lillywhite, producer; Hugh Padsham, engineer; recorded at Townhouse Studios, London, England.] Virgin VA 13147.

Performance: **Smart but bopping**
Recording: **Mixed for maximum danceability**

Considering the inaccessibility of their first two albums *White Music* and *Go 2,* the success and general commerciality of XTC's last album, *Drums And*

Wires, came as a surprise. This time, with *Black Sea,* XTC ought to find itself an even wider audience, because there's plenty here to satisfy even the most timid. Only in a few spots is this LP less than acceptable in a pop mainstream sense. But although XTC has modified its experimental zeal somewhat, it is still one of the most progressive of the newer British rock and roll bands to make it on any commercial level at all.

Black Sea fine-tunes what was begun on *Drums And Wires.* Danceability abounds throughout most of the record, as does superb production, musicianship and writing. Guitarist Andy Partridge's songs dominate the album, and he's learned to finely craft a melody without losing sight of the need for incessant rhythm and meaningful lyrics.

In fact, one of the most attractive characteristics of Partridge's songs is his ability to say something with punch while attaching his message to the most hummable melody. Take for example "Living Through Another Cuba," a song which warns of impending war between the U.S. and Communist countries. While Partridge is singing lines such as "If they're not careful, your watch won't be the only thing with a radioactive glow," the band is cranking out some of the most rhythmic and melodic pop heard all year. Most of Partridge's songs zero in on some pertinent social or political subject, but almost all refuse to give up the beat. In a manner similar to that of the Kinks' Ray Davies, Partridge often pens what may be termed neo-protest lyrics, while other songs of his deal with more personal relations between the sexes.

What is disappointing, though, in spite of Partridge's fine craftsmanship, is that bassist Colin Moulding didn't contribute more to *Black Sea.* Moulding also has a fine pop vision, which complements Partridge's so nicely. His "Generals and Majors" (another song about the military) is one of the highlights of the album and "Love At First Sight" exhibits a sense of ironic tongue-in-cheek humor that shows that Moulding and Partridge think along the same lines in many ways, which helps unify the band's sound. Unfortunately, those are the only songs Moulding contributed, and additional output by him would have helped balance the record.

Despite the few faults, *Black Sea* is a good followup to the popular *Drum And Wires.* Producer Steve Lillywhite took great care to keep the music from getting too soft while also keeping it from being too eccentric for the masses. The sound quality is hot and clean, but it doesn't assault. XTC is turning into a band that should appeal to both new wave purists and the average record buyer at the same time. And so far they've done so without sacrificing any integrity or by stunting their own growth. J.T.

KERRY LIVGREN: *Seeds Of Change.* [Kerry Livgren and Brad Aaron, producers; Brad Aaron and Greg Webster, engineers; recorded February thru March, 1980 at Axis Studios, Atlanta, Ga.] Kirschner NJZ 36567.

Performance: **Quality all-star set**
Recording: **Well-schooled**

Multi-keyboards and semi-classical songwriting have always been major distinguishing factors for Kansas, a group that, while otherwise well-equipped, might still be languishing in Midwest clubs were it not for their par-

ticular brand of fusion finery. Even though "Dust In The Wind" has its mass appeal, the more progressive pieces are what give Kansas a decided edge in a rock arena that is often way too predictable.

And Kerry Livgren is that man behind the ivories for Kansas, a talented player and composer who has been long overdue for a solo venture. *Seeds Of Change* is no disappointment whether you favor grandiose terraces of electronic textures or just good rock & roll. Livgren has brought together notables from several major groups to sing and play on the session, assimilating them easily into his overall sound, while handling all guitars and keyboards himself.

"Just One Way" starts off with more than a hint of Southern R&R supplied by bassist Paul Goddard of the Atlanta Rhythm Section, plus hornman Bobby Campo and vocalist Jeff Pollard of Le Roux. "Mask Of The Great Deceiver" is introduced by some stormy atmospherics from Livgren's synthesizers and drums by Jethro Tull's Barriemore Barlow, then features a hard rock vocal by Ronnie James Dio (formerly in Ritchie Blackmore's Rainbow and now with Black Sabbath). Dio returns later for majestic vocals on "To Live For The King," a slow and powerful epic of mystic vision.

Steve Walsh sings on the preachy "How Can You Live," and fellow Kansans Phil Ehart and Robby Steinhardt play on the impressive "Ground Zero." And check this out, frequent Kansas engineer Davy Moire (not turning dials on this session), is lead vocalist for "Down To The Core." Surprisingly good tune.

Other notables showing up throughout the disc are Mylon LeFevre, David Pack or Ambrosia, and spouse Victoria Livgren. The material is high-minded and excellently performed. Kerry Livgren is obviously at home in the studio, and Axis is looming as one of the best. R.H.

THE ROCHES: ***Nurds.*** [Produced and Engineered by Roy Halee; Jon Mathias, recordist; Dave Alhard, assistant recordist; recorded at The Record Plant, New York, NY.] Warner Brothers BSK 3475.

Performance: **A second bullseye**
Recording: **Nothing fancy, but still super**

If anyone was worried that the sophomore jinx would strike down those three innovative sisters from New Jersey, the Roches, *Nurds* will dispel that fear completely. The sisters' second album is every bit the gem that their debut album was last year. The voices continue to amaze with their uncanny harmonies, and the songwriting continues to be some of the freshest around.

The listener is treated, first off, to a recording that doesn't sound as bare as the Robert Fripp-produced record last year. There was something strikingly pure and fresh about Fripp's minimalist approach to the first album, and many persons might have wanted to see that approach repeated this time out. But under the guiding hand of Roy Halee, the Roches have decided to open up, bring on some musicians to round out the music a bit and get down. The result of the fuller musical cast is a most satisfying album.

The same care was taken in putting the second package together, howevers so one will hear all three of those remarkable voices with considerable clarity. Even on the raucous opener, "Nurds," the three voices intertwine rather than homogenize—they are distinct musical threads in a wacky song (a song that not only continues the self-deprecating humor of "We" from last year, but also serves as a send-up, or put-down, of punk rockers). It's a wild little autobiographical number told in up-tempo liveliness that stops just this side of silliness. The end includes some great spoken shouts moving between channels; the shouts echo a schoolyard. In the gorgeous a capella "It's Bad For Me," a 1933 Cole Porter chestnut, one can fully appreciate the considerable musical skills possessed by the sisters. Here is a perfectly realized three-part harmony (some may want to compare this to the Andrews Sisters) with each part clearly defined—Suzzy's alto in one channel, Maggie's alto in the other channel and Terre's soprano in the center.

There are other musical joys on the album: The mock 50's "Bobby's Song," with its near-"shoo-wop" sound and uncharacteristically jazzy clarinet line in the background near the end of the song; or the traditional Irish ballad, "Factory Girl," that mixes surprisingly well a folksong approach with a more contemporary arrangement; or the real curio, "The Boat Family," that marks the contrast between American chocolate bars and the bland staples a boat family is used to.

The "wall of sound" effect that was used so well on a song such as "Hammond Town" in the first album gets an occasional airing here, such as on "My Sick Mind," and a carefree sound with acoustic guitars and light drumming adds a crispness to "The Death of Suzzy Roche." The lyrics to these songs, by the way, are something else.

From a recording point of view, "Factory Girl" pretty well sums up the real strength of this album. The song opens with a solo vocal line over a barely audible percussion and guitar accompaniment. A second voice is added, and soon a synthesizer tone underpinning the whole piece can be detected. By the third verse, the synthesizer and percussion unfold into prominence. After a few solo vocal passages, the trio lets out all the stops by the sixth and final verse, and electric bass, guitar, synthesizer and percussion all are fully incorporated into the arrangement, pretty much as equal partners in the presentation. The result is a song that has one foot in a

THE ROCHES: A trio by which to measure artists of the '80s.

traditional Irish folk song setting and the other foot firmly in the late-20th century.

The Roches also get away with murder more than once on the album—particularly the discordant harmonies (near cacophony) in "One Season"—but they can come right back with some utterly astounding musical passages. When coupled with the remarkable lyrics they pen, the Roches present a formidable and talented force to be reckoned with, and a trio by which truly original artists should be measured in the 1980s. S.R.

TALKING HEADS: *Remain In Light.* [Brian Eno, producer; Dave Jerden, engineer; recorded at Compass Point Studios, Nassau, The Bahamas. Additional tracks recorded at Sigma Sound, New York, N.Y.] Sire SRK 6095.

Performance: **Entrancing, hypnotic, intelligent and funky, too!**
Recording: **So complicated it sounds simple—really!**

Much had already been said about Talking Heads' "conversion" to African funk rhythms before this album, the group's fourth in as many years, was released. *Remain In Light* does indeed reflect the Head's growing interest in complex rhythmic music, but not at the expense of its previous minimalist sound, as one might have expected.

The groove is the thing here. Where on *Fear Of Music,* the third Talking Heads' album, singer/songwriter David Byrne showed an interest in danceable funk a la the popular "Life During Wartime" and "Cities," here the effect was achieved in a more and calculated manner. Having studied African music with producer Brian Eno (Byrne and Eno have a collaborative album due to be released soon), the head Head and the producer entered this project with a more total conversion already in mind. Naturally, given the talents of both men and the musicians in the group, the album is an immense success on that level—it accomplishes what it sets out to do, without abandoning the tenets of a New York-based rock for intellects that Talking Heads was founded on.

Byrne and Eno are not so concerned here with lyrics or even vocal phrasings as on prior records. Where last year's album consisted of songs bearing single word titles and lyrics that often required no interpretation, being narratives with specific intent, this time the lyrics were apparently added as an afterthought, shaped to fit the studio-conjured melodies (or, in some cases, non-melodies, as some pieces avoid chord changes and other melodic and harmonic shifts).

There is a certain hypnotic feeling contracted from listening to the record in sequence. The LP begins hot and hard with three out-and-out funk numbers, and by the time the second side rolls around, it becomes relatively (though never outwardly) melodic and more literal, until it winds down with an Eno-ized free-form "ambient" piece called "The Overload." (Had the Heads chosen to strip that finale of voices and guitars, it could easily fit onto one of Eno's solo efforts.) However, the funk and African-influenced material will inevitably be the stuff that's talked about for a long time.

"Crosseyed And Painless," which was the first single from the album, is not far removed from the last album's "Life During Wartime" track in its singular rhythm and incessant pulsation. And "Once In A Lifetime" will probably grab the same audience that found itself singing along to "Wartime" and "Cities" in the dance clubs, because it is the one danceable track here that includes lyrics with a concrete, sing-a-long story line. The other tracks which do fine Byrne and Eno avoiding their tendency to write lyrics that are totally oblique (even though they fit wonderfully with the chosen rhythm tracks) are not exactly bouncy. "Seen And Not Seen," in fact, is a straight prose tale of one who is able to alter his face by imagining how he'd like it to look (could this concept be adjusted to apply to the Heads' music?) but it hardly veers from a simple melody and constant, though calm, undanceable, quirky rhythm.

Rather than trying to figure out *what* Byrne is writing about on this album, which could possibly frustrate anyone who tries, it is suggested that the listener, or dancer, simply tune effortlessly into the polyrhythms, the call-and-response vocals, the layered instrumental backing, the steaming but uncluttered production, and clean, unchancy, well-engineered sound as a whole.

The Heads have attempted, successfully, to create a total music here, which does not draw the listener toward any particular instrument or voice or lyric or even rhythmic transition (there are no startling changes to speak of). As

is their tendency, they have moved beyond even their own past giant-steps, remained ahead of most others in the process, and will probably be long gone by the time the others catch up. J.T.

JAZZ

PANAMA FRANCIS AND THE SAVOY SULTANS: *Panama Francis and the Savoy Sultans.* [Black and Blue Records, producer; Gerhard Lehner, engineer; recorded Jan. 31 and Feb. 11, 1979 at Barclay Studios, Paris, France.] Classic Jazz CJ 149.

Performance: **Roll back the rug, it's jitterbug time**
Recording: **A loose approximation of 1940s jukebox sound**

Panama Francis came to New York City from Florida in 1938. By that time Al Cooper had already established his nine-piece relief band at the Savoy Ballroom which was known as the Savoy Sultans. Now, for those of you who are too young to know about relief bands and the Savoy Ballroom, this is how it worked. The Savoy would hire a big name—Count Basie, Chick Webb or Jimmy Lunceford—to come in and play the night. The featured band would play a set and then the house band would play the intermissions. So here would come Basie with his All-American Rhythm Section (as they liked to call Count Basie, Freddie Green, Walter Page and Jo Jones in those days)—five or six saxophones including Lester Young on tenor, seven or eight brass with trumpeters like Buck Clayton and Harry Edison and trombonists like Dicky Wells and Benny Morton, plus Jimmy "Mr. Five By Five" Rushing and Helen Humes on the vocals—and this little bunch of nine locals would either cut 'em or make them work harder than usual to win the crowd. And the Sultans was a "no-name" band. Their closest thing to a star was alto saxist Rudy Williams whose playing on the Sultans' Decca record of "When I Grow Too Old To Dream" had made the side something of a minor hit in jukeboxes. It wasn't like Chick Webb's "Tisket A Tasket" but it brought the nickels into the machines (yes, Virginia, it only cost a nickel to hear a

record on a jukebox in those days). The Savoy Sultans lasted into the early 40's. I don't know how long the Savoy lasted but it too was doomed as the draft started taking most of the good musicians out of action and the general economics of the 40's and 50's were working against the big bands. There were periodic attempts to revive bands like The Savoy Sultans, including one spearheaded by a former Sultan, George Kelly. Eventually George gave up on his combo and joined up with Panama Francis as tenor sax soloist and arranger and so it is that the new Savoy Sultans are around today.

They say comparisons are odious; I didn't hear enough of the old Savoy Sultans to make valid comparisons anyway. I can only report what I hear now and that's that Panama Francis has a hot little nine-piece band that beats all for swinging dance music. They've been working concerts and clubs and boatrides around the New York area for a while now but nowhere are they the heroes that they are in Europe, where this kind of music is not just enjoyed but *adored*. It was during one of these foreign tours that the French Black and Blue label recorded this LP. The band has yet to record stateside. It swings from the first beat to the last and it's guaranteed to get the Lindy Hoppers out of their seats and on their feets. It's that kind of a record—it's that kind of band. Everyone does his job, but if I may be permitted two special favorites, they'd have to be the booting tenor sax of George Kelly and the smooth alto sax work of Howard Johnson, who used to be featured with Charlie Johnson's band at the Paradise (that was some kind of band, too).

The repertoire is mostly from the Savoy Sultans book with some additions including "Song of the Island" which was featured by both Count Basie and Louis Armstrong, "Clap Hands Here Comes Charlie," a tune favored by both Basie's and Chick Webb's bands, Panama's "Blues in Bea's Flat" including the famous King Oliver break from "Snag It" and Norris Turney's original "Checkered Hat," which Norris wrote as a salute to the late Johnny Hodges (saxophonist with both Duke Ellington's and Chick Webb's orchestras). There's also a tune called "Little John Special" that Panama Francis used to play with Lucky Millinder's band on nights when they alternated with the Sultans at the Savoy Ballroom.

I don't know whether or not a deliberate attempt was made to accentuate the rhythm section, but the recording job is heavy, heavy, *heavy* on bass and drums. It gives the band much the same sound as it had on those old Wurlitzer bubble-light jukeboxes which always had the bass on full blast. It doesn't sound to me in my living room like the band sounds in person, but it's a good recorded example of what this band can do and that's good enough even if it just gets you out to hear the band if you're in the New York area. If you aren't where the band is playing, you'll either have to make the trip, wait for a better balanced recording job or settle for one that's not quite as good as the band is "live" —but almost. J.K.

CARMEN LEGGIO: ***The Gem.*** [Carmen Leggio, producer; engineer not listed; studio not listed; recorded January, 1979.] Leggio Records CL-1.
CARMEN LEGGIO: ***Another Gem.*** [Carmen Leggio, producer; engineer not listed; studio not listed; recorded February, 1979.] **GENE KRUPA QUARTET:** ***In Concert.*** [Producer not listed; engineer not listed; studio not listed; recorded in 1966 in Detroit, Michigan.] Leggio Records CL-2.

Performances: **Leggio's playing is fine throughout; that of the supporting players varies**
Recordings: **Fine in '79, sick in '66**

In case you didn't read my review of Carmen Leggio's release on the Progressive label (*Smile*, March 1980 issue), let me reiterate that Carmen Leggio is a fine reed player. It is his misfortune that he's not in a class with Charlie Parker and Lester Young . . . but then, who is? There are many fine players who are overlooked simply because they aren't Bird or Prez. Carmen is one of these and it'a shame. Carmen Leggio now has his own record label so he doesn't have to wait for some A&R man to get around to him (after they've

reissued all the Bird and Prez they have in the can). Here we are presented with an LP and a half of Carmen Leggio's alto saxophone playing with players as strong as drummer Frank Dunlop and pianist Hal Danko and as weak as Flossy Tall. Flossy doubles flute (which she plays acceptably) and trumpet (on which she plays very tentatively). I have the feeling that her recorded debut has come a few years too early and if she does mature into a finished jazz artist these early recordings may come back to haunt her. That happens when one does his woodshedding in front of a microphone. She's at her best when playing straight melody in back of Leggio's inspired jazz playing. In other words, when she is being used, as Jackie Gleason's string section was used, to frame the interpretations of an improvising jazz artist. The best example of this comes on *Another Gem* as Carmen solos on Antonio Carlos Jobim's "Wave." This cut and "Night And Day" on *The Gem* show off Leggio's Bird-inspired alto sax work to best advantage. Other highlights come from Hal Danko's inspiring piano work throughout *The Gem* and Frankie Dunlop bop-scatting his way through "That's O.K."

That Carmen can also play the tenor sax is shown by the B side of *Another Gem.* Here he is paired with Gene Krupa (not at his best but still better than most other drummers I could mention), John Gamba on piano and Benny Moten on bass. Although Gamba and Moten are not up to the the standards of the other members of the quartet, it doesn't really matter. Krupa's combos were always a showcase for Krupa on drums and whoever was playing sax that week (Charlie Ventura, Eddie Shu or Carmen Leggio). Ventura may have been the first, but Leggio fits right into the pattern. Krupa's sax men always had the tendency towards that long lyric vocal line that one found both in Italian vocal tenors such as Pavarotti and Caruso and Italian saxophone playing tenors such as Vido Musso, Charlie Ventura and Carmen Leggio. "Sorrento" was a mainstay of this kind of tenor . . . both Pavarotti and Vido Musso number the song among their greatest hits and, while I'm not certain that he recorded it, Ventura certainly played this Neapolitan air with Krupa's band. Leggio gives a fine account of himself on the piece and plays well on "Sing Sing Sing" but the latter doesn't come off because Gene Krupa's illness had, by that time, robbed him of a great deal of the fire and zest he brought to the piece in 1937 when he made the definitive recording of it with Benny Goodman's Orchestra. Interestingly enough, I heard Krupa play that piece, with Benny Goodman, one more time in 1973 at the Newport Jazz Festival. I don't know what happened that night but it was like 1937 again, even though Gene was very ill. It's too bad that it didn't happen in 1966.

Although this recording serves to document Gene Krupa, it's not in the way I'd want to remember him. The sound is terrible. Somebody had a tape machine there and took it down in none-too-high fidelity. Yet, I guess we ought to be grateful for it because it does give us one of Gene's warm and affectionate stage speeches. No performer ever loved his audience more than Gene Krupa but then it was a reciprocal love affair. I speak as one who knows: I stood outside the Oriental Theatre in the rain for hours one Memorial Day to get inside to hear him with Tommy Dorsey's Band, so I think I can be forgiven my romanticized notion of not wanting to remember my hero at less than his peak powers.

J.K.

MARIAN McPARTLAND: *At The Hickory House.* [Bob Porter, reissue producer from original sessions produced by Lee Magid and Ozzie Cadena April 12, 1952; Dec. 12, 1952; April 27, 1953 and Oct. 1953; Rudy Van Gelder, engineer; recorded at the Hickory House, N.Y., N.Y.] Savoy 2248.

Performance: **Bright, vigorous and entertaining**
Recording: **Boxy, but then '50s recordings always were**

I didn't get to The Hickory House—not ever. I'm sure it closed long before I moved to New York in 1967. However, I did get to hear quite a bit of Marian McPartland in Chicago; in fact, I heard what I was told was her first American appearance. It was a Sunday afternoon concert at the Moose Hall in Chicago and Marian appeared along with her then husband Jimmy who, if I remember correctly, was so fresh out of the service that he hadn't had time to get any civilian clothes and was still wearing his uniform. Shortly after that Marian and Jimmy took a little band into the Brass Rail on Randolph Street and that was when I started hanging out there. Jimmy was good to me and he played "Sugar" every time I showed up but there was trouble with that band. There were some musicians in that band who were pushing toward a more modern concept and they weren't too thrilled playing "Royal Garden Blues" and "Muskrat Ramble" all night long. The absence of Dixieland standards on this record might seem to indicate that Lady McPartland also preferred a more modern repertoire. I, frankly, don't agree with this. I think if anything Marian may have been made aware of some of the more progressive elements in jazz by some of her Chicago cohorts. Anyway, one thing is certain, by the time these records were made the only remaining tie to the traditional repertoire associated with Jimmy McPartland was "Aunt Hagar's Blues." It may even be that what Marian chose to record for Savoy was not indicative of her total repertoire at the Hickory House but then again considering the changes that Charlie Parker and Thelonius Monk had made on Fifty-second Street I'd have been surprised to hear anyone playing "Sugar," or "Muskrat Ramble" or "Royal Garden Blues" at the Hickory House in the fifties.

Anyway, by the time these recordings were made Marian McPartland was off on her own career and she and Jimmy seldom crossed paths except for any occasional record session from then on. I think it's all to the good. I wouldn't have enjoyed seeing Marian develop into just another Chicago style pianist following in Joe Sullivan's footsteps because that's where her family name and fortunes had led her. I think the dichotomy between Marian's playing and Jimmy's playing has been good for both of them and in their occasional sessions together (several of which I've been fortunate enough to hear) the contrast has merely served to sharpen the playing of both Marian and Jimmy.

The program on this double LP reissue is very much the sort of playing we've come to expect from Marian. It is bright. Even on ballads and music that tends to bring out the heavy handedness in other pianists Marian always plays with a certain joy of playing that is nearly infectious. Her style is swinging and certainly moves along nicely and above all Marian

McPartland knows how to handle an audience. Today she still does. Although at times in concert she'll go out in left field with something very cerebral, catch her at a club and it'll be tunes and more tunes that the audience remembers and will ask to hear again. The danger of this sort of playing—and maybe the reason why Marian McPartland has been venturing into more cerebral music lately—is the danger of being taken for granted as background music. It's happened to most piano players who play clubs and it's one of the dangers of the profession. One can either, as Bill Evans has often done, reject the popular aspects of the music and withdraw into one's self (which is, I guess, what I mean by cerebral playing) or as Marian has done, just ignore the dangers and go on playing material like "It Might As Well Be Spring" and "A Nightingale Sang In Barkley Square" and hope that the listeners outnumber the talkers and the glass clinkers.

Actually only two of the four sides included here were recorded "live" at The Hickory House with attendant crowd noises and even an intro by D. J. Al "Jazzbo" Collins but frankly all the recording sounds a little boxed in to me. Rudy Van Gelder could have done better at his studios in Hackensack but I doubt that Rudy's studio in Hackensack was open yet.

The liner notes to this album are a gem with Marian discussing her tenure at the Hickory House in minute detail and some of those photos are priceless. So are some of Marian's accompanists especially drummer Joe Morello who later went on to fame with Dave Brubeck's Quartet. Marian has a way of finding superb accompanists like Eddie Gomez and Brian Torff on bass and breaking them in well before they go off to join other units and get their share of the jazz hall of fame.

Marian McPartland still plays around New York, usually at the Carlyle Hotel and sometimes at the Newport Jazz Festival either by herself or with Jimmy. The liner notes admit that she is currently recording for Concord Jazz and I know that she has her own record label which issues her records from time to time. The important thing is that when they do write the history of jazz piano I think they'd better set aside a chapter for Marian McPartland. She's been playing too long and too successfully to go unrecognized. J.K.

OREGON: ***In Performance.*** [Oregon, producers; David Green, engineer; Vern Carlson, associate engineer; recorded "live" at Carnegie Hall, New York, N.Y., Nov. 24, 1979; Saint Foy University, Quebec, Nov. 29, 1979; Outremont Theater, Montreal, Nov. 30, 1979, by Fedco Audio Labs, Providence, R.I. and Le Mobile Filtroson Limitee, Ste.-Therese, Quebec.] Elektra 9E-304.

OREGON: ***Roots in the Sky.*** [Oregon, producers; David Greene, engineer; Jesse Henderson, (at Longview) and Barry Magaliff, Lou Schlossberg and Harold Tanowsky (at Columbia), associate engineers; recorded at Longview Farms, North Brookfield, Mass., December 1979 and at Columbia Recording Studios, New York, N.Y., April 1979.] Elektra 6E-224.

Performances: **Intelligent, imaginative, skilled**
Recordings: **Crisp, bright, first-rate**

OREGON: Thoughtful, serious music sparked by verve and humor.

These two albums by Oregon confirm what almost anybody familiar with the group suspected for a long time—this quartet of musical virtuosos is making just about the most intelligent music around. Oregon is an ensemble for improvisational jazz purists, but it also is an ensemble for those who savor chamber music from earlier eras. While none of the tracks on either album are modern settings for classical music (such as was done frequently on the Paul Winter Consort albums, on which Oregon members played), the compositions are similar in structure to chamber music compositions of earlier eras.

Some of Oregon's music is difficult to listen to; the improvisational nature of the playing tends to get long-winded, particularly when no identifiable melody is evident. But other examples are most refreshing—highly innovative and dynamic compositions that are a joy to hear.

Oregon consists of Ralph Towner on guitar and keyboards, Glen Moore on bass, Paul McCandless on oboe and other wind instruments, and Collin Walcott on percussion, sitar and tabla. Their ensemble sound probably can be appreciated best on a quadraphonic recording, but ordinary stereophonic recording still brings out the amazing intricacies and interplay of the group's music.

The more recent of the two records is a masterfully done "live" album, with the group playing before appreciative audiences in New York and Canada. At times the silence of the audience resembles that of the recording studio, so rapt is the attention being given the performers on stage. But the audience reaction to the playing is warm and close. The recording is such that the audience sounds neither too distant nor too obtrusive, while the quartet's playing has been recorded in such a way that a true concert sound has been reproduced very well.

The recording is pretty much straightforward, with no audio tricks played on the listener, and of course, no overdubs. The instruments are separated nicely, although a musical theme may be carried on both channels.

On the double-disc "live" album, only one of the nine cuts will likely be familiar to the listener—a new setting for "Icarus," which was used as the Paul Winter Consort theme for several years, appearing most recently on the Winter album, *Common Ground.* This is a delightful melody, well recorded, very close to the listener without distortion or mushiness. Splendid rhythm accompaniment can be heard throughout the selection.

Some other selections on the "live" album have very little melodic line, but this does not mean that they are short on musical value. "Free Piece" may not have any thematic thread, but it features an incredible weave of textures. "Buzzbox" and "Drum Solo" reflect African or Eastern influences, with Walcott having a field day on his various drums and percussive instruments. The former ends with some wild small animal sounds, resembling a pack of mice or gerbils; the latter, built mostly on Walcott's tablas, features interesting variations in pitch in the instruments.

The interplay between McCandless' oboe and Towner's piano is very interesting throughout, and Towner's few guitar solos also are skillfully done. Walcott gets a chance to demonstrate his ability on the sitar on several selections, particularly "Deer Path," which explores many of the musical possibilities of the instrument.

"Orion" comes closest to being a classic jazz improvisation, with so many things going on at once that the various instrumental voices easily could get lost in the shuffle. But each sound is heard distinctly, blending so well, as the piece moves toward a

cohesive blend in the finest jazz tradition.

The earlier album, *Roots in the Sky,* is perhaps more melodic than the "live" album, but it is no less improvisational and no less exciting. "Sierra Leone" and "Longing So Long" both feature the same African influences heard on "Buzzbox" and "Drum Solo" from the "live" album. The piano-oboe interplay can be heard on "Ogden Road," and guitar-oboe interplay is evident on "June Bug" and "Hungry Heart."

The recording is top-notch, although there is one point in the title track in which the various rhythm instruments, particularly bass and percussion, tend to overpower the thematic statements in the other instruments. But that track also features interesting separation of the percussive voices, particularly when heard through a pair of earphones.

Except for some of the work being produced by Manfred Eicher on the ECM label (including work by Towner), you won't find much in recorded jazz today that matches Oregon in composition or style. the music requires the listener to think almost as much as it requires the listener to listen. One comparable group that comes to mind is the Canadian percussion ensemble Nexus, but that group has barely reached even cult status yet. This is thoughtful, serious music, sparked by a dash of verve and humor every now and then, performed by four dedicated musicians. S.R.

LOUIS ARMSTRONG: ***Louis Armstrong Chicago Concert.*** [Michael Brooks, reissue producer; Frank Abbey, engineer; recorded "live" at the Medinah Temple, Chicago, Ill., June 1, 1956.] Columbia C2 36426.

Performance: **Historical**
Recording: **Hysterical**

"Live" concerts were always a good place to catch Louis Armstrong. Satchmo was always at his best when he had an audience that responded to his music and to which he could respond. Pops was like that. This may not have been the best "live" concert to have recorded. For one thing, it was tied down to a History of Jazz concept which included a narration by Helen Hayes (not included on this recording). For another this was neither the best nor the

A CELEBRATION OF JAZZ PIANO: AMINA CLAUDINE MYERS/ TOSHIKO AKIYOSHI

By Nat Hentoff

Marion Brown's *Poems for Piano*, as interpreted by Amina Claudine Myers, is surely a classic of what Brown calls Afro-American piano music. Structured so that written and improvised sections alternate, the graceful lyricism of the pieces can be imagined by their titles—"Sweet Earth Flying," "November Cotton Flower," "Evening Song," and "Golden Lady in the Graham Cracker Window," among others.

Brown first came to jazz attention as an alto saxophonist, and then as an educator (he has taught at a number of colleges) and composer. Everything he does is characterized by lucidity, thoughtfulness, deep affection for his Georgia roots, and a searching curiosity about all things Afro-American. (The first side on this Sweet Earth Records album is *Toomer Triptych*, a tribute to the 1930's black writer, Jean Toomer).

As a composer, Brown prefers simplicity. These pieces are easily assimilable, but the melodies are so song-like, so naturally compelling, that they stay in the mind. The pianist, Amina Claudine Myers, is widely experienced in the farther frontiers of jazz, but her playing here indicates that she relishes, and meets, the challenge of simplicity. The recorded sound is good, though I would prefer a mite more presence. But then again, this is more for the inner ear than for vivid display.

Another, more renowned jazz composer, is Toshiko Akiyoshi. She is also, of course, a briskly inventive pianist; but in recent years, her roles as composer and co-leader of the Akiyoshi-Tabackin big band have left her little time for playing. This has been partially rectified in *Notorious Tourist from the East* (Inner City) in which Toshiko has produced and led a small combo session with trumpeter Steven Huffsteter, bassist Gene Cherico, and drummer Billy Higgins.

Toshiko clearly enjoys the improvisatory freedom of this small group context, and plays with continuously imaginative zest. Of particular interest is a solo track, "Memory," on which Toshiko again reveals that, more than anyone else in jazz, she is able to "humanize" the electric piano. Not only is the sound softly glowing rather than metallic, but she is able to sustain a most sensitive introspective mood by fully shaping the sound to her intent.

The rest of the rhythm section is brilliant. Cherico, now with Frank Sinatra, is a former colleague of Toshiko's and blends easily with her. Billy Higgins, one of the most crisp and musical of all drummers, is a master of keeping the time resilient. Huffsteter, who's part of Toshiko's big band, has a clear, haunting sound—very personal and evocative.

As for the engineering, it's uniformly first-rate-spacious, full-bodied, precisely balanced.

"I try to be as swinging and melodic as possible," says Toshiko. She thoroughly succeeds.

AMINA CLAUDINE MYERS: ***Poems for Piano/The Piano Music of Marion Brown.*** [Rick Jeffery, producer; Fred Miller, engineer.] Sweet Earth Records SER 1005 (P.O. Box 821, Northampton, Massachusetts 01060.)

TOSHIKO AKIYOSHI: ***Notorious Tourist from the East.*** [Toshiko Akiyoshi, producer; James Mooney, engineer.] Inner City Records IC 6066.

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worst All Star ensemble that Louis fronted. It did have two fine horn players backing up Louis' trumpet and vocals. One was former Jimmy Lunceford trombonist and vocalist, Trummy Young. While Trummy may not have been at home with the Dixieland style and the New Orleans tailgate style of trombone playing (which is nowhere in evidence on these records), Trummy was a fine player in the swing tradition, an engaging singer and a fine comic foil for Louis on their version of "Rockin' Chair." The other was, for my money, the best clarinetist to ever play with the Louis Armstrong All Stars, Edmund Hall. Only Barney Bigard could hope to compete with Hall for facility, tone, drive and a sense of where the clarinet belongs in the classic New Orleans jazz ensemble. The band also had a very non-New Orleans rhythm section, a non-descript bass man and a swing pianist who belonged to the 52nd Street Onyx Club generation and completely lacked the traditional jazz feel that Earl Hines or Marty Napoleon brought to other editions of the All Stars. If one member of the band didn't belong on that stage that night, it was pianist Billy Kyle. But then, conversely, if one player did play his buns off on 6/1/56 (in addition to Louis, that is) it was drummer Barrett Deems. He drove that band like a jockey heading for the finish line. If he was a bit loud or unsubtle in the process, he nonetheless gave the band more impetus than it received under any of its other drummers, with the sole exception of Big Sid Cattlett. There is another performer who is not listed in the personnel but who is introduced by Louis on the record and that's his female singer, Velma Middleton. You can read in Dan Morgenstern's liner notes about the many indignities that this marvelous entertainer had to suffer at the hands of those pundits who believed that only Armstrong should be allowed to sing with the All Stars. To this we can now add the elimination from the personnel listing on the album cover: Shame on somebody.

Another problem with concert recording is the variable sound of which this is a superb and shining example. Musicians sing and play into dead mics and wander in and out of focus. It would be easy to blame engineer Frank Abbey, but more than likely he was just a victim of circumstances, taking it down for Louis or Joe Glaser or somebody with portable equipment and doing the best he could in a treacherous auditorium which has been known to produce some of the best and some of the worst recorded sound in the history of the Chicago Symphony Orchestra's recording career. It's a pity that this was the case, however, because what was lost, muddled or garbled was part of a concert where Louis went into some areas which were not too common for him during the All Star days; "West End Blues," "Sunny Side Of The Street" and "Clarinet Marmalade." Especially catch Edmund Hall's liquid New Orleans clarinet style on the latter. Of course, Satchmo the entertainer is here too with "Mack The Knife" and "That's My Desire." "Hello Dolly" was yet to come. The obvious reason that these records didn't come out before is the poor sound quality and yet the playing of Armstrong, Hall, Young and Deems and the personalities of Satch and Velma make up for a lot. J.K.

SHOWS and SOUNDTRACKS

JOHN WILLIAMS: *Star Wars—The Empire Strikes Back.* [John Williams, producer; Eric Tomlinson, engineer; Lionel Newman, recording supervisor; recorded at Anvil Recording Studios, Denham, England, December 1979 and January 1980.] RSO Records RS02-4201.

Performance: **Another class act, all the way**
Recording: **Rich, full, luxurious**

The collaborations between John Williams and the London Symphony Orchestra for Williams' splendid film scores give reason to cheer that some fine orchestral music is being composed and recorded these days. Williams has established himself as an excellent contemporary composer for the symphony orchestra with his three blockbuster film scores, *Star Wars, Superman* and *The Empire Strikes Back* and the orchestra has done nothing to detract from its already solid reputation as one of the truly fine musical organizations in the world.

Some of the score for *The Empire* is derived from the earlier *Star Wars* score, such as the main theme and the "*Imperial March*" theme of Darth Vader. But just as the movie itself is a brand new story, so, too, is the music that accompanies it.

Williams again trades on grandeur as his staple, using a large musical brush to paint his part of the cinema experience. But he is writing for an epic tale, and his musical vision complements the cinematic vision of director George Lucas quite well.

To accompany one of the film's great characters, Yoda, Williams has devised a beautiful musical signature, and the statement recurs several times during the soundtrack recording, including a stirring version near the end of the film score. And Williams continues his success at being able to compose properly impressionistic music when needed—the strident, cold composition to accompany the snow battle scene, for example, or the ethereal choral-orchestral composition signifying Lando's city in the clouds.

Williams also never loses sight of his melody lines, although one won't find very many extended compositions on this double album set of 17 tracks. As far as the recording is concerned, each track has a definite beginning and ending, and Williams knows how to start and how to stop, with a minimum of musical side-tracking. The compositions are very formal in structure.

The sound of the recording is as good as the Warner Brothers recording of *Superman* or the earlier 20th Century Fox recording of *Star Wars.* One presumes that the folks who engineered a group of about 100 musicians know absolutely what they were doing, because the full range of orchestral colors and tones can be heard. The compositions require particularly smooth pickup of the strings, subtle shadings of woodwinds and brilliance in the brasses, and this has been achieved. Very few musical tricks or gimmicks are employed—a chorus is added on at least one track, and a synthesizer has a minor part on at least one other—but there are requirements for carefully controlled crescendoes, particularly in the brasses, and some delicate passages featuring winds and pizzicato strings.

The separation generally is uniform, although one might notice some slight sliding of emphasis between channels in otherwise uniform orchestral passages. The higher strings and basses and celloes generally are recorded in separate channels, which adds a nice spaciousness to the recording.

This record contains nearly all the

grandeur of William's *Superman* score, which I personally think is his best to date, and it is almost as thrilling to hear as it is to see the film it accompanies. *The Empire Strikes Back* constitutes a recording that can stand on its own merits, regardless of whether one has seen the film. Williams has done it again. S.R.

ORIGINAL CAST: *Funny Face.* [Martin Williams and Bill Bennett, producers; Jack Towers, remastering engineer; original recordings made between December, 1927 and December, 1928 in New York, N.Y. and London.] Smithsonian DPMI-0418.

ORIGINAL CAST: *The Bandwagon.* [Martin Williams and Bill Bennett, producers; Jack Towers, remastering engineer; original recordings made between 1930 and 1944.] Smithsonian DPMI-0417.

Performances: **Broadway milestones**
Recordings: **Fair to middling, but spruced up nicely for this reissue**

There are a couple of ways to consider albums of show tunes like these. Since I was only a year old when *Funny Face* hit New York, I'm not exactly in a position to judge how well these excerpts convey the ambiance of the show, which is one thing an original cast recording ought to do. As prime examples of the early work of Fred Astaire and his sister Adele, these recordings certainly do their job. I am in total agreement with Sylvia Syms' evaluation of Fred Astaire's singing quoted in the liner notes for *Funny Face* . . . "he carried the grace of his dancing over into his singing. He danced words. His singing was the shortest distance between two points." Vocally Adele was the lesser light of the two. Never having seen her dance, I can only go on her reputation, which ranked with her brother's. The photos included in both albums testify to her beauty.

Looking down the score of tunes from *Funny Face* we find only " 'Swonderful" as a tune that has held its own as a classic standard. As good as *Funny Face,*" "My One And Only" and "The Babbit And The Bromide" may be, they have not stood the test of time. The same can be said of *Bandwagon,* which while boasting such fine

songs as "High And Low," "New Sun In The Sky" and "I Love Louisa," is famous primarily for Dietz and Schwartz' biggest smash hit "Dancing In The Dark."

Yet there was surely no comparison between the shows. *Funny Face* was a book show with a plot line—a healthy one for those days at that—and *Bandwagon* was a revue of strung together songs, dances and sketches. It's no wonder, therefore, that *Bandwagon* suffers less from the necessary editing and taking out of context that goes hand in hand with putting out a show album, even today. Another advantage that *The Bandwagon* has is Leo Reisman's orchestra. Leo's band is heard on all of the selections except for the last two. One of these is a recreation of the original scoring of "Hoops" by Robert Russell Bennett many years after the fact and the other is English musical comedy stars Clifford Mollinson and Jean Collin singing "High And Low" which they recorded when it was part of the London production of an earlier Dietz/Schwartz revue, *Here Comes The Bride.*

A bit of technical explanation is necessary concerning the LP of *The Bandwagon.* Reference is made to a 33-⅓ rpm experimental recording which was made by Leo Reisman's orchestra and stars of the show. This recording was made October 5, 1931 and for some strange reason is not listed by Brian Rust either in his *Victor Master Book,* his *Complete Entertainment Discography* or his *American Dance Band Discography.* Fragments of this early LP experiment (a ten-inch standard grooved record which played at 33-⅓ rpm and gave about 10 minutes of music) have been issued previously on Victor's Label X Vault Originals *Fred Astaire* (LVA 1001) but the whole has never been put onto LP to the best of my knowledge. Even more interesting is the coincidence that so little of what is on the Smithsonian LP duplicates what is on the Label X LP. What these two reissues have in common from the October 5, 1931 session is only a brief "Sweet Music" with the Astaires and the Reisman band and a chorus of "I Love Louisa" by Reisman's band. On the Label X that chorus is preceded by another Fred Astaire vocal on the tune but that's been excised from the Smithsonian LP. Both LPs include versions of "New Sun In The Sky" and "I Love Louisa" which Astaire and Leo Reisman's orchestra recorded for regular 78 rpm release and which Victor put out as Victor 22755. Label X includes the shortened versions of "Hoops" and "White Heat" which appeared on the 33-⅓ recording while Smithsonian opts for the full 78 rpm versions which were issued as Victor 22836. Both versions of "Hoops" feature Fred and Adele Astaire with Reisman's orchestra. Both versions of "White Heat" include a chorus of pianistics by composer Arthur Schwartz but the extended version which appears on the Smithsonian LP includes a hot trumpet soloist (might be Bubber Miley) whereas he isn't heard on the Label X. Other items that can be found only on Smithsonian include a chorus of "New Sun In The Sky" by Reisman and the orchestra (was an Astaire vocal excised from this one too?), an instrumental "High And Low," "Confession," "Ballet Music" and "The Beggar's Waltz." I hope someday I get to hear the entire 33-⅓ *Bandwagon* record so I'll know what else is missing from both LPs. The 78 rpm version of "Hoops," by the way, is also on *Leo Reisman, Volume 1* (RCA LPV 565). It is from Dan Langan's liner notes for that album that I was able to get the exact date that the 33-⅓ rpm recording was made.

Funny Face is less complicated. Also, in my opinion at least, less worthwhile. I know that there are those who genuflect at the name of George Gershwin. Certainly at his best (in my opinion he was at his best in more ambitious music like *Porgy And Bess* and *Rhapsody In Blue)* he deserved to be called a genius. At his worst—and this score is far from his worst—I find him predictable and uninteresting. You can spot a Gershwin tune right off because so many of his stock tricks turn up in obvious and conspicuous places. As for brother Ira's lyrics, they certainly have an intellectual flair to them but they too often tend toward the precious. " 'Swonderful" is certainly one of his better attempts but the lyric of "The Babbit And The Bromide" falls considerably short of that model of all patter song teams, Gilbert and Sullivan. Yet, judging from the description of their "nut dance" by Stanley Green in the liner notes to the *Funny Face* album, the Astaires were far too visual an act to transfer successfully to records. Fred does get in a few taps on "My One And Only" but basically it's a singer's and player's

idiom. If Astaire did tap successfully on some later recordings (notably the series made by Norman Granz for Clef that have recently been reissued on DRG Records), that's the breaks of the game. A lot of water's gone under the bridge since Astaire tapped out "My One And Only" in London in 1928. Still what Fred Astaire sang and danced back in the twenties and thirties is deserving of our attention today. I'm glad that it all got down on record when it happened and that Smithsonian has put it out again for posterity to enjoy.

The recordings vary from some of the fine work that Victor did in 1931 to E.M.I.'s attempts at livelier recording in 1928 which just ended up tubbier. Jack Towers has done what he could to bypass distortion and "de-pop" and "de-click" the originals. If he didn't quite work a miracle every time out he can't be faulted for batting less than a thousand. What he did do overall was a miracle indeed.

Those enamored of George Gershwin's way of embellishing his own compositions at the piano will find a couple of bonuses on the *Funny Face* album. Those who are fond of the twin piano team of Arden and Ohman will also find some nice work of theirs on *Funny Face.* Even though the original records were labeled Arden and Ohman and Their Orchestra, it's not the truth. It was Victor Arden and Phil Ohman in front of the usual Victor House Band (the same one that Nat Shilkret and Leonard Joy fronted) according to Rust, probably under the direction of Dr. Frank Black! Their medley from *Funny Face,* which took up one side of a Victor twelve-inch opens side two of this LP. The selections opening side one seem to have been a ten-inch 78 from which the vocals by Johnny Marvin have been excised by Martin Williams and friends (not too great a loss).

As usual these albums can be bought at the gift show at the Smithsonian Institute if you happen to be near Washington, D.C. Otherwise they can be ordered for $7.98 each from Smithsonian Customer Service, P.O. Box 10230, Des Moines, Iowa, 50336.

J.K.

RY COODER: ***The Long Riders.*** [Ry Cooder, producer; recorded and mixed by Lee Herschberg; Leslie Morris, production assistant; recorded at Amigo Studios.] Warner Brothers HS 3448.

Performance: **Lively and first-rate**
Recording: **Right there in your parlor**

Using a mixture of traditional and original material, Ry Cooder has fashioned a recording every bit as stunning and enjoyable as his *Jazz* from two years back. He has reached back to the late 19th century for some of the songs here, and he has written some of his own, too, to recreate the sound of the near-West (Missouri) in the last quarter of the 19th century. Cooder has assembled a remarkably tight little ensemble that seems to get quite a kick out of playing.

While there is no indication that this recording is a digital effort, like his last one, *Bop Until You Drop,* the sound is clean, sharp and uncluttered. The instrumentation contributes to the sound—the music is scored for guitar, bass, dulcimer, piano, banjo, mandolin, fiddle, harmonium and percussion, thus forming the kind of acoustic string band sound that is gaining in popularity through such players as David Grisman.

RY COODER: Tasty Americana.

Even when the ensemble swells with the addition of horns, tin whistle, multiple keyboards and vocals, the clarity remains intact, with nice separation in the channels.

As for the material, I pass judgment on the merits even without seeing the film, which is something a reviewer probably should not do on a soundtrack recording. Although one usually needs to know whether the music on the record matches the scenes and moods on the screen, this soundtrack certainly can be accepted on its own merits, which are considerable.

You will find some recognizable songs here—"Jesse James" and "Rall 'Round the Flag"—and you will fin some that stir something familiar in th back of your mind. But these are un commonly good musical settings Cooder sings the lead on "Jess James," for example, and his arrange ment may be a bit snappier than one i used to. But the real highlight jus might be "Rally 'Round the Flag, " i only because it is so much fun. Fou male voices, including Cooder's, puf new life into his chestnut, sounding boozy, bluesy and bleary and perhaps as if an untrained quartet of hard drinkers happened to come together, started singing for the hell of it, and wound up sounding good in spite of themselves.

About half the 13 tracks are instrumentals, and the theme in particular fairly crackles with good-natured fun. "Seneca Square Dance" seems more refined and civilized and resembles a rag in structure; "I Always Knew That You Were The One" is a slow two-step featuring two fiddles, banjo and dulcimer in a near-classical setting and "Cole Younger Polka" is a looser version of "Seneca Square Dance" that comes across as a jovial barn dance tune.

Among the vocals, "I'm a Good Old Rebel," sung by Mitch Greenhill, is a gutsy, uptempo song that sounds as if it might be part of an old 78-rpm record. Jim Keach sings the lead on "Wildwood Boys," and two tracks have spoken narratives. Only one, the reminiscence of a character played by Harry Carey, Jr. about his grandfather and Jesse James, fails to generate any excitement.

One can't review this album without mentioning David Lindley, who usually turns up on Jackson Browne's albums as electric guitarist. He shows here that he is every bit as skilled a wizard with stringed instruments as Cooder, and he also has contributed two of the album's compositions.

Cooder has written or cowritten eight of the selections, and keyboardist Jim Dickinson (also a harmonium player) has cowritten one. And Cooder also has given us some rather exotic instruments to listen to—bajo sexto, samisen and saz, for example, which he plays, and mandola, chumbus, tamboura and the chord zither, which are played by others in the ensemble.

This is as tasty a slice of Americana, served warm and fresh, as one is likely to find.

S.R.

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