

Profile:
Guitarist
Pat Travers

ICD 08560
\$1.75

MODERN RECORDING & MUSIC

VOL. 5 NO. 12
SEPTEMBER 1980

a session with: **SMOKEY ROBINSON**

Stereo Miking Techniques

LAB REPORTS:

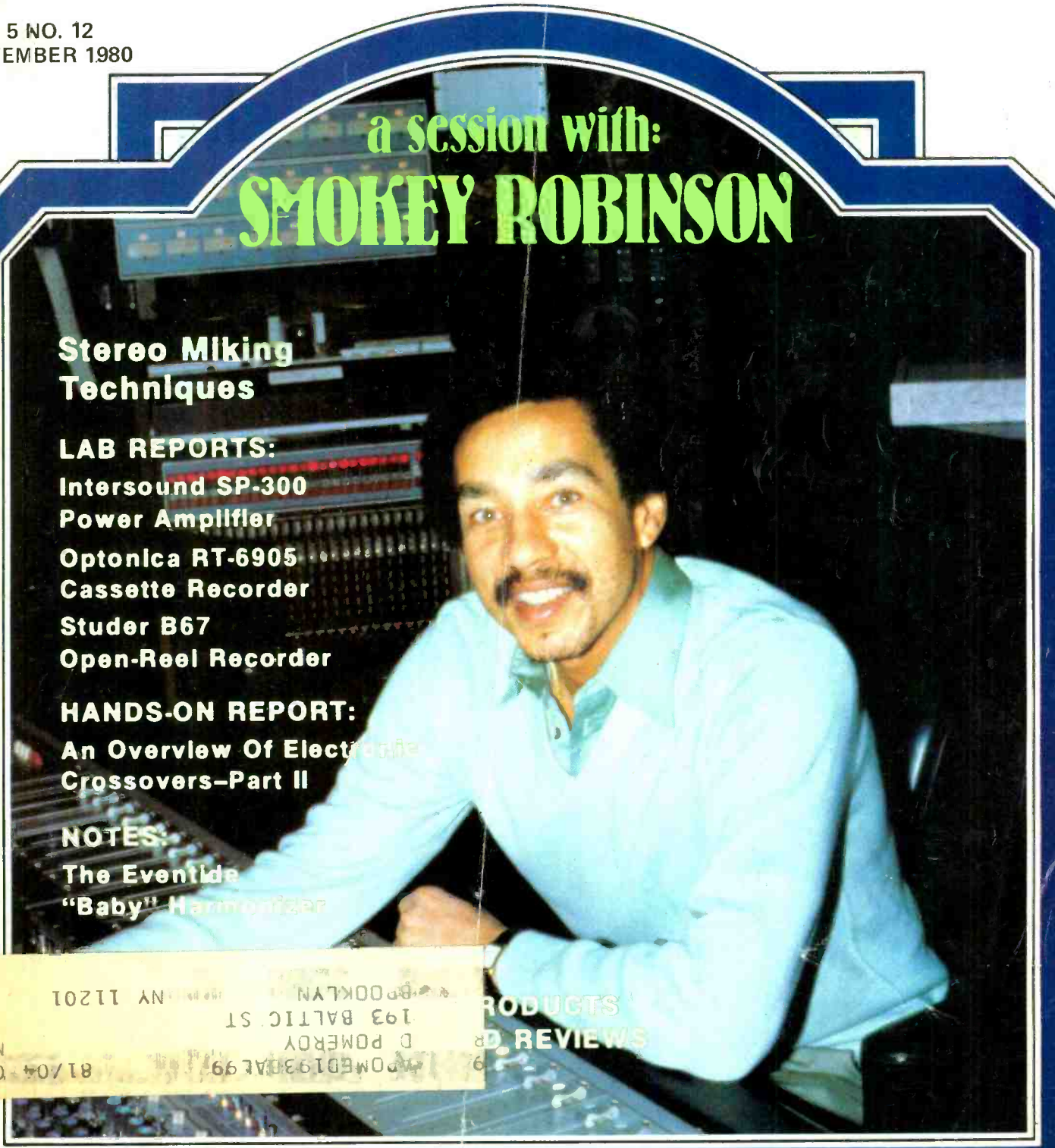
- Intersound SP-300
Power Amplifier**
- Optonica RT-6905
Cassette Recorder**
- Studer B67
Open-Reel Recorder**

HANDS-ON REPORT:

- An Overview Of Electronic
Crossovers—Part II**

NOTES:

- The Eventide
"Baby" Harmonizer**



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REVIEWS**

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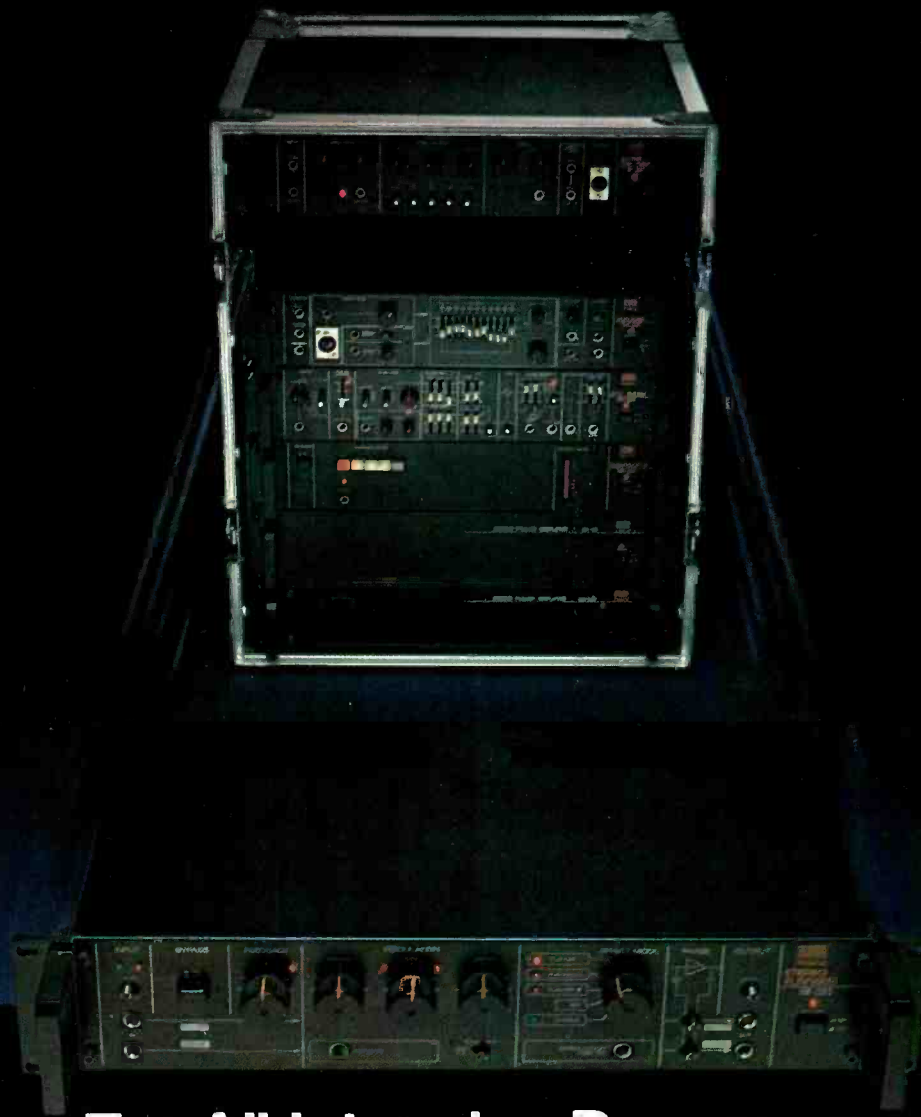
The only thing that really hasn't kept pace with our other phases of expansion is our price tag. It has escalated only a fraction in two years . . . and that only to justify the extras we offer. So we are still the most affordable 16X4 mixer that money can buy in our performance category.

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MODERN RECORDING & MUSIC

SEPTEMBER 1980

VOL. 5 NO. 12

THE FEATURES

STEREO MIKING TECHNIQUES 38

By Bruce A. Bartlett

Despite all the sophisticated recording equipment that abounds these days, sometimes it is good to know what to do if you *don't* have all that posh gear lying around. Here are some miking techniques that allow you to record and balance music acoustically.

A SESSION WITH SMOKEY ROBINSON 44

By Don Ketteler

From the Rolling Stones to Linda Ronstadt, many artists playing in varied musical veins have been influenced by this month's cover artist. When Smokey Robinson speaks, the rest of us should sit up and listen.

PROFILE: GUITARIST PAT TRAVERS 50

By Jeff Tamarkin

Pat Travers is a young man with some strong opinions on recording his music—somewhat refreshing considering how many musicians simply get led around by the nose. And while you may not agree with his ideas, his popularity is undeniable, as witnessed by the sales on his past albums, and his latest, *Crash And Burn*.

COMING NEXT ISSUE!

Chick Corea "Live!"

Bassist Alphonso Johnson
and more in MR&M's

special 6th anniversary issue!!

Cover Photo: Courtesy Motown Record Corp.
Smokey Robinson B&W Photo: Courtesy Motown Record Corp.
Pat Travers Photo: Courtesy Polydor Records

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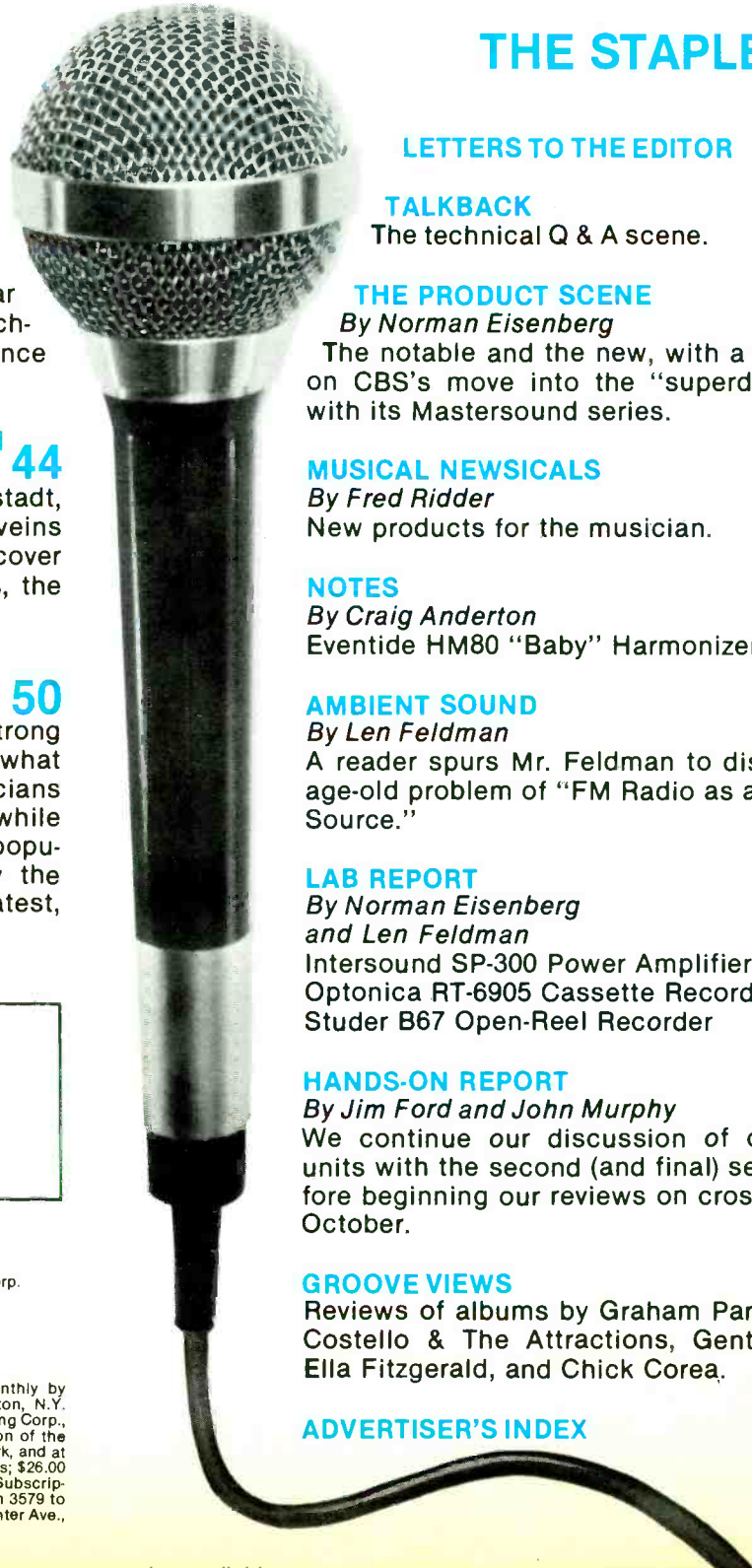
By Jim Ford and John Murphy

We continue our discussion of crossover units with the second (and final) section before beginning our reviews on crossovers in October.

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Reviews of albums by Graham Parker, Elvis Costello & The Attractions, Gentle Giant, Ella Fitzgerald, and Chick Corea.

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LETTERS TO THE EDITOR

Picking up the Sound and the Fury

I came across an old copy of MR (now MR&M) and think it's great. How can I subscribe to your magazine?

Also, I am just getting started in the sound reinforcement business. I'm thinking about getting a sixteen channel mixing console with four out or an eight channel that can be cascaded together so I can get greater flexibility on jobs where I might need twenty-four or more channels and maybe more than four out. I also intend to use the console for recording demos and the like. I would like to know what kind of console to get, and what type of mics—what type for voice, different instruments, etc.—and also what type of mics to use overhead to pick up the voices of actors on a stage without having to have the actors speak directly into the mic. I'd also like to know what type of speakers and signal processors I would need. I'd like, too, the address of Dynacord, Inc. who makes Stramp consoles.

—Dave Banfield
Tacarigua, Trinidad,
West Indies

You could either obtain a subscription form from an issue of MR&M or write directly to the subscription department. Our rates are \$14 for 12 months or \$26 for 24 months. You can make a check or money order (U.S. currency only) or charge it with MasterCard or Visa. Our address can be found on the masthead of this issue.

If you need addresses, you could look in the back of MR&M's Buyer's Guide. Send for it at the same address as MR&M—it's \$2.95 plus \$1.00 for postage. It's impossible for us to suggest equipment to you, as we don't know all the purposes for which you'll be using it. Work with our Buyer's Guide and try to see a professional audio dealer if possible. You can write to Dynacord at: P.O. Box 26038, Philadelphia, Pennsylvania 19128.

Winning the Battle

I'm an ex-pro musician who dropped out a number of years ago due to a lack of success and income. I've never lost my love or interest in music and have always been interested in the recording end of the business. I was told by every studio I approached that without a firm electronics background, my chances were very slim of ever getting my foot in the door. I believe, contrarily, that being a musician with an ear for commercial music, the battle is more than half won.

I am presently pursuing recording as a hobby, with hopes of operating my own studio when the time comes. I discovered your magazine three months ago and was overjoyed to find that I'm not alone in my interests and dreams. I have noticed, however, that most of the recordists whose letters you've published seem to be a little further along in experience than I, so I would appreciate some info for us (I hope there's someone out there besides me) beginners.

My studio consists of a Teac A3340-S; a Craig Sound on Sound deck as a second machine; a homemade 6 in, 4 out mixer,



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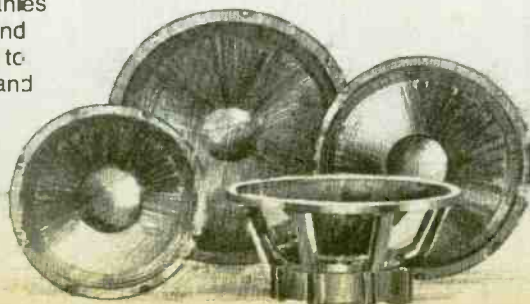
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thanks to Craig Anderton; four preamps; and a piece of outboard equipment: a low-cost 5-band graphic equalizer, which I patch in when necessary. My stereo amp doubles as a headphone amp, and for mixdown, I use an old Harman Kardon Commander P.A. amplifier through Fender Bassman speakers. My microphone borders on embarrassing, as I'm using some very old unidyne dynamic P.A. types. Still, with little technical

knowledge of whether or not my setup or procedure is correct, I'm turning out some very good-sounding tapes. Every time I do a session, too, the results seem to improve. Pardon my long-winded letter, but I'm more than just a little proud of the accomplishment, since I've never recorded anyone but myself. I play all the instruments and do the vocals, which sure requires an awful lot of overdubbing and pre-mixing.

Once again, thank you for your very interesting and informative magazine. Please consider some more beginner-based articles for my sake. Also, some more articles on building your own by Craig Anderton would be very timely.

—Terry Wetzel
Homestead, Fla.

We think you're quite right; the battle is more than half won. But everybody fights a battle particularly idiosyncratic for them, and you might agree that you're getting to your most demanding confrontations right now. More than anything, experience teaches best and tends to take more time and energy. But you may find our "Electric Primer" series of recent issues to be of great value in establishing a firm electronics background—check 'em out. Obviously, you've committed yourself to winning the battle. No doubt, you will succeed. Best wishes and thanks for writing.

Rush Job

Several years ago, I was swept up in the whirlwind of music by Rush. I've had the pleasure to attend their last five area concerts, and musically speaking, they've never let me down.

One thing I have noticed, however, is the upgrade of the quality of sound coming through the P.A. system. I wonder if it would be possible to feature them in an article and compare the Rush of yesteryear to the Rush of nineteen-eighty, with regard especially to sound reinforcement.

—Larry C. Brown
Hamilton, Ohio

Sounds good to you? Sounds good to us. We'll see if we can get a gig with Rush. Stay with us.

Downtime Letter

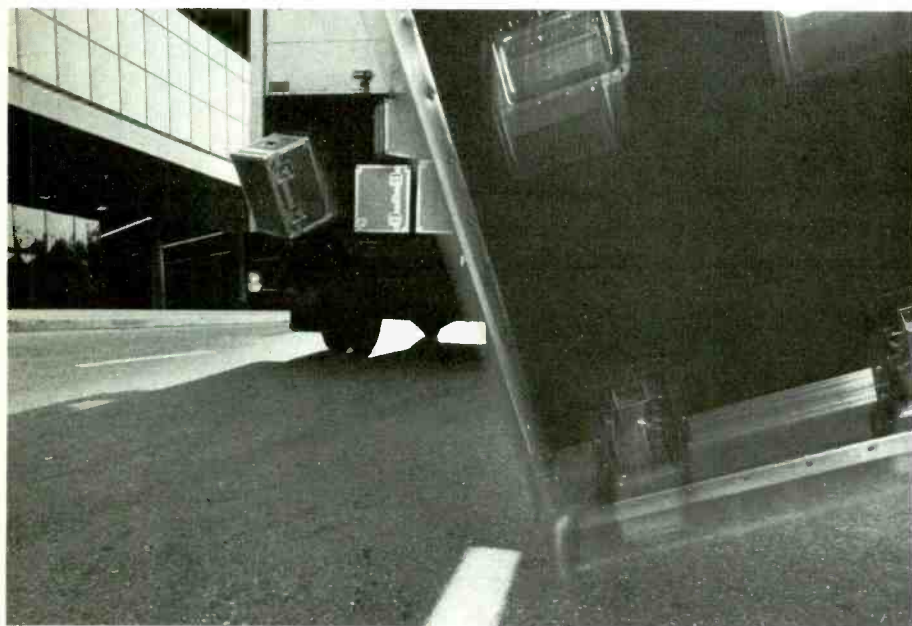
I don't have time to lose and neither have you. I know you're busy people.

Just one question: Who makes "Mellotrons?" You know, those studio keyboards that sound like ten violins in the background.

Hoping to hear from you at your earliest convenience.

—Donald Belliveau
Haute-Aboujagane, New Brunswick

Although not too popular with the musician's union, it seems, the Mellotron is



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available through Sound Sales, Inc., P.O. Box 151, Cornwall Bridge, Conn. 06754, phone (203) 672-6681. We're not sure a Mellotron sounds like "ten violins in the background" but it may be what you're looking for.

Blank Cassette Evaluations

The recent article by Len Feldman and Norman Eisenberg evaluating blank cassette tapes was very good. Letting your reading public know what test procedures were used plus laying all the information in front of us in an easy-to-understand format: an excellent accomplishment.

I do have a question about procedure. The Nakamichi 1000 has adjustable controls for different tapes. Was the Nakamichi 1000 adjusted for each tape? If not, was the tape deck set with the TDK AC-337 and AC-317 and then left for all the tapes? Thanks for your time.

—Peter T. Sabin
Audio Consultant
Bang & Olufsen of America, Inc.
Elk Grove Village, Ill.

Len Feldman replies:

While it is true that the old Nakamichi Model 1000 has adjustments of sensitivity and bias for different tapes, these adjustments are internal and are not considered user controls or adjustments. Accordingly, we used the Nakamichi 1000 as it was supplied by Nakamichi, adjusted at the factory for what were probably TDK and Maxell samples. It is my understanding that Nakamichi's private label tapes (for which the machines are adjusted) are, in fact, supplied by these two tape manufacturers, or at least they were at the time our reference Nakamichi 1000 was originally purchased.

Needless to say, we realize that a readjustment of the machine for each type of tape tested might have yielded improved results for some of the tapes, but this was not really the point of the tests. Most users of cassette decks do not have such readjustment facilities and what we really wanted to see was how much variation one is likely to encounter when switching from one grade of high quality tape to another without readjusting bias and sensitivity parameters of a reference tape deck. I believe (and you seem to confirm) that we accomplished this goal.

Thank you for your kind comments concerning our tape tests. Cordially,

—Leonard Feldman
Technical Editor
Modern Recording & Music

Evasive Guide

In your February 1980 issue, you answered a letter and named a book as a reference source. It was called Bob Heil's *Practical Guide to Concert Sound* from Melco Publishing in Marissa, Ill. I have tried to contact (both through a local bookstore and by telephone) Melco Publishing and have had no luck. It's like they don't exist. Can you tell me how else I might go about getting this book? Thanks for any help you can give me. I'm very interested in the book.

—Mike Jones
Indianapolis, In.

I need help locating a book by Bob Heil. I understand it was mentioned in some magazines. My efforts to find it, however, have been fruitless. I believe the title is *Guide to Concert Sound*. Musically yours,

—Dave "Fatjack" Stalder
Greenfield, Iowa

Subsequent to our publishing Melco's address in the February issue, we were informed that Bob Heil is handling distribution of his book himself. Write him c/o Heil Sound, 2 Heil Industrial Blvd., Marissa, Ill. 62257 or call (618) 295-3000.

Who's Counting?

Did you folks ever notice that the "Profile" section of *MR&M* is almost always two or three times longer than the cover story? I began to notice this with the November 1979 issue with Yes on the cover. I thought the cover story was the "feature" story. Pardon me if I am mistaken. You guys are really the greatest.

—Peter Gravina
Teaneck, N.J.

You're right. The cover story is the "feature" story. And right again, the "Profile" usually is longer. It's just the nature of each type of article. You're not getting gypped or anything, but if it makes you feel any better, you can call the "Profile" the "feature" story and look at the cover story as the sec-

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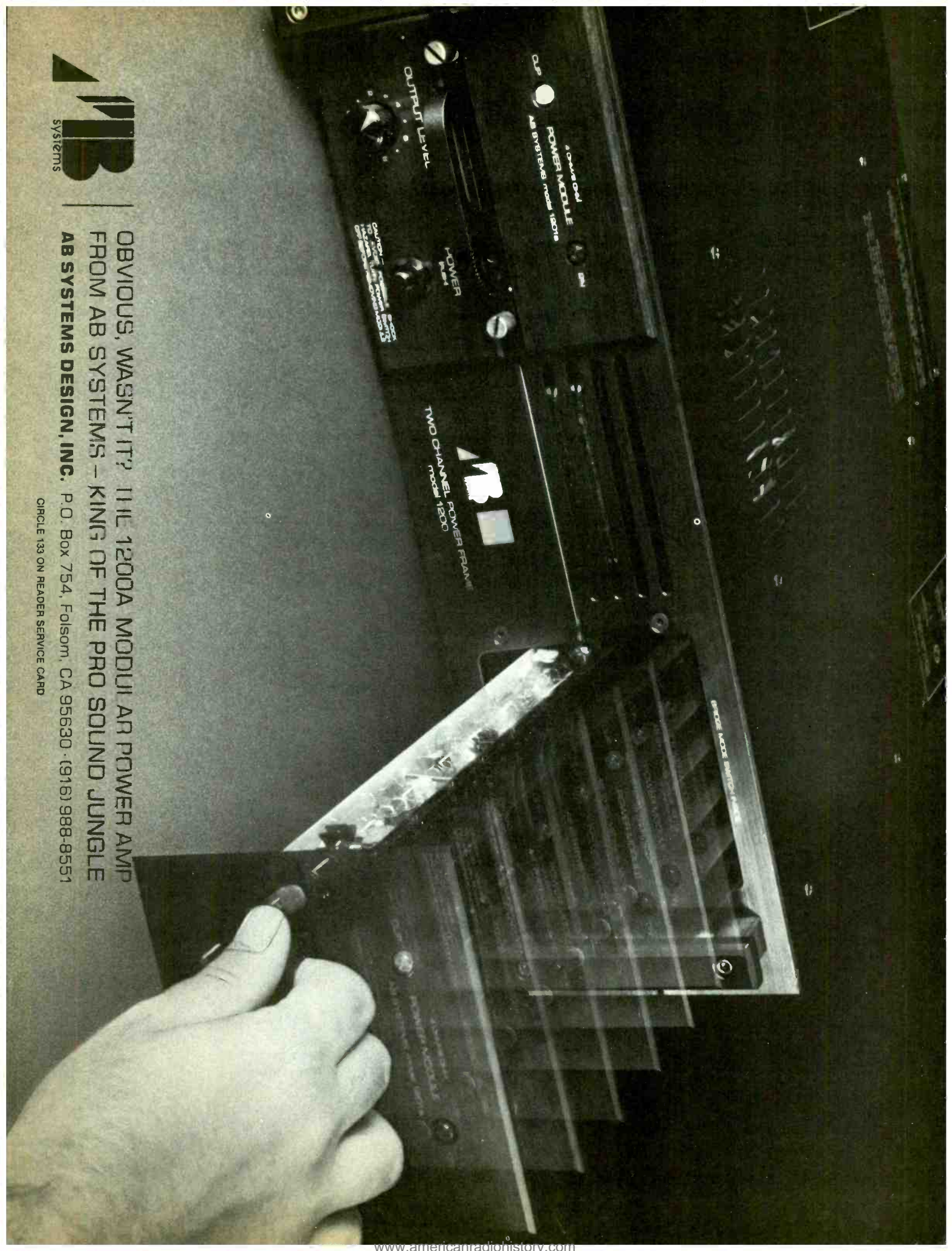
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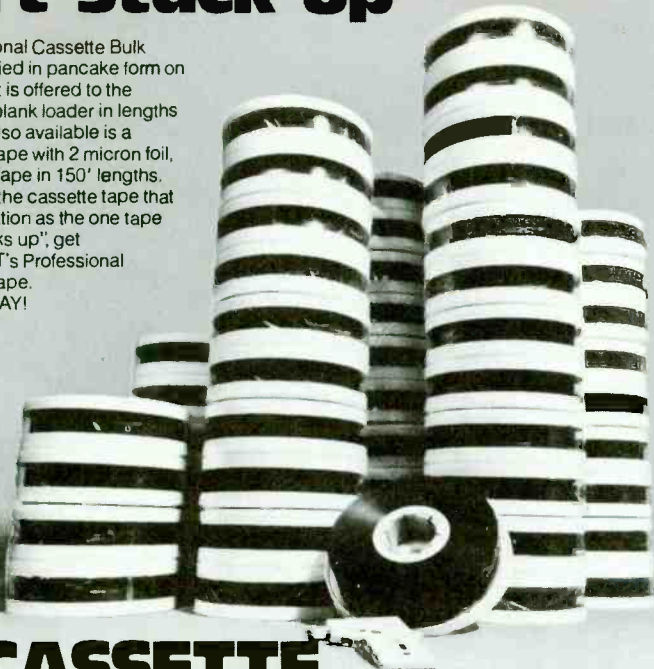


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CIRCLE 127 ON READER SERVICE CARD

and feature, whatever you wish. You could even read the magazine upside down, if you wanted to. We don't care. Just enjoy!

Feeling Teased

Come now! You honestly don't think you can pacify us would-be audio experts by simply saying that the various measurement procedures would require an answer the size of a text book without at least calling attention to a text book that would shed some light on the subject.

Of course I'm referring to the letter from S.A. Viezner in the March '80 issue, "Letters to the Editor."

Other than that, all I can say is, it's a great magazine; keep 'em coming.

I noticed the mention of acoustics in the March issue and would be interested in seeing more like it as it applies to both large and small rooms.

I also liked the article on the limiter, and would very much like to see more of the same type of thing. Many thanks.

—Donald Walker
Chicago, Ill.

Many of the test equipment manufacturers, such as Sound Technology publish pamphlets and booklets dealing with test measurements and how they are made. Naturally, most of these emphasize the equipment made by the manufacturer, but they are still useful. Other manufacturers that come to mind for this purpose are Hewlett-Packard and Tektronix.

Europe Hungry

As a subscriber to your fantastic magazine, may I suggest that you pay a little more attention to the distribution of *Modern Recording & Music* on the European market? I've looked for your *Buyer's Guide* in Amsterdam and in London in all the major bookstores. Unfortunately, it is the same as your magazine: it's not available. So I had to order it by money order. I still believe that there is a market in Europe for your magazine; we only have a couple and one is for the real pro and another more for musicians who do home recording, but the semi pro market is completely empty.

Meanwhile, I am looking for a "pen pal" who's also busy with amateur demo recordings. I have a Tascam 80-8 with dbx and two Model 5s from



Cherokee Studios, Hollywood, California.

JBL 4313 Studio Monitor. It flattens the competition.

Introducing the 4313.

Flat frequency response. It means accuracy. Naturalness. Reality.

JBL gives it to you without the bigger box that you'd expect along with it, since the 4313 only measures about 23" x 14" x 10"!

This new, compact professional monitor produces deep, distortion-free bass. And does it with a newly developed 10" driver. Its massive magnet structure and

voice coil are equivalent to most 12" or 15" speakers. Yet it delivers heavy-duty power handling and a smoother transition to the midrange than most larger-cone speakers.

The 4313's edge-wound voice coil midrange accurately reproduces strong, natural vocals and powerful transients.

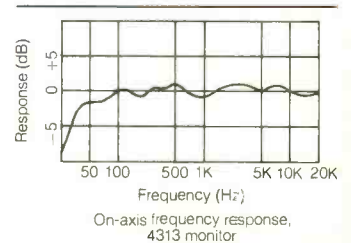
Up top, a dome radiator provides high acoustic output with extreme clarity and wide disper-

sion. A large 1" voice coil gives it the ruggedness needed in professional use.

Working together, these precision matched speakers offer superb stereo imaging, powerful sound levels and wide dynamic range.

Audition the 4313 soon.

We think you'll agree that its combination of flat response, power and moderate size flattens the competition.



James B. Lansing Sound, Inc.,
8500 Balboa Blvd.,
Northridge, California 91329

JBL First with the pros.

Tascam. I would like to exchange details and tapes with somebody over there. Could you print my name and address in your next magazine?

—J. Brunner
Molenstraat 36
4201 CX Gorkum
The Netherlands

Done! And as for the distribution problem, you may be surprised to hear that MR&M has for years been a pretty well-kept secret domestically as well as

on overseas newsstands. We're doing our best to get into a wider public eye, naturally. Thanks for writing.

Recommended Reading

Not meaning to tromp on your back issue sales, but in response to Dean Harris' "Hypothetical Vinyl" (in "Letters to the Editor," May '80), one of the most informative overviews of this whole music business is *How to Make and Sell Your Own Record*, by Diane

Sward Rapaport, available either through Music Sales Corporation or Quick Fox, \$9.95. It completely covers it all, although just a light touch on the recording chapter. That's understandable inasmuch as whole books cannot cover that; besides, that's what your great magazine is for. And the book's format is very unique; check it out.

Totally unsolicited—just a note from a happy reader.

—Mike Bailey
Creative Rediffusions
PMB Productions
Panama City Beach, Fla.

Music Sales Corp. is at 33 West 60th St., New York, N.Y. 10023. Quick Fox is a division of that corporation.

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Incidentally . . .

This is the first time I have ever written out a check for a magazine subscription renewal within the first half hour after receiving it in the mail. It's a fine magazine and has paid for itself over and over. Sometimes, my issue arrives late, though; do you think you could add a little preventive medicine to the subscription computer so that this doesn't happen anymore? (It's a real drag being left out of the conversation at my local music store 'cause I didn't get my mag yet!)

Also, how about a column where readers could ask questions about "incidentals" they may have discovered on a record or album cover and get the answers from the people responsible for the "incidental?" I have always wondered why Bill Szymczyk has left cryptic messages on every record he produces (Eagles, Walsh, J. Ferguson, et al.). These are found between the last groove and the label—check and see. Perhaps you could call the column "Call 'em" or "Off the Record."

Anyway, thanks for two years of the learning, thinking, and creating you have given me (and minimal disco). Still rollin' my own at home,

—John Hwardzel
Mountain Top, Penn.

Wha? Mebbe it's your turntable.

(Otherwise, we're glad you're a rapid renewer and that you've found MR&M to be of great value. We're keeping tabs on the computer, which has been known to read every subscriber copy before mailing it out just because we won't acknowledge IBM on the Masthead.)

THE 'OVER EASY' COMPRESSOR/LIMITER.

YOU'LL SWEAR IT ISN'T THERE.

Until now the recording engineer had to settle for a compressor/limiter that was somehow... limiting. Most compressor/limiters utilize a threshold above which compression kicks in, suddenly and audibly. The engineer has to use this device quite sparingly to preserve the "naturalness" of the music he's recording.

The dbx Model 165 is a compressor/limiter that is nothing short of revolutionary. "Over Easy"™ compression allows the signal level to pass through the threshold and gradually adds the desired amount of gain change over the range of several dB. The result is compression that doesn't sound "compressed." Engineers who have used it have checked to make sure it was really connected.

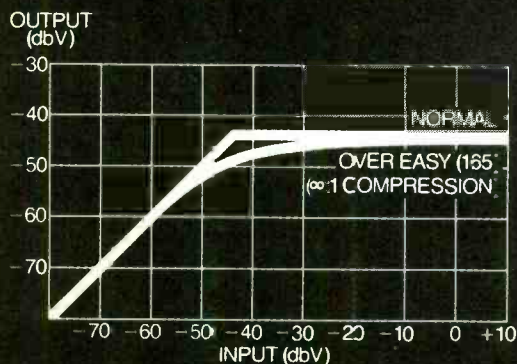
The 165 incorporates other exclusive dbx design features such as true RMS level detection and feed forward gain control. A separate input is provided to the level detector. Because attack can be completed before the signal arrives at the gain control stage, this input allows the creation of special effects.

The 165 is the most flexible compressor/limiter in the dbx line. It is strappable for true stereo operation. (A master/slave switch is located conveniently on the front panel). It has manual attack and release rate controls that can be switched on for special effects. Despite all its features, it occupies only 3½" of rack space.

In the hands of a good engineer, dbx's new 165 is more than the most natural-sounding compressor/limiter you can buy; it is an integral part of the creative recording process. dbx, Incorporated, 71 Chapel Street, Newton, MA 02195, 617-964-3210.

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CIRCLE 92 ON READER SERVICE CARD

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The process starts with the multichannel recorder.

Specifically, our A-3440

—the new standard for four tracks on 1/4-inch tape with sync.

Rugged, reliable and very fast to operate, the

A-3440 uses one button per track for Record/Playback status and

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The key to controlling your sound for recording and mixdown is the mixer. For the right balance between real multichannel recording flexibility and low cost, try our Model 2A (shown here with optional MB-20 meter bridge and sideboards). Six inputs drive four separate outputs. Each input has switchable mic/line mic attenuation (to reduce over-

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(±12dB at 100Hz and 10kHz),

color-coded channel assign

buttons, pan (for stereo balance) and slide fader

level control. There's a master fader



for overall level control. And lots of mixdown flexibility with the Model 2A's patch points. You can hook up external equalizers (like our GE-20), reverb units, any signal processors that will help you get the results you want.

If you're just getting started, get our free 16-page introduction to multitrack recording called "Are You Ready For Multitrack?" And if you're already cutting tracks, invest \$4.95** in "The Multitrack Primer," our 48-page guide to

setting up and using a multitrack

studio, with special emphasis on never before

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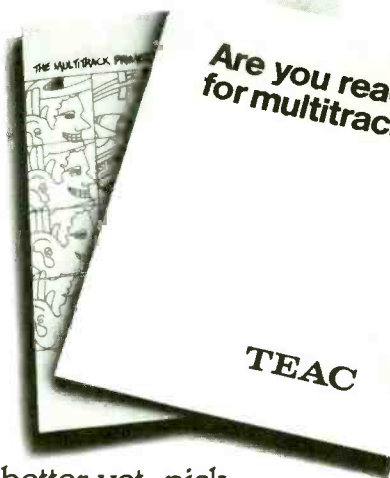
us. Or

better yet, pick

them up at your TEAC Multitrack dealer.

Then get your hands on the tools that give you all the time you need.

*dbx is a registered trademark of dbx, Inc. The dbx unit is available optionally. **Retail prices are determined by individual TEAC Multitrack dealers.



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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.

Do-It-Yourself Sound

I am doing sound for a local country band and to save money I would like to construct my own snake. I would very much appreciate a schematic of a 16 in-4 out junction box. I will be using Belden cable. I would also like to ground each connector independent of the others.

—Rick Odea
Brownsville, Wisc.

By using the correct Belden cable, a snake will have the same electrical characteristics as the use of mic cables in that every conductor, including the

ground, will be separate.

The first decision to make is this: Belden manufactures a 19-pair cable, after which comes a 27-pair cable (part numbers 8769, 8773 respectively). If you can afford the 27-pair cable, the extra lines will always come in handy if you decide to expand at any time.

The Belden wiring code (Fig. 1) should be used when making the snake: This code serves as a written reference both during assembly and also in the event of a repair being necessary. Taking the first cable pair as an example—black paired with red—the shield, (bare wire) black, and red will connect to pins 1, 2, and 3 of the XLR connector respectively.

By using the preparation procedures listed below, the finished product

should survive years of use and misuse.

Instructions for construction of stage box: Mount the XLR connectors on the base section of the box—a cast type is a good economical choice. Doing this will allow the lid to be removed for access without straining the cable. Greenlee punches leave a clean hole for mounting the XLR's— $\frac{1}{8}$ " for female and $\frac{3}{4}$ " for male. Next fit a Kellems grip (commonly known as a "Chinese Finger puzzle") to one end of the box. This type of clamp will grip the cable tightly without causing a "kink" at the clamping point.

Next, feed the unprepared cable through the Kellems grip into the box until you have 2 or 3 feet to work with. (By pushing the mesh part of the

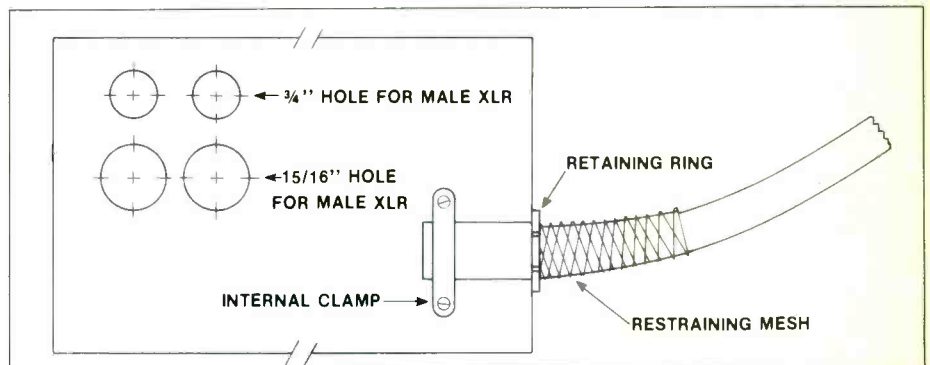


Fig. 2: Stage box.

Pair Number	Color Combination	Pair Number	Color Combination	Pair Number	Color Combination
1	Black paired with Red	10	Red paired with Blue	19	White paired with Blue
2	Black paired with White	11	Red paired with Yellow	20	White paired with Yellow
3	Black paired with Green	12	Red paired with Brown	21	White paired with Brown
4	Black paired with Blue	13	Red paired with Orange	22	White paired with Orange
5	Black paired with Yellow	14	Green paired with White	23	Blue paired with Yellow
6	Black paired with Brown	15	Green paired with Blue	24	Blue paired with Brown
7	Black paired with Orange	16	Green paired with Yellow	25	Blue paired with Orange
8	Red paired with White	17	Green paired with Brown	26	Brown paired with Yellow
9	Red paired with Green	18	Green paired with Orange	27	Brown paired with Orange

Fig. 1: Belden color coding for paired cables.

clamp into itself, the cable can be pulled back out.) Strip the polypropylene sleeve back to allow each XLR to be reached. Also cut the various pieces of string, etc., wrapped around the pairs. Now there is a choice—by cutting each cable pair to reach its own XLR, a neater finish may be obtained, but by leaving each pair long, less stress will be present at the soldered joints and also, if a mistake is made, it is far easier to make good if there is some spare lead.

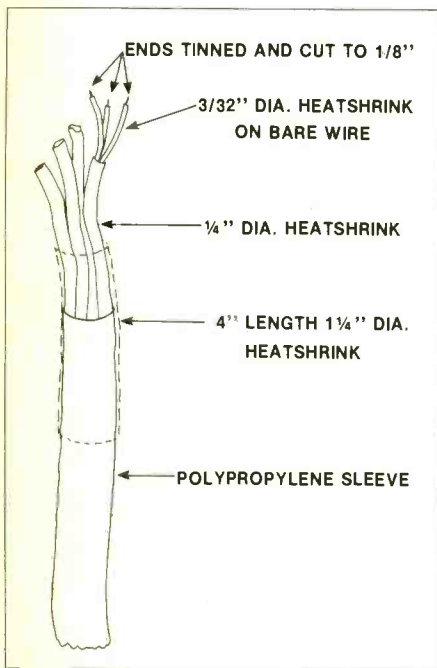


Fig. 3: Cable prepared to join connectors

Take a piece of 1- $\frac{1}{4}$ " diameter heat-shrinkable tubing about 4" long, slip it over the end of the cable, slide it all the way down, and forget about it.

With a *small* pair of wire snippers, put a nick in the beldfoil insulation of each pair (at the edge of the wrap) and unpeel the foil leaving 1- $\frac{1}{2}$ " of wire. Place a piece of $\frac{3}{32}$ " heat-shrink 1- $\frac{1}{4}$ " long over each shield wire (the bare one). These pieces may then be shrunk using a heat-gun. Cut $\frac{1}{4}$ " diameter heat-shrink to the same length as the remaining beldfoil plus $\frac{1}{2}$ " and slide a piece over each pair all the way down to the polypropylene sleeve. Shrink these. Take the piece of 1- $\frac{1}{4}$ " heat-shrink, arrange it so that the middle is at the junction of the $\frac{1}{4}$ " heat-shrink and the polypropylene sleeve, and shrink it.

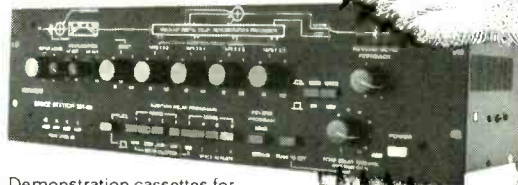
Now strip the insulation back $\frac{1}{4}$ " from each colored wire and twist all the

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CORPORATION

CIRCLE 42 ON READER SERVICE CARD

exposed wire individually to insure that no odd strands are left. Using a small-tipped soldering iron and multicored solder, tin all the ends. After this, cut 1/2" from each end to leave clean tinned ends to solder to the XLR's which should also be pre-tinned the same way.

Take the cable back through the Kellems grip until 1/2" of polypropylene sleeving is left protruding past the internal clamp, and tighten down said clamp. You are now ready—keeping a very careful eye on the Belden code—to solder the leads to the XLR's (see Figs. 2 and 3).

To prepare the fan-out at the other end, the basic steps regarding heat-shrink and pretinning are essentially the same, the only addition being that two pieces of 1-3/4" heat-shrink—one over the other—about 9" long should be used to provide extra strain relief. There are two ways of assembling the fan-out: The first is to cut each pair to meet its specific console channel, and after fitting each XLR, binding each wire together with cable ties. This makes very tidy arrangements, and eli-

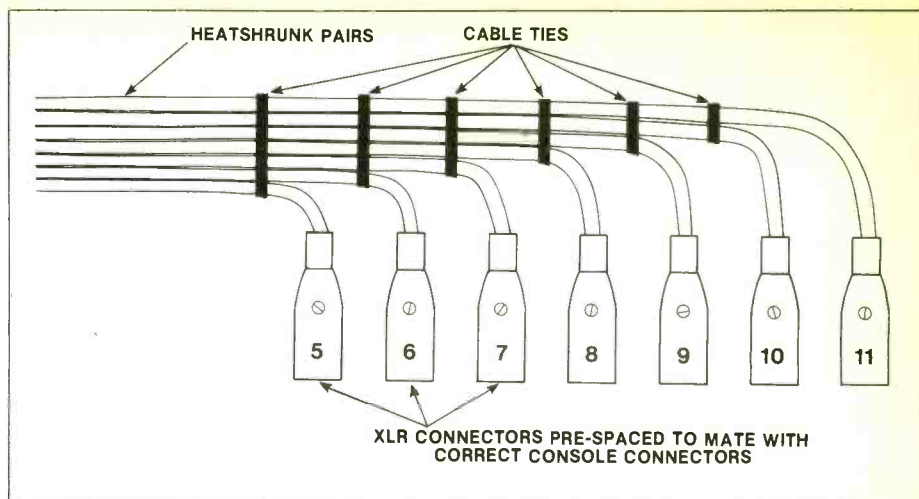


Fig. 4: Pre-spaced fan-out.

minates searching for "the right plug for the right hole." However, the disadvantage of this type of hard loom is that it is impossible to repatch. (See Fig. 4) The other method is to keep all the leads long. (As heat-shrink comes in 4 foot lengths, this is the length to use.) By its very nature, this type takes longer to plug up, but is inherently flexible. Identifying the connectors can

be made simpler by using different colors of heat-shrink (red, blue, yellow, black and white are readily available from Alpha Corp.) to group sets of cable, 1-5 in red, 6-10 in blue, etc. (See Fig. 5)

An effective method of numbering the fan-out connectors which is "prettier," easier to read and almost as permanent as engraving, is to obtain some



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Some tapes show their age more than others. And when a tape ages prematurely, the music on it does too.

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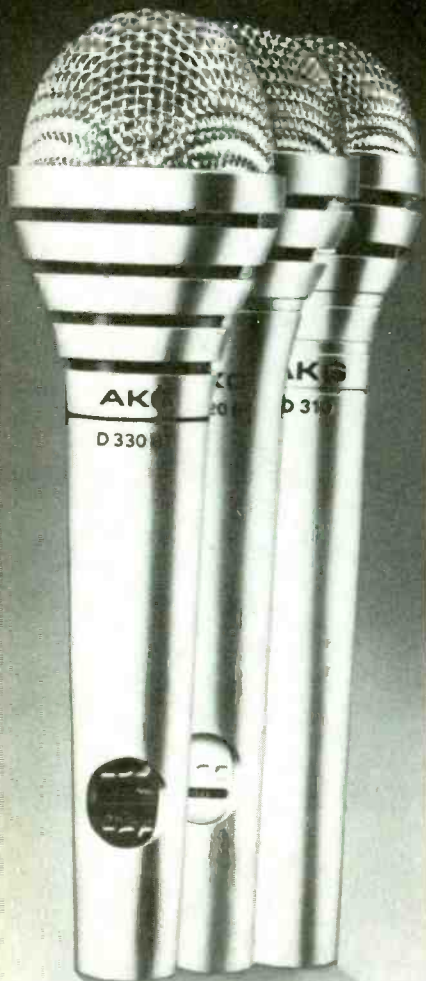
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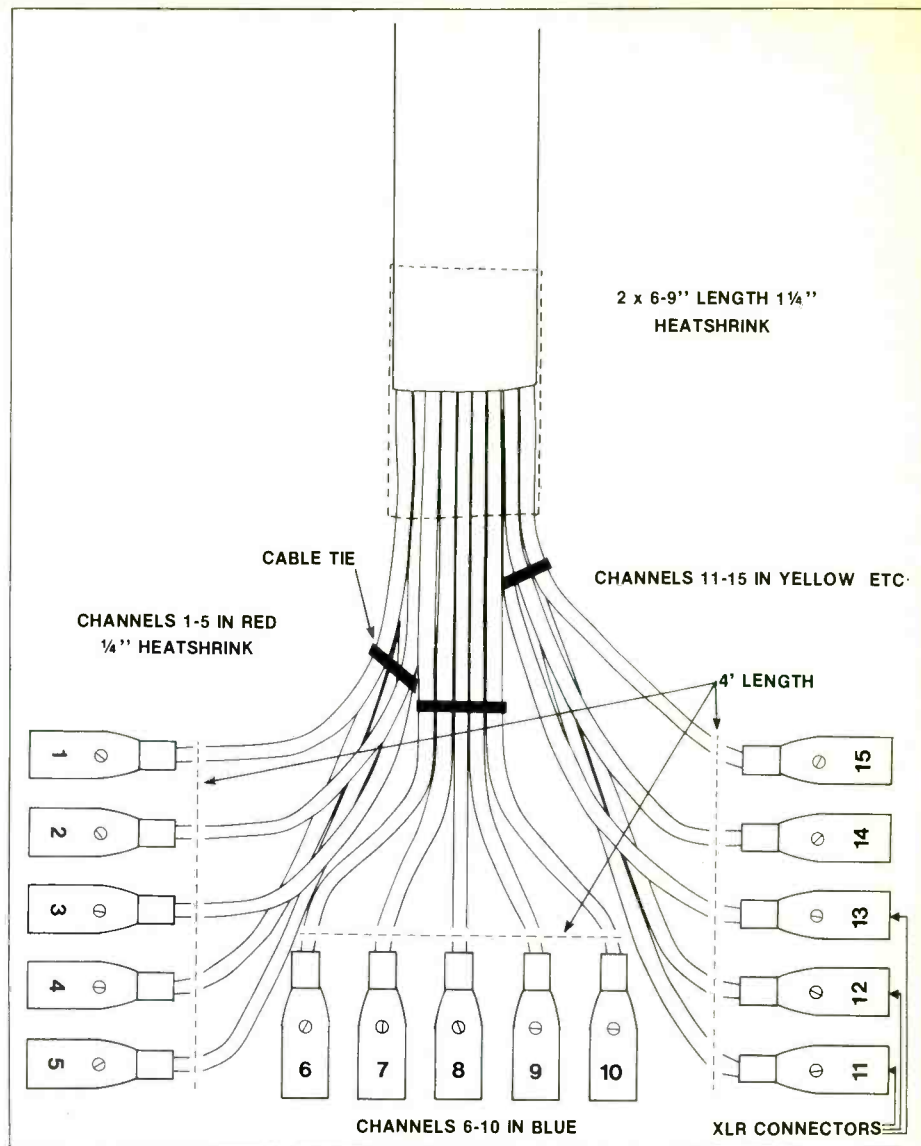


Fig. 5: Alternate fan-out.

1" x 1/2" sticky labels and number them with dry print lettering. After attaching the labels to the connectors protect them with a 2" length of common garden-variety scotch-tape. The stage box may also be labeled with dry print lettering. To protect this and any paintwork, coat the box with clear acrylic spray (2-3 coats); this must be done *before* the connectors are fitted.

One other point to be considered, however, is that the outlay required for tools (heat-gun, rivet-gun to mount the XLR connector, Greenlee punches, soldering iron, cutters, etc.), when added to the cost of the components, may exceed the cost of a prebuilt snake. You would be wise to completely cost out the project and compare prices before you start, bearing in mind that although the snake may only take a day to build, the pieces may take weeks to obtain.

Do not hesitate to call if you need more help.

—Steve Griffiths
Chief Technician
Tasco
Newbury Park, Ca.

A Screamer from Up North

Regarding Mark Evans and Larry Dunlop's answer to Chuck Small's question in Talkback in the April 1980 issue about miking techniques for acoustic instruments in "live" applications ("Acoustic Amplification Advice," page 18), may I contribute a less expensive and equally adequate method of miking the banjo.

Tape a Superscope EC1 condenser microphone to the steel bar that runs through the banjo shell, with the element directly under the bridge. The sound is unbelievably natural and very

MONEY MACHINES



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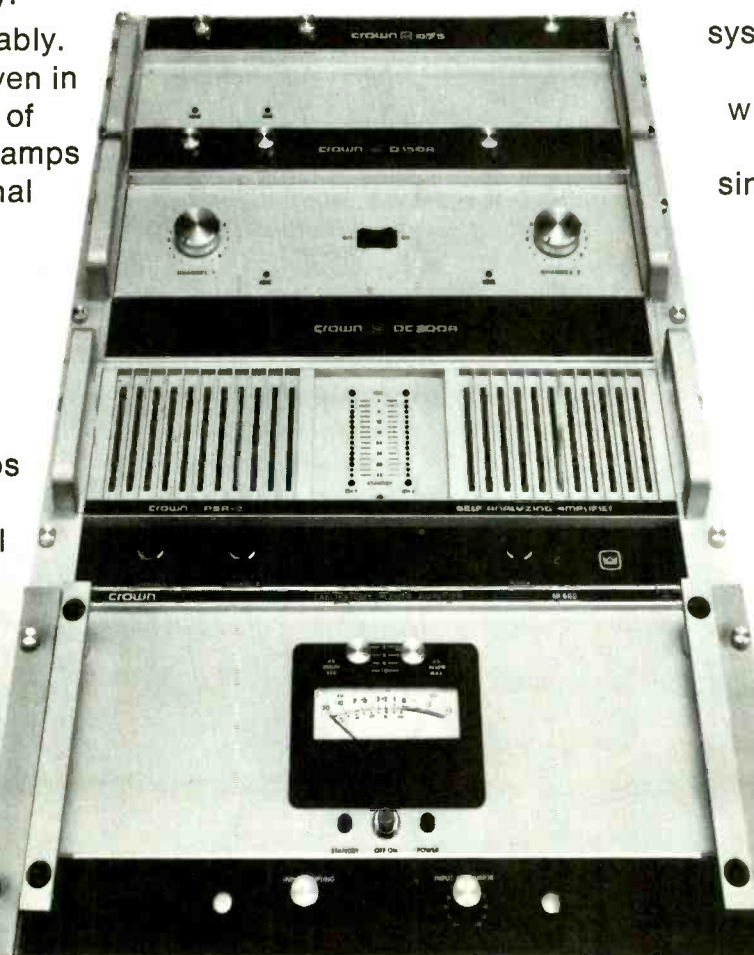
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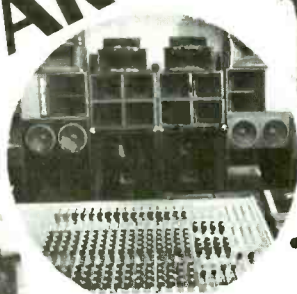
punchy. The cost is about \$15.00 and the mic weighs only a few ounces. While the mic is low-Z unbalanced and omnidirectional, I have never found feedback or line noise to be a problem. Freedom of movement is, of course, unlimited with this technique.

The mic should be run directly into the P.A. with a little high-end EQ and reverb or echo if you desire. This method will make even an inexpensive banjo sound good, and a good banjo will really scream.

—Tom Bartlett
Owner and Chief Engineer
North Country Sound
Recording Studios
Auburn, N.H.

Thanks, Tom. While we felt that Mark and Larry (whose studio, City Recorders, is responsible for some of the finest recordings of acoustic bands available today) did just a bang-up job delineating the miking techniques that they have so successfully put into practice, we felt it only fair to present your letter to our readers who either have stringent budget guidelines that must be met, or for those who simply like to experiment to get different sounds.

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Mr. Wonderful Replies

[From our "To Be Continued..." file comes the following. To put Mr. Powell's reply in the proper perspective, grab hold of your July '80 MR&M and check out "Teac Transistor Trouble" (Talkback, page 26). We applaud Teac's persistence in following up on Mr. Munson's unique problem, and if we played a small part in helping him get his part... well, that makes us feel good, too! Read on for the happy ending.]

—Ed.]

Your recent request for help in *Modern Recording & Music* has just been brought to my attention. Since our last conversation was in April, and I did not hear from you again, I had assumed that you had obtained the information for your A-4300 from our Japan office, as I had suggested.

After reading your request for help, I did some further checking in our parts department's obsolete/old stock section, and found a board that seems to match the foil pattern you sent us on January 1, 1980.

The tab transistor on that board is a 2SB512, which does not show up in the A-4300 Service Manual. On the chance that this is *the* transistor you need, I

Why we created our own total system.

We simply had to. Because no chain is stronger than its weakest link. And no music system is better than the distortion or noise coming from any of its components.

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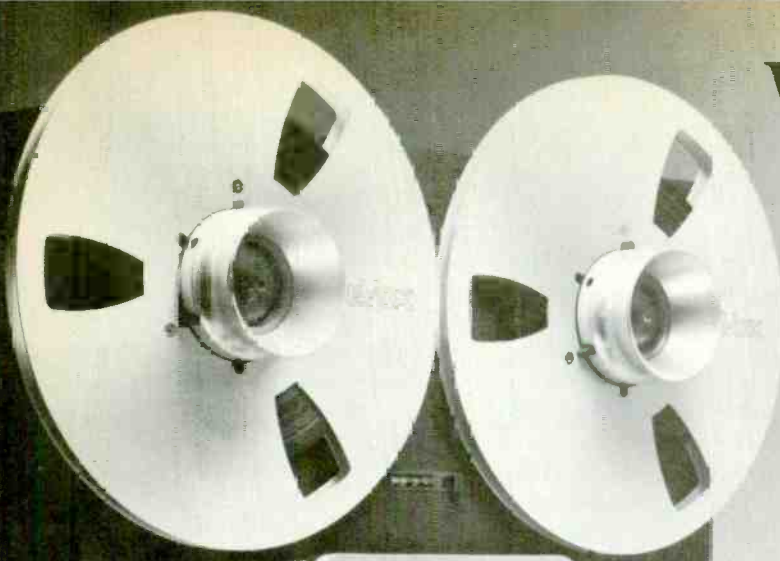
The total Revox system delivers virtually distortion-free music from every source and in any mode—music reproduction so true that it is unmatched by any other system available today.

All the components in the Revox system are designed to meet the professional quality standards that have been set by the Revox B77 open reel recorder with its ingenious logic control system. The B750 integrated amplifier, for example, is renowned for its fast transient response to all musical signals and for its low TIM. It is paired with the incredible B760 digital synthesizer FM tuner with the unusual capability of programming 15 stations which you can recall at the push of a button. The B790 direct drive, quartz controlled turntable reduces tracking distortion to an absolute minimum using a revolutionary new system called Linatrack.

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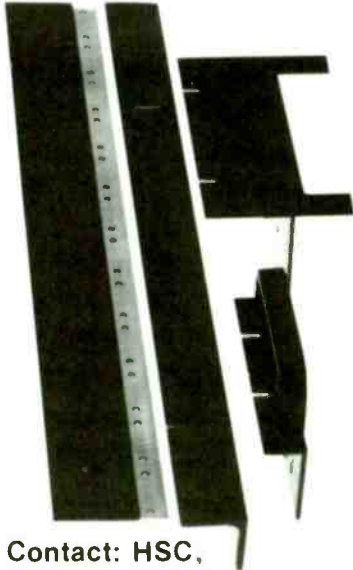
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have sent one along free-of-charge.

I am sorry for the delay in obtaining the information you needed, but I am sure that if the machine had been serviced either here or at one of our Authorized Service Centers, a faster determination of the exact transistor needed could have been accomplished.

I would have preferred to have seen the board personally, rather than hope that the enclosed 2SB512 is the right transistor for your PCB, since a 2SB512 is not listed in the Service

—John R. Powell
Technical Correspondent
Teac Corporation of America
Montebello, Ca.

Model 5 Modification

[In response to the letter from Ed Perrone we printed in the June 1980 Talkback column ("This One's For You," page 26), requesting information on a specific modification to a Tascam Model 5 board, we received the following. We thank Mr. Breviak for his contribution but would also like to leave the door open to any of you who were planning to write but haven't gotten to it just yet.

—Ed.]

We have had two Tascam Model 5 mixers in our 8-track studios for four years now and have become familiar with a variety of modifications for these units to increase their usefulness.

To address your question regarding phantom powering, we have installed 1.7 K 1% resistors right on the microphone jacks. One resistor goes to pin 2 and the other to pin 3. The other side of each resistor is tied together and a bus wire is connected to all these common sides forming the common voltage bus to supply the phantom power. We have picked up this power in our boards right from the console supply. We used the plus 15 volt supply available from pin 20 of the power supply which can supply up to 500 ma. This should prove useful for 4 to 6 mics. Of course, we are talking about 15 volt power which limits your choice of mics. We use our AKG C-451s in this way quite nicely. If you wish to use Neumann or other 48 volt mics, you should increase the resistor value to 2.7 K and run a wire from the phantom busses to an external 48 volt supply. This supply should have a good ground connection to the power supply ground in the console. If you really wish to get adventurous and power

both the AKG and the 48-volt mics as we do, I would suggest the approach we use. Install the phantom resistors on, say, the first 4 or 6 inputs and clearly label these in your studio. Then use an external 48-volt supply for the Neumanns. Unless someone is really asleep, you shouldn't get into problems with two phantom voltages looking at each other and you can freely use all top quality condenser mics with a minimum of external boxes.

We have also developed modifications for a master control on the cue send and a way to have a true 8x2 monitor mix when using two boards together for 8-track recording which I would be happy to pass along, if you wish.

—W. Eric Breviak
Brittain Square Sound
Munroe Falls, Ohio

Hope—and Owner's Manual—In Stock

I own a Teac Model A 4010 GSL reel-to-reel deck which was purchased for me in Japan (as far as I know, they were never marketed here) a number of years ago. When I originally got the deck, it, of course, had to be modified for U.S. AC voltage, so I brought it to my (then) Teac official service center and asked them to perform the work. Never having seen nor heard of the deck, the people who serviced it needed to see the schematic and basic service manual that had come with the machine. The modifications done, I took my deck home and have had many happy hours playing with it.

The problem now? I sorely miss that schematic and service manual and the Teac people I speak to look at me skeptically when I name the machine. Is there hope? Can you help?

—Duff Kurland
Santa Clara, Ca.

Conversation with John Powell, Technical Correspondent for Teac in Montebello, California brought some good news for you! The A 4010 GSL was indeed marketed here a few years ago, and the literature you desire is still in stock. You can obtain the owner's manual and associated literature by sending \$4.70 to the Parts Department, Teac Corp. of America, 7733 Telegraph Rd., Montebello, California 90640. Be sure to specify stock number 51011080 in all your correspondence with them.



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CIRCLE 99 ON READER SERVICE CARD





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PRODUCT SCENE

By Norman Eisenberg

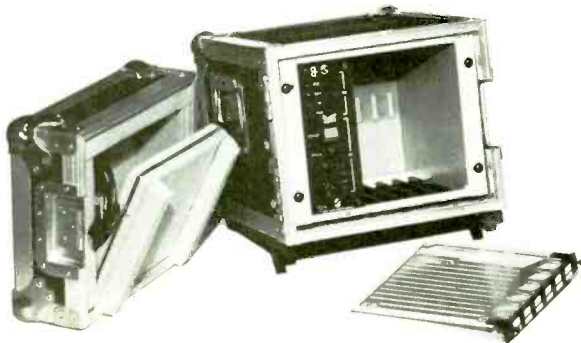
TWO-SPEED CASSETTE DECK

From Mitsubishi there's word of its new model DT-40, a cassette recorder that operates at $3\frac{3}{4}$ ips in addition to the standard speed of $1\frac{7}{8}$ ips. Other features include a three-head configuration, metal-tape capability and a closed-loop, dual-capstan drive system with a PLL DC servo motor. The deck also has a programmable memory function and automatic spacing pause system (ASPS) that provides a three-second interval of silence between recorded selections. Meters are peak-reading, with a peak-hold feature. Controls are "feather-touch," and the panel provides for mic/line input mixing, variable and four-position bias adjustment, timed record and playback, memory play, automatic repeat, output level control and microphone inputs.

CIRCLE 5 ON READER SERVICE CARD

SCAMP MINI-RACK

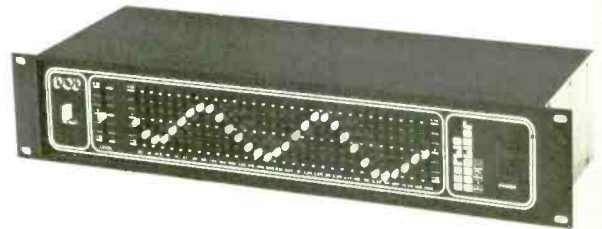
Scamp has announced its new Mini-Rack. Incorporating two new modules—the S26 power supply and the S12 jack module (both of which also fit the standard 19-inch rack)—the Mini-Rack is mounted in a "robust flight case" that has pack-flat handles plus a lid-locker to store cables and connectors.



CIRCLE 6 ON READER SERVICE CARD

31-BAND EQUALIZER

Thirty-one bands on standard $\frac{1}{3}$ -octave ISO centers across the audio range are offered in the model R-831 graphic equalizer (mono) from DOD Electronics of Salt Lake City. Occupying $3\frac{1}{2}$ inches of rack space, the device provides up to 12 dB of boost or cut for each center frequency, and operates on normal AC line voltage. Inputs and outputs provide for both balanced and unbalanced lines. Distortion is spec'd at less than 0.01 percent; signal-to-noise is listed as 90 dB.



CIRCLE 7 ON READER SERVICE CARD

PRO AUDIO FROM PANASONIC

Products announced by Panasonic's newly formed Professional Audio Division include a turntable/mixer console, portable mixer, turntable, two tonearms and four directional (cardioid) microphones. According to Division head Jim Parks, these items are the beginning of what will become a "very broad line of professional audio products that will manifest itself by the middle of 1981." Also announced is the line of products known as Ramsa, which includes a three-stereo-input mixer and a stereo DC power amp rated for 200 watts per channel. The mixer (model WR-8608) includes two microphone input circuits that incorporate an echo generator, plus a stereo 2-watt monitor amplifier for headphones.

CIRCLE 8 ON READER SERVICE CARD

COMPACT AMPLIFIERS

The MicroAmp Series, from ATI, includes compact high-performance stereo turntable, dual microphone and dual line amplifiers, available in three output configurations for different applications. Transformer output models are designed to provide optimum protection in high RF environments. For lowest distortion and widest frequency response, the differential output models are suggested, while the single-ended output models represent the greatest economy units. Features include dual-concentric gain controls, self-contained transient-protected shielded power supplies and compact packaging that allows desk mounting, stacking and single or two-abreast rack-mounting in 1¾ inches.



CIRCLE 9 ON READER SERVICE CARD

JVC OVERHAULS CASSETTE LINE

Design emphasis in JVC's new line of cassette decks has been placed on tape compatibility, head construction, electronic circuitry, transport mechanisms and ease of operation and control, according to company v-p Harry Elias. Top of the new line is the model KD-A77, a 3-head machine priced at \$570. Lower-priced decks include the \$500 model KD-A7 with two heads and an 84-bit fluorescent readout showing signal levels in seven different frequency zones; the \$350 model KD-A55, a 2-head model with automatic scan of selections on a tape; and the \$300 2-head model KD-A33. All these JVC decks have metal-tape capability, and full-logic transport controls that permit fast-buttoning.

CIRCLE 10 ON READER SERVICE CARD

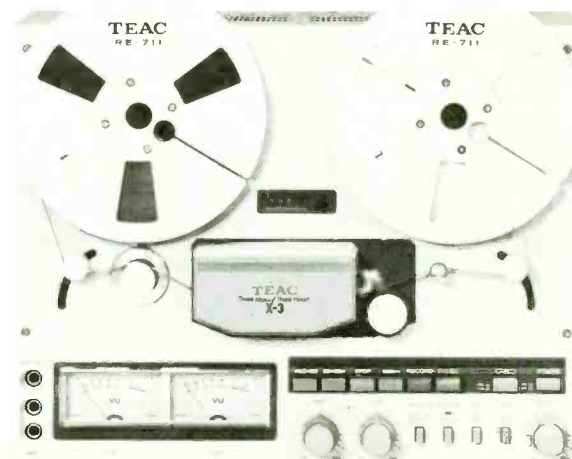
TEAC DECKS AND TEST TAPES



A relatively low-priced open-reel deck, five cassette decks and a line of cassette test tapes have been announced by TEAC. The open-reel deck, the model X-3, is a 3-motor, 3-head recorder with, among other features, front-panel input line/mic mixing, and two-position selectors for bias and EQ. Price is \$550.

The cassette deck line is topped by the 3-head model C-3X which incorporates the new Dolby HX system, providing up to 7 dB of noise-reduction at 12 kHz, and 15 dB at 15 kHz. Both HX and the Dolby-B are included, plus the capability for optional interface with dbx II. The C-3X also includes the optional 3¼ ips speed. Price is \$650. Teac's model A-770 is another 3-head cassette deck at \$600, while the CX-400 features 3-head operation at \$320. All the cassette decks are metal-tape-capable.

The test tapes include cassettes for calibration and alignment, with both 70 usec and 120 usec time-constant references available, plus a cassette torque meter.



CIRCLE 11 ON READER SERVICE CARD

PROGRAMMABLE EQUALIZER

Twenty-eight sets of EQ curves and level settings can be stored and recalled by the Model 2800 Programmable Equalizer offered by 360 Systems of Tarzana, California. Self-contained, the device uses a microcomputer to handle a four-band parametric equalizer. Explains the manufacturer: "With the model 2800 it is possible to pull the plug and take a sound from the studio to the cutting room. Or get repeatable special effects on the road with a stage act. And in non-music applications it provides unusually extensive spectral manipulation, with the advantage of direct comparison between all twenty-eight stored programs. Occupying 3½ inches of rack space, the 2800 comes in single and dual channel versions, priced at \$1,415 and \$1,730 respectively.



CIRCLE 12 ON READER SERVICE CARD

STEREO/MONO POWER AMP

In bridged mono mode, the new model 7501 power amplifier from Soundcraftsmen is rated to produce 750 watts of output power into an 8-ohm load, 20 Hz to 20 kHz, less than 0.09 percent THD. In stereo mode, working into 4-ohm loads, each channel is rated for 325 watts; working into 8-ohm loads, the rated output is 250 watts per channel. A new electronic switching circuit in the amp is said to provide automatic compensation to allow continuous 2-ohm operation without actuating any of the protective circuitry. The amp's class "H" design, explains the manufacturer, features low operating voltages and allows use without a fan under all normal operating conditions. TIM is spec'd as less than 0.02 percent; slew-rate, greater than 50, IM less than 0.05 percent (typical, 0.02 percent); dynamic headroom, better than 2 dB. In addition to these "state of the art" specs, the model 7501, says Soundcraftsmen, is built on a ruggedized chassis with modularized construction and it is designed for use by touring groups or professionals under "extremely adverse conditions." Inputs are both balanced and unbalanced; outputs are 5-way binding posts.

CIRCLE 13 ON READER SERVICE CARD

ELECTRONIC CROSSOVERS



Four new electronic crossovers have been introduced by Teaser Wireworks. All are said to have been designed to meet the rugged performance demands of professional sound installers for use in discos and in sound reinforcement. All four units are standard rack-mountable in 1¾ inches space.

The model 400 is a fixed-frequency 2-way crossover. Output features include clip indicators and 10 dB of boost and cut for each output channel. Individual mute switches for each output enable the user to switch the output signal in and out for special effects. Two versions are available: one, for disco use, has screwdriver-adjust lock-down pots; the other, a pro version, has knobs on the pots and three-conductor ¼-inch phone jacks for inputs and outputs. The 400 may be purchased with any specified crossover frequency; rolloff is fixed at 18 dB/octave.

The 400A is a variable-frequency version (50 Hz to 15 kHz). It too may be purchased in either the disco or pro format.

The model 600 is a fixed-frequency 3-way crossover, available in either the disco or pro versions.

The 600A is the variable frequency version of the 600. Low frequency crossover may be varied from 50 Hz to 1 kHz; high frequency crossover, from 500 Hz to 15 kHz.

All models can be purchased with an optional mono bass output, subsonic filter or low-impedance inputs and outputs.

CIRCLE 14 ON READER SERVICE CARD

AUTOMATED RECORDING CONSOLE

Designed as an "in line" style board with up to forty inputs and outputs, the Coronado is one of a series of "stock or pre-engineered" consoles from Quad-Eight, a manufacturer known in film studios for its post-production sound console systems. Included in the Coronado are high-speed automation sampling, 33 frequency equalizers, Penny and Giles faders, an output level of +28 dBm, six send busses and full EQ on echo effects return channels.

CIRCLE 15 ON READER SERVICE CARD

ANTI-FEEDBACK MIXER



By automatically attenuating inactive microphones in a multi-mic setup, the Model DE-4013 Voice-matic Microphone Mixer from Industrial Research Products is said to avoid the howl of feedback without the need to reduce overall gain. Background noise and other room ambient noises are eliminated too, says the manufacturer.

The device's modular construction allows the user to choose 2, 4, 6, 8, 10 or 12 channel units. For larger requirements, additional chassis can be tandem-connected. Standard features include sensitivity and attenuation controls for each channel, auxiliary output, chairman override and front-panel LED status indicators. The Voice-matic fits into a standard 19-inch rack.

CIRCLE 16 ON READER SERVICE CARD

NEW ITEMS FROM OLSON

Olson Electronics has a new Teledyne Stereo Disco Mixer (model RA-868) that features a five-band graphic equalizer. Inputs are provided for two stereo tape decks, two stereo turntables, two microphones and two auxiliary lines. Each channel has slide-type controls. A fader may be used to blend left and right channel signals. Cueing has a separate level control, and headphones may be plugged into the front panel. For making announcements over the music, there's a switch that lowers music volume by 14 dB. Constant sound-level readout is available on two large VU meters. Housed in a wood base and using a sloping front panel, the RA-868 costs \$260.

Also announced by Olson are a multitester (model TE-424) for checking AC, DC and ohms (\$19), and a wireless FM intercom (model AM-567). The latter device provides two-way communication over two channels. Price is \$70.

CIRCLE 17 ON READER SERVICE CARD

"WE TOLD YOU SO . . ."

The tail is apparently wagging the dog again, as it has done many times in the history of audio. I refer specifically this time to the recent announcement by none other than CBS Records of its entry into the "super-disc" area. Thus, what began as a maverick trend on the part of small, virtually unknown recording studios finally has been given "Establishment" support by a major label. And apparently, CBS is putting its "first team" into the game. The listing of performers includes such names as Leonard Bernstein, Zubin Mehta, Pink Floyd, Bruce Springsteen, Lazar Berman, and more.

CBS will be releasing discs cut from digital tape masters; other discs processed from masters cut at half-speed; and chromium-dioxide cassettes duplicated from digital tape masters. The three formats are known collectively as the "Mastersound" series, and individual releases are priced at about \$15.

In addition to the actual recording techniques, the discs feature new packaging—a static-reducing inner sleeve and a non-shrink outer wrap. *MR&M* readers are, of course, familiar with the digital-tape-to-analogue-disc technique and with the extended-range potential of high-bias tape. As for half-speed mastering, it involves running both the master tape deck and the disc-cutting turntable at 16 $\frac{2}{3}$ rpm, or half the normal playback speed of 33 $\frac{1}{3}$ rpm. Cutting thus takes twice as long, but it reduces by a factor of 4 the power needed by the cutting head. This, goes the explanation, reduces the load on the driving power amplifiers and thereby allows them to operate more linearly. The cutting stylus can engrave the groove more accurately and improvements are claimed in terms of extended frequency response, better transients, reduced channel crosstalk and the ability to cut higher-amplitude signals with no rise in distortion.

To be sure, none of this is really new—in one way or another it all has been done before by lesser-known recording outfits. But apparently, at least one major label has finally got the message that, for the most part, today's records have not been up to the performance potential of today's best audio equipment. The fact that an outfit as prestigious as CBS is actually doing something about it should encourage all those involved in recording—especially the clear-eyed and clear-eared "minors" who have through the years insisted upon and implemented the highest standards for the art.



NEWSIGALS

MUSICAL INSTRUMENT AMPLIFIERS & SPEAKERS

Roland Corp US has announced the introduction of a new hybrid tube/solid state guitar amplifier known as the Bolt-60. The new unit is a 60-watt RMS amplifier with a single 12-inch speaker using a conventional tube power stage with one 12AT7 and a pair of 6L6GC for the warm, harmonically rich tube sound favored by so many guitarists. The low-level stages of the Bolt-60, however, use FET circuitry which allows a more sophisticated, flexible design with lower overall noise than would be possible with all-tube circuitry. For example, the amplifier's bass, mid-range and treble EQ controls give



the musician the range of control and freedom from interaction while maintaining low noise operation. The Bolt-60 has two signal channels which may be selected via a dual footswitch which also controls reverb on/off. The first signal channel is a high-gain channel for distortion and feedback sounds and has two volume controls for maximum control of the sound, while the second channel is the "clean" or

low-gain channel which has a single volume control. The tone control section, the reverb unit and the external effects loop patch points are common to both input channels along with a master volume control. For private practice or tuning, the Bolt-60 is also equipped with a headphone jack.

CIRCLE 19 ON READER SERVICE CARD

Acoustic Control has added to its speaker cabinet line with the introduction of the model 404 bass cabinet. The 404 is a front-loaded, ported cabinet with a single 15-inch driver rated at 4 ohms impedance and 125 watts RMS power handling capability. By using a ported design, the Acoustic 404 offers high efficiency and the snappy sound associated with larger cabinets in a compact enclosure (23"x26½"x11½") that is ideal for club or studio use.

CIRCLE 20 ON READER SERVICE CARD

St. Louis Music Supply Co. has again expanded its Crate line of guitar and bass guitar amplifiers. The Crate CR-IB is a budget-priced, closed back bass amp with a single 12-inch speaker driven by a 20-watt RMS solid state amplifier. Controls on the amplifier include gain, bass, treble and master volume controls. The Crate CR-IRD is also a 20-watt/single 12-inch amplifier, but is designed for guitar rather than bass guitar. This model includes reverb, a foot-switchable distortion circuit and a treble super charger circuit which provides 20 dB of treble boost when switched on. Controls on the CR-IRD include gain, distortion, bass, treble, reverb and master volume. Both of the combo models in the Crate line are housed in solid Ponderosa pine cabinets and feature a perforated steel grille. Also added to the Crate line is the CR-IIRH, a separate amplifier head for use with external speaker cabinets.

This amp head has an output power rating of 60 watts RMS, and uses bi-fet IC circuitry in the preamplifier stages which are said to produce much the same kind of tonal warmth as a tube amplifier. The active tone controls on this head are particularly versatile thanks to a variable frequency control on the midrange section. Controls on the CR-IIRH include gain, bass, midrange frequency, midrange level, treble, reverb and master volume.

CIRCLE 21 ON READER SERVICE CARD

A folded horn bass cabinet and a three-way full-range speaker system are among the most recent additions to the Heppner Sound lineup. Heppner's model B-3 is a ½-folded bass horn with a 15-inch driver designed for base guitar or P.A. applications. Because of the folded horn design, the B-3 features high efficiency, good projection and a full bottom end response. The 15-inch driver in the B-3 has a 3-inch high-temperature voice coil and is rated at



250 watts power handling capacity. Frequency response for the unit is given as 35 Hz-2 kHz. The Heppner VH-3 is a three-way system designed for a variety of short-throw applications. The system has a 250-watt rating and frequency response is quoted as 35 Hz-20 kHz. Bass is handled by a 15-inch woofer, midrange by a 1.5-inch voice coil compression driver and horn, and treble by a 1-inch voice coil driver.

CIRCLE 22 ON READER SERVICE CARD

SYNTHESIZER EQUIPMENT

The latest news from Rivera Music Services concerns not a new product but a package of modifications for a very popular existing product, namely the MiniMoog synthesizer. The RMS Modified Mini has an extended range of tonal manipulation plus new control signal routing possibilities for significantly enhanced performance capabilities. A fourth oscillator with flashing LED rate indicator has been added to the unit for LFO use to free up VCO 3 for audio use. Sync has been added to the existing oscillators along with micro-vernier tuning knobs which improve the tuning resolution by a factor of forty. Precise tuning is also facilitated by a beat frequency LED which allows visual tuning of the oscillators and chromatic transpose switches for VCO 2 and VCO 3 which allow those oscillators to be transposed through a full octave range in semi-tone steps for rapid changes in chordal relationships. To facilitate external signal processing, oscillator and filter signal outputs are made available on jacks along with keyboard control voltages and gate outputs. The keyboard itself is modified for multiple triggering to provide a clean control output from each key depression even if the previous key has not been completely released. All modifications are carried out at Rivera's Boston location and are warranted for a full year.

CIRCLE 23 ON READER SERVICE CARD

The Catstick is a new, spring-loaded joystick controller from Octave-Plateau Electronics, Inc. which can be used with any patchable, voltage-controlled synthesizer. Four separate but identical sections are used in the Catstick, one for each direction of joystick movement away from its spring-loaded center. Each section will turn on

one of the two built-in LFOs and add a control voltage offset. In use, the Catstick can be used in place of foot-pedals, ribbon controllers or pressure-sensitive controllers with greater versatility since the single Catstick controls four different modulation patterns with its single stick.

CIRCLE 24 ON READER SERVICE CARD

Polyfusion, Inc. has announced the introduction of the model 2058 polyphonic keyboard. Polyfusion refers to this new model as a major technological breakthrough in that all the external controls presented to the musician are music-related while the logic programming is done automati-



cally inside the unit. The 2058 keyboard was originally designed as the controller in large Polyfusion modular synthesizer systems, but by using the model 2068 interface the 2058 can control from one to eight synthesizers or synthesizer expander modules. The 2068 interface provides power for the keyboard unit and gives the user eight pitch, gate and velocity outputs plus inputs for three different modulation signals. A unique feature of the 2058/2068 system is that if less than eight voices are patched, the 2058 will adjust itself via its logic circuitry to properly control the outputs actually being used. Among the performance features of the velocity-sensitive 2058 keyboard are a unison mode, in which all voices track one key; glide in both unison and polyphonic modes; and an octave transpose function to expand the playing range to six octaves; all three of these functions are remotely switchable via footswitch jacks on the rear panel of the unit. Also provided are

a modulation source selector to choose among the three external modulation inputs, a spring-loaded, zero friction pitch bender of all-new design and master controls for scale, range, glide rate, velocity sensitivity and modulation amount.

CIRCLE 25 ON READER SERVICE CARD

The Heath Company is well known as the world's largest manufacturer of electronic kits. Their latest offerings include the HA-8-2 Music Synthesizer System which includes the hardware and operating software necessary to produce music with a Heathkit H-8 computer. The hardware comprises a synthesizer circuit board which plugs

directly into the bus of the H-8 computer and connects to a stereo system or other amplification via two shielded cables. The software is designed to accept entry of any song from conventional sheet music, and the supporting documentation permitting effective use of the system even if the user cannot read music. The synthesizer system requires a Heathkit H-8 computer with at least 24 K of memory plus a floppy disc drive and a video terminal for use.

CIRCLE 26 ON READER SERVICE CARD

MICROPHONES

Cetec Vega, one of the pioneers in professional wireless mic systems has announced two all-new hand-held wireless mics for use with the company's existing receivers. The new models have integrated the antenna into the mic housing to eliminate the dangling wire or "rubber duckie" and yield improved performance. The Model 80

uses an Electro-Voice 671 capsule, while the Model 81 uses a Shure SM-58 capsule. Both models use a 9-V alkaline battery for up to nine hours of continuous use. Power on/off and audio on/off switches are provided, along with a gain control and LED level/battery indicator. The mics operate in the 150 to 216 MHz VHF band with a range of up to 1000 feet.

CIRCLE 27 ON READER SERVICE CARD

Shure Brothers Inc. has introduced a new microphone model, the SM63-CN which was designed for on-camera and on-stage use. The new mic is an omnidirectional dynamic design with an output level some 6 dB hotter than comparable mics. It incorporates a humbucking coil for minimum pickup of hum fields, gradual low-frequency roll-off for more intelligible vocals, built-in breath and pop filter and a rugged grille of a polyester material called Veraflex. The modern styling of the mic results in an attractive package less than 6 inches long and weighing in at a very light 2.8 ounces.

CIRCLE 28 ON READER SERVICE CARD

MUSICAL INSTRUMENT ACCESSORIES

One problem which has always plagued performing musicians is the tangled mess which results when several effects accessories are connected for use at the same time. Over the years only a few manufacturers have addressed this problem, but recently several products have been introduced which may serve to help musicians keep their effects together:

RolandCorp US has announced the introduction of the SIP-301 bass guitar preamplifier which was designed to be a versatile control center for the bassist who wants to explore some of the sonic and expressive possibilities of his instrument rather than just laying down the bottom layer of a band's sound. Rather than conventional tone controls, the Roland's active bass, mid-range and treble controls are switchable to operate over two different frequency ranges, plus low-cut and high-cut filters have been added. Two inputs, one high gain and one low gain, are pretty much customary these days, but two external effects loops such as the Roland has are not; one of the effects loops is pre-tone controls and appears on the front panel while the

other is post-tone controls and is on the back of the unit. Even more unusual is the inclusion of compressor and electronic crossover circuits in the SIP-301. The compressor section has controls for dynamic range and threshold and a compression ratio variable from 1:1 to 1:6.6, and will produce the full, punchy sound that recording engineers have used compressors to achieve for years. The crossover section has a variable crossover frequency (50 to 400 Hz) and makes it convenient and economical for the bassist to achieve the added clarity, power and punch from bi-amplification with nothing more than a two-channel power amp and appropriate speakers.

CIRCLE 29 ON READER SERVICE CARD

New from A/DA is a low-noise, voltage controlled flanger with optional control pedal. The basic flanger effect is by now quite well-known, but the A/DA unit has several interesting innovations including an even/odd harmonic selector which increases the range of sounds produced by the unit. Also, since the flanging is voltage controlled, the musician may use an external control pedal for effects other than the conventional sweeping flanger sound, or he may connect the flanger to an external control voltage (from a synthesizer, for example) for even greater versatility.

CIRCLE 30 ON READER SERVICE CARD

Pro-Co Sound, Inc. has introduced the Pedalboard Effects Case. The Pedalboard is a rugged ABS plastic case with internal dimensions of 24" x 16½" x 15¼" into which the musician mounts and preconnects his

effects devices. Effects units mount to the bottom half of the Pedalboard with special Hedlock fasteners which allow the various units to be re-arranged, removed or serviced just by unsnapping and resnapping the fasteners. Once the effects are installed in the case, set-up is no more complicated than removing the lid of the Pedalboard, plugging the instrument into the first effect and plugging the last effect into the amplifier. Effects may be left pre-connected between gigs since they are totally protected inside the case which also has enough room for storage of extra cables, straps, batteries and the like.

CIRCLE 31 ON READER SERVICE CARD

For musicians who haven't already made a heavy investment in effects units, Sounder Electronics offers their Portable Effects System which is built around a two channel, nine input mixer complete with stereo octave-band equalizer. A typical Sounder system will include octave divider, flanger, distortion, digital delay, reverb spring, compressor, voltage controlled filter and wah-wah effects, but this can be adjusted to suit the individual user's needs since each Sounder system is literally custom-built. A full system such as the one described fits in two suitcase size cases weighing approximately forty pounds. A foot control board is included with the Sounder system, complete with LED indicators to signal which effects are engaged. Effects may be switched in and out by using either foot-switches or panel-mounted push-buttons.

CIRCLE 32 ON READER SERVICE CARD



Peavey equalizers have been designed using the latest computer assisted design techniques and precision components to offer the musician, sound man, and home audiophile flawless performance without extravagant cost or compromises in quality.

The Stereo Graphic features two independent ten-band sections with 15 dB cut or boost at ten center frequencies. Filters are provided for each channel with continuously variable 12 dB high and low cut or boost.

The EQ-27 features 27 bands at one-third octave centers throughout the audio range and is fully compatible with the most professional real time analyzers.

Each system's input circuitry can be matched to a wide range of signal levels thanks to special gain/attenuator level controls. Balanced and unbalanced outputs are equipped on each unit with protection for any accidental overvoltage or short circuit situation that may occur.

Because of a high level transformer balanced output circuitry the Stereo Graphic and EQ-27 have the capability of providing greater than +16 dBm into 600ohms making them excellent as high quality line amplifiers.

The Peavey Stereo Graphic and EQ-27 are technically two of the finest equalizers available today. Exceptional performance and compatibility with a wide range of signal and impedance levels make these units an unmatched professional value.

PEAVEY STEREO GRAPHIC & EQ-27 price/performance no other graphics can equal.



Complete specifications and descriptions of the Stereo Graphic and EQ-27 are available upon request

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STEREO MICKING TECHNIQUES

By Bruce R. Bartlett

As a recordist and/or musician, you may want to do on-location stereo recordings of an orchestra, band, choir, organ, chamber group, quartet or soloist. In this article, I will describe stereo microphone techniques that capture the sound of a musical event as a whole, using only two microphones. With these methods the recording engineer lets the conductor balance the musicians *acoustically*, rather than mixing the instruments on a mixing board. The aim is to recreate in the listening room an accurate sonic image of the musical ensemble with concert hall reverberation, as heard from some ideal seat in the audience.

Three techniques often used in stereo recording are the "coincident-pair," the "near-coincident" and the "spaced-pair" techniques. With the coincident-pair (or "X-Y") method, two directional microphones are mounted with their diaphragms one above the other, angled apart to aim roughly toward the left and right sides of the ensemble (see *Figure 1*). Near-coincident placement also has the microphones angled apart, but with the microphone grilles spaced a few inches apart horizontally (*Figure 2*). The spaced-pair (or "A-B") technique places two matched cardioid or omnidirectional microphones several feet apart, aiming straight ahead toward the ensemble (*Figure 3*).

To get a directional or stereo effect in multi-track recording, a recording engineer manually pans the signals from each instrument (track) to the desired position between the monitor speakers. In stereo recording, the microphone array automatically pans the signal from each instrument into the proper position between the speakers.

How These Techniques Work

The location of sound images between two loudspeakers depends on the signal intensity differences and time differences between the two recorded channels. Identical musical signals of equal level, sent to two stereo speakers simultaneously, will produce a sound image in the center between the speakers (assuming the listener is seated some distance away, equidistant from the speakers). However, if the level of the right channel is increased by a few dB, and/or the left channel is delayed a few tenths of a millisecond, the resulting sound image will appear somewhere off-center toward the right. The greater the level difference or time difference between channels, the farther from the center the image appears, up to the limit of the speaker position.

Suppose two directional microphones are angled apart in a coincident-pair arrangement (*Figure 1*). An off-center sound source will produce a

level difference between channels, because the microphone aiming more toward the source will put out a stronger signal than the microphone aiming away from the source. If two cardioid or omnidirectional microphones are spaced apart horizontally in a spaced-pair arrangement (*Figure 3*), an off-center sound source will produce a time difference between channels. This is because the sound arrives at one microphone later than the other. Angling *and* spacing cardioid microphones (near-coincident placement, *Figure 2*) produces both intensity and time differences between channels. These differences localize the reproduced sound images between a pair of loudspeakers.

The farther from the center of the orchestra an instrument is, the greater the intensity and/or time difference between channels it produces, and so the farther from center its reproduced sound image is. Also, the greater the angle and/or spacing between microphones, the greater the intensity or time difference between channels a particular instrument produces, and so the farther from center its reproduced sound image is.

Stereo Microphone Placement: Desired Results and Undesired Results

In stereo recording, the microphones should be placed so that each instrument will be reproduced in the same relative location as it was during the recording. Suppose that the recording is heard from a pair of loudspeakers. Instruments in the center of the orchestra should be reproduced exactly between the two speakers. Instruments at the sides of the orchestra should be reproduced from the left

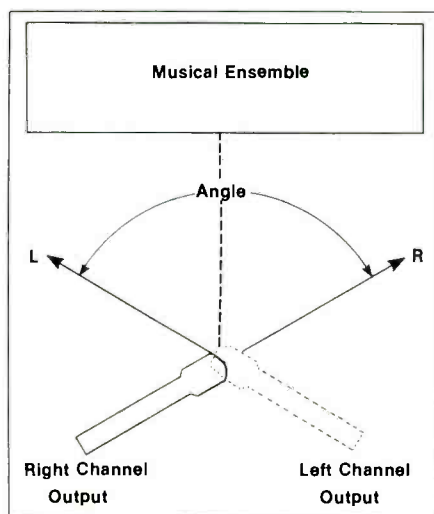


Fig. 1: Coincident-pair technique.

or right speaker. Also, instruments located half-way to one side should be reproduced half-way to one side, and so on. This objective can be called "accurate localization." Note, however, that a narrow stereo spread may be preferred for some ensembles.

Figure 4 shows some stereo localization effects to listen for. Figure 4-A shows a top view of an orchestra. The letters correspond to instruments in various locations: (Far) Left, Left Center, Center, Right Center and (Far) Right. If the recording microphones are placed properly, the corresponding sound images of these instruments will be accurately localized between the speaker pair (as in Figure 4-B). If the microphones are not angled or spaced far enough apart, the reproduced orchestral width is too narrow (see Figure 4-C). This can be called a "narrow stage width" effect, or a "poor stereo spread."

On the other hand, spacing or angling the microphones more than is necessary to achieve a speaker-to-speaker spread, produces an "exaggerated separation" or "ping-pong" effect. That is, instruments near the center are reproduced toward the extreme left or right, rather than near the center. Instruments directly in the center of the orchestra are still reproduced exactly between the speakers (see Figure 4-D).

What sort of results can be expected from various microphone anglings and spacings? A carefully controlled listening test was conducted to compare several microphone pair arrangements (details available in the first "Recommended Reading" reference).

Specific Coincident-Pair Arrangements

According to test results, coincident-pair techniques tend to reproduce the orchestra with a narrow stage width (as in Figure 4-C). Angling two coincident cardioid microphones 90° apart (Figure 5-A) gives a poor stereo spread, unless the ensemble forms a semicircle around the microphone pair. This arrangement reproduces most of the reverberation from the center. If microphones with a more directional polar pattern than cardioid are used at 90°, the stereo spread is wider. Hypercardioid and bidirectional are two such patterns. The coincident placement of two bidirectional microphones at 90° to each other is called the "Blumlein" or "Stereosonic" technique (Figure 5-

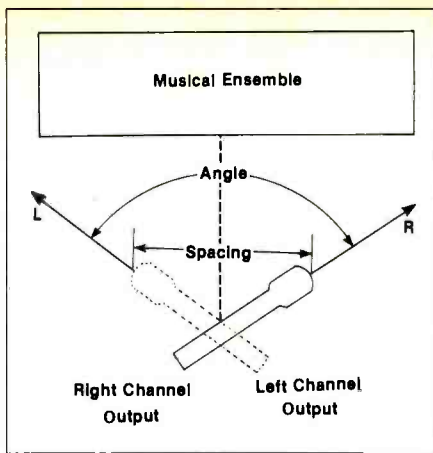


Fig. 2: Near-coincident technique.

D). It gives a very uniform spread of reverberation between the speakers, which is highly desirable.

Crossing cardioids at 120° (Figure 5-B) also spreads the reverberation evenly between the speaker pair. The orchestral stereo spread is wider than that produced by 90° angled cardioids, but it still does not extend all the way between the speakers, unless the ensemble forms a near semicircle around the microphone pair. This angle is useful where a full stereo spread of the ensemble is not desired (a string quartet recording, perhaps).

Angling two cardioids at 180° (Figure 5-C) achieves a fairly wide and accurate spread of instrument images. However, sounds arriving from straight ahead (that is, from the center of the orchestra) approach each microphone at 90° off-axis. The 90° off-axis frequency response of many directional microphones is weak at high frequencies, and so this technique may give a dull, distant sound to instruments in the center of the orchestra. In

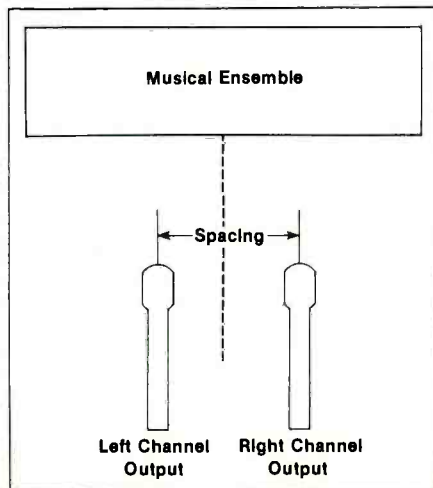


Fig. 3: Spaced-pair technique.

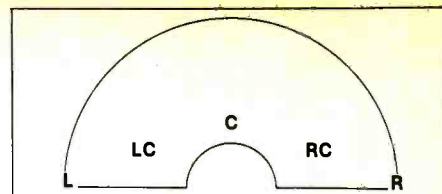


Fig. 4-A: Orchestra Instrument locations (top view).



Fig. 4-B: Accurately-localized Images between speakers (Listener's perception).



Fig. 4-C: Narrow stage width effect.



Fig. 4-D: Exaggerated separation effect.

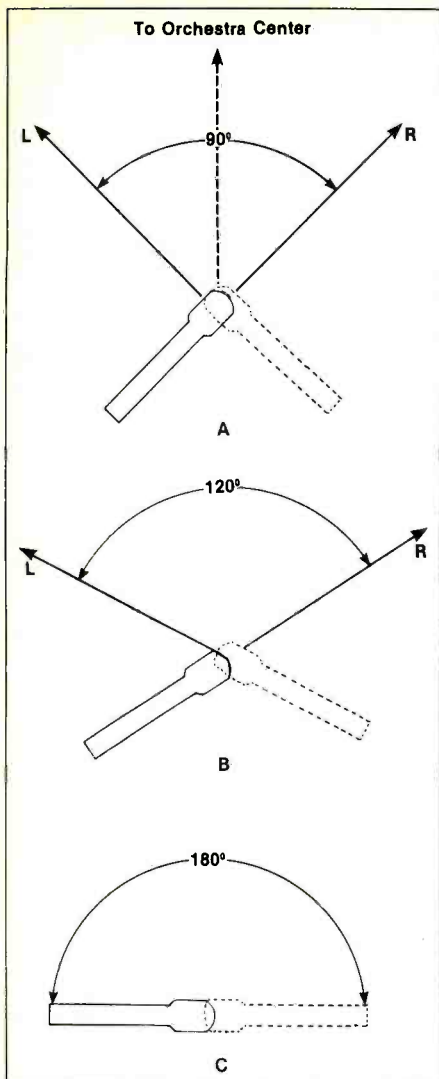
Fig. 4: Stereo localization effects.

addition, this angling tends to reproduce much of the reverberation toward the extreme left and right.

If two recorded channels are mixed to mono, any time differences between channels can cause dips in the frequency response of the mono signal, due to phase cancellations. Coincident techniques, in which the microphone grilles are aligned vertically, have no time difference between channels and so are mono-compatible. Other techniques will produce dips in mono frequency response that may or may not be audible. So, if monophonic reproduction is expected, it is helpful to monitor the recording alternately in stereo and mono to listen for differences in tone quality.

Specific Near-Coincident Arrangements

The near-coincident techniques tend to provide accurate localization (as in Figure 4-B). That is, instruments at the sides of the orchestra are reproduced very near the speakers; and instruments halfway to one side tend to be reproduced halfway to one side. Two examples are a 110° angled, 7-inch spaced cardioid array (the ORTF, French Broadcasting System, Figure



Figs. 5-A, -B, -C: Coincident cardioid microphones.

5-E); and a 90° angled, 8-inch spaced array (Figure 5-F).

The Stereo 180 System, developed by Lynn T. Olson, is a 135° angled, 1.8-inch spaced hypercardioid arrangement. The hypercardioid patterns have out-of-phase rear lobes that work to reproduce sound sources outside the speakers, as well as between them.

Specific Spaced Arrangements

Listeners commented that the spaced-pair techniques (Figure 3) produce relatively unfocused, hard-to-localize images for off-center sources. These methods are useful if you prefer the sonic images to be diffuse, rather than sharply focused (say for a blended effect). Spacings greater than about three feet give an "exaggerated separation" effect, in which instruments near the center are reproduced nearly full-left or full-right. Instruments

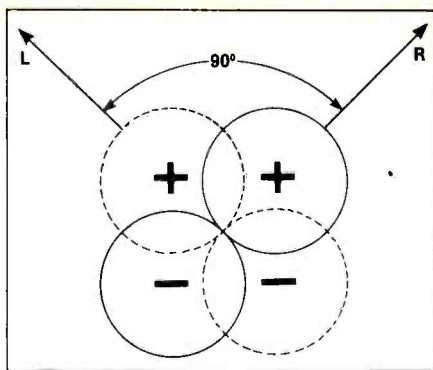
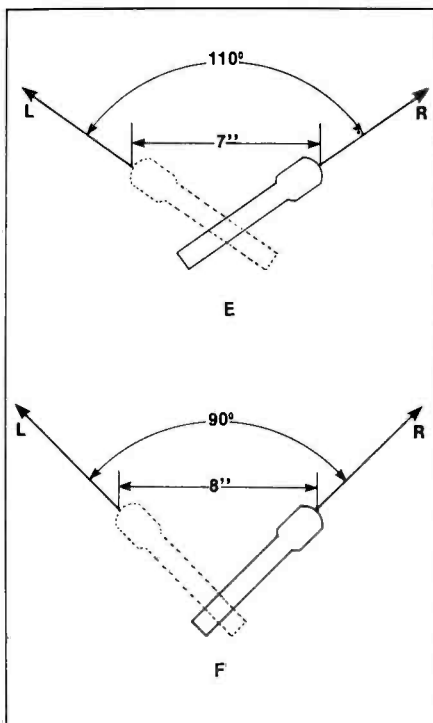


Fig. 5-D: Coincident bi-directional mics.

exactly in the center of the ensemble are still reproduced exactly between the speakers (as in Figure 4-D).

A disadvantage of the three-foot spaced-pair arrangement (Figure 5-G) is that the microphones pick up center instruments louder than side instruments. Spacing the microphones farther apart, say ten feet, may be necessary to cover the whole orchestra adequately. This will produce excessive separation, but at least the instrumental balance will be better. Given a choice between balance and localization accuracy, balance may be of more musical value.

In another spaced-microphone arrangement (Figure 5-H), a third microphone is centered between two



Figs. 5-E, -F: Near-coincident cardioid mics.

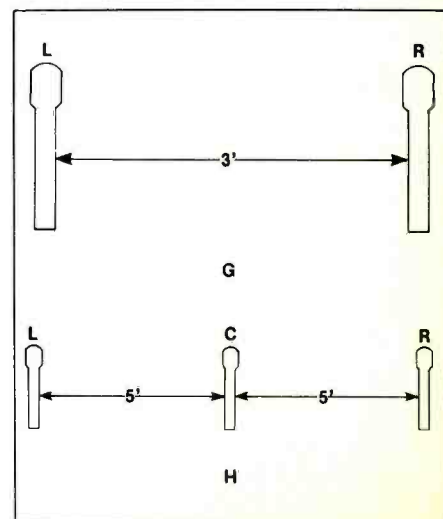
widely-spaced microphones. The center microphone output is split to both channels and mixed in at equal levels. This reduces excessive stereo separation while still covering the whole orchestra.

Another problem with the spaced-pair technique can occur if records are made from tape recordings. The difference in sound path length from an off-center source to each microphone creates low frequency phase differences between the two channels. Strong low frequency out-of-phase signals cause excessive vertical modulation of the record groove. This makes the record difficult to cut and track, unless the recorded level or stereo separation is reduced. The coincident and near-coincident methods, therefore, generally present an easier cutting job.

Desired Microphone Characteristics for Stereo Recording

To optimize sound image focusing, two microphones used for stereo recording should match closely in frequency response, phase response and polar response. Microphones with uniform frequency response from about 40 Hz to 20,000 Hz will cover nearly the full range produced by musical instruments. Frequencies below 80 Hz may need to be rolled-off to reduce rumble, unless very deep organ or bass drum sounds must be recorded.

The response should be broad and flat off-axis as well as on-axis, so that the tonal qualities of instruments from all directions will be reproduced well. Stated another way, the polar pattern



Figs. 5-G, -H: Spaced microphones.

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ideally should have the same shape at all frequencies. The microphone data sheet should provide this needed information.

Stereo Recording Procedure

Armed with all the above, we are ready to follow a microphone set-up procedure for "live" stereo recording.

1.) Set the microphones in the desired stereo pickup arrangement (the ORTF system is suggested for starters because it tends to provide accurate localization).

2.) Raise them high on a microphone stand (about 10 to 20 feet) to keep the front row of the ensemble from overbalancing the back row. Tilt them down to aim at the orchestra.

3.) Place the microphone stand about 12 feet in from of the front-row musicians.

4.) Monitor the sound through headphones or loudspeakers.

5.) The closer the orchestra is to the microphones, the closer it will sound on the recording. If the orchestra sounds too "dry" and close, with prominent scraping and keying noises, place the microphones a few feet farther from the ensemble. If, on the other hand, the orchestra sounds too reverberant and distant, move the microphone pair a little closer to the ensemble. The object is to settle on a microphone-to-source distance where you monitor a tasteful balance between hall reverberation and direct sound from the orchestra. The audible sense of distance to the ensemble (the "perspective") should be the same as you would hear from an ideal seat in the concert hall. Note that the microphones usually must be placed closer to the ensemble than the best "live" listening position. Six to twenty feet are fairly typical microphone-to-source distances.

6.) Now check the stereo localization accuracy. Record yourself speaking from various locations in the orchestra area while announcing your position (e.g., "left side," "mid left," "center"). If the reproduced stereo spread is too narrow, increase the angle or spacing between microphones until localization is accurate. Do the opposite to reduce excessive separation (see Figure 6). Increasing the angle between microphones will also make the orchestra sound farther away, so you will have to place the microphone stand a little closer to the

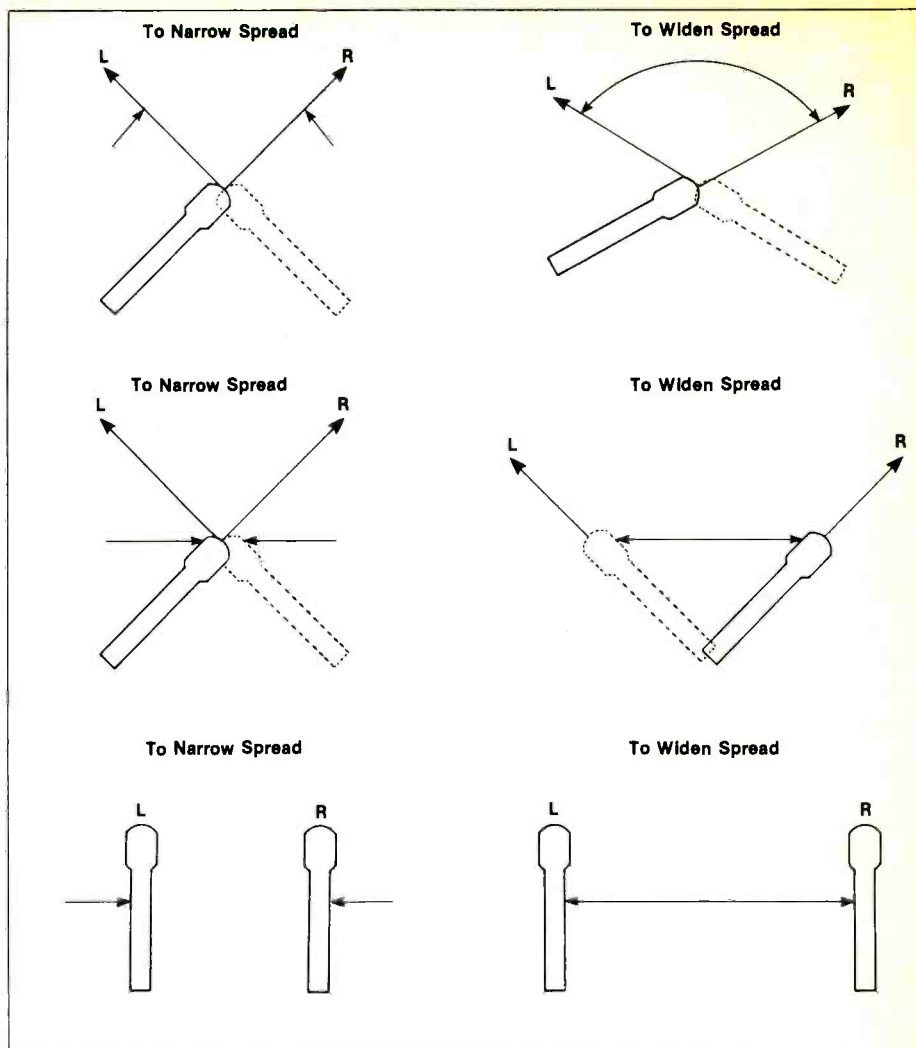


Fig. 6: Stereo spread control.

ensemble to compensate. Increasing the spacing between microphones will not change the sense of distance to the ensemble, but it may make the images less focused.

Due to certain psychoacoustic phenomena, the stereo spread reproduced between headphones does not always correlate with the stereo spread reproduced between loudspeakers. For example, coincident cardioids produce less stereo spread over headphones than over loudspeakers. Near-coincident cardioids produce roughly the same stereo spread over headphones and loudspeakers. Spaced-pair microphones produce a wider stereo spread over headphones than over loudspeakers. These differences must be taken into account if you are monitoring with headphones.

Conclusion

Several microphone pair arrays used for recording in stereo were discussed.

Each has some advantages and disadvantages. The sonic compromises you are willing to make will determine which method you choose. Practice these techniques to gain some understanding of them, and soon you will be making realistic stereo recordings.

Recommended reading for a more detailed discussion of the topic:

Bartlett, B. "Stereo Microphone Technique," *dB Magazine*, December, 1979, pp. 34-36.

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CIRCLE 67 ON READER SERVICE CARD

A session with

Smokey Robinson

By Don Ketteler

The description of a 40-year-old company vice-president who doesn't drink liquor or smoke cigarettes, plays golf and jogs and has lived with the childhood nickname of "Smockey Joe" may not conjure up the image of someone who has been referred to as "the world's greatest living poet." These discrepancies are more easily reconciled if you know this same person also came from a Detroit ghetto in the late 50s, and, with a band originally known as the Matadors, sold

over 60 million records as the Miracles.

The person is, of course, Smokey Robinson, who can now, as an artist/producer/executive, reflect on over twenty years of legendary success. His hits and accomplishments with the Miracles, as an artist in his own right and as a songsmith who has written and produced for scores of artists, is history.

Currently, he is a man enjoying his artistic freedom and independence, his family and job, and a new Motown

album titled *Warm Thoughts*.

"In the beginning it was mono. We'd go into the studio and everybody would be there—the string players, the horn players, the singers and the band. When you came out, that was it, you were done!"

These are Smokey Robinson's recollections of his early days as a producer and artist with the Miracles. It was a time when you didn't have a chance to go back and remix or overdub. It was a performance oriented mode of record-



ing, not so much the world of the technocrat and constructionist.

"I liked the fact that the feeling was often better because we were all doing it at once," continues Smokey, "nowadays you try and not lose track of the emotion of the song in the midst of the technical changes that have come about."

Besides the technical differences that have occurred through Smokey's career, he now has as an independent artist more time and leeway to stretch

out and take chances. It's his own life and future that his decisions affect, and he is not burdened with artistically jeopardizing others with what he does. He's not required to play it safe and do things to benefit a group and everyone's general interest.

With these thoughts in mind, Smokey reflects on his most recently released album, *Warm Thoughts*. "Overall, I would say *Warm Thoughts* is a much better album than *Where There's Smoke*. I have geared myself

to more ballads, *a la Cruisin'*. We'd [Marvin Tarplin and Smokey] actually worked on *Cruisin'* for five years. Marv and I basically had written it before I even left Detroit in 1972. We were going to cut it with another group, but the deal didn't pan out and I eventually changed the words to those that now are on it—after having recorded this version three years ago and adding and changing things until I felt it was right. But, in general I feel I had jumped off my path at times with the

disco tunes on *Where There's Smoke*. When I recorded that album, disco was happening and I responded to its influence."

Whether Smokey Robinson is doing disco, heavy metal or handstands, his work is unmistakable. His forte undeniably is the ballad, and aside from what Smokey considers to be *Warm Thoughts'* artistic improvements in that direction, Mike Lizio, his engineer of the last four years, has some reasons of his own for feeling that it, technically, is his best album so far.

"We recorded it at Mo-West [Motown Recording Studios—West], which has great studios and mixdown facilities. They have Neve boards, Necam automated mixdown and 3M decks. The monitors are a custom setup by Guy Costa. Sunrise, one of their three rooms we did most of our work in, sounded great."

Smokey's studio work has been demanding on Mike, and rather helter-skelter. Mo-West has actually only had the Neve consoles for a year or so, so even the work on *Where There's Smoke* (some of it, by the way was even cut at Smokey's home studio) was recorded on old Quad-Eight consoles whose quality wasn't as good as the new Neve equipment. Mike elaborates:

"For a lot of his older projects, we had used Smokey's home studio. It was only 16 tracks (currently being remodeled and fully upgraded) and we ended up making lots of slave copies to work with in other studios. That is, we'd have a 16-track master from his studio which we would turn into a 24-track first-generation master to work on at a 24-track facility and then make another slave from that and take a 16 track back to the house. So, a bunch of that early stuff is third and fourth generation before it even got mixed."

For Smokey, these technical shortcomings and sacrifices in working conditions were amply compensated for by the convenience, which provided him not only the opportunity to be able to run into the house and grab something to eat or play with his kids, but also, because he is a very spurdy worker, the artistic freedom to tape a new idea at 4 A.M. (So, what do you do, go for the convenience and artistic concerns, or for that extra touch of technical quality?)

For Mike, the advantages don't tip quite so heavily against the disadvan-

tages, and reflect his feeling that, "I'm most pleased with *Warm Thoughts* of all the work I've done with Smokey. We used the same basic recording approach, had great tunes, some exceptional string dates and better equipment."

It would seem, then, that all of these complications, and the quality and consistency that has prevailed in spite of them, merely speak to the commitment and ability of those involved.

Now that we've looked at the studios and what might be some of the considerations and complications of obtaining the end product of a Smokey Robinson album, let's turn our attention to the basic approach to the sessions and the recording techniques.

Mike explains that Smokey's basic instrumentation for a session includes: a pianist, bassist, drummer and three guitarists. "Smokey is always looking for as natural a sound as possible, so I don't use much processing or recording tricks. Recording him has become easier in this regard because after working together for so long, we have established a rapport. I know how he wants to hear things and we don't have to be asking each other questions about the basics all the time."

Smokey concurs, "I don't get so involved in the studio setup and basic

INSTRUMENT LIST

GUITARS:

Marv Tarplin - Gibson Les Paul
Wah-wah Watson - Gibson 335

GUITAR AMPS:

Marv Tarplin - Fender Twin
Wah-wah Watson - Fender Princeton

BASS:

Chuck Rainey - Fender Jazz Bass

BASS AMP:

Ampeg SVT

DRUMS:

James Gatson - Pearl Drums
Zildjian Cymbals

KEYBOARDS:

Fender Rhodes

MIC LIST

Piano: AKG 414s (2)
Bass: Direct
Guitars: Sennheiser 441
Rhodes: Direct
Vocals: AKG 414
Background Vocals: Neumann U 87
Kick: E-V RE 20
Snare: Shure 545
Toms: Neumann KM 86s
Hi-Hat: AKG 451
Overheads: AKG 451s

miking techniques and sounds. I always let Mike have a free hand with the setup. If I hear something that he's done that I want to sound differently, I'll say let's try this or that, and it moves along very smoothly. I do, of course, get involved much more with the musicians and arrangements."

As to musicians, Smokey still works with his guitar player and co-writer of many years, Marv Tarplin. Marv, in fact, has through the years written the music for many songs, such as: "Tracks Of My Tears," "Going To A Go-Go," "Just A Mirage," and others. He provides a solid core and collaborator for Smokey's ongoing studio work, and they make for a happy and satisfied team.

The rest of the band that is used for a standard studio complement is called A Quiet Storm, coined appropriately from the earlier album of the same name. "I use the same people on my albums as I do in concert," says Smokey. "I don't use only my band members, however, there are some studio musicians I do use on all my stuff. For the most part, though, I use my own musicians." In fact, since 1975 only a few members of this 9-piece band have changed.

With Smokey's vocals, Mike uses almost exclusively an AKG 414. "When I first started working with Smokey, he said he had not been satisfied with the vocal sound he had been getting. So, we sat down with a bunch of different microphones and started going through them very methodically trying to find the one best suited for him. The 414 was it, and we've been using it ever since. It is good for Smokey because it's got a very, very, wispy high end and it is hot. It's almost too hot because it tends to pick up everything. If you make little clicks with your tongue they come through like firecrackers and flaw the

track. But, the mic is so well suited for his subtlety and falsetto, which is so clear with that microphone, that it is all worthwhile."

Dropping out 4 or 5 dB at around 500 or 600 Hz, because of a bit of a resonance Smokey's got there seems to be the only equalization Mike needs. With the 414, the rest of the spectrum, and particularly the high end, is so solid that nothing else needs to be done.

Smokey's attitude towards recording his vocals is to get a good sound and go in and do it. He'll sing against the instrumentation four or five times on different tracks and, unless one completely hits, make a composite of what is best. There are no golden microphones or secret techniques, just ample talent and clean, natural recording. "Mike may mic me differently depending on the song and conditions, but we use no effects; I just sing it with feeling and we try to capture that."

• • •

Songs are rarely conceptualized in a final form when Mike and Smokey go into the studio. Basic structure and parts usually exist, but much of it gets worked out in conjunction with the musicians, the mood and, often, a razor blade and some splicing tape.

Mike says, "Smokey likes the ability to change things. He'll let a track run for 10 or 12 minutes which we may end up editing down to only 4 minutes; he wants that option of having all that material to choose from. The musicians may play a part at the end that he really likes but feels should be positioned differently in the song, so we'll splice it from there and move it up to the beginning, or wherever. Smokey has got an incredible head for this sort of thing, almost visionary. He'll come up with an idea to move a section from one place to another and it may be tough for you as the engineer to conceptualize—let alone do it—and you may end up cutting on the off beat or in between beats, but when you get it together, it works. I never considered myself a good splicer until I started working with Smokey, but I've had lots of practice with him, and now I do.

(A couple of examples of this art from the *Where There's Smoke* album include "Cruisin'" and "Get Ready.")

As mentioned, the basic "Cruisin'" track was several years old, and as Mike recalls, "Besides adding new guitar tracks, we fixed up vocal spots—half of which were sung 2½ years

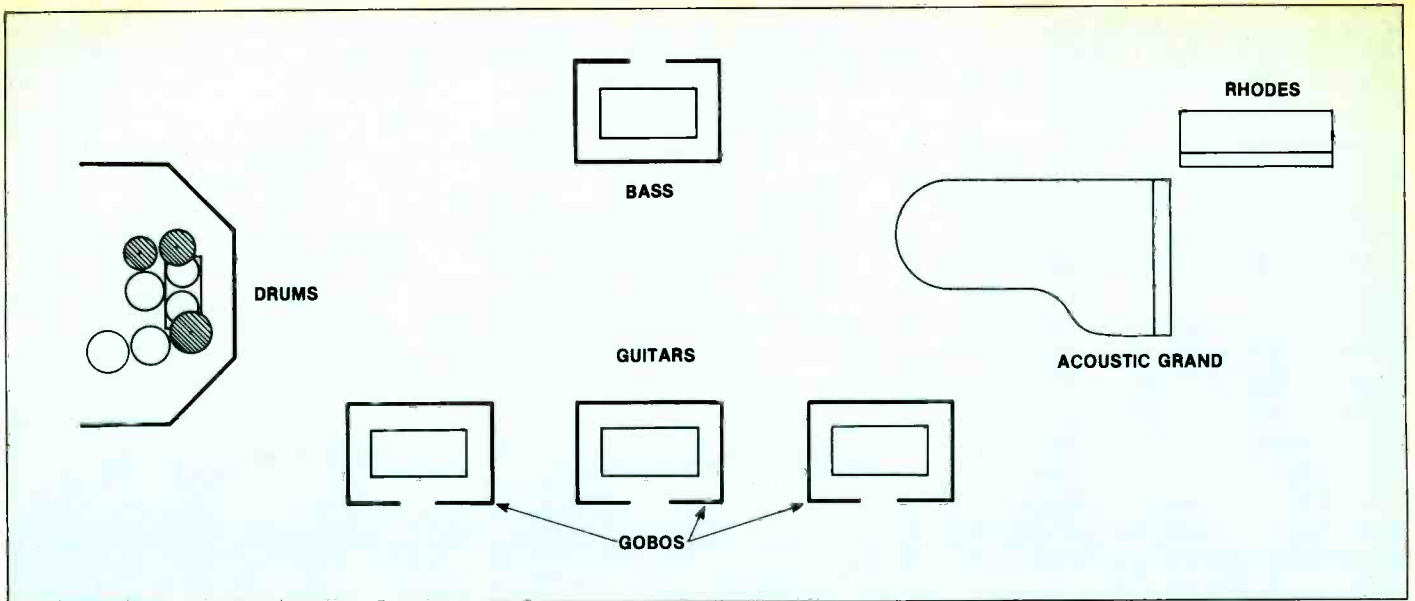
ago. This wasn't so much a splicing problem as it was one of matching the sounds and dropping in the parts using different equipment; this was quite a challenge. To this day it gives me nightmares."

On "Get Ready," the story goes that if one were to play the 24 tracks as they were recorded, and then the album or single versions, there is no way the two would sound related. Mike laments, "I listen to them and don't even know how we did it. It's not only shorter [the album and single releases],

but the splicing has completely changed the arrangement. What the single starts with isn't what the master starts with, the section after that is changed . . . and it goes on. We moved things, looped passages—you name it, we did it. We even ended up having to pull out certain parts so we could make the splice, so parts wouldn't hang over. 'Get Ready' was the splicing climax."

"Hangover" problems were often alleviated by splicing parts on the 2-inch master so additional splicing





wouldn't have to be repeated down the line. It can make it easier to eliminate sections before the strings and the vocals, or whatever, are going to go on because you don't have as many things hanging over. Vocals always seem to be a problem. They are the hardest thing to splice around and nobody wants to make a premature decision on which to keep or cut.

After all this, mixdown was often relatively easy, even with the problems recording the tracks on different equipment caused.

Mike explains, "I'll mix down a song for several hours or so, and then Smokey will come in and make whatever final changes he sees fit. His stuff used to be tough to mix, but I write that off to the fact that we had to fix up so much of it because of the recording process with different equipment and maintaining alignment and calibration on it all. We'd have to fix all those things that got screwed up in the beginning. Things have also settled down in regard to mixing, particularly on *Warm Thoughts*, because he's back to more ballads. I can hear ballads well so they are easier for me to work with, and I think they show Smokey at his best."

In coming full circle from the Miracle's all or nothing mono studio days to Smokey's newest, and perhaps more familiar, *Warm Thoughts* album, he reflects on his early influences and the change from street corner *a cappella* to his contemporary role as artist/producer/execu-

tive at Motown.

"My style has absolutely been influenced by others. I don't think there is anybody singing today that can say his style didn't come from somebody or somewhere. I used to buy song books instead of candy when I was a little kid. I bought and listened to lots of records when I was growing up. I had many, many idols in the record business. My favorite singers and groups (to name a few) were: Sam Cooke and Sarah Vaughn were my favorite male and female singers, while I also thought Jackie Wilson, Frankie Lyman, Ella Fitzgerald, the Spaniels, the Dells, the Drifters, among others, were fabulous. I've always had my favorite people in the record business, and I'm sure they have been influential on how I think, how I sing and how I write. I can only hope that I, in turn, have been able to positively influence others."

Interestingly, and perhaps surprisingly, with those memories and stories of street corner harmonies and *a cappella* precision, Smokey and the Miracles have never actually recorded *a cappella* in the studio. "Our visions on the street corner were that (one day) we'd be singing our songs to music. We've, actually, always done arrangements for our record dates, even in the beginning. In the studio it's more important than ever for you to have charts and parts because the musicians will have probably never heard your material. Certainly there was a romance and charm about the street, and particularly a comradery between us as we struggled to become

successful with nothing but our harmonies and our visions."

Within his artist/executive framework at Motown, Smokey seems to love every facet of his life, and feels being an executive and having an appreciation for the business of music good and helpful. "I think it is really a blessing to be involved in a life that you love. It makes the work that much easier and more rewarding. I think the record business would be better if artists knew things like what is making their record actually get played and onto the charts. All artists know is whether they are hearing their record or not, and from that they often don't realize just how much effort is being put into promoting them. I feel the more they know and understand, the better the rapport between them and the record company, the healthier the business would be.

"I also love the flexibility I have to produce other people. I have just completed two other projects as producer: my two nephews Keith and Darryl and their album called *Kicking It Around*, and my group, A Quiet Storm, has a single called "Only You" and an upcoming album.

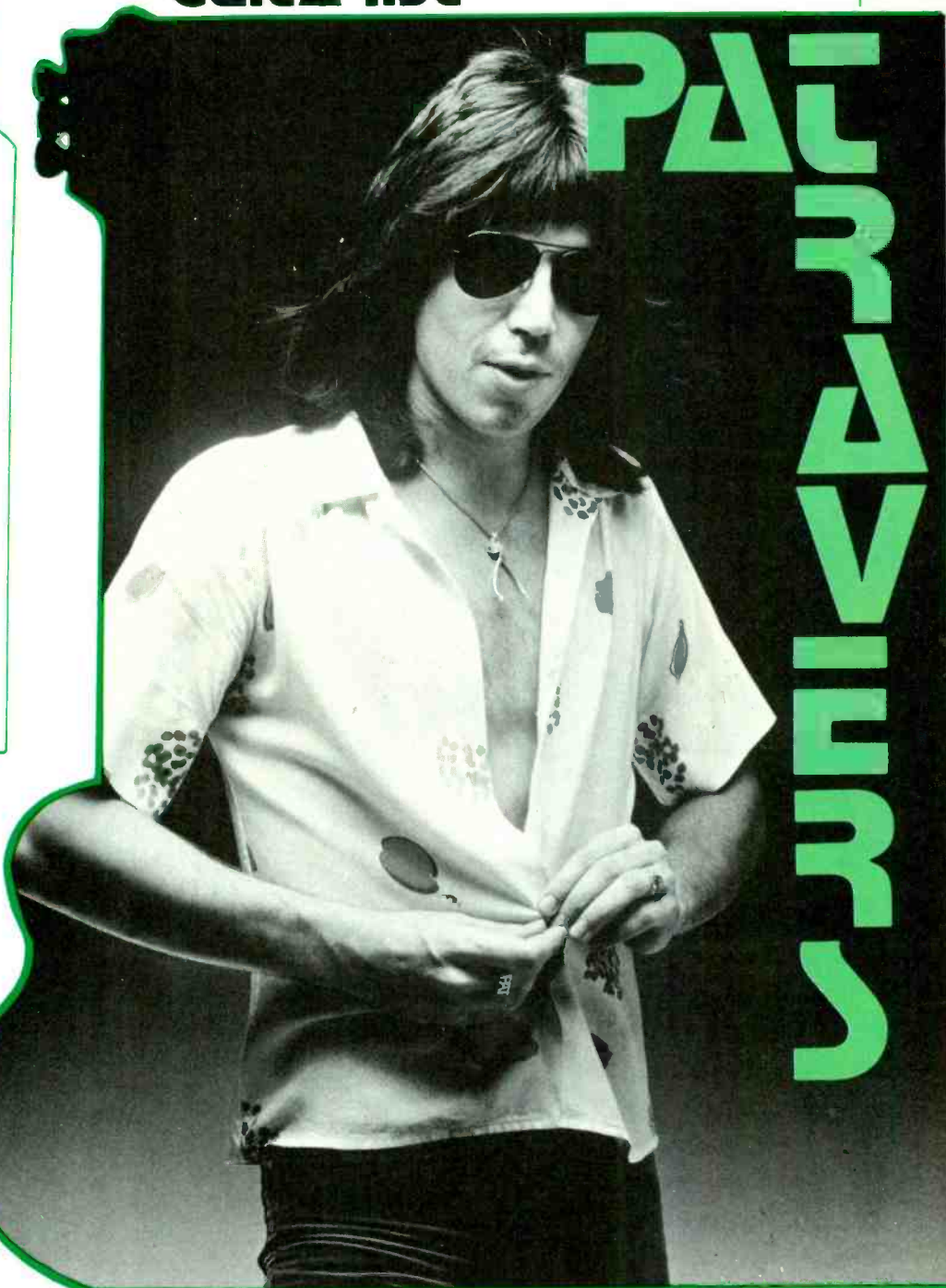
So here it stands, a glimpse of an artist that has withstood the test of time and loves what he's doing. A genuinely nice guy who gives interviews on his birthday and just wants to make good music and have everyone be happy. After so many years of hits and success, through the highs and the lows of show business, Smokey Robinson seems a happy and content man at ease with himself and his accomplishments.

EXPRESSION



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PROFILE: GUITARIST



By
Jeff Tamarkin

*Pat Travers—in a relaxed state, wearing glasses and speaking slowly—almost seems to be a different person than the rabid rock and roller who has recorded six high-powered albums since 1976. In conversation, Travers proved to be quite knowledgeable about the studio and recording techniques, as he explained some of the processes that went into the recording of *Crash And Burn*, the Pat Travers Band's latest release.*

*This LP was a departure of sorts for the PTB, utilizing electronic keyboards to a great extent, and including some ballads and material that is closer in style to classic progressive rock than the guitar-oriented heavy metal boogie which characterized Travers' past work, especially his best-selling "live" album, *Go For What You Know*. But as Travers explains in the following interview, it was simply time for the band to move ahead, "to do what we had to do,"*

in his own words. Crash And Burn does include a hefty dose of guitar-based rock and roll, of course, and the record, produced by Travers and Dennis Mackay at Quadradiol Studio in Miami, and featuring the talents of rhythm guitarist Pat

Thrall, bassist Peter "Mars" Cowling and drummer Tommy Aldridge, is certainly the most totally realized Travers album to date. At 26 years old, Travers is easily one of today's youngest musicians to have achieved so much popularity.

Modern Recording & Music: Before we get into the questions regarding your recording techniques, can we establish what your background is? How did you get started in music?

Pat Travers: Well... I guess I got started when I was about 13, up in Canada. I was born in Toronto but I got started in Ottawa, where my family finally settled. I got started in garage bands and then moved up to high school proms, and then graduated to the bars. I played the bar circuit for about five years before I ever recorded anything at all. I'm 26 now, so I guess it's been about six years since I finally quit the bars. The turning point was when I moved to England. That's where I first started to record.

MR&M: What was the music scene like in Canada when you started out?

PT: There were a lot of bar bands. It was really no "scene" at all; it was just local bands, who never really made any impact on the United States at all. Or anywhere else.

MR&M: Why did you begin playing guitar, as opposed to being a construction worker or having some other day job?

PT: I guess the first time I saw the Beatles on Ed Sullivan and the Rolling Stones, and started watching Hullabaloo and Shindig and all that. I figured it was more attractive than anything else. It was at least some form of individualism. And also having all those girls chase after you and the prospect of having lots of money appealed to me. Unfortunately, you find out the harsh realities. Times have changed. It was all very exciting when I started in music, and then once I got hooked, it was just something that I wanted to do.

MR&M: What was the first music that you listened to?

PT: God, everything. Probably the same stuff you listened to. The Beatles, Stones, then the guitar players: Hendrix, Cream.

MR&M: Was there any particular guitar player you admired more than the others?

PT: No, I think I was just influenced by all of them.

MR&M: What was your first recording experience like?

PT: I'd been in London for about three weeks. I was 20 years old. I hired a 16-track studio and I really got right into it; it was a lot of fun. It was very basic, of course. It was the first time I ever overdubbed vocals and guitars and things like that. I got the bug then and there.

MR&M: When you first walked into a studio and saw all of that equipment, did you have any idea what it was all for?

PT: Well, it was a little frightening. Eventually, you figure out that it's just one channel duplicated 36 or 24 times over. As long as you know what's happening on one channel, you pretty well have the rest of the board sussed down.

MR&M: What was your first guitar?

PT: The first electric guitar was a Gibson Les Paul. I got that after my fourteenth birthday and got it stolen about a year later. Then I had a Gibson SG, which I broke in half, and then another SG which was hot and the police took away from me. Then a Hagstrom Swede and a Gibson ES 335 stereo and a couple of Telecasters, Melody Makers, Les Paul Juniors, just about all of them except for a Strat. I've never owned a Strat, and I have no desire to. I'm not really a guitar collector. I have four or five now, which isn't all that many. I've given a couple away.

MR&M: What kind of material did you play in your first bands?

PT: Just cover versions. I didn't start writing till I moved to London. Then when I did, I met up with my bass player, Mars (Cowling) and we recorded our first album. That was at Chappell Studios in London, on New Bond Street. That was a 16-track with an old Ampex recorder, and an ancient Neve console. It was really weird, because you had to walk around 30 feet from the console to get to the actual studio. They had a monitor in there. There was no window at all.

MR&M: You've progressed a lot since your first album. When you look back at your first album, does it seem

amateurish to you?

PT: Not at all, really. Because it was so sparse, it didn't actually sound all that good. A couple of years ago, I took the 2-track masters into a studio and re-EQ'd them. You couldn't tell the difference; they sound real good now. The album wasn't all that bad. I just didn't have the experience to know how to make it sound good.

For the second album, I was unleashed into a full-scale 24-track studio, using a Cadac console and speakers and a Studer recorder, which is still my favorite recorder. You learn by fiddling. To this day, I only know how to achieve an effect; I still don't understand the electronics of what goes on. But I know that if I do this, this will happen. Now, I'm starting to understand limiting and EQ and compression.

MR&M: But it's still mostly trial and error?

PT: Yeah, I did a lot of experimenting with overdubbing and backwards recording and different tape speeds and backwards echo, how to use flangers and phasers and harmonizers and things like that.

MR&M: Can you see yourself making a direct-to-disc record or even using digital recording techniques?

PT: I don't see the point. There's not a record player made that will warrant that. As soon as you put something to disc, you lose about 50% of all the quality you put into it. Even if you go direct-to-disc, fine, but as soon as the disc is punched out and put on the average Victrola, every time it goes around, it's destroyed. I don't play records at home any more. I went out and investigated tape players, because I deal with them more. I have a Teac 3440 S reel-to-reel. But it's bulky to have the tapes around. So I got an Aiwa cassette player, which I found to be the best one. It has bias controls and you can make great copies. The only difference between the two decks is that there's a little more hiss on the cassette. But as soon as they speed up the cassettes to 3¾, there's no reason cassettes shouldn't replace everything.

MR&M: Do you have a home studio?

PT: I just haven't had the time to get

“Dennis keeps the monitors louder than any producer I’ve ever heard . . . we blew up six speakers in three days.”

one together. I just got a patch bay before I went out on the road, and I just got a little stereo mixer for my Teac and some microphones. I want to get a dbx, but it’s all sitting around in boxes; I haven’t had a chance to put it together.

MR&M: Would you like to get your studio to the level where you can make your records in it?

PT: I’d like to go into partnership, because I don’t want to have to maintain it. I want to have access to it, but I want to get involved with someone who will be actually technically involved in it. That’s a 24-hour a day job. I live now in Coconut Grove, Florida, so I’ve done a lot of work at Bay Shore and at Quadracial. I don’t like Criteria much, except for their mix-down room, which is great. There’s a new studio called International Sound, which is going to be really hot. Still, everything in Miami is MCI, and MCI has its drawbacks.

MR&M: Has your producer had a great effect on your music and recordings?

PT: Dennis Mackay is my producer. He came from the Trident school of producers (in London). He’s showed me some interesting things, some little secrets and things. Also, on this last album, we got into more experimenting with microphones.

MR&M: Do you consider yourself primarily a guitar player, or more of a total artist?

PT: Well, since I’ve been playing the guitar the longest, that’s more of my forte. But I consider myself a vocalist, and I’m getting into keyboards. I think I’m turning into a not too bad producer.

MR&M: Do you consider songwriting to be as important as the guitar playing?

PT: Without the good songs, we wouldn’t sell any records. Let’s put it this way: I got very bored with the guitar for a couple of months, and that’s when I got into the keyboard thing very heavily. I just felt uninspired. The guitar’s always been something that’s very easy for me to do. It’s never really been all that difficult. I have spent time at it, studying it. I know it and I’m probably one of the better players around. I only say that because everybody tells me I am,

so I guess if everybody says so, I must be.

MR&M: So, was it your idea to use a lot of synthesizer on the *Crash And Burn* album?

PT: It was all my idea, but they put up with me. Most of the synthesizer stuff I did after the band had left, so they didn’t have to set around and listen to me f_____ up.

MR&M: How have your long-time fans taken to the new sound with emphasis on keyboards?

PT: The numbers have gone down real well. At least no one has said they were going to fire-bomb my next gig if I don’t stop playing keyboards. It’s something I have to do to keep progressing.

MR&M: How would you describe a typical session for *Crash And Burn*?

PT: It varied from day to day. We concentrated mostly on the feel. We put no restrictions on the length of time a solo would go, because there are such things as razor blades and you can just cut out. We would use whatever it took to get us in the mood to do the track, whether it was booze or pot or whatever, or just totally straight. If it didn’t happen after four takes, we’d go out and drink a lot of wine and come back and try again. If we still couldn’t get it, we’d just out and out jam. Some of those jams turned out to be “Born Under A Bad Sign” and “Snortin’ Whiskey.” It was very loose and very easygoing. I tried to have no tension. We had no outside pressures at all. My manager never showed up and he wouldn’t let anybody from the record company come down, or hear anything. I was the only one who had any copies of rough mixes. We didn’t want any external pressure until the very end. Then it was, ‘OK, you’ve spent enough time, now let’s get this done.’ I wanted everybody to feel comfortable. The studio is, I was gonna say, a sterile environment, but it’s weird. You don’t have that instant feedback that you do “live,” and everybody’s got a different cue on their headsets. It takes a while to adjust to that. I think everybody has; we’ve been recording long enough.

MR&M: Are you influenced by current trends, particularly new wave?
PT: Only in the sense of making everything fairly sparse. It took me a long

time to learn that the more you put on the less you hear.

MR&M: What exactly did Dennis Mackay do as your producer?

PT: Dennis is fantastic with drums, with getting a big sound out of a small amount of things. He’s got a neat style of mixing insofar as he treats each part of a song as a separate part; in other words, to get the best out of each part. Say there’s one specific part where it’s a solid drum roll by itself. Instead of going through and pushing that one drum fill when there’s nothing else there, we’ll do an edit, mute everything else except for the drums, so that there’s no open channels, no nothing, and all you hear are those drums.

MR&M: Does he work mostly on a technical level, or does he influence the material as well?

PT: Dennis keeps the monitors louder than any engineer or producer I’ve ever heard. Engineers have had to leave the room. I don’t know how he does it. I’ve had to leave the room! We blew up six speakers in three days. He likes to feel it. He’s technical only so far as it serves him. He gets the equipment to work for him, he doesn’t work for it.

MR&M: When you’re recording, do you spend most of your time playing and forget about the control room, or do you get involved in the control room?

PT: Oh no, I spend most of my time in the control room. I have a wireless guitar. I mix the albums, get my own sound. It’s my music and some of the special studio effects are my ideas, and Dennis makes them realities.

MR&M: I’d like to ask about a few specific cuts on *Crash And Burn*. Is there anything special about the recording of the title track?

PT: We recorded that as a three-piece. Pat didn’t put on his guitar until later. I did the keyboard solo until I felt that I made a statement.

MR&M: What about “Snortin’ Whiskey?”


PT: That was “live.” A “live” vocal.

MR&M: Do you feel that the album accurately captures the group’s “live” sound?

PT: At the time it did. We’ve gotten much tighter. We’re going to do a lot more “live” recording. “Born Under A

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"I'm probably one of the better players around . . . everybody tells me I am, so I must be."

Bad Sign" was another "live" one. We used it just to jam, to loosen up before we'd start doing whatever it was we were going to do that day. We laid it down and I thought it sounded good, so I kept it on.

MR&M: How about the Bob Marley song on the album, "Is This Love?"

PT: That was just an experiment in rehearsals. It was also an excuse to smoke a lot of kaya, and to do something different. We were all into Marley, but we'd never tried to play reggae music. We tried to play it authentically.

MR&M: Was it hard to get the reggae rhythm?

PT: The rhythm itself wasn't difficult, but it was hard to get the attitude.

MR&M: What kind of guitars do you use in the studio?

PT: I use the same guitar and amp in the studio that I use "live." I use a Gibson Melody Maker. And I use a 50-watt Marshall with one cabinet and I use a 100-watt Marshall with one cabinet and a Leslie 122. I use that on four tracks and then I do another track on a harmonizer, the new harmonizer which has the extra decimal points so it's between 100 and 101. I put that on a separate track and then you get a spread across the stereo.

MR&M: What about pickups?

PT: Ask Pat Thrall, he's got every pickup in the world. I just send someone down to get a Gibson replacement pickup. I don't even know whether they're back pickups or front pickups. I really don't care. Every guitar I've ever had sounds the same.

MR&M: When you're mixing, do you try to make sure the guitar is always out front, or do you try to keep everything in perspective?

PT: Where it belongs. On the *Crash And Burn* album, you can hear everything on any system, even in mono. The art of mixing is to have it all there.

MR&M: Do you use any special microphones?

PT: The standard ones. I don't want to tell you, y'know, because I use a different vocal mic than anyone has used

for vocals. We just run it flat through the board with a limiter and that's it. It's a matter of experimentation, of where you put your ambience mics. Usually condenser mics for the amps. **MR&M:** Any special miking techniques?

PT: There again, I just don't want to tell everybody. This is a competitive business. I think this album sounds great and it sounds great for a couple of reasons. Once we found the right microphones, we didn't have to work that hard. The rough mixes don't sound that different than the final mixes. It just mixed itself.

MR&M: Do you use a lot of overdubbing?

PT: Not so much on this record. Usually it was just a vocal overdub, or to patch up a guitar solo. On "Material Eyes," there was a lot of overdubbing, and of course on "Live Will Make You Strong." There were a lot of vocal over-

SELECTED DISCOGRAPHY

<i>Pat Travers</i>	(1976) Polydor 6079
<i>Makin' Magic</i>	(1977) Polydor 6103
<i>Putting It Straight</i>	(1977) Polydor 6121
<i>Heat In The Streets</i>	(1978) Polydor 6170
<i>Go For What You Know</i>	(1979) Polydor 6202
<i>Crash And Burn</i>	(1980) Polydor 6262

dubs on that. But, for the most part, the rest was just the four of us playing. It sounds bigger than that, but that's what it is.

MR&M: Do you plan to continue heading in that direction, toward a bigger sound?

PT: Yeah.

MR&M: Do you think that might alienate some of the fans who like it simple and punchy?

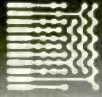
PT: Yeah, it's gotta sound punchy. I'm not opposed to using limiters, though. You gotta watch it. Limiters cause ear fatigue. One or two songs sounds great, but after that, you tend to want to turn it down.

MR&M: Would you like to produce other artists?

PT: I hope to do that this year. I have nobody in mind, but I keep listening to tapes and I really want to do that.

MR&M: And what about your own next album?

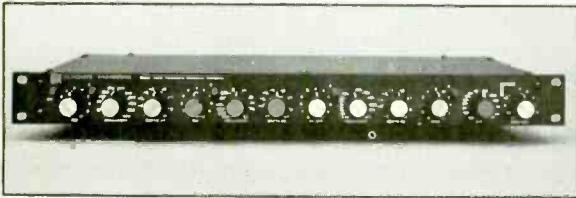
PT: I'm gonna take my time on that. We have most of it already recorded. Whenever it's necessary . . .



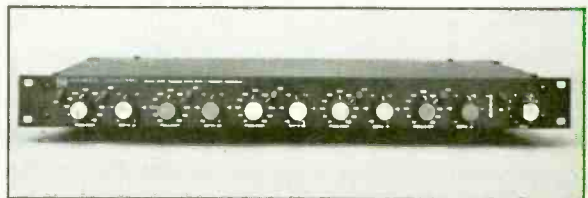
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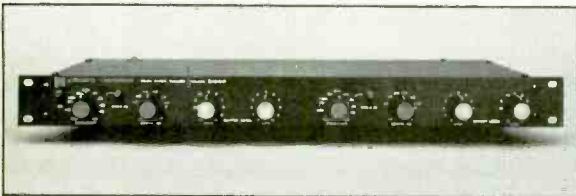
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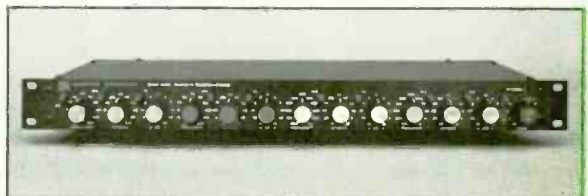
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Model 1500 Feedback Suppressor



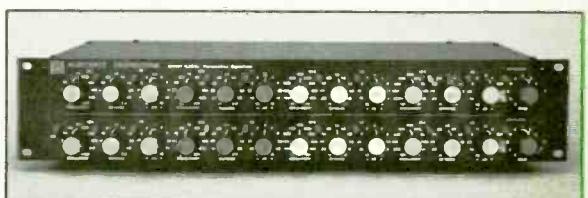
Model 2100A Tuneable Electronic Crossover



Model 4100 Parametric Equalizer - Preamp



Model 5200A Stereo Mixer/Preamplifier



Model 4200A Parametric Equalizer

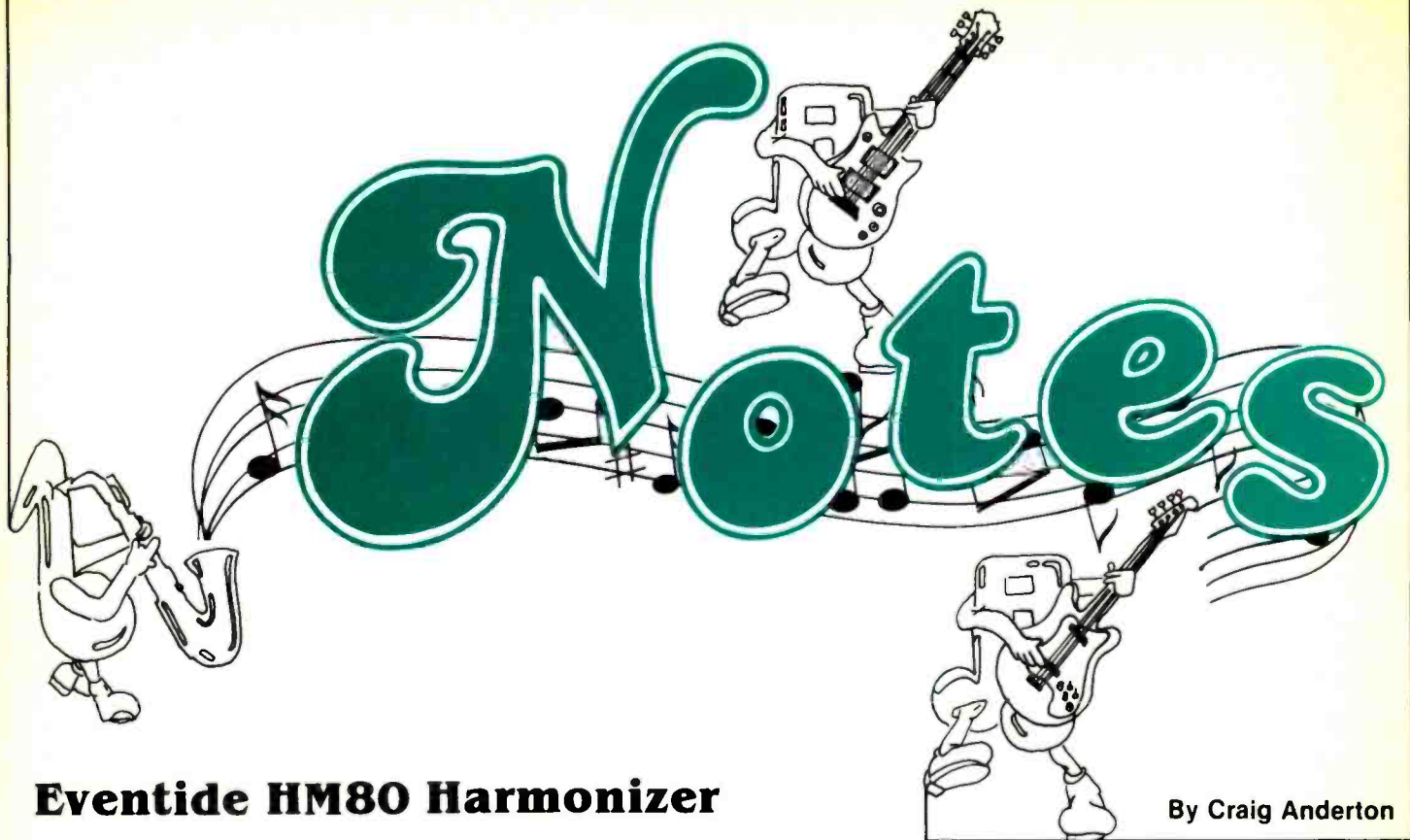


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Eventide HM80 Harmonizer

By Craig Anderton

This month's review is a perfect complement to last month's piece on the MXR Pitch Transposer, because it shows how two companies can take the same basic technological concept and end up with two radically different products. While both units are "harmonizing" devices that list in the \$800 range, MXR adopted the approach of taking one particular function—harmony synthesis/pitch transposition—and implementing it superbly. Eventide, on the other hand, has opted for squeezing as many sounds as possible out of the basic harmonizing circuit. Naturally, when you see a manufacturer covering a lot of bases, it's logical to ask what kind of compromises had to be made in the process, as well as what benefits the user derives from this added flexibility—and those two subjects alone will give us more than enough to talk about in this column.



WHAT IS IT? First of all, the Baby Harmonizer (or BH for short) is true to its name in that it is one of the cutest pieces of equipment that I've seen. Intended primarily for on-stage use, it measures 26½ x 21 x 6 cm (or 10½ x 8 x 2½ inches, weighs next to nothing and has a classy black anodized finish. The knobs have black inserts with silver skirts, and the legending is extremely legible (even under adverse lighting conditions) due to the use of big, bold white letters on a black background. For visual appeal and layout, the BH scores well.

The BH offers four primary sonic functions. These are:

1.) *Echo (delay)*—In this mode, you basically have a solid-state echo unit with a minimum delay of less than 8.5 ms

and a maximum delay of a little over 250 ms. This range covers doubling, thickening, slap-back echo and fairly long "spacey" echo effects. As with most other echo units, it is possible to add feedback (regeneration) so that the echoes repeat at ever decreasing volume levels.

2.) *Pitch transposition and harmonization*—As in the case of other harmonizing devices, you can transpose a signal upwards in pitch or downwards in pitch. Adding feedback creates pitch shifting echo effects.

3.) *Backwards tape simulation*—This is unique to the BH, and while the sound has some rough edges, it also has some interesting uses. The effect works particularly well with program material, vocals and other sound sources with rapidly varying amplitude envelopes.

4.) *Capture and repeat*—This is another unusual mode of operation, although synthesizer players and E-Bow fanatics will recognize it as being similar to "infinite sustain." What basically happens is that as you play a note or chord you wish to sustain, you tell the BH to hold this piece of sound by toggling a switch labelled "Repeat." The BH will continue to hold that sound and allow you to play over it, until either someone pulls the plug or you tell the BH to stop by re-toggling the repeat switch.

In addition to these four basic functions, you can obtain other familiar sounds with a little more knob-twiddling. For example, short amounts of time delay with feedback can give "reverb" effects; small amounts of pitch change with feedback can give flanging/chorusing effects.

To control these various sounds, the BH has five knobs and two switches. Reading from left to right, the knobs are: Delay, Pitch, Output, Mix, Feedback and Level. The two switches include a three-position mode switch and a three-

position momentary "repeat" switch. The function of these controls will become clear as we go along.

Eventide has provided a number of jacks on the back. There are two input jacks, one for high-level inputs (tape tracks, synthesizers, etc.) and another for the low-level inputs (stock guitars, electric pianos, and the like). You cannot use microphones with the BH unless they have some kind of built-in preamplification. There are also two output jacks, one for feeding low-level instrument amp inputs and one for feeding line-level inputs. Two more jacks serve control purposes: one allows for remote triggering (say, with a footswitch) of the capture and repeat function, while the other accepts an external control voltage that allows you to vary the pitch transposition interval. The BH has a two-conductor line cord coming out of the back (not three conductor, oh well). There is no outside fuse post.



As with most units that I review, I took the BH apart to see what kind of parts they used and how easy the BH would be to service. I found the usual bunch of ICs one expects to find in a piece of digital equipment, all mounted on a single circuit board. Some of the ICs (I presume the more expensive—and failure prone—parts such as memories and data conversion chips) were socketed; the others were not. The circuit board is epoxy glass, has no "fixes" on it and is sensibly laid out. High-quality capacitors, resistors and other components are used instead of less expensive alternatives. While I would not consider the BH to be indestructible, with care it should be able to make it through the rigors of touring.

An important consideration for any piece of equipment is the quality of the documentation. The BH arrives with an 18-page manual that, while friendly and well-intentioned, is somewhat wordy and could very easily lose the non-technically minded musician. Luckily it includes a bunch of sample control settings, so if you manage to hook up the right inputs and outputs, and don't feel like wading through the text, you can just set up the sample patches and get acquainted with the BH in that manner.

PRE-FLIGHT for the BABY HARMONIZER—Now that we've gotten the physical description out of the way, fasten your seat belts and pretend you're looking over my shoulder as we go through the BH's paces.

The first step is to choose the right input and output jacks, and then correctly set the level. Choosing the right jacks is pretty obvious—if you're a guitar player playing through a guitar amp, you plug your guitar into the jack labelled "guitar" and the amp into the jack labelled "instrument amp." If you're feeding a console or other line-level device, use the "high" output; if you've got a hot signal source, feed it into the "high" input.

Setting the level is a bit more complex. Failing to set the level correctly (or plugging into the wrong jacks) will give you decidedly inferior operation. Too little level means you'll hear a constant (and annoying) amount of noise in the background, while too much level will give you distortion. To make sure you set the levels right, Eventide has included a two-color LED that's supposed to aid in level setting. As with the instructions, I'm sure there are nothing but good intentions behind this feature, but the end result is

confusion rather than illumination. After setting the levels in accordance with how I understood the instructions, the noise was really pretty bad; so bad, in fact, that I was wondering how I was tactfully going to say "this thing's a dud" in print. Then I started experimenting, and found that cranking up the level so that the red overload indicator was on most of the time not only cleaned up the S/N ratio, but added no objectionable distortion. My advice for setting levels is to forget the spiffy indicator light (even though it looks really flashy) and just use your ears. Put the BH in the delay mode, set the output mix so that you hear the delayed signal only, crank up the level until you're at the verge of distortion and all will be well.

One point worth emphasizing is that any device which modifies time is going to have a certain amount of audible noise, although compansion techniques (which are used in the BH) help keep this down. Setting the levels properly will render most of this hash unobjectionable, but there still may be times during quiet passages (especially if you're playing through a system with good high-end response) where the noise will show up. Nonetheless, I would think that for most musicians, the noise level is definitely acceptable.

There were also some miscellaneous sonic artifacts which sounded similar to clock feedthrough. For some reason, these were most prominent with the level control at mid-rotation and the output mix control at either extreme (these glitches apparently had nothing to do with the signal level going through the BH since they were there even when no input was present). Interestingly, these problems would disappear when the level control was all the way up. For this reason, *to avoid distortion*, I'd recommend leaving the level control up full and adjusting the input level either at your instrument or at whatever box feeds the BH.

OK, now we're plugged in and we've got the levels set properly; that means it's time to evaluate the sounds of the four main functions.

EVALUATING the ECHO SOUND—To get echo effects, you set the output mix for the desired blend of echo and straight sound, the feedback control for the number of echoes, the mode switch on "delay," and the delay control for the desired delay. This delay control is a 32-position rotary switch, with about 8.5 ms of delay between detents. The minimum delay position sounds, for all practical purposes, as if there is no delay, while the maximum delay gives some pretty good spacey echoes. Without feedback, the output mix control works in the normal way: full counterclockwise is the straight signal, full clockwise is the effect signal and in between you get varying blends. However, adding feedback throws off this balance. With



feedback added, full counterclockwise gives some of the echoed signal along with the straight signal instead of just the straight signal; as you move the control towards center, the straight signal gets somewhat "softer" (as might be expected); but at almost the exact center, the echoes cancel out. As you move further clockwise, the echoes return while the straight signal becomes less and less prominent. While this anomaly might bother some people, the echo quality is quite good (especially if you're used to inexpensive analog delay lines), and as long as you don't need real long echoes, the BH is a good little solid-state echo unit.

EVALUATING the HARMONIZED SOUND—Here's where we start getting really subjective. First, though, I had better explain some of my own biases about applying harmonizing effects.

For me, there are essentially five "killer" harmonizing patches. The first one is a harmony line exactly one octave above the signal; with guitars, this gives a 12-string effect, and with a little regeneration you can get great string synthesizer-like sounds out of just about anything. In this mode, the harmonizing device acts like a polyphonic octave multiplier. The second patch is similar, but produces a harmony line exactly one octave below your original sound. In this case, you've got a polyphonic octave divider which is great for adding more depth.

The third "killer" patch is setting the harmony line just a tiny bit higher than the straight signal, and adding feedback; the result is an upward spiralling of echoes that I just love to hear. The fourth patch is similar, but involves setting the harmony line just slightly lower in frequency to get downwards spiralling. Incidentally, if the interval between the straight and harmonized line is really small, say, 1/8 tone or so, and you add lots of feedback, the resulting chorusing sound is excellent. The fifth patch involves using a musical interval to create a parallel harmony, say a fifth or major third tracking along with whatever you're playing.

My basic test for a harmony synthesizer is how well it creates the above five sounds; the MXR Pitch Transposer, for example, does patches 1, 2 and 5 very well. However, one of the properties that makes the MXR so good for harmony synthesis—namely, a very small delay time between the straight signal and harmonized signal—paradoxically makes it less effective on patches 3 and 4 (the spiralling echoes). The BH has some added delay time, which makes the spiralling longer lasting and better defined. The MXR unit requires patching in an additional echo device if you want to vary the delay of the harmonized line; the BH allows you two different delays depending on how the delay control is set. So much for the aside . . . now, back to the BH.

To get harmonizing, you set the mode switch to "Forward," the output mix to the desired blend of harmony line and straight sound, the pitch control for the desired harmony interval and the delay control for how much delay you want between the time that you hit a note and the time that the harmonized note appears (there must always be some delay due to the nature of harmonization). As mentioned above, this control only gives two delay options, even though it is a 32-step control. The feedback control adds that spiralling effect we alluded to earlier.

Sad to say, the BH's octave above and below sounds are not very good; in fact, I think they're pretty close to unusable. It seems to me that the musically valid range of

the Harmonizer is about plus and minus a fifth from your original signal. I get the impression that Eventide feels the same way, since the pitch knob is arranged so that it's easy to set intervals within the plus-and-minus-a-fifth range, and virtually impossible to easily set the octave above and below extremes of the control. The good news is that as long as you're not too far away from the initial pitch (say, within a few full tones either way), the fidelity is quite good; this means that the BH does an excellent job with patches 3 and 4 previously mentioned. The spiralling echo sounds, flanging sounds and chorusing sound you can get with the BH set for close harmonization are striking and effective.

Using the BH to create a parallel harmony gives mixed results. For one thing, there is no way to easily change the line between, say, major third and minor third, so once you've selected your harmony line you're stuck with it. A fifth or a fourth comes out sounding pretty good. The harmonized signal quality isn't exactly high fidelity, but the approximation is, as they say, close enough for rock and roll. The splicing glitch for the BH sounds like a tape splice where there's a gap between the two ends of the tape, and is not particularly pleasing . . . but, that's the price you pay for trying to cut up little pieces of a signal and trying to put them back together again.

EVALUATING the CAPTURE and REPEAT MODE—In this mode, regardless of where you have the knobs set you'll get a pretty similar effect. Strike a chord and depress the repeat switch; surprise! the chord keeps repeating. While the sound is not particularly smooth (it has a regular and fairly prominent percussive splicing glitch), it is nonetheless very effective for pedal point work. (Have the BH grab something like an E, then play B and A chords over it.) You can also use this feature to capture a chord which you can then solo against, or capture a spoken word and keep repeating it. Toggling the repeat switch a second time "unfreezes" the BH and returns you to whatever setting you had before initiating the repeat. While capture and repeat isn't exactly an earth-shaking feature, it has its place and is a welcome addition to the BH collection of tricks. (Incidentally, in this mode the pitch control remains effective, so that once you've grabbed a chord you can transpose it with the pitch knob. Adding feedback or going into the tape reversal mode has an effect, but these variations seem to muddy the sound more than anything else.)

EVALUATING the TAPE REVERSAL MODE—Here's another unusual feature that, as far as I know, is unique to Eventide equipment. You go into this mode by setting the mode switch on "Reverse"; the pitch and output mix controls are still active, but the delay control is, according to the manual, best ignored. In any event, the way this mode works is by storing a signal in memory and reading it out of memory in reverse order (i.e., the last stored bit gets sent out first). Again, we have a timing glitch to deal with; the memory can only store so much, which creates a cyclic and percussive glitching effect. However, in this case, the reverse tape sound is so unusual that the glitch essentially becomes part of the effect.

The reverse tape sound is not without its compromises, however. You must use percussive or rapidly changing input signals for this mode to sound effective. Program material works fine, as does rapid singing (try "scatting,"

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Ambient Sound

BY LEN FELDMAN

FM Radio as a Program Source

I'd like to devote this entire column to the subject of FM radio. Let's face it, much of what the typical home recordist records on tape comes from this program source and, in my opinion, all too little has been said about FM audio quality in this or any other magazine in recent times. I was reminded of this by a letter I received from a Mr. H. Bloom, of Soundmaster, Ltd., a Canadian manufacturer and installer of electronic sound amplifiers. He wrote, in part, "Another item I would like to point out to you concerns frequency response and simple distortion measurements on signals broadcast by FM stations. I would suggest a fifteen minute broadcast of, say, 100 Hz, 1 kHz and 10 kHz tones, plus an extended 1 kHz for harmonic distortion analysis. These would be read out on our receiver. I would also like to know if there is any legislation regarding the use of EQ on FM broadcast consoles. As you're well aware, we've all experienced different tone quality from different stations playing the same disc.

Let's back up a bit to the beginnings of FM and, later, stereo FM. When the FM broadcast band was first authorized (and later moved up in frequency) by the Federal Communications Commission, the hope was that FM would be a true high fidelity broadcast medium. Maximum allowable frequencies (of the audio signals) were set at 15,000 Hz and pre-emphasis was set at 75 microseconds, which amounts to a treble boost during transmission of around 13.6 dB at 10 kHz. The reason for the treble boost during transmission (and the similar amount of treble cut or de-emphasis at the receiver) was, of course, the desire to reduce background noise or hiss without sacrificing frequency response. But such an extreme amount of pre-emphasis and de-emphasis could not be had without making other sacrifices, and the most important of these is the attendant loss of dynamic range. Think about it, if highs are going to be boosted that much and if program content contains equal amounts of all frequencies (actually it doesn't, but stay with me for a moment), then in order to broadcast 10 kHz without over-modulating, you've got to *back down* on overall levels by 13 dB and mid- and low-frequencies must be transmitted at 13 dB less intensity in order to accom-

modate those boosted highs. That, in turn, reduces the "distance" between the background noise floor and the average program level.

As I said, treble tones or highs in typical program material are never as loud as mid and low tones, so the situation isn't quite that bad. But neither are the highs in *modern*, well-recorded program material as low in amplitude compared to mids and lows as they used to be, and 75 microseconds of pre-emphasis is just not a realistic value for today's FM, in view of the kinds of recordings that are now available (with much greater high-frequency content in them than years ago). Interestingly, FM broadcasting in Europe, which came several years after FM in the U.S., recognized this fact and specified a pre-emphasis and de-emphasis characteristic of only 50 microseconds (less boost of trebles during transmission).

American FM broadcasters, locked in as they were to the 75 microsecond pre-emphasis requirement, started to seek other solutions. Being, for the most part, commercially-operated stations, they had to fight for higher percentages of the listening audience. One way of going after more listeners (or at least so they think) is to try to be "the loudest sound on the dial." Since this cannot be achieved by over-modulating beyond the allowable ± 75 kHz, another "solution" was to compress the living daylights out of the signal so that *all* portions of the music sound as loud as they legally can. The dynamic range is destroyed, but the sound is *loud* and attracts the listener as he scans the dial.

Another way out, of course, is to equalize the program material at the broadcast console before it ever leaves the studio and heads for the transmitter modulator. Remember, the 13 dB of boost at 10 kHz that results from fixed transmitter pre-emphasis is *after* the signal leaves the studio console. The FCC has long ago decided that what you do *ahead* of the two audio lines leading to the FM modulator and transmitter is a matter of artistic and not technical consideration. So, if a broadcast engineer (no doubt at the direction of his station manager) wants to cut treble by 5, 10 or even 15 dB at 10 kHz, there's no one who is there to say that it's against the law because it isn't. But if you

have been following the discussion so far, you will realize that by cutting treble response at the studio end, the entire FM carrier can now be modulated *harder* (louder sound when you tune to the station at home) because there are no highs to be pre-emphasized by the fixed 75 microsecond time constant with possible overmodulation of the transmitter.

The reason why you detect so many differences in the sound quality of different FM stations in your area, Mr. Bloom, is very likely because not all of your local stations are using the same degree or combination of equalization. Some are more drastic than others in their attempts to be "the loudest guy on the dial."

Dolby FM

Readers are undoubtedly all familiar with Dolby B noise reduction as it applies to tape recording. But for several years now, Dr. Ray Dolby has been trying to promote Dolby B as a means of solving some of these problems on FM as well. Dolby reasoned (correctly, I think) that if the high degree of pre-emphasis of U.S. FM rules was intended to reduce background hiss and noise, his system could accomplish the same thing *without* requiring such an enormous amount of fixed treble pre-emphasis at the transmitting end. In fact, he proposed that when using Dolby on FM, the pre-emphasis value be reduced to only 25 microseconds or one-third of its standard value. In that way, the amount of fixed boost at 10 kHz that has to be applied at the transmitter would be reduced by approximately 10 dB to between 3 and 4 dB. That would permit stations to *retain* some semblance of good dynamic range without having either to compress or fool around with the overall tonal response of the music at the console.

Much to everyone's surprise, the FCC actually went along with the proposal. I say much to everyone's surprise because the FCC has always been big on compatibility, and it was somewhat amazing to many of us that they would permit a station to suddenly change their pre-emphasis value from 75 microseconds to 25 microseconds while there were millions upon millions of FM tuners and receivers out there with fixed, 75 microsecond de-emphasis circuits built-in. If you think about it, the incompatibility that resulted with these sets was not all that bad. While the more-than-needed treble cut at the receiver tends to cut highs, remember that in Dolby B, treble tones (at least at low levels) are boosted at the encoding end. So, if you listen to a Dolby FM broadcast with a standard FM tuner or receiver (one having 75 microsecond de-emphasis) the extra treble cut tends to be at least partly offset by the Dolby treble boost (at low levels).

One would have thought that given this new modulation freedom, those FM stations which opted for Dolby would now have thrown out all their compressors and left the EQ controls on the board in their "of" or "flat" settings. Such, unfortunately, was not the case, and the desire to be the loudest station on the dial remained of paramount concern. The result: stations (or many of them) *still* used compressors and simply took advantage of the reduced pre-emphasis associated with

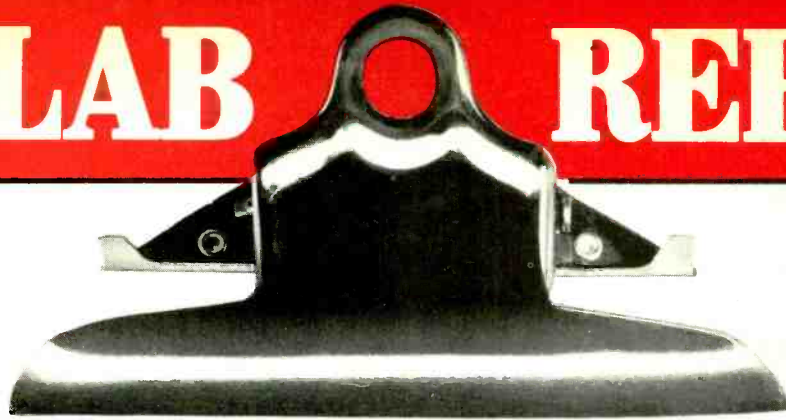
Dolby FM to boost average loudness levels up by another 10 dB. Needless to say, that is *not* what Dr. Dolby had in mind and it is this misuse of his system which has deterred the more rapid growth and widespread acceptance of Dolby FM. (It's rumored that Dolby withdrew permission from several stations to use his system, realizing how badly it was being misused.)

What Can You, The Recordist, Do?

As you have gathered by now, *most* FM stations are not providing the kind of sound that the late Major Edwin Armstrong (the inventor of FM and just about every other important innovation in radio) might have hoped for. If you are very lucky, there are one or more stations in your area who do try to broadcast a clean signal with a reasonable amount of dynamic range and a minimum of EQ. With a little listening experience it is pretty easy to determine who they are. For one thing, their modulation levels tend to be a little lower than everyone else's (they aren't as loud, on average). If a recording is being played over the air and you are familiar with it, or own the same recording, it's easy enough to quickly put your own disc on your turntable and make an A-B comparison. You'll quickly discover whether or not an excessive amount of compression or EQ has been added. And, of course, if you find that you do want to use program sources from stations which have done a lot of signal processing, there is no law that says that what has been done cannot be undone. In other words, if you can figure out just what sort of EQ has been introduced, you can apply the inverse EQ before recording. And if you can get a handle on the type and amount of compression that has been applied at the studio, there are any number of good and relatively inexpensive single-ended expanders which you can use in your listening and recording chain to try to undo the damage. Finally, you can, of course, make your feelings known to the offending stations. Remember, that as a listener you have a fair amount of clout. Listener ratings determine the prices that stations can charge for commercial time and a listener rebellion is what stations want least of all.

Before leaving the subject of FM broadcasting and the contents of Mr. Bloom's letter, let me say that I think it would be a great idea if stations did provide us technical types with an occasional test tone or two. Remember, however, that even if they did this, you would have no easy way of determining whether the distortion you measured was caused by elements at the transmitting end or at your tuner and receiver. There are a great many more factors involved in the generation of harmonic distortion in an FM system than the generation of THD in an amplifier or preamp. For example, even slight mistuning of your receiver or tuner has a more profound effect on increasing distortion than does a slight difference in design.

I would agree, however, that those stations that *are* using Dolby FM ought to at least provide us with a Dolby level test tone once in a while. The Dolby FM station I listen to gives up about 15 seconds of this tone every morning at 6:00 A.M. and I'm losing sleep!



NORMAN EISENBERG AND LEN FELDMAN

Studer B67 Open-Reel Tape Recorder



General Description: The term "Studer B67" denotes a general open-reel tape recorder series available in many different versions, the variations being in track configuration, physical format (console or portable), VU meter incorporation, and so on. The version tested for this report is properly known as the Studer B67-2/2-VU Sync Professional. It is a half-track (two-track, two-channel) model, incorporating true VU meters and "sel-sync" (the facility for synchronizing a previously recorded track with a new track being recorded). The recorder operates at three speeds: 30, 15 and 7.5 inches-per-second. The heads for erase, record and reproduce (play) are completely separate. In common with all B67 versions, this one employs three motors (one for capstan drive and one each for the reels or spools); electronically interlocked control logic; a new electronic tape counter with positive and negative readout; forward and reverse counting; and real-time readout for all tape speeds. Some special transport options provided on the Studer include the automatic mode, whereby the machine switches into rewind when it senses the presence of a transparent leader at the end of a reel of tape, continuing in that mode until the leader at the beginning of the tape activates either "stop," "play" or "record"—depending on the programming previously selected. "Dump-editing" also is

possible by using a "motor off" button which disables the right-hand spooling motor. Yet another option is provided by the "fader start" button which assigns priority for stop and play commands from the transport to an external mixing console.

The tape turntables occupy the upper portion of the transport chassis and come fitted with removable hubs for 10½-inch reels. The tape runs through large diameter tape guides and tension idlers (identical parts on each side of the head assembly) under the head cover where there are additional tape guides. A tape-lift button extends from the top of the head cover, and a tape-splicing block with three pre-cut slots is affixed to the bottom of the cover.

Ranged along the lower portion of the transport section are three groups of controls. The left group includes the AC power switch, a repeat control, the automatic-mode switch, the motor-off button (for "dump editing"), the button to activate "fader start" and a pause button. The middle group contains the main transport controls (rewind, fast-forward, play, stop and record). The third group includes the tape counter and reset button plus the tape-speed selectors.

The large VU meters occupy the center of the amplifier panel. For each channel there are identical controls. These include an illuminated safe/ready but-

ton with indicators for each state, illuminated buttons for input, sync and reproduce, dual-concentric record level controls and dual-concentric playback level controls. Another illuminated button, centered under the level controls and known as "UNCAL," may be used to activate or deactivate the panel level controls. The input and reproduce buttons function as the "tape-source" selector on other decks with regard to the meter display. Finally, under each meter is a stereo headphone jack.

Line inputs and outputs are made via XLR sockets located across the top of the deck. On this section there also are a grounding post, an AC power socket and multi-pin sockets for an optional remote-control unit, a capstan speed control and a VU panel. On the rear of the deck is a fuse-holder and a mains-voltage selector.

The sides of the recorder have handles that hinge down into a recess. Instructions for head alignment, bias adjustment, and much more are contained in a service manual which includes complete details on circuitry, construction, and so on.

Test Results: Every specification for the Studer B67 was confirmed or exceeded in our lab tests. We used Maxell UD-XL open-reel tapes in our tests (Studer specs are referenced to Ampex 456 or equivalent). For the 30 and 15 ips speeds, we measured record/play response at 0 dB, which is a record level of 4 dB above 200 nWb/m or approximately 317 nWb/m. The 7.5 ips speed response was measured at -10 dB from that reference level. In all cases, the response was ruler-flat to well above 20 kHz—so flat in fact that we saw no point in plotting the results on a graph—they would be straight lines.

Distortion at the 0 VU level was extremely low for all three speeds. Signal-to-noise characteristics were excellent. While Studer gives its S/N ratio with reference to 3 percent third-order distortion at a magnetic flux level of 1040 nWb/m, we found that with our sample deck and the tape we were using, 3 percent distortion occurred at a +14 dB level, which works out to be more like 1580 nWb/m. This probably accounts for the outstanding 77 dB S/N we obtained as compared with the specified 71 dB.

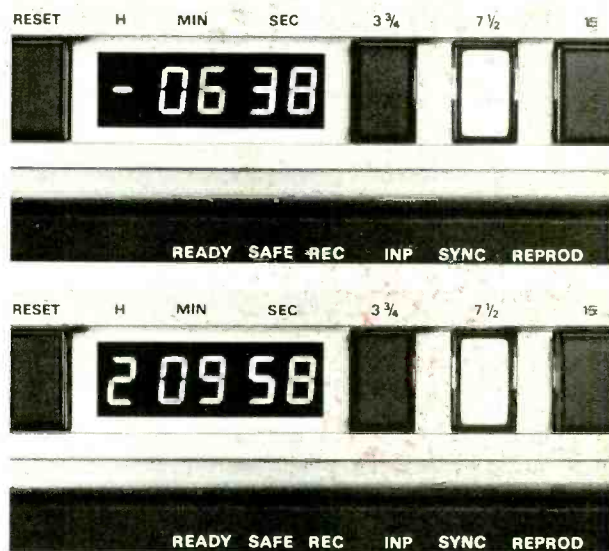
Transport performance was as splendid in its way as the recorder's electronic performance. Wow-and-flutter at any speed was extremely low, and the responsiveness and smoothness of all control actions were truly gratifying.

General Info: Dimensions are 19 inches wide; 20 1/2 inches high; 10 inches deep. Weight is 75 pounds. Price is \$5,450.

Individual Comment by L.F.: It was certainly a pleasure to get my hands on a truly professional open-

reel deck from Studer Revox America, Inc. and to be able to put it smoothly (ever so smoothly) through its paces on the test bench. There are no less than sixteen different variations for the B67 series, but apparently they all use the same superb transport system. The new electronic counter also is standard equipment and offers both forward and reverse counting, real-time readout at all tape speeds, using six digits for hours, minutes and seconds, mathematical display sequence (for negative times, the hour digit changes to a minus sign) and complementary display sequence (negative times are displayed by the complement).

The sel-sync feature included in this deck is the same Studer uses on its multi-track machines. The frequency response in sel-sync is deliberately rolled off at around

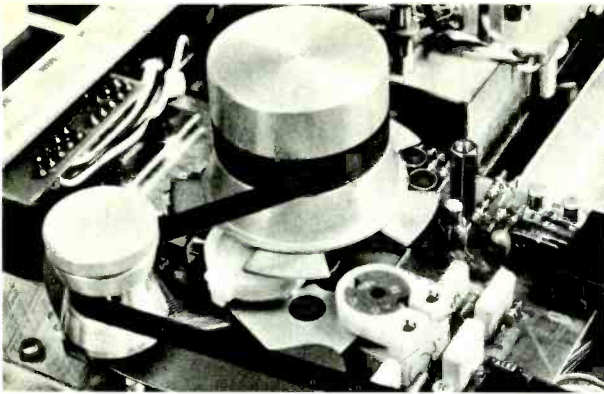


Studer B67: The electronic timer features real time read-out for all tape speeds.

12 kHz in order to avoid any oscillation through the associated board when crosstalk approaches zero dB at high frequencies, and in order to make track bouncing possible. If the frequency-limiting components associated with the sel-sync circuit are removed, frequency response becomes equal to that measured for the playback head.

Incidentally, the heads in this deck are very closely spaced, which we found to be an advantage when attempting to do electronic editing. For editing, the manually operated head shield may be lowered, permitting access to the face of the head. The built-in mechanical tape cutter and the interchangeable splicing block on the head cover facilitate quick and clean editing, I found.

To really appreciate the superb transport action of this deck one should try a "hands on" session with it. The electronically interlocked control logic consists of one large scale integrated circuit (LSI) that stores all



Studer B67: Partial view of transport mechanism and capstan system.

internal and external commands. Transport functions that require an intermediate "stop" mode before the next command can be carried out are released only after the tape has come to a standstill. The control logic reports each transport function by lighting up the corresponding push button. The logic system also permits the inclusion of several additional functions beyond the usual ones such as the automatic command (programmable on the transport control board).

The people at Studer Revox refer to this version of the B67 as "portable." I suppose one could call it that, though at 75 pounds of weight I would hardly expect to lug it around very often. Portable or not, the B67 is certainly a high-quality tape deck that could well form the central, mastering component of any professional studio, large or small.

Individual Comment by N.E.: In assessing the merits of a really professional-grade tape recorder such as this one, it becomes apparent what separates the

real pro model from the "home audiophile" type of machine. It is not so much a matter of actual sonic performance. There are many lower-priced recorders that have response characteristics similar to these or even a little better. At that, I would be hard put to name too many that can boast such low distortion or such ample signal headroom at the Studer B67. Well, what about "features?" I can hear someone saying: "The B67 has no built-in mixing facility and no microphone jacks, but the so-and-so model that costs half as much does." The point is, anyone spending over \$5000 for an open-reel high-speed deck is not looking for such features. He (or she) will have separate mic-mixers and reamps, and likely too a mixing board or console with which a unit such as the B67 mates logically and functionally. What the B67 does have, from the pro standpoint, is dependable performance and sturdy construction—the block, for instance, surrounding the heads is a massive hunk of finely machined metal. The tape turntables, the chassis, the controls—in fact everything about this recorder are all generously designed and amply proportioned. The meters are very large and legible—as one observer put it, "You can see them from almost across the room."

The only possible hitch here is the same one we noted for the Revox B77 test-reported in an earlier issue (November 1979). It concerns the lack of readily available adjustments for different tapes. This is apparently in keeping with the Studer philosophy of deliberately not providing user-available bias and EQ controls. Procedures for making such adjustments are spelled out in the service manual and they are complex [but we assume if you're buying this machine, you do know what you're doing]. Be that as it may, if you stick to tape that is Ampex 456 or equivalent, you don't have to worry—the recorded results will come in on, or better than, specs.

STUDER B67 2/2-VU OPEN-REEL TAPE RECORDER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Tape speeds	30; 15; 7.5 ips	confirmed
Reel capacity	10.5 inches	confirmed
Frequency response (± 2 dB)	40 Hz to 20 kHz	37 Hz to 24.5 kHz
15 ips	30 Hz to 18 kHz	23 Hz to 24.5 kHz
7.5 ips	30 Hz to 15 kHz	16 Hz to 21.5 kHz
Wow-and-flutter		
30; 15; 7.5 ips	0.04; 0.06; 0.08%	0.022; 0.03; 0.04%
THD at 0 VU, 30; 15; 7.5 ips	NA	0.2; 0.35; 0.35%
Record level for 3% THD	NA	+ 14 dB (at all speeds, re: 0 dB = + 4 dBm)
Best S/N (standard tape) "A" wtd	71 dB	77 dB
Rewind time, 2300-ft tape	120 seconds	110 seconds
Line input sensitivity	- 20 dBm	confirmed
Line output level	+ 22 dBm/600 ohms	confirmed
Bias frequency	150 kHz	confirmed
Erase ratio	75 dB	77 dB (1 kHz at 15 ips)
Speed accuracy, 7.5 ips	0.2%	better than 0.1%

CIRCLE 2 ON READER SERVICE CARD

Optonica RT-6905 Cassette Recorder



General Description: It is almost impossible to describe the Optonica RT-6905 in the usual manner, so complex is its roster of over one hundred features, controls and options. The owner's manual numbers 61 pages (double column), which may be something of a record for a cassette deck.

Basically, the unit is a three-head (erase, record and play) cassette recorder, with a fourth head for special automatic sensing operations, and a built-in microprocessor (or microcomputer, as Optonica calls it) with a quartz digital clock.

The microcomputer may be programmed to operate the deck in conjunction with the timer system which also may be used to control four AC outlets at the rear. In addition to automatic unattended recording and playback, this system also offers special timed automatic program selection (up to fifteen selections on a cassette may be programmed in any order chosen by the operator), plus automatic program search for playback. Tape tension also is optimized by the microcomputer prior to each playback operation. Associated with the system is a built-in calendar that enables programming in advance for a full week. The real time that a cassette has been running, or the time remaining on it, also is counted and displayed. Bias and equalization may be set for four basic tape types (normal, chromium-dioxide, ferrichrome and metal) via push buttons; fine adjustments of bias current and recording sensitivity then may be made manually to trim the initial adjustment.

The transport is powered by two motors operating through a closed-loop dual-capstan drive system. Controls are full-logic solenoid operated, and fast-buttoning is possible except for flying-start recording. All transport functions (including the automatic program search system) may be remote-controlled by means of an optional infrared wireless unit. In addition to the readout displays, there is a switchable "beep" confirmation of button use. Programming operations

may be changed or cancelled. There also is a switchable hourly chime system and alarm-programming by day of the week. Batteries serve to protect the computer's memory in the event of AC power failure.

The front panel of the Optonica RT-6905 is, understandably, larger than usual. It actually consists of two panels, with the upper, larger panel relating mainly to tape deck operations and the lower, smaller panel given over to the timer options. As stated earlier, to attempt to describe in detail the contents of these panels in the space available here would be hopeless—no less than ten pages in the owner's manual are devoted to doing just that. Generally speaking, the cassette compartment and the transport keys occupy the center portion of the upper large panel. To their left is the deck's LCD display panel replete with digits, symbols, light indicators and various controls. The main power switch and a stereo headphone jack also are in this area.

To the right of the cassette compartment are the metering and controls associated with signal recording and playback. The meters are peak reading fluorescent bar graphs, one for each channel. A peak-hold feature is provided. Below them are a limiter switch; separate in-

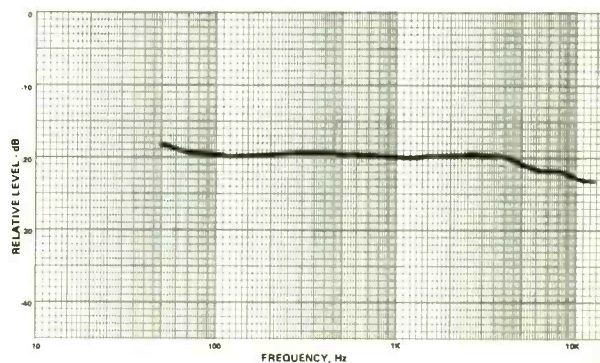


Fig. 1: Optonica RT-6905: Playback-only response, 120 usec EQ.

put controls for microphones and line (input mixing is possible); and the output level control. Both input controls are dual-concentric to permit adjustment on each channel individually or simultaneously. The output level control handles both channels at once, and applies to the line output jacks and to the front panel headphone jack.

Below this group are controls for the deck's Dolby-B system which includes an FM MPX filter option, a recording calibration selector and a recording characteristics fine adjuster (with additional adjustments on the side panel). And below this group are controls for tape/source monitor, and for generic class of tape selection. Along the right-hand portion of the panel are meter switches, microphone jacks, and a stereo line input jack that accepts a ¼-inch phone plug which, when inserted, cuts off the rear-panel line jacks.

The lower panel concerns the timer. Prominent here is the timer LCD display section indicating mode, day, time, AC outlets selected, various possible modes employed and the digital readout information. The rest of this lower panel contains a number of controls and indicators relating to the many possible functions and operations that can be set up.

The upper portion of the rear of the Optonica deck contains the usual pin-jacks for stereo line-in and line-out plus the deck's AC power cord. The lower section of the rear contains the four AC outlets that may be programmed, a separate line cord for the timer section and a special cable that links the deck and the timer. The battery compartment also is accessible from this panel.

Test Results: In the time available for preparing this report it was literally impossible to put this extraordinarily versatile and complex system through all of its possible modes. The number that we did try, however, did work as intended.

In terms of audio performance as such, the deck met or bettered most of its main specifications, and also gave a very good account of itself in those tested areas for which no specs were available. Our measured playback response is plotted in *Fig. 1*, while the record/play response—measured at -20 dB below the unit's meter's zero-dB—is graphed in *Figs. 2, 3 and 4*

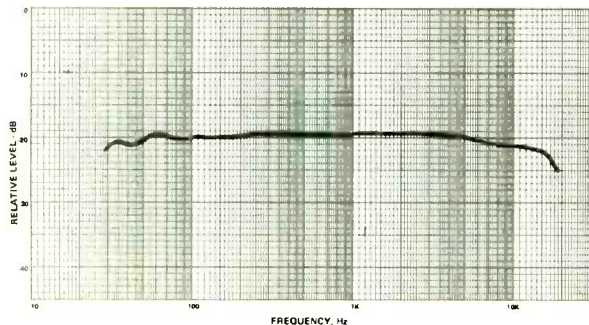


Fig. 2: Optonica RT-6905: Record/play response, TDK OD tape.

for normal (TDK-OD), high-bias (TDK-SA) and metal (TDK-MA) tapes, respectively.

Wow-and-flutter was as low as on any machine we have measured, with an impressive reading of only 0.025 percent WRMS. Distortion also was extremely low—under 1 percent for all three tapes tested. A slightly higher adjustment of bias for the metal tape might have squeezed a little more performance from our particular tape sample in terms of S/N and perhaps slightly lower distortion, but probably at the expense of that wide frequency response out to 21 kHz—that, of course, remains a matter of personal preference which can be satisfied by the deck's adjustments.

General Info: Dimensions are 17 inches wide; 8½ inches high; 14½ inches deep. Weight is 35 pounds. Price is \$1,800.

Individual Comment by L.F.: I am probably going to get some nasty letters from inveterate knob twirlers, button-pushers and audio gadgeteers, but I must be honest with you. To me, the awesome capability of the RT-6905 deck is nothing short of a bit of "overkill." Measuring its basic performance was no real problem. We were able to do that in the lab in the normal time expected, and our usual results (which are quite good, by the way) are shown in the accompanying table of "Vital Statistics."

But before we could even turn on the RT-6905, we had to spend a couple of hours reading the comprehensive 61-page owner's manual just to figure out all of the things that the built-in microprocessor and the timer section below the main deck panel can do. Do you know the difference between "APMS" and "APSS?" Neither did I until I found the appropriate paragraphs in the book that told me that APMS is "automatic programmable music selector" which can be programmed to search out and play up to fifteen musical selections on a tape in any desired order. APSS, on the other hand, scans the tape at high speed in either rewind or fast-forward mode and, when it detects a blank space (which you, of course, must have added to the tape when recording selections), the transport stops automatically there or switches to the play mode.

The quartz clock at the lower left serves as the center of a timer system that controls four AC outlets wired in two groups. Each group can be programmed separately for timed auto start and stop. In addition to automatic recording and automatic waking-up-to-music possibilities, this system also offers special timed (APMS) and tape selection replay options.

I just have to quote a paragraph from the owner's manual which discusses the programming capability of the RT-6905 a bit further. The paragraph is titled "Microcomputer-Controlled Daily and Weekly Programming" and goes on to say:

"A built-in calendar function works with a microcomputer in the RT-6905 to keep track of days of the week, enabling programming for a full week—up to 42 steps a

week or a day. Programs are not cancelled after execution, so regular operations like wake-up alarm or music or daily recording operations need only be programmed once. And the convenient 'every day' function allows easier programming of daily operations, with later programming of, say, week-end operations, cancelling only the reprogrammed days, so that the 'every day' program for week-days is still intact."

I hope that's clear to everyone! Mind you, I have nothing against dreaming up clever things for a microprocessor to do in a cassette deck. I simply wonder how many users—who will be attracted to the unit (and perhaps will purchase it) because of all the buttons and bells and whistles—will actually end up using even half of the programming features of which the RT-6905 is capable. And, if I am right and they don't, the obvious question that follows is: How much extra did these purchasers have to pay for all of these programmable features? My own guess (and it's only a guess) is that perhaps 50 percent of the cost is wrapped up in the timer and the microprocessor programming features of the deck. I arrive at that figure simply because I have measured decks at about half the cost of this one which provide the same *basic* level of performance without all the programming features. I found it rather amusing too that, for all the automated features on the RT-6905, its designers saw fit to place the fine-trim bias and sensitivity adjustments behind a cover on the side panel, and to have them manually tuned rather than by means of that all-knowing and all-doing microprocessor.

Individual Comment by N.E.: The designers of this deck must have set out to build the world's most complicated cassette recorder, one that would boast more microprocessed, timer-controlled automation than anything else on the market—and that would, concomitantly, sport the most populous and complex control array with a suitably lengthy owner's manual to go along with it. If that was their goal—along with, of course, reputable audio performance as such—they have succeeded. But a product such as this raises some interesting questions.

One concerns the whole recent trend of embellishing

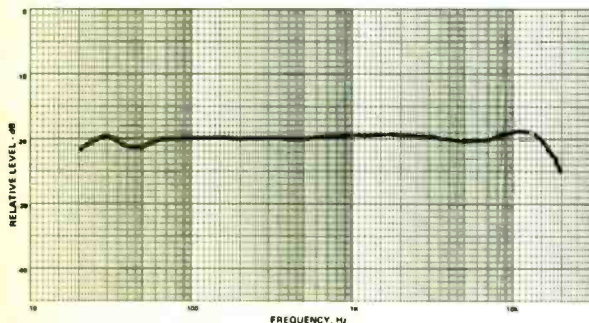


Fig. 3: Optonica RT-6905: Record/play response, TDK SA tape.

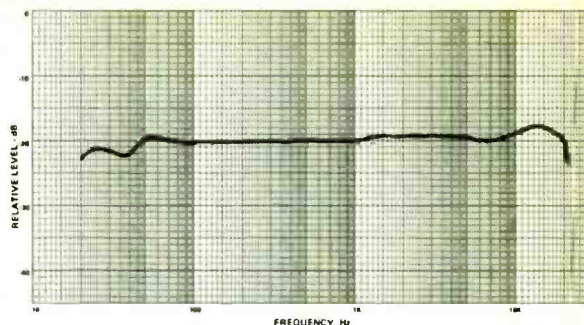


Fig. 4: Optonica RT-6905: Record/play response, TDK MA tape.

what is, in the long run, a "convenience format" and which is still only second-best to open-reel in strict recording terms from the standpoint of the semi-pro or full pro or any advanced serious recordist. Is the cassette format becoming too over-developed for its own future good, not unlike dinosaurs of prehistoric times? Are we witnessing a dazzling display of versatility and ingenious complexity for its own sake? Is it all a manifestation of a new kind of one-upmanship, or a new kind of front-panel war among manufacturers similar in a sense to the former wattage-race among amplifier manufacturers? How much, in other words, of all this clever engineering serves a real useful purpose and how much of it is a showing of technical muscle far and beyond any normal need within the context of the cassette format?

A related question, of course, is for whom would a product such as this be intended? I suppose there must be those who would actually master a 61-page manual in order to utilize this deck to its full versatility. On the other hand, there may be lots more who would want to own it with the idea that, while they may not use all of its automation-capability at first, it would be comforting or assuring to know that there are areas of potential use to be explored, should the spirit or need move them at some future date. Of course, for this possible option, they will have to pay a sizable price for this deck.

In any event, it should also be noted that—automation and computer tricks aside—the deck does provide more than competent audio performance as a cassette machine. Not the best we have yet encountered, but really very good. Response with metal tape did go beyond the 20-kHz mark although the lowest distortion, the best signal-to-noise and almost as good headroom were achieved with high-bias ferrichrome tape. Fast-wind time was rather slow at 105 seconds for a C-60 cassette, but on the other hand wow-and-flutter was really very low at only 0.025 percent.

I think the best advice I can offer to anyone contemplating this unit is to try to see it "in person" and try also to get a look at its owner's manual. If they, or the price of the unit, do not faze you, the RT-6905 may be just the thing for you.

OPTONICA RT-6905 CASSETTE DECK: Vital Statistics

PERFORMANCE CHARACTERISTICS	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response, normal-bias type	± 3 dB, 30 Hz to 16 kHz	± 3 dB, 29 Hz to 17 kHz
high-bias tape	± 3 dB, 30 Hz to 18 kHz	± 3 dB, 30 Hz to 18 kHz
metal tape	± 3 dB, 30 Hz to 20 kHz	± 3 dB, 30 Hz to 21 kHz
THD at 0 dB		
normal bias; high bias; metal	NA; NA; NA	0.75%; 0.70%; 0.95%
Record level for 3% THD		
normal bias; high bias; metal	NA; NA; NA	+ 5.5; + 7.0; + 7.5 dB
S/N ratio, Dolby off		
normal bias; high bias; metal	NA; 60 dB; NA	59 dB; 61.5 dB; 58 dB
S/N ratio, Dolby on		
normal bias; high bias; metal	NA; 70 dB; NA	68 dB; 71 dB; 67 dB
Wow-and-flutter (WRMS)	0.038%	0.025%
Speed accuracy	NA	+ 0.1%
Mic input sensitivity	0.2 mV	0.13 mV
Line input sensitivity	50 mV	65 mV
Line output level	1 volt	1 volt
Headphone output level, 8 ohms	125 mV	140 mV
Fast-wind time, C-60	NA	105 seconds
Power consumption	43 watts	52 watts

CIRCLE 3 ON READER SERVICE CARD

Intersound SP-300 Power Amplifier



General Description: The Intersound SP-300 is a stereo power amplifier intended for professional applications, and rated to deliver 100 watts per channel into 8-ohm loads, 150 watts per channel into 4-ohm loads or 200 watts per channel into 2-ohm loads. It may be switched to provide bridged mono operation with rated outputs of 200 watts into 16 ohms; 300 watts into 8 ohms; or 400 watts into 4 ohms.

The front panel contains two input level controls, one for each channel. Each is labeled in dB steps, and each has its own overload warning indicator LED. Between the two controls are two more LEDs that indicate stereo or mono operation (the mono/stereo switch itself is at the rear). Also on the front panel are a thermal indicator, a "ready" indicator, a power indicator and the main power switch combined with a magnetic circuit breaker.

In addition to the mono/stereo mode switch, the rear

contains balanced inputs (XLR-type connectors) and ¼-inch phone jacks for unbalanced inputs. The main outputs are five-way binding posts, insulated from the chassis. There also is a pair of phone jacks for auxiliary output (channel paralleling) applications. For mono use, the mode switch is moved to mono position, and the output is taken from the two "plus" (red colored) binding posts as per instructions printed right on the panel. The rear also has dual ground terminals (separate for signal and chassis) that permit selecting different grounding systems (the owner's manual contains a special section on avoiding ground loops). The amplifier's power cord terminates in a three-prong plug.

The Intersound SP-300 may be installed "as is" on its four small rubber feet, or it may be standard rack-mounted, with some attention to proper ventilation as detailed in the owner's manual.

Test Results: In MR&M's lab tests, the Intersound amplifier met or exceeded most of its specs, and was a bit shy of spec in a couple of relatively unimportant areas (see accompanying "Vital Statistics"). For those interested, the circuitry is described in the owner's manual. Briefly, it is an all-discrete main amplifier circuit. The input stage employs a low-noise matched pair of monolithic FETs operating as a differential amplifier with a bipolar cascode bootstrap. The second stage follower minimizes loading on the input pair, isolates Miller effects and helps rapid overload recovery. The final voltage stage uses another differential pair with a cascode shielded current mirror circuit to obtain symmetrical drive to the output circuit. Thermal-tracking bias circuitry sets quiescent bias levels for the output stages and prevents thermal runaway at high operating temperatures.

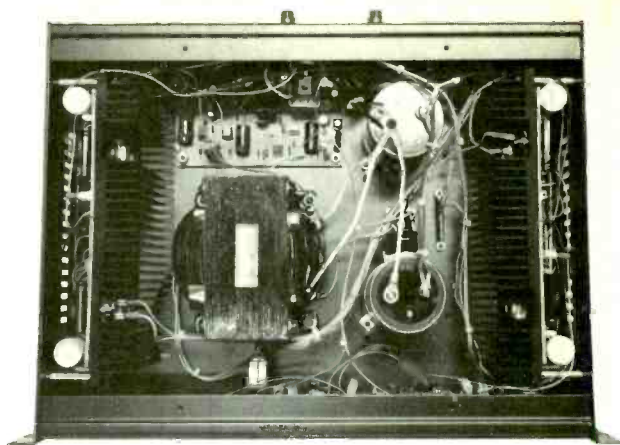
The output stages themselves are wideband full complementary emitter follower triple devices using wideband bipolar transistors which have been selected for high safe operating area, high thermal stability and uniform current gain. What Intersound calls a "variable threshold dissipation limiter" circuit monitors voltage and current across the output devices. This circuit provides drive limiting in the event of a sustained fault condition, but without introducing spurious responses sometimes associated with conventional VI limiters.

In addition to the protection circuit just described and the magnetic circuit breaker mentioned earlier, there are four other types of protection circuits in the SP-300. Thermostats monitor each channel module and remove AC power in the event of an over-temperature condition. The front panel indicator ties in with this circuit. An overload indicator monitors input and output signals. Unlike clipping indicators, this circuit also responds to other forms of overload such as high-level ultrasonic signals (oscillation) and dissipation limiting.

In order to protect the speakers from transients which may occur during turn-on, a relay-controlled delay allows all circuits to stabilize before speakers are connected to the amplifier. DC protection is also provided by a special circuit that disconnects the speaker load when excessive subsonic frequency energy or DC levels of more than a few volts are present in the signal path. This circuit is self re-setting, and the amplifier resumes normal operation as soon as the abnormal signal is removed.

General Info: Dimensions are 19 inches wide, 5½ inches high, 13¼ inches deep. Weight is 43 pounds. Price is \$599.

Individual Comment by L.F.: You'll find no flimsy phono-tip jacks here; only unbalanced quarter-inch phone jack inputs and 3-pin XLR connectors for balanced input operation. One feature which I, for one, appreciated was the dual grounding arrangement—separate signal and chassis ground terminals that allow the user a choice of grounding method. I can't tell you how



Intersound SP-300: Internal view of the unit.

many times I have been in a situation where I would have given just about anything to be able to separate the grounds in a complex hookup in this way, both for hum reduction and, in some cases, to prevent heavy circulating currents and ground loops that upset other equipment with which an amplifier must often be interfaced.

While our measurements (tabulated in the "Vital Statistics" chart at the end of this report) only have space for 4-ohm and 8-ohm power output results, we should note that this amp can drive 2-ohm loads very comfortably and will deliver in excess of 200 watts per channel when doing so, at less than 0.15% total harmonic distortion.

As far as listenability is concerned, I found the sound reproduction from this amplifier to be smooth and totally lacking in any audible forms of distortion, either of the static or dynamic types which have been talked about at length lately. I am told that, following good engineering practice, negative feedback in this amplifier was not used as a cure-all, but was applied only after the designers did everything they could for excellent linearity and low propagation delay. The result, in my opinion, is an amplifier that offers the ruggedness and features required by professionals while delivering the clean sound that anyone will be happy to listen to, regardless of the listening location or environment.

Individual Comment by N.E.: The overall impression of the SP-300 amplifier is one of what may be called the "three R's" of professional audio equipment: reliability, ruggedness and roadability. The complement of features and controls, not to mention the inputs and outputs, are obviously designed with the pro user uppermost in mind. At the same time, the clean performance of this amplifier, its power/distortion characteristics, could well appeal to the home audiophile who hankers after a dependable amplifier in which "cosmetics" are less important than basic performance.

INTERSOUND SP-300 POWER AMPLIFIER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Continuous power for rated THD, 8 ohms, 1 kHz	100 watts	100 watts
Continuous power for rated THD, 4 ohms, 1 kHz	150 watts	158 watts
FTC rated power (20 Hz to 20 kHz)	100 watts	100 watts
THD at rated output, 8 ohms, 1 kHz	0.04%	0.04%
THD at rated output, 4 ohms, 1 kHz	0.08%	0.015%
THD at rated output, 8 ohms, 20 Hz	0.04%	0.04%
THD at rated output, 8 ohms, 20 kHz	0.04%	0.04%
IM distortion, rated output, SMPTE	0.03%	0.017%
IM distortion, rated output, CCIF	0.02%	0.01%
IM distortion, rated output, IHF	0.05%	0.03%
Frequency response at 1 watt (for -2 dB)	5 Hz to 100 kHz	5 Hz to 60 kHz
S/N ratio re: 1 watt, "A" wtd, IHF	90 dB	90 dB
S/N ratio re: rated output, "A" wtd	110 dB	103 dB
Dynamic headroom, IHF	NA	0.63 dB
Damping factor at 50 Hz	100	103
IHF input sensitivity	0.1 volt	0.1 volt
Input sensitivity re: rated output	1 volt	1 volt
Slew rate (volts/microseconds)	45	80
Power consumption, idling; maximum	100; 600 watts	121; 750 watts

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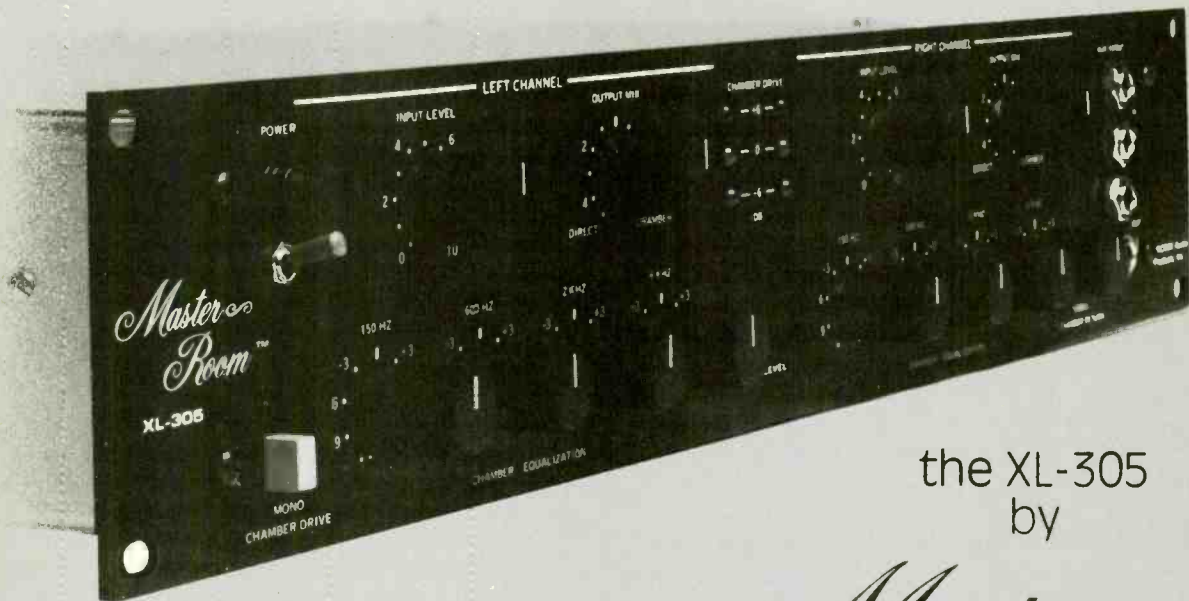
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All Overview of Crossovers - Part Two

By John Murphy and Jim Ford

Our exploration of loudspeaker crossovers continues this month as we reveal a fundamental design flaw of some of the most widely used crossover types: summing error.

Last month in this space we presented a discussion of crossover basics which covered the requirement for multiple loudspeaker drivers in full-range systems, the role of the crossover in these systems and the difference between systems employing passive crossovers and those employing active electronic crossovers. This led to a discussion of multi-amplification (bi-amplification, tri-amplification, etc.) and the advantages of a multiamped system over a loudspeaker system employing a passive crossover powered by a single power amplifier. We concluded the column last month with guidance for crossover frequency selection.

This month we will cover the problems with current crossover designs and identify the crossover types that provide solutions to the crossover problem. We hope that this overview of crossovers (and the series of crossover product reviews to follow in upcoming months) will help our readers better understand their loudspeaker systems and make more informed decisions when purchasing crossovers.

Problems with Current Crossover Designs

As we discussed last month, the function of a crossover is to divide the audio signal frequency spectrum into two separate bands which can be individually reproduced by separate loudspeaker drivers. The drivers should be selected for their ability to cover the assigned frequency range and also for sufficient overlap in response over the crossover region.

Although rarely discussed, it is obviously assumed that these separate frequency bands will be recombined at some point in the listening chain. Actually, the recombination occurs as the signals from the separate drivers are radiated into the listening environment. The resulting frequency response of the system depends not only on the response characteristics of the individual drivers, but also on the way the outputs of the crossover combine. This brings us to the subject of the crossover's summed response.



In order for the individual signals *from* the separate drivers of a loudspeaker system to combine to produce a flat frequency response, it is first necessary that the signals applied *to* the drivers combine to provide a flat frequency response. This is, flat response requires that the output signals from the crossover sum correctly. At first this might seem like an obvious requirement, but the sad truth is that crossovers without summing error are rare. Most of the crossovers we have observed over the past year or so do not produce a flat summed response.

The primary reason for this poor performance is the persistence of one particular crossover design: the 12-dB-per-octave Butterworth filter pair. As a member of that family of filters known as "even-order Butterworth" filters, the 12 dB/octave Butterworth filter is

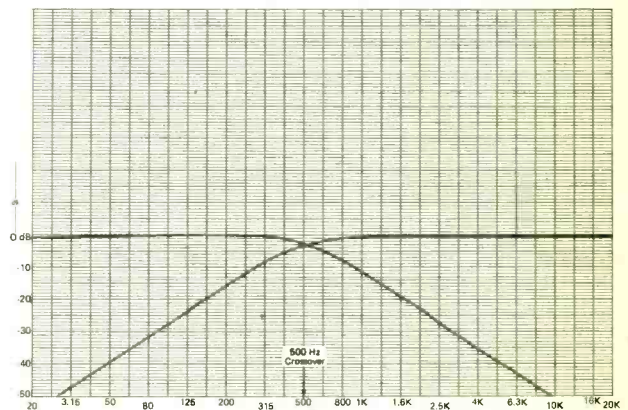
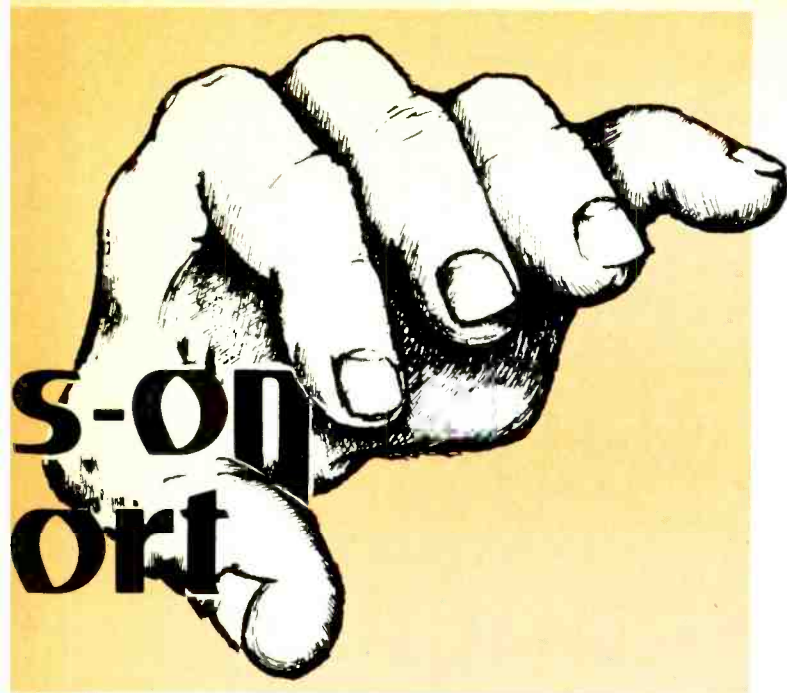


Fig. 3: Response of the individual filters of a typical 12-dB-per-octave crossover (Butterworth).



incapable of delivering a flat summed response.¹ The individual filter response curves of a typical 12 dB/octave crossover are shown in *Figure 3*. This particular unit has a crossover frequency of 500 Hz at which point the response of each filter is down 3 dB. When the high- and low-frequency outputs of this crossover are electronically summed, the result is a flat frequency response with a deep notch at the crossover point as shown in *Figure 4*; note also the aberration in the phase response of the combined signals. A significant improvement can be made by inverting the polarity of one of the outputs of the 12 dB/octave crossover. The summed response then exhibits a 3 dB peak at the crossover frequency (*Figure 5*) which is a big improvement over the 30 dB notch of *Figure 4*.

It might be argued that it is not valid to electronically sum the outputs of the crossover since, in use, the

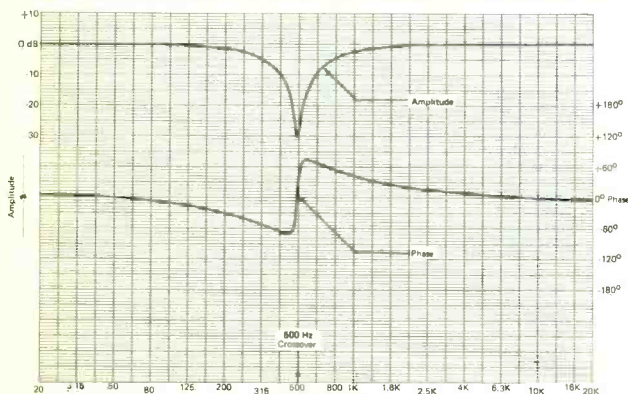


Fig. 4: The summed amplitude and phase response of a typical crossover with 12-dB-per-octave slopes.

crossover output signals will always be summed acoustically. However, even when the outputs are acoustically summed (using high quality loudspeaker drivers with adequate overlap) the result is the same: either a notch or a peak at the crossover point depending on the relative polarities of the drivers. Others have reported, and our own listening tests have confirmed that this notch at the crossover is readily audible. As a result, replacing a 12 dB/octave crossover with a unit that has no summing error can eliminate a significant source of coloration in a loudspeaker system and bring the listener a step closer to the original performance.

Although the units designed with 12 dB/octave cutoff slopes consistently exhibit summing problems, they are not the only culprits. We've seen at least one 18 dB/octave crossover with gross summing error. In this particular case the manufacturer was claiming that the crossover employed "18 dB per octave Butterworth filters." Inspection of the frequency response curves of the unit revealed that the filters did in fact have an ultimate cutoff slope of 18 dB/octave. However, the filter response curves displayed a broad, gentle cutoff indicative of an "overdamped" filter rather than the maximally flat response and quick cutoff characteristic of a true Butterworth filter. When the

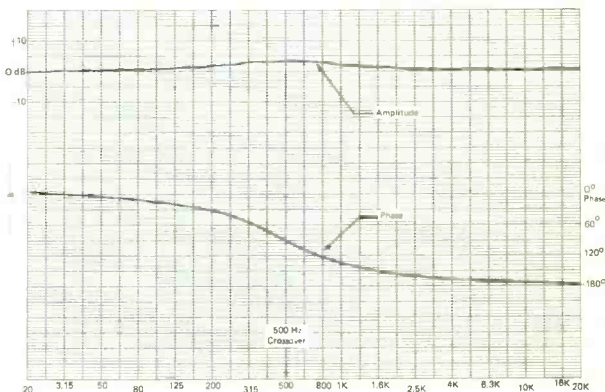


Fig. 5: The summed amplitude and phase response of a typical 12-dB-per-octave crossover with the polarity of one output inverted.

high and low outputs of this crossover were summed the resulting amplitude response had an unusually wide notch at the crossover. Inverting the polarity of one output produced a wide 3 dB peak at the crossover frequency. The point is this, there are many ways to make bad crossover filters even though the 12 dB/octave Butterworth pair is the most infamous.

Solutions to the Crossover Problem

The solution to the problem of crossover summing error is to use as crossovers only those filter types which can sum to provide a flat frequency response. In our observations of products available over the last year or so we've seen only two types of crossovers that are capable of properly summing. The first is the 18 dB/octave Butterworth filter pair which is currently employed in several units on the market. The other type we've seen that will properly sum occurred in a product that is rather unique. This particular unit employed 12 dB/octave Butterworth filters with a front panel control for adjusting the attenuation of the filters at the crossover point. By setting this control for 6 dB of attenuation at crossover (rather than the -3 dB response of a "normal" filter pair) and inverting the polarity of one output, a flat summed response could be obtained. Unfortunately, using a straightforward polarity connection or any other setting of the "attenuation at crossover" control resulted in the typical summing errors of 12 dB/octave crossovers. The fact that a flat summed response could be obtained with this unit seemed as much an accident as good engineering. We should note here that these are by no means the only two types of filters that are capable of an accurate summed response; they are just the types that have found their way to market.

Probably one of the best solutions to the crossover problem is the 18 dB/octave Butterworth filter pair. The individual response curves for a typical 18 dB/octave crossover are shown in *Figure 6*. When the high and low outputs of this filter pair are summed, the

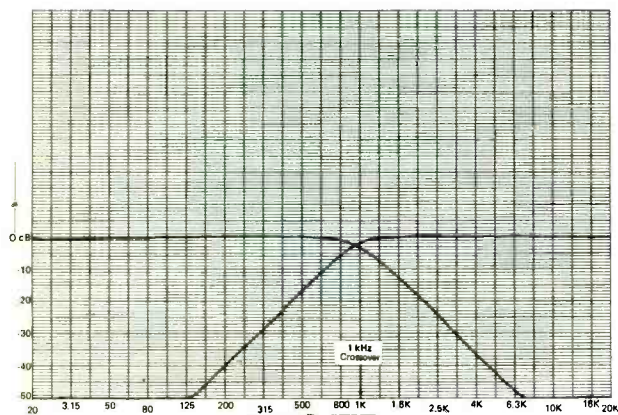


Fig. 6: Response of the individual filters of a typical crossover with 18-dB-per-octave filter slopes (Butterworth).

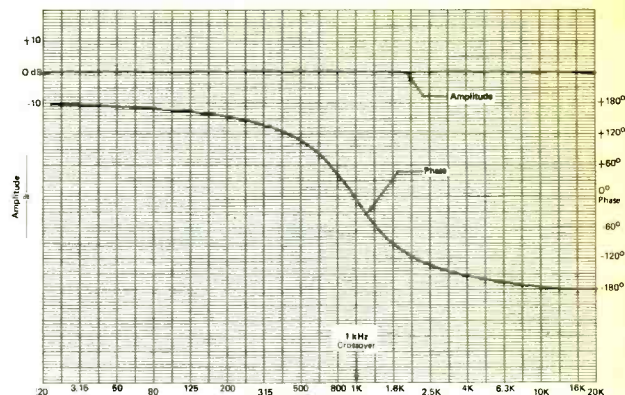


Fig. 7: The summed amplitude and phase response of a typical crossover with 18-dB-per-octave slopes.

result is a flat amplitude response regardless of whether the relative polarity of the outputs is inverted or not. The summed response characteristics for both cases are shown in *Figures 7 and 8*. Comparing the two cases it can be seen that inverting the polarity of one output provides the best phase characteristic—that is, the least total phase shift across the spectrum. Whether or not such a phase shift is audible has, to the best of our knowledge, not been firmly established. One report¹ that we are familiar with indicates that this phase shift is not audible; another researcher reports² that some change can be noticed on certain sounds (clicks) when a phase shift of this type is introduced into the listening chain. Our own listening tests to this point have indicated that this phase shift is not audible. However, we suspect that it may require a very high quality monitor with accurate phase response to reveal such a subtle effect. (Can you really expect to hear the introduction of a subtle phase distortion over a monitoring system which has severe phase distortion?)

For the most critical monitoring systems where accurate phase response is desired (and the quality of the drivers warrants it) there is a class of accurate phase

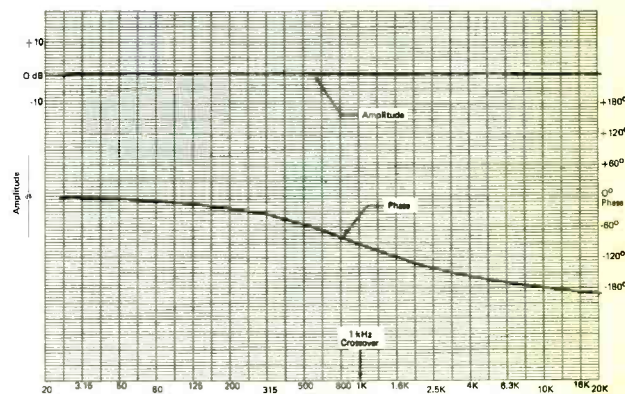


Fig. 8: The summed amplitude and phase response of a typical 18-dB-per-octave crossover with the polarity of one output inverted.

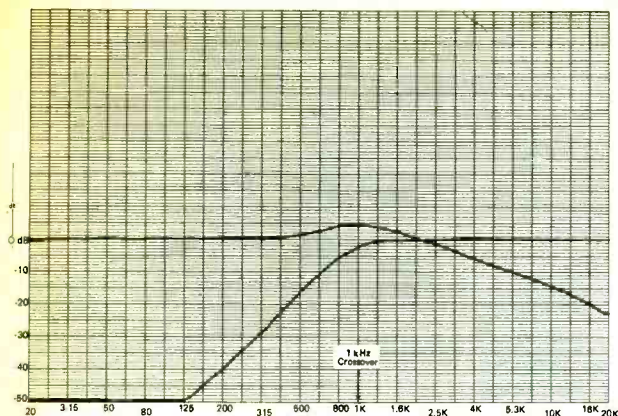


Fig. 9: Response of the individual filters of an 18-dB-per-octave crossover (Butterworth) with a derived low-pass output.

crossovers which can be employed. These filters constitute what are known as "constant-voltage" crossovers and their use was first described in detail³ by Dick Small, one of the pioneers of scientific loudspeaker design. One example of this class of filters is the filter pair shown in *Figure 9*. The high-pass filter is an 18 dB/octave Butterworth type. The low-pass signal here is "derived" from the high-pass signal in such a way as to force the sum of the outputs to equal the input signal. This is done by subtracting the high-pass signal from the input signal to obtain the low-pass signal. (IF: $LOW = IN - HIGH$, then: $HIGH + LOW = IN$.) The resulting low-pass response is a bit unusual in that it has a 4 dB peak at the crossover frequency and a cutoff slope of only 6 dB/octave, but as *Figure 10* shows, the summed response has not only a flat amplitude response but a flat phase response as well. Because of this it will do something no other class of filters will do: it will pass a square wave without distorting the shape of the waveform. The filter pair shown in *Figure 9* is only representative of the constant-voltage filters since many different filter shapes are possible. In fact, whenever one of the filter outputs is derived from the other as we've described, the constant-voltage characteristic results.

Whenever a 12-dB/octave Butterworth crossover is used (and there are many of them out there!) there is a choice between the response shown in *Figure 4* and that shown in *Figure 5*. The 3 dB peak is clearly preferred over the 30 dB notch. This response is obtained by reversing the polarity of one crossover output with respect to the other. In practice this is typically accomplished by reversing the leads to one loudspeaker driver or the other (but not both!). The situation is complicated by the fact that in some crossovers the manufacturer has already performed the phase inversion so that a second reversal by the user then results in the "in-phase" connection of the drivers and the corresponding notch in response.

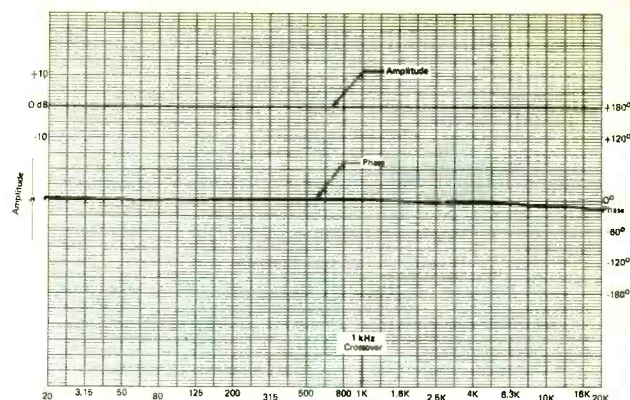


Fig. 10: The summed amplitude and phase response of the derived crossover in Figure 7.

Our discussion has been concerned mainly with 12 and 18 dB/octave Butterworth crossovers because these are the types most frequently employed in electronic crossovers. However, it should be noted that a flat amplitude response can be obtained with 6 dB/octave crossovers and also 30 dB/octave crossovers (these are both so-called "odd order" filters like the 18 dB/octave type). Similarly, we should note that 24 dB/octave and 36 dB/octave filters will exhibit the same problems as 12 dB/octave types since these are all "even order" filters.

In conclusion, we recommend 18 dB/octave Butterworth crossovers for general purpose use in high-quality loudspeaker systems. These filters provide an accurate summed response whether the relative polarity of the outputs is inverted or not. However, the inverted polarity connection offers a better phase characteristic than the non-inverted connection. At this point in time the indications are that the phase shift resulting from these crossovers is not generally audible. For critical monitoring where it is felt that accurate phase response is required, constant-voltage crossovers should be employed. Because constant-voltage crossovers sum to provide both flat amplitude and flat phase response they have a unique capability to pass square waves intact.

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GROOVE VIEWS

Reviewed By:
ROBERT HENSCHEN
NAT HENTOFF
JOE KLEE
ALLAN KOZINN
STAN SOOCHER

POPULAR

GENTLE GIANT: *Civilian*. [Geoff Emerick and Lee Abrams, producers; Geoff Emerick, engineer; recorded at Sound City, Van Nuys, Ca.] Columbia JC 36341

Performance: **More or less pretentious**
Recording: **Improved, cleaner**

One of the most innovative English bands of the early Seventies, Gentle Giant brought complex rhythms and mondo-Baroque harmonies to rock & roll. Excellent albums like *The Power And The Glory* and *Free Hand* were bold, important, challenging, and entertaining.

As the decade wore on, however, Gentle Giant faltered with the trendy times, and then tried to capture that changing audience with compromising, and mediocre, issues such as *The Missing Piece* and *Giant For A Day*. An excellent "live" band of visual flair and mechanical precision—a neon sign onstage flashed "PRETENTIOUS" during their more esoteric passages—Gentle Giant took off two years to freshen up. They rethought their musical direction, switched labels from Capitol to Columbia, and came back with a disc that streamlines their classical-rock roots without bowing to pop or disco commercialism.

"Convenience (Clean And Easy)" reattains the old Gentle Giant intensity but makes it look effortless. Kerry

Minnear's synthesizer and organ work is reminiscent of vintage Yes to a certain extent, Gary Green is jazzy on guitar, and Ray Shulman rips along on bass. Lead vocalist Derek Shulman, of course, has always been an exciting front man, and he has some strong new song vehicles in "All Through The Night," "Number One," and "Underground." With an organ pipe voice similar to Steve Winwood, Shulman distorts a bit at high volumes, that's part of his sound. But Geoff Emerick keeps Giant's muddiness to a minimum.

The band rocks pretty steadily, but Minnear does a sensitive job on the ballad "Shadows In The Street" and Shulman breaks off for "Inside Out," a dreamy, Traffic-sounding cut on side two. The consistency of material here, whether fast or slow, is the key for



GENTLE GIANT: Back after a layoff with consistent material.

Gentle Giant. The band has always been a cooker in the fusion vein, as they proved on a recent 5-week U.S. tour, but the long layoff gave them time to come up with some worthy music. *Civilian* offers eight new works of appeal and imagination. R.H.

GRAHAM PARKER: *The Up Escalator*. [Jimmy Iovine, producer; Shelly Yakus, engineer; Dave Thoener, Jon Mathias, additional engineering; James Farber, Steve Marcantonio, Benji Armbrister, Larry Franke, Bernie Yakus, assistant engineers; no recording location given; mastered at Sterling Sound, N.Y. by Greg Calbi.] Arista AL 9517.

Performance: **Masterful**
Recording: **Exquisite**

Graham Parker's albums often take time to grow on a listener. His last one, *Squeezing Out Sparks*, didn't really make its impact for months after its release, but by the end of 1979 many critics had placed it in their listings of the top albums of the year. GP and the Rumour's newest takes about half of the first side to make its impact, and by the end of the record it's already obvious that this is every bit as strong as last year's effort. It's just a bit different: slicker (without much apparent damage, luckily), thanks to Jimmy Iovine's production, and somewhat clearer in focus and direction, thanks to Parker and band's maturity as an ensemble.

There has been one major change in

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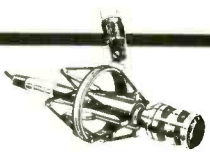
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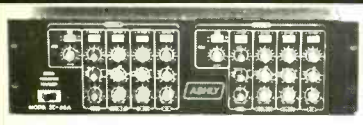
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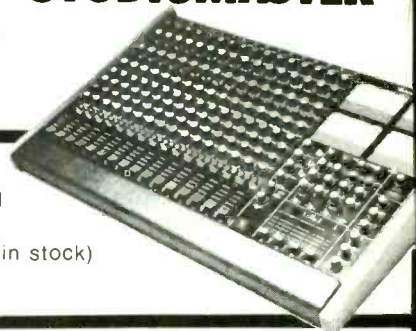
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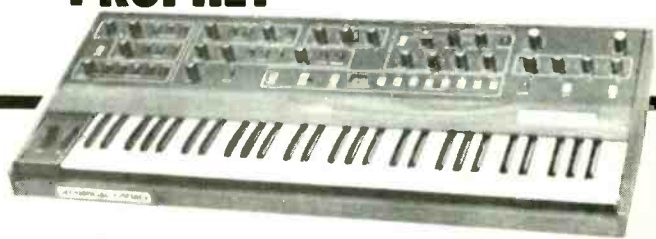
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the band's lineup. Keyboardist Bob Andrews has left the Rumour (at least as Parker's backing band, though he may continue on the Rumour's own albums). He's been replaced on this recording by piano vet Nicky Hopkins, who is a natural in this outfit and who would be a welcomed permanent addition, judging by the contributions he's made here.

The organ is being played by the E Street Band's Danny Federici, but generally the instrumental sound is

dominated by the ever-improving playing of Brinsley Schwarz and the drumming of Stephen Goulding.

However, despite the fact that the Rumour has turned into one of the most talented and rockiest groups around, it's Parker's songs and singing that draws all of the other elements together. And these ten songs are among the best he's ever written, without a weak one in the bunch.

The lyrics are enhanced by Iovine's production, which places Parker's



GRAHAM PARKER: Certainly slicker, but certainly aimed in the right direction.

seething vocals way up front throughout most of the mix, and still maintains the individual musician's contributions, without the sound ever becoming murky. This is a rare record that is both always powerful yet clear as a bell. Each musician in the band is given his chance to shine. Schwarz turns in short but brilliant guitar solos in a few songs, while Hopkins and the rhythm section keep up an airtight, solid rock and roll base behind them. This is a band in the true sense of the word, not unlike the Stones in their approach.

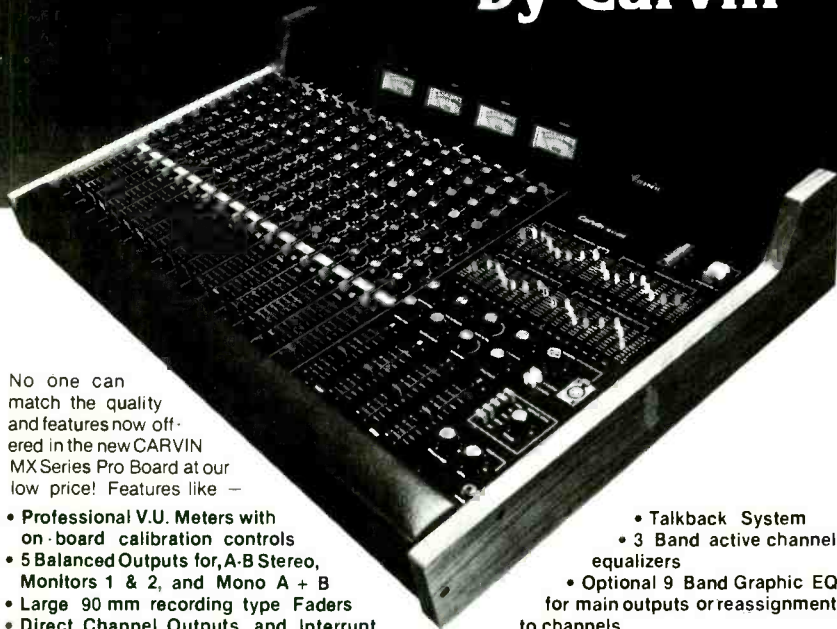
There is a unified sound on *The Up Escalator* that was only hinted at on *Sparks*, and only in time will it be obvious whether the songs themselves hold up as well as the recording of the songs. But Parker has shown that he is an adaptable artist—he can sing a ballad emotionally, and shout a rocker so that he sounds positively threatening—and it's safe to assume that he will get his due, if not this time out, then maybe the next. J.T.

ROBIN WILLIAMSON AND HIS MERRY BAND: *A Glimt At The Kindling*. [Robin Williamson and his Merry Band, producers; Joel Goldsmith, engineer; mixed by Dirk Dalton, Robin Williamson, and Jerry McMillan; recorded at Dirk Dalton Recording, Santa Monica, Ca.] Flying Fish FF 096.

Performance: **Quaint**
Recording: **Airy**

Tales of Robin Hood usually include a group of minstrels who sit peacefully by the side of the road, commenting on the events unfolding before them. Arrows

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fly, fortunes are lost, kings are overthrown, but the minstrels never lose their cool. And they never talk about themselves. Robin Williamson and his Merry Band leave the role of the minstrel as passive storyteller in the dust as they seize center stage while Williamson tells us about his childhood in Scotland.

"The Road The Gypsies Go" sets the stage for Williamson's pranks: "They came glittering through the gloom/& their tongues as strong and nimble/As would bind the looms of luck." Then, "Me & The Mad Girl" finds a schoolboy skirting the edge between sanity and insanity. "Lough Foyle," with lyrics by Williamson set to "Nancy's Whiskey," is an anti-military tune. "By Weary Well" describes the loss of innocence through love. The real centerpiece, though, is "Five Denials On Merlin's Grave," an ancient history of the British Isles that recounts the plunderings of invaders with Williamson's hypnotic monologue weaving in and out of the Merry Band's musical tapestries. Because the Merry Band's main concern is the preservation of the traditional acoustic instrumentation of Celtic music, their arrangements are dotted with highland bagpipes, hammer dulcimer, metal string harp, bones, bombarde, and eight-keyed baroque flute. Williamson's voice sometimes sounds like Donovan mimicking Ian Anderson, which lends the procession whimsical overtones.

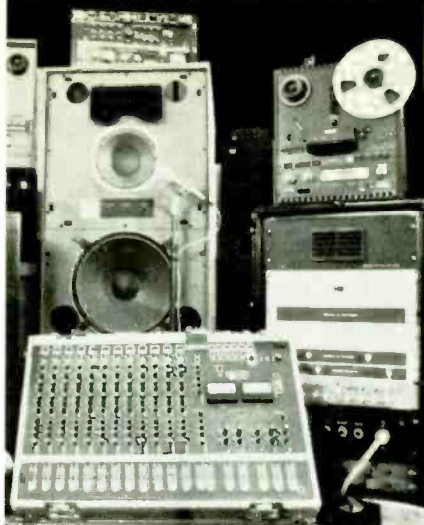
Williamson's twelve albums with the Incredible String Band represented the greatest amount of British chart activity of any group between 1967 and 1973 with the exception of Cream, the Beatles, and the Rolling Stones. His third release with his Merry Band is being overlooked by the rock/jazz/disco/country mainstream. But that probably won't stop a Scottish brogue from creeping into your speech after several listenings to *A Glint At The Kindling*. SS.

ELVIS COSTELLO AND THE ATTRAC-TIONS: *Get Happy!!* [Nick Lowe, producer; Roger Bechirian, engineer; recorded in Holland.] Columbia JC 36347.

Performance: **New Rock energy in a nutshell**
Recording: **Hectic but apropos**

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disc to attempt this. But when the most important songwriter of recent years, Elvis Costello, condenses his considerable craft down to a barrage of two-minute songs it is a noteworthy moment for today's rock.

There is so much new material here that *Get Happy!!* may lack the immediate impact of *Armed Forces*. And in a certain sense, Costello loses a bit of the momentum that has been building from one album to the next since his breakthrough three years ago. But even on the least impressive cuts,

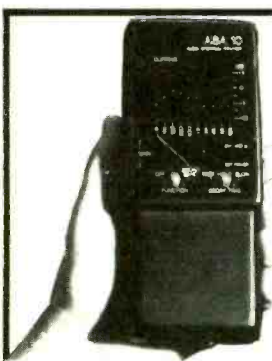
where an Elvis "formula" can almost be cited ("I Can't Stand Up For Falling Down," "I Stand Accused"), there remains an infectiousness about the Attractions' basic beat.

With the intensity of a Costello "live" performance, this studio session races from one tune into another, rarely letting up on a persistent pulse or relinquishing its hold on our senses. Behind the fervent tempo and steady stream of Costelloesque melodic hooks, as simple as they may seem, Elvis is an engagingly clever lyricist too—even

when many of his songs center around typical topics of love, break-up, and loneliness. There's a slightly angry edge to these lyrical statements, and only a touch of humor in Costello's serious image juxtapositions.

Best of the rockers include "The Imposter" and "King Horse," while other cuts show an interesting debt to such historical figures as the Beatles ("Possession," "Beaten To The Punch"), Booker T. & The M.G.'s ("Temptation"), and Buddy Holly. *Get Happy!!* also draws heavily on Caribbean reggae and ska rhythms (Costello recently produced The Specials for Chrysalis) that make for excellent songs like "Opportunity" and "Human Touch." When he slows down further for "New Amsterdam," "Riot Act," and "Motel Matches," Elvis is sometimes painfully evocative: "... forever doesn't mean forever anymore."

Nick Lowe writes in his liner notes that he and Costello shared concern over the number of tracks on the LP. "We can now reassure hi-fi enthusiasts and/or people who never bought a record made before 1967," he says, "that with the inclusion of this extra music time they will find no loss of sound quality due to 'groove cramming' as the record nears the end of each face." Actually, from an artistic standpoint, this volume *could* have been pared down to the standard six bands per side without injury. But there's good new material here, and maybe the hectic schedule lends this package extra urgency. R.H.



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CIRCLE 59 ON READER SERVICE CARD

JAZZ

ELLA FITZGERALD AND COUNT BASIE: *A Perfect Match*. [Norman Granz, producer; Dave Richards, engineer; recorded at Mountain Studios, Montreux, Switzerland, July 12, 1979, on the Sony Digital Recording System.] Pablo Today D2312110.

Performance: **An Ella-gent en-Counter**
Recording: **Digital perfection**

At the time of this recording Ella was 61 years old. She'd been in the business more than 45 years and who could blame her for being a little tired of it all. She sounds like she's just that for the first

three tunes on this LP but somewhere during her singing of "Make Me Rainbows" Ella Fitzgerald catches fire and when Ella Fitzgerald catches fire, things happen. For the rest of this LP, it's one of those nights when Ella was right and the band was right (primarily Basie's band but with Ella's rhythm section, plus Freddy Green on guitar) and the crowd was right (from the date and place, I'd guess it was the Montreux Festival crowd, but then why doesn't the record jacket state so?).

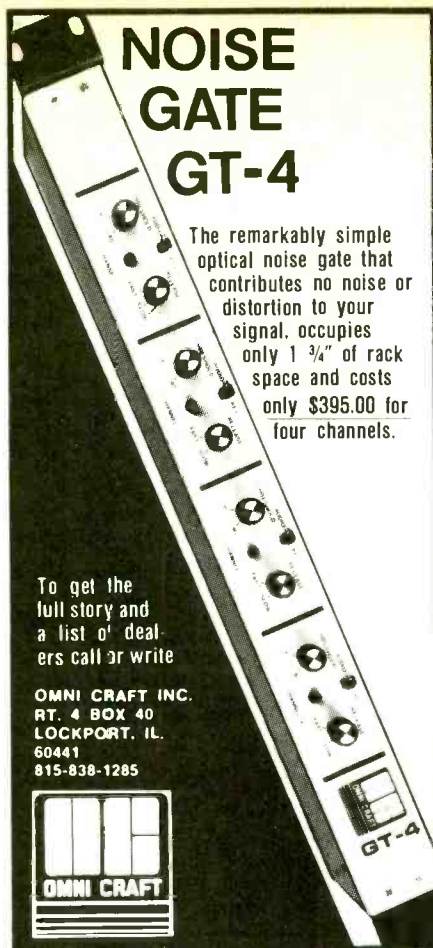
Actually, Norman Granz could have made a lot better use of Basie's band. For most of the record they're just reading charts behind Ella. Any dozen and a half guys from the Local 802 hiring hall could have done that, but when you've got Basie's band doing that, it's a waste of Basie-power. Danny Turner provides a flute solo on "Round Midnight" and the final "Basella" has contributions from saxophonist Eric Dixon (not that good) and trombonist Bootie Wood (who is playing better than any trombonist I heard last year, so he got my vote in the polls). "Basella" is the track they're going to talk about on this LP. It's a medium fast blues that opens with Basie at the piano before Ella goes into her scatting act. Ella plays her famous quotations game and is joined in the fun by Dixon and Wood. Before they're through they've gone all the way from "C Jam Blues," "Shake That Thing" and "When Yuba Plays the Rhumba On The Tuba Down In Cuba" to "Things Ain't What They Used To Be," "Rockin' In Rhythm" and "Hallelujah I Just Love Her So."

In between there are gems such as a burning hot "St. Louis Blues" and an "After You've Gone" that rank among the best I've heard.

There's likely to be less agreement about Ella's way with Billie Holiday's classic blues "Fine And Mellow." Ella's blues have always been a lot more up than Billie's and comparing the styles of the two is as futile as comparing Lester Young and Charlie Parker. Both are excellent but for ever so different reasons. Ella even manages to make some kind of sense out of "You've Changed," a ballad which always left me cold until this hearing.

I can understand why Ella feels comfortable with her pianist, Paul Smith. Paul is an excellent accompanist and he sure knows Ella's charts—he's been doing it long enough so he should. I've always admired Paul and found him a very tasty player, but so is Basie and why the heck Count isn't on piano for the whole LP instead of just coming in


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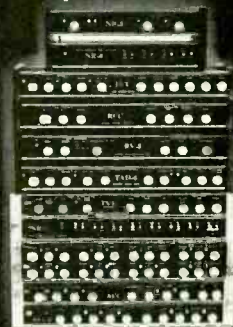


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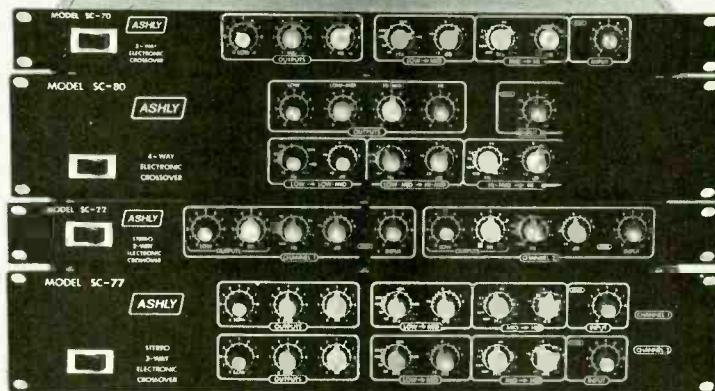
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The Wondrous Scope of Jazz Piano

By Nat Hentoff

Henri Renaud is a French pianist-composer of considerable jazz quality, but it is as a recording director that Renaud now makes what is perhaps his most significant contribution. Encouraged by Bruce Lundvall, president of Columbia Records, Renaud has achieved an unusually ambitious project, *I Remember Bebop*. On two LPs, eight of the most vital pianists of modern jazz are heard—separately—in brilliant tributes to the masters of bop.

Thus, Al Haig plays Dizzy Gillespie; Duke Jordan re-explores Tadd Dameron; John Lewis improvises on his own distinctive, distinguished themes; Sadik Hakim (formerly known as Argonne Thornton) recalls his time with Charlie Parker; Walter Bishop Jr. also probes the protean forms of Bird; Barry Harris provides incisively fresh perspectives on Thelonious Monk; Tommy Flanagan illuminates Bud Powell; and the continually surprising Jimmy Rowles creates impressions of works first performed by the Miles Davis Nonet.

I cannot recall so sustainedly absorbing, and diversely exciting, a piano set. All the players are in exceptional form—perhaps because they knew that the producer, Henri Renaud, is also a most discerning musician. He also wrote the notes and makes the useful point that John Lewis, as is so evident here, is both a great jazzman and a great bluesman. The recording quality is such that engineer Stanley Tonkel ought to get a special Grammy for this one. It's all so clear and full—and alive.

Meanwhile, formidable new pianists keep coming on the scene, and one, 35-year-old George Cables, is responsible for one of the year's most hotly precise and cohesive albums. An alumnus of, among other combos, those of Art Blakey, Sonny Rollins, Freddie Hubbard,

and Dexter Gordon, Cables records for Contemporary. The late Les Koenig made this label a model of sensitivity to musicians, and his son, John, is continuing the tradition.

Playing mostly originals by Cables, the band performs with a collective warmth and mutual attentiveness that makes this more than a showcase for soloists. Not that the individual players don't get plenty of space in which to stretch. They include trumpeter Freddie Hubbard; vibist Bobby Hutcherson; and a most striking tenor and soprano saxophonist, Ernie Watts, who has a big, fervent sound and bountiful ideas.

In this compatibly challenging setting, by the way, Freddie Hubbard is more relaxed and thoughtful than he has been on records for some time. As for George Cables, he is a pianist with prodigious technique, but it's all used to serve his passion for telling stories and setting moods in many colors. Currently he's leading his own group, Cable Car, and is working on more albums for Contemporary.

Another Contemporary tradition, by the way, has always been careful engineering attuned to the way the musicians hear their music. This heritage too is being maintained, as evidenced by the *presence*, in ensemble and in solo, of the music here. But it's not artificial presence. It's as real as they are.

AL HAIG, DUKE JORDAN, JOHN LEWIS, SADIK HAKIM, WALTER BISHOP JR., BARRY HARRIS, TOMMY FLANAGAN, JIMMY ROWLES: *I Remember Bebop*. [Henri Renaud, producer; Stanley Tonkel, engineer.] Columbia C235381.

GEORGE CABLES: *Cables' Vision*. [John Koenig, producer; Allen Sides, engineer.] CONTEMPORARY 14001.

for "Basella," I, for one, can't figure out! Between you, me and the gatepost, although the liner notes state that Count Basie plays only on "Basella," if he isn't the pianist whose intro begins "Honeysuckle Rose," then Paul Smith's been taking "splanking" lessons from the man who invented the splank, Count Basie himself. Also, despite the fact that Mickey Roker is listed on drums for the whole set, it sure sounds to me like Big Bad Butch Miles on drums after the band comes in again following Ella's trading fours with Bootie Wood on "Basella."

Never matter, no mind, it's a perfect match, a great record, Buy one...buy two and turn on a friend. J.K.

CHICK COREA: Tap Step. [Chick Corea, producer; Bernie Kirsh, engineer; recorded and mixed at Love Castle Studio and Oceanway Recording Studio, Cal.] Warner Bros. BSK 3425.

Performance: **Diversity with flair and finesse**
Recording: **Fewer indulgences**

No question about the fact that Chick Corea has, in less than ten years, risen from the jazz ranks to become a household word with rock & rollers. His popularity is certainly deserved—Corea is a hard-working composer and multi-keyboardist with few equals. But as he now probes every nook and cranny of his creative whim, indulgences have become frequent and his recordings are now so diversified as to seem almost imposing.

Luckily, there's only one Gayle Moran vocal on this album and a lot more music. Not that Moran doesn't deserve her say as an artist, but her brand of ethereal romanticism limits what Corea could do in terms of contemporary root music—basic, emotional music with less concern for elaborate technique, and a greater emphasis on spontaneity.

One immediate example of just this kind of earthen fervor is "Samba L.A.," the opening cut with Brazilian percussionist Airtó Moreira, his wife Flora Purim, percussionist Laudir Oliveria, and a carnival chorus. This six-minute tune percolates with pulse and color, and bodes well for the rest of the album.

Ms. Moran sings on "The Embrace," typically thin and sentimental, but there's more emphasis on musician-

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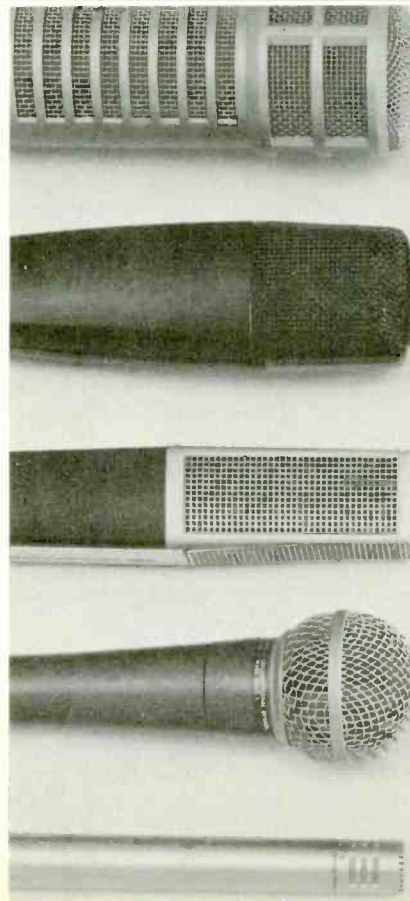
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ship, especially Corea's piano and Hubert Laws on flute. "Tap Step" sends Corea's cohorts into an upbeat, glossy combination of bebop, marching band, dance, and fusion musics. It's a fine tune, exemplary of Corea's expanding prowess as an arranger for larger groups. Possibly a little too manipulated, but hot. Note the new Corea rhythm section of Bunny Brunel (fretless bass) and Tom Brechtlein (drums), plus Joe Farrell on tenor sax and Al Vizzuti on trumpet.

Side two contains a partially synthesized fusion piece with a taste of Latin ("Magic Carpet") and an excellent horn chart ("Flamenco") with room for Joe Henderson to step out on tenor. Less familiar formats are "Grandpa Blues," a slow shuffling R&B tune influenced by Herbie Hancock's use of the Vocoder (Stanley Clarke makes his only appearance here on piccolo bass and talk box), and "The Slide," a simmering Latin jam with plenty of percussion and grittier keyboards.

Corea may still be trying to cook on too many burners at once. He flirts with styles but doesn't commit himself to any single direction for any length of time. On one hand, few musicians can claim this much diversity with so much flair and finesse. More feeling and less flash—perhaps whole albums devoted to single concepts—might be the something deeper that jazz fans could really sink their teeth into. But this is still one of Corea's better recent efforts, and the fidelity is famously superb. R.H.

JIM BEEBE'S CHICAGO JAZZ: *Saturday Night Function*. [Robert G. Koester, producer; no engineer listed; recorded September or October, 1978 at Malcolm Chisholm Sound Studios, Chicago, Ill.] Delmark DS-218.

Performance: **The ensemble Toots—and how**

Recording: **It all comes through—together**

At last a band that plays just what its name claims. Jim Beebe's Chicago Jazz is just that—Chicago jazz. And, like most of the best bands in that style, the ensemble is what is important. Jim Beebe, as good a trombonist as he is, will not make you run home and break up all your Miff Mole and Jack Teagarden records. He's good but he's

not that good. And neither Bob Schulz nor Spanky Davis is the new Messiah on trumpet. They don't need to be. In Chicago style—some call it Dixieland, some just call it music, I call it jazz myself—the soloist is subservient to the polyphonic improvised ensemble and you won't hear much of that anymore. It shows up on the first and last cut of this record in particular but the ensemble spirit is always bubbling beneath the surface. Since this band plays (or at least did play at the time this recording was made) in the Flaming Sally's Club in Chicago's posh Blackstone Hotel, there's a certain Las Vegas show lounge sophistication to some of what they do. Their versions of "Hard Hearted Hannah" and "I Only Have Eyes For You" are certainly concessions to that kind of a gig where the band has to play requests, and "Bourbon Street Parade," featuring drummer Barrett Deems, probably brings down the house especially during convention season. Interspersed with what the public wants to hear are hard-driving versions of such jazz classics as "I Ain't Gonna Give Nobody None Of My Jelly Roll" and "Struttin' With Some Barbecue" plus such rarities as Jelly Roll Morton's "Winin' Boy Blues" and Steve Behr's boogie-woogie tribute "Memories of Albert Ammons."

Some of these players have been around the Windy City long enough that I had heard them before I split town for the Big Apple, and many is the night I spent listening to Beebe play trombone with Bob Scobey's band. The real surprise here is Steve Behr. A mutual friend had taken me over to Steve's home some years ago because he felt I should hear this exciting young pianist. He was, at the time, much influenced by Thelonius Monk and his playing was not at all in what you'd call the traditional Chicago bag and yet there were telltale signs, like Fats Waller and Jelly Roll Morton records laying around the house, which told me that he was studying the past masters. That's why I'm not too surprised to hear him playing a totally believable and stylistically-correct stride piano in a Chicago Jazz band.

In addition to the blazing ensembles which make it impossible to sit still while listening to this recording, there are some excellent solos here. The contrast between the two trumpeters, Bob Schulz (in whose playing I hear traces of Louis Armstrong, Joe Oliver and Muggsy Spanier) and Spanky Davis

(who is in a Bix Beiderbecke and Bobby Hackett mold) is exhilarating especially when they trade fours. Also Charlie Hooks gets off some very fine New Orleans style clarinet playing, especially on "Winin' Boy" and "Saturday Night Function," that reminds me of Barney Bigard and of Barney's own predecessor, Jimmy Noone.

The sound is clear, which is the main thing that is needed in this kind of jazz. The ability to discern each different voice in the ensemble and the part it plays to make up the whole is especially vital when two trumpets are used. By the way, if they both are trumpets as the liner notes state, then Spanky Davis certainly gets a cornet sound out of the trumpet at times.

Also, at the end of "Struttin With Some Barbecue," somebody stuck a Louis Armstrongish "oh yeah" on the record. When I asked producer Bob Koester about this he said that he couldn't remember who it was, which leads me to suspect it may have been spliced in from another take or maybe even a run through before the actual recording began.

I hope there will be more records by this fine Chicago-based band in the future. Nowadays, with the ego trip that many jazz soloists are on, there's a crying need for strong ensemble statements. J.K.

CLASSICAL

BEETHOVEN: *Symphony No. 6 in F, Op. 68 "Pastoral."* English Chamber Orchestra, Michael Tilson-Thomas, conducting. [Steven Epstein, producer; Robert Auger, Milton Cherin, engineers.] Columbia M 35169.

Performance: **Strange**
Recording: **Ambient**

BEETHOVEN: *String Quartet in C-sharp minor, Op. 131, arranged for String Orchestra.* Vienna Philharmonic, Leonard Bernstein, conducting. [Gunther Breest, producer; Hans Weber, recording supervisor; Klaus Scheibe, engineer.] Deutsche Grammophon 2531 077.

Performance: **Grand**
Recording: **Very Good**

Now, here's an odd pair: a symphony striving to be a chamber work, and a

string quartet striving to be a symphony. Neither is an entirely new idea—the concern for authenticity in recent years has led to many pared down recordings of pre-Romantic symphonic works, and string orchestra arrangements of Beethoven's *Grosse Fuge* are not all that rare. Of course, this sort of thing is fraught with problems, both aesthetic (*can it work? should it work?*) and practical (*does it work?*).

I'll skip the polemical arguments on either side and deal with the practical question. Beginning with the Tilson-

Thomas disc, the answer is, no, it doesn't really work. What Tilson-Thomas has done here is reduced the size of the string sections so that the winds do not need to be doubled. The point of this, according to Peter Eliot Stone's liner notes, is to suggest a sonority closer to that which might have been heard in Beethoven's day. There are several things wrong with this theory, some of which are hinted at right on the liner. For one, if you're going to claim "authenticity," you can't go just half way. You must use old instru-

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ments (not done here) and you must take the pitch down to what it was in the early 19th-century (not done here either). Second, the score makes it clear that this is not a chamber orchestra work. If, in Beethoven's day, too few players were available to bring the composer's intentions to full fruition, that's one thing; but since full forces are available today, there's not much point in approximating early 19th-century inadequacy.

What we get from Tilson-Thomas's approach is a novel but unbalanced sound. Yes, an interesting inner voice emerges now and then. But generally, these emerging inner voices serve only an accompanying, harmonic function, and do more harm than good when they well up and overshadow the more important lines. Another interesting idea here is the use of split strings—the first violins and violas on the left, the second violins and cellos on the right. This makes for a nice antiphonal string sound when the string sections are in full force. Here, because the string sections have been reduced, the effect is not as powerful as it might have been.

The recorded sound, on the other hand, is quite nice. The stereo separation (including the separation of the strings) is pleasant, and there is plenty of ambience around the small ensemble, making for certain particularly charming effects. The bird calls at the end of the second movement, for instance, are crisp and vivid. Good production isn't everything, though, and for the same money you can have a more level-headed performance using standard forces. (Two of my favorites are the 1969 Jochum/Concertgebouw, Philips 6570 159, and the 1963 Reiner/Chicago, RCA LSC 2614, neither of which can be called sonically antiquated).

The Bernstein arrangement of the Quartet, Op. 131 works much better. In a sense, the work heard here is a different piece of music from what you'll find on a quartet disc. The filled-out string sections provide a sense of titanic proportion that this late-Beethoven is certainly capable of bearing. The playing of the Vienna Philharmonic strings is superb, and Bernstein uses his larger forces to stretch the expressiveness of the score to the limits. *Sforzandos*, for instance, sound much more dramatic in this arrangement than in traditional quartet performances, and the addition of double-basses, taking the cello line down an octave or two at certain spots, adds a further dimension.

This seems to be miked fairly closely,

without a great deal of room sound. The string section separation is not quite so striking as on the Tilson-Thomas disc, and my pressing was noisier than one normally expects from DG. A.K.

ITZHAK PERLMAN: Encores. [Suvi Raj Grubb, producer; Michael Gray, engineer; recorded in the United States and England, probably in 1979.] Angel SZ 37560.

Performance: **Technically astounding; musically moving**
 Recording: **Angels of the highest order**

TCHAIKOVSKY: Concerto for Violin and Orchestra in D; Serenade Melancolique. Itzhak Perlman, violin, The Philadelphia Orchestra, Eugene Ormandy, cond. [Suvi Raj Grubb, producer; Michael Gray, engineer; recorded in 1979, probably in Philadelphia, Pa.] Angel SZ 37640.

Performance: **Warm and personal**
 Recording: **See above**

With violinists, more so than with pianists or vocalists, there has always been a dichotomy between the virtuoso technique and the need to show it off, and the sensitively moving interpreter. In the days before Itzhak Perlman there was the need to choose between the technical perfection of a Heifetz or the soul of a Kreisler. That carried down into future generations as Heifetz begat the Oistrakhs and Kreisler begat a line of violinists including Zino Francescatti. The critics were constantly pitting the machine violinists against the Gypsy fiddlers. The truth—and few came even close to the truth—was, and is, that both technical prowess and emotional communication are a part of any musical experience. I doubt that Perlman is the first violinist to espouse the double goal of a high level of technique and a high level of emotional interpretation, but he is certainly the most successful thus far. Combine with this the charisma of a performer who appears well on TV talk shows and (although it is totally unnecessary), the sympathetic picture of the kid who conquered polio to go on to be a major concert artist.

The Tchaikovsky *Violin Concerto* has had too many superlative recorded performances for me to refer to any one as definitive. They go all the way from the historic 78 RPM set by Heifetz with Sir John Barbirolli and the London Philharmonic Orchestra, through early mono

LPs such as the one by Heifetz with the orchestra directed by Walter Susskind, right up to this current recording under review here. Most of the famous names of contemporary violinists are represented in the Schwann catalog by at least one recording of this work. This is Perlman's third recording of it. Ormandy (also trained as a violinist before his days of conducting) is no stranger to the Tchaikovsky, having accompanied renditions by violinists David Oistrakh and Isaac Stern as well as this latest collaboration with Perlman.

The *Serenade Melancolique* is less familiar to LP and, frankly, as a piece of music, I find it entertaining but one or two hearings should suffice. It is to the credit of the soloist and conductor that they really play this music instead of feeling "well, let's see how quickly we can get this thing over with." The same is true of the encores played by Perlman with pianist Samuel Sanders on that aptly titled LP. They range from the seriousness of Wieniawski's "Second Polonaise brillante" to such lighter works as the Heifetz arrangements of "Jeannie with the Light Brown Hair," "Deep River" and "Alt Wien." What all the works on this LP—with the possible exception of the Wieniawski—have in common is charm. I really think there is too much meat to the Wieniawski to classify it as an encore. My personal favorites are Henri Vieuxtemps' "Souvenir d'Amerique (Variations burlesques on "Yankee Doodle")" and Antonio Bazzini's "Dance Of the Goblins," which Perlman describes quite accurately in the liner notes as a "fiendish work, which presents the violinist with every conceivable kind of difficulty." I have the word of a professional violinist friend that this is a good description of the problems the work presents and that Perlman not only plays it, but plays it faster and more accurately than any violinist of his acquaintance. I may be incorrect, but I think I heard at least one tape splice during the Bazzini but with a work of such difficulty, I can't fault Itzhak Perlman for taking advantage of the technical aids placed at his disposal.

There is really little that can be said about the sound. Like most classical labels, Angel has always taken good care of sonic business and it is a compliment to them that there are very few Angel recordings that I can think of where one is conscious of the engineering involved. The sound is good and clean and natural—and natural is the best after all.

J.K.



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