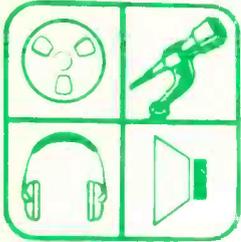


VOLUME 3 – NUMBER 3

MAY/JUNE 1972

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engineer/producer

—the magazine to exclusively serve the recording studio market... all those whose work involves the recording of commercially marketable sound.

—the magazine produced to relate... RECORDING ART to RECORDING SCIENCE... to RECORDING EQUIPMENT.

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AT LARRABEE SOUND

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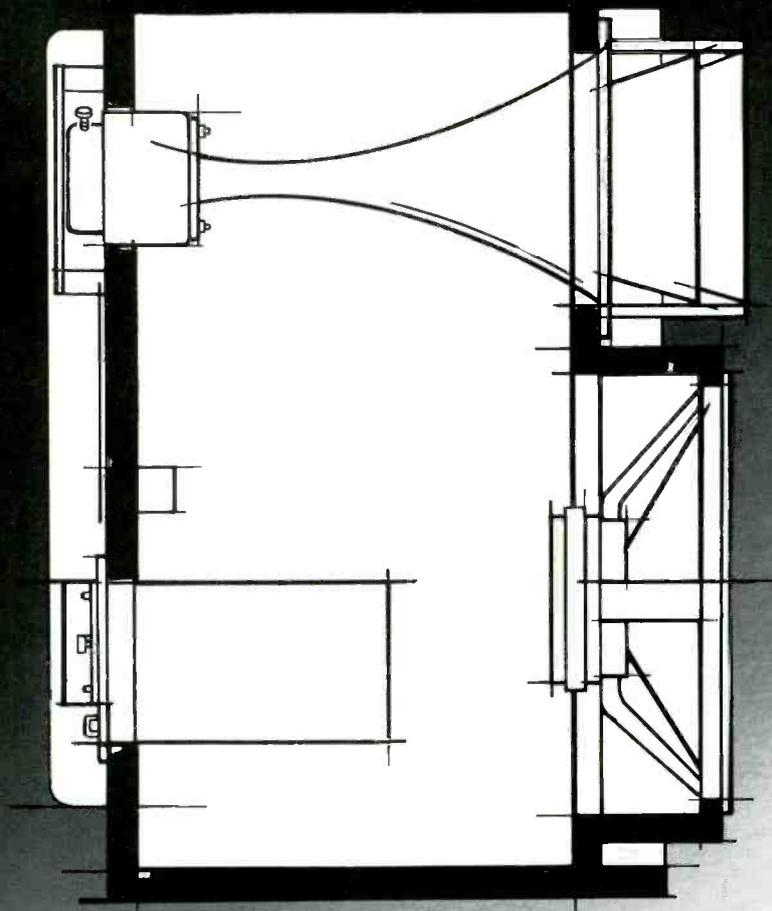
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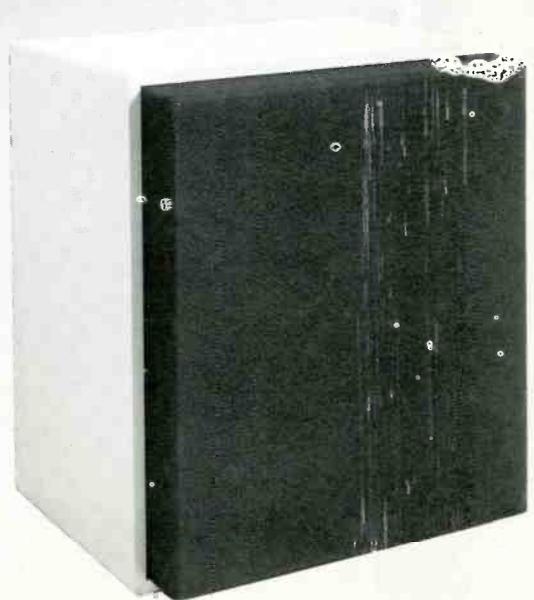
Classified 36

Cartoon 39

CREDITS – cartoon: WAYNE YENTIS



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Have you ever wondered why good monitor systems are two-way systems? It's because they guarantee transient accuracy. They don't have the inevitable problem of source displacement that occurs in systems with separate tweeters. And they don't burn out, as tweeters in most 3-way systems are prone to do, with the super highs present in much of today's music. Few drivers are capable of such a wide frequency range. Because so few speaker builders use the kind of phasing plug which makes this possible.

To make the system work, power has to be delivered. Biamping is the only solution. So we built a biamp right into the enclosure. It provides more than enough power to make the components produce more than enough sound. Depending on the music, the 90 watts of available power may be equivalent to three or four times that amount when compared to single amplifier systems.

This is truly a new recording tool.

Write for further information on the 9846 Monitor Speaker system. Altec, Professional Studio Products, 1515 South Manchester Avenue, Anaheim, California 92803.

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The only dual delay device available

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Model 920-16 Time Cube is the *only* acoustical delay line system of professional quality, and is designed specifically for recording studio applications and optical film recording.

See your dealer or write for complete specifications.

\*Evolved from the original design of Dr. Duane H. Cooper of The University of Illinois, in collaboration with M. T. Putnam of UREI.



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## LETTERS and LATE NEWS

FROM: BILL LAZARUS  
PARAMOUNT RECORDING  
HOLLYWOOD, CALIFORNIA

While I have recorded a great many things for James Taylor, and producer Peter Asher, I hasten to advise that his single "You've Got A Friend" was not one of those I recorded, for which R-e/p gave me undo credit in "RECOGNITION 1971" appearing in your March/April issue.

FROM: PETER ASHER  
PRODUCER, LOS ANGELES

There is an error in your "Recognition 1971" awards in your most recent issue. The single You've Got A Friend by James Taylor was engineered by Richard Sanford Orshoff at Crystal Studios, and not by Bill Lazarus at Sunset Sound.

I have great respect and affection for Bill who is an excellent engineer and I have used him in the past, but I recorded the whole of the Mud Slide Slim album at Crystal with Richard whom I consider one of the finest engineers in town.

---

AUDIO TECHNIQUES, INC. BOWS AS NEW COMPANY TO SERVE PROFESSIONAL AUDIO PRODUCTS USERS IN THE NORTHEAST.

Announced by President Hamilton H. Brosious, and Vice President Robert Berliner, both well known and long-time former Scully Recording Instrument Company executives, Audio Techniques will be located at 121 Hamilton Ave., Stamford, Connecticut, to serve the 12 north-eastern states.

Distribution franchises have been secured for the entire line of MCI multi channel tape recorders, DOLBY noise reduction systems, STANDARD TAPE LABS test tapes, TABER bulk tape degaussers, and VIDEO TECHNIQUES closed circuit television products.

---

### From the READERS

*An editorial material rating of the most useful feature article, as gathered from the Reader Service Cards received prior to press time.*

#### MARCH/APRIL ISSUE:

RICK HALL . . . . . 36.9%  
RECORDING IN 1915. . . 13.8%  
QUAD AUDIO FOR TOMMY 47.2%

Audio Techniques will import and feature popular European audio equipment to be sold throughout the U.S. and Canada through professional distributors. The first such imported products is the LEVELL line of transistorized portable test equipment.

Audio Techniques will be a sister company to Video Techniques, Inc. a well known northeastern CCTV systems company also located at the Hamilton Avenue address. Together the two firms will offer the most complete Audio/Video engineering systems, sales and service capability in the northeast.

**DICTAPHONE NAMES DONALD F. SMITH RECORDING MANAGER.**

Dictaphone Corporation has announced the appointment of Donald F. Smith as Director of Marketing of the Recording Automation Group. This group comprises the Scully and Metrotech Divisions which design and produce multi-channel tape recording and reproducing equipment for professional and communications applications. Smith will have his office at the company's recently opened 41,000 sq. ft. facility in Mountain View, California.

Smith comes to Dictaphone from the Ampex Corporation where he was a

Regional Manager and National Sales Manager in professional audio and video tape equipment sales. While at Ampex he also developed instrumentation and video training courses for the United States Government.

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ATTEND THE 43rd  
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WALDORF ASTORIA  
NEW YORK CITY  
SEPT. 12-15, 1972**

**B. W. ASSOCIATES; NEW AUDIO CONSULTING, SALES AND SERVICE ORGANIZATION ANNOUNCED**

Bill Wilson formerly Mincom Div., 3-M Co. east coast field service engineer has announced his resignation from that post to form B. W. Associates. The new audio consulting, sales and service firm will operate from headquarters at 415 West Fullerton Parkway, Chicago, Illinois 60614.

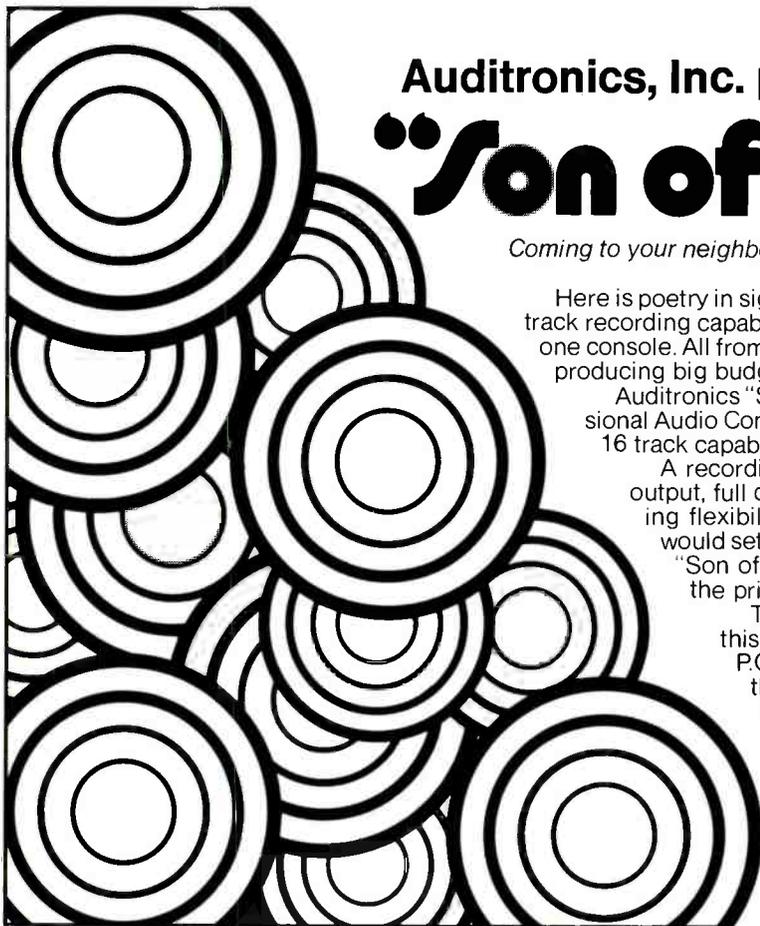
**ROBINS INDUSTRIES (FAIRCHILD SOUND EQUIPMENT) ACQUIRES PLANT IN COMMACK, ON L.I.**

Robins Industries Corp., manufacturer of consumer electronics and data processing accessories as well as professional sound equipment, has acquired the 50,000 square foot plant at 75 Austin Blvd., Commack, Long Island, N.Y., in the Commack Industrial Park in early-American style.

Herman D. Post, president, said the company would relocate and consolidate many of its activities there starting in June. Robins and its subsidiaries, including Fairchild Sound Equipment Corporation, have been headquartered in College Point, N.Y., in the Flushing area of Queens, for many years.

The new building is situated on a three-acre site visible from the Long Island Expressway at Interchange 54.

Robins has occupied a number of progressively larger plants in the Flushing area since it was founded by Mr. Post in 1954. Last Fall the company entered the professional sound equipment field by acquiring Fairchild Sound, which produces components and consoles for broadcasting, recording studios and sound reinforcement systems.



**Auditronics, Inc. presents a sneak preview**

# **"Son of 36 Grand"**

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Here is poetry in sight and sound for recording studios that want 16 track recording capability, with real life performance and economy in one console. All from a manufacturer with over five years experience producing big budget recording systems and consoles.

Auditronics "Son of 36 Grand" is a second generation Professional Audio Control Console, five years in the making, that puts 16 track capability within the economic range of every studio.

A recording console that provides 16 in, 8/16 channel output, full quadraphonic capability, and complete monitoring flexibility for both recording and mixdown, normally would set you back about \$36,000. But the action packed "Son of 36 Grand" gives you all this at less than half the price!

To get your pass for a backstage peek at specs on this rising new star, just drop a line to Auditronics, P.O. Box 12637, Memphis, Tennessee 38112... the people who brought you "36 Grand" and many other stupendous extravaganzas.



**auditronics. inc.**  
MEMPHIS TENNESSEE

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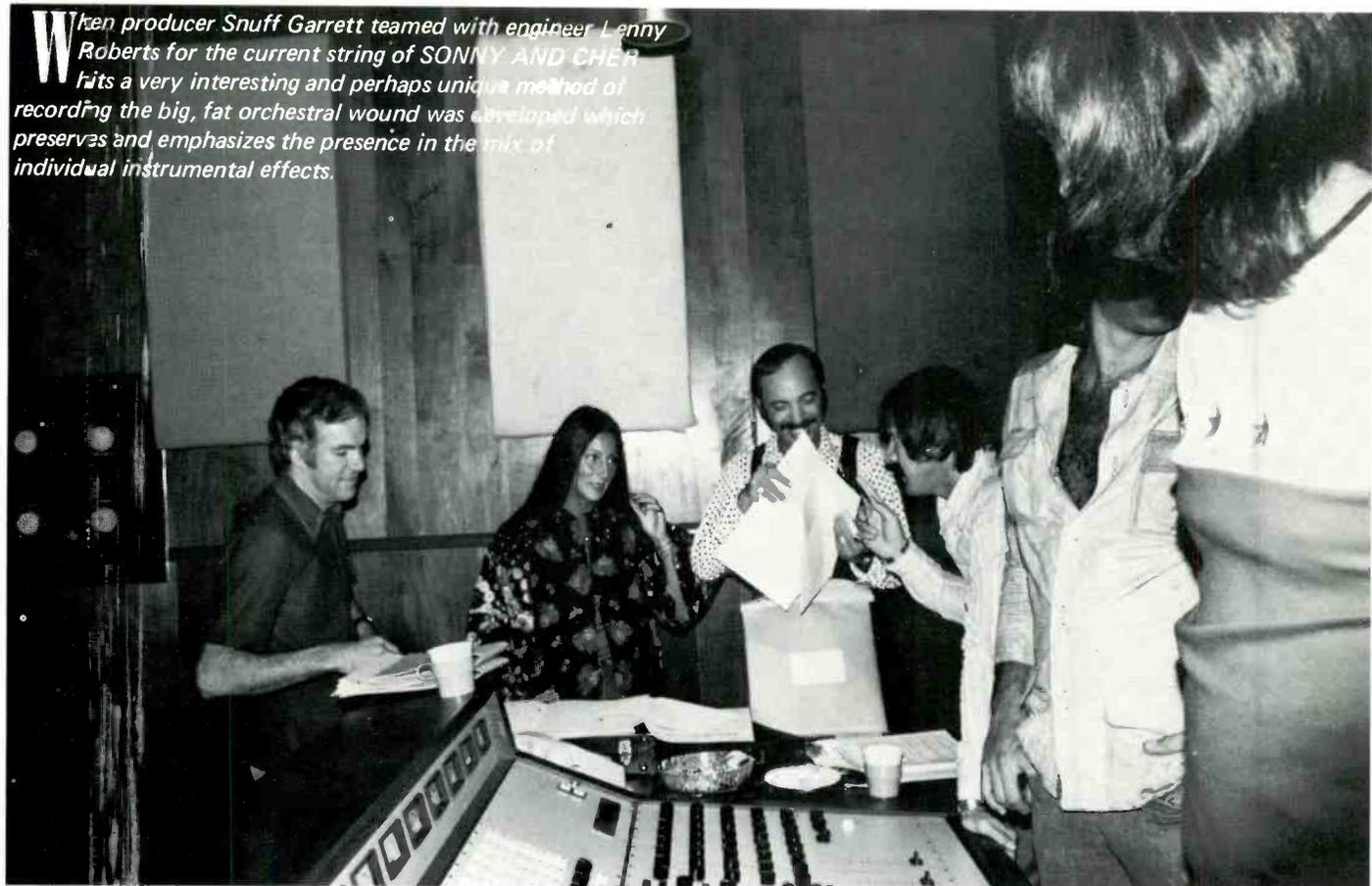
Individual submasters, all 8 buses. 4 gang master controls, complete mono overdub bus with VU meter and master control optional. Pan pots on 2 channel mixdown for program and individual pan pots on echo send for all 8 buses. Same reverb on tape playback as on bus when recording dry, but monitoring with reverb with "Preview" monitor option. Separate echo switching. And many, many more.

Compare prices too. Check the competition. The 1608c does more and does it better. Complete descriptive information is available for the asking.

**ELECTRODYNE CORPORATION**  
An MCA Tech. Company, 13035 Saticoy Street  
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When producer Snuff Garrett teamed with engineer Lenny Roberts for the current string of SONNY AND CHER hits a very interesting and perhaps unique method of recording the big, fat orchestral sound was developed which preserves and emphasizes the presence in the mix of individual instrumental effects.



CAPPS

CHER

GARRETT

SONNY

ROBERTS

## "SIMULTANEOUS OVERDUBBING"

### RECORDING SONNY and CHER at LARRABEE SOUND

by BARRY RUDOLF

Most often to get a big, *ballsy* orchestral sound the producer simply uses a very large group of musicians, in a big room, and records them all at once, coping as best he and his engineer can with the long standing problem of ambient sound and leakage. This is not to suggest that ambient sound necessarily detracts from the overall depth of a quality recording. The proper balance of room sound and the effect of creatively controlled leakage can, as we all know, make a valuable contribution to a record. However, as an example, where drum and brass leakage into string and percussion tracks occurs, the results are a predictably muddy background . . . the absence of presence. The consequence is cancellation or masking, either fully or partially, of the producer's and the arranger's creative use of the more subtle and interesting figures, sounds and instruments.

Overdubbing, while it insures optimum separation and offers some advantage to smaller more extemporaneous groups

has its drawbacks when used to record big bands. There are several acknowledged and decided advantages to having the whole band play together. Prime among them, naturally, is the quality of the performance itself which is certainly more cohesive and exciting when all the musicians are playing to one conductor, and to one another in a live session. Both Sonny Bono and Snuff Garrett prefer to record, hearing the band all playing together. Too, when all of the tracks are heard at one time, and the arranger is on the session, changes in the arrangement can be made much more easily. For example, when a horn line or a rhythm pattern conflicts with a string line, the change can be made right on the date without needing to book another studio session and the necessity to recall the players to overdub the new part. Overdubbing is acknowledged generally to be a more expensive method of recording a large band.

So, to retain all of the advantages of recording the big and exciting sound of an orchestra playing together, yet also being able to achieve a remarkably good measure of room ambient and leakage control to preserve the kind of presence which has been a distinctive feature of the Sonny and Cher sound, it was decided to try splitting the band into two parts for seating in two adjacent, but completely independent studios . . . recording both sections of the band simultaneously . . . in other words a *simultaneous overdub* session.

While this started as an experiment it has worked so well that it is now standard operating procedure for recording Sonny

and Cher, as well as other large groups including Johnny Mann, Jerry Fuller, Davy Jones, The Brady Bunch among others who use the Larrabee Studio.

The rhythm section, made up typically of drums, percussion, electric and/or string bass, piano, electric piano, harpsichord, 3 to 4 woodwinds, 3 trumpets, 3 trombones, and as many as 3 guitars is seated, as shown in the studio layout (Figure 1) in "Studio A" (20'x35'x12') . . . facing the conductor's podium.

The string section, 10 violins, 2 violi, 4 celli and a string bass are seated in adjacent "Studio B" (16'x22'x12') focusing on a 24 inch Conrac video monitor displaying full image of the conductor in "Studio A."

With the strings removed to "Studio B," and with the use of baffles, and close miking on most other instruments, and a canopied drum booth, about the only sound filling "Studio A" is the brass. These trumpets and trombones can then produce an open full sound unlike the blurry, cloudy sound they ordinarily produce when the microphones have to be placed too close to their bells in an attempt to control leakage, a necessity when strings are present in the same studio.

What makes this an exceedingly workable set-up is the Audio/Video umbilical linking the two studios, the conductors podium, and the control rooms. It would have been unthinkable to have attempted this dual studio technique, *simultaneous overdubbing*, if a practically unlimited, but relatively simple, A/V communications network hadn't been designed.

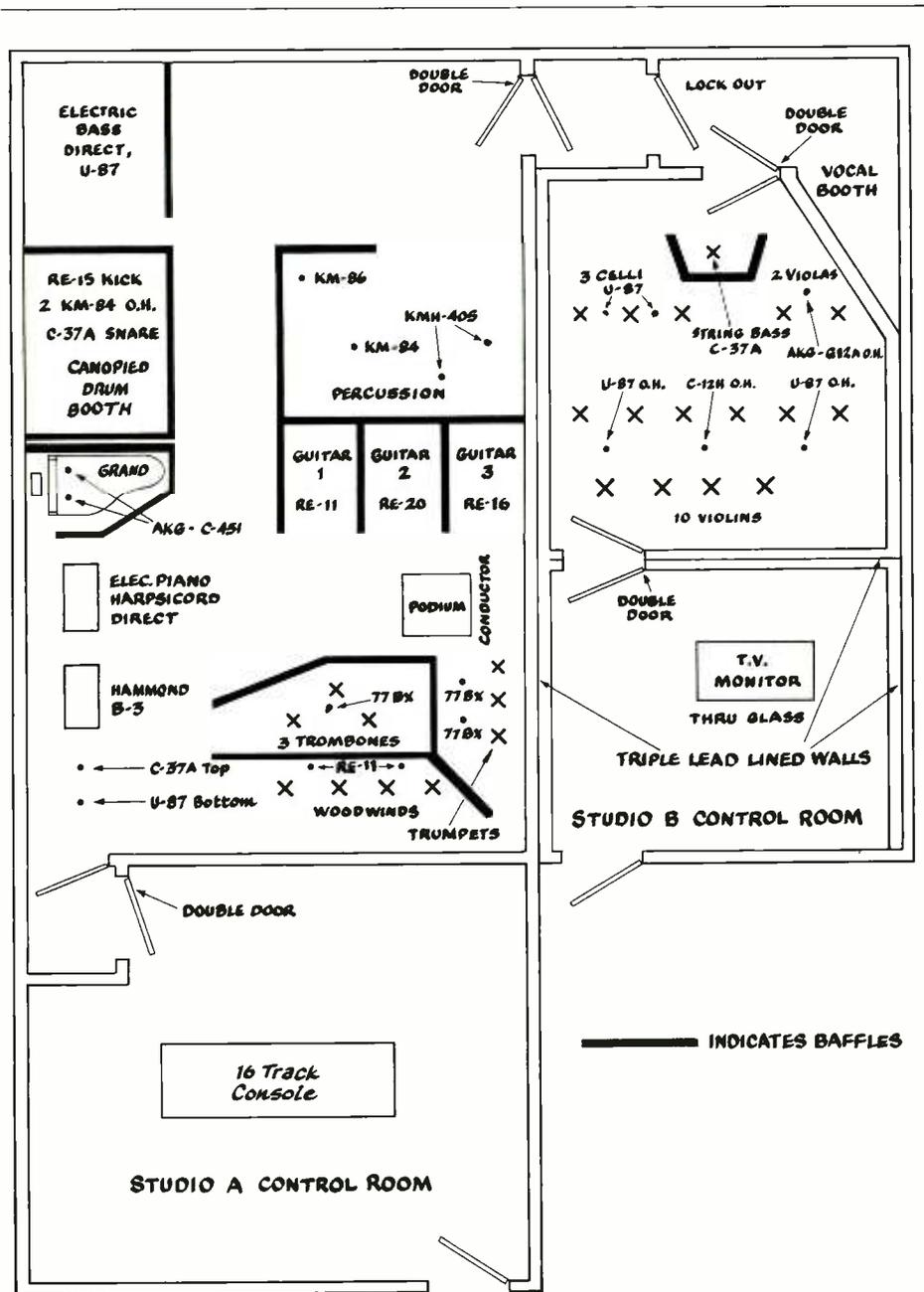
### THE CONDUCTOR'S PODIUM - GORG0

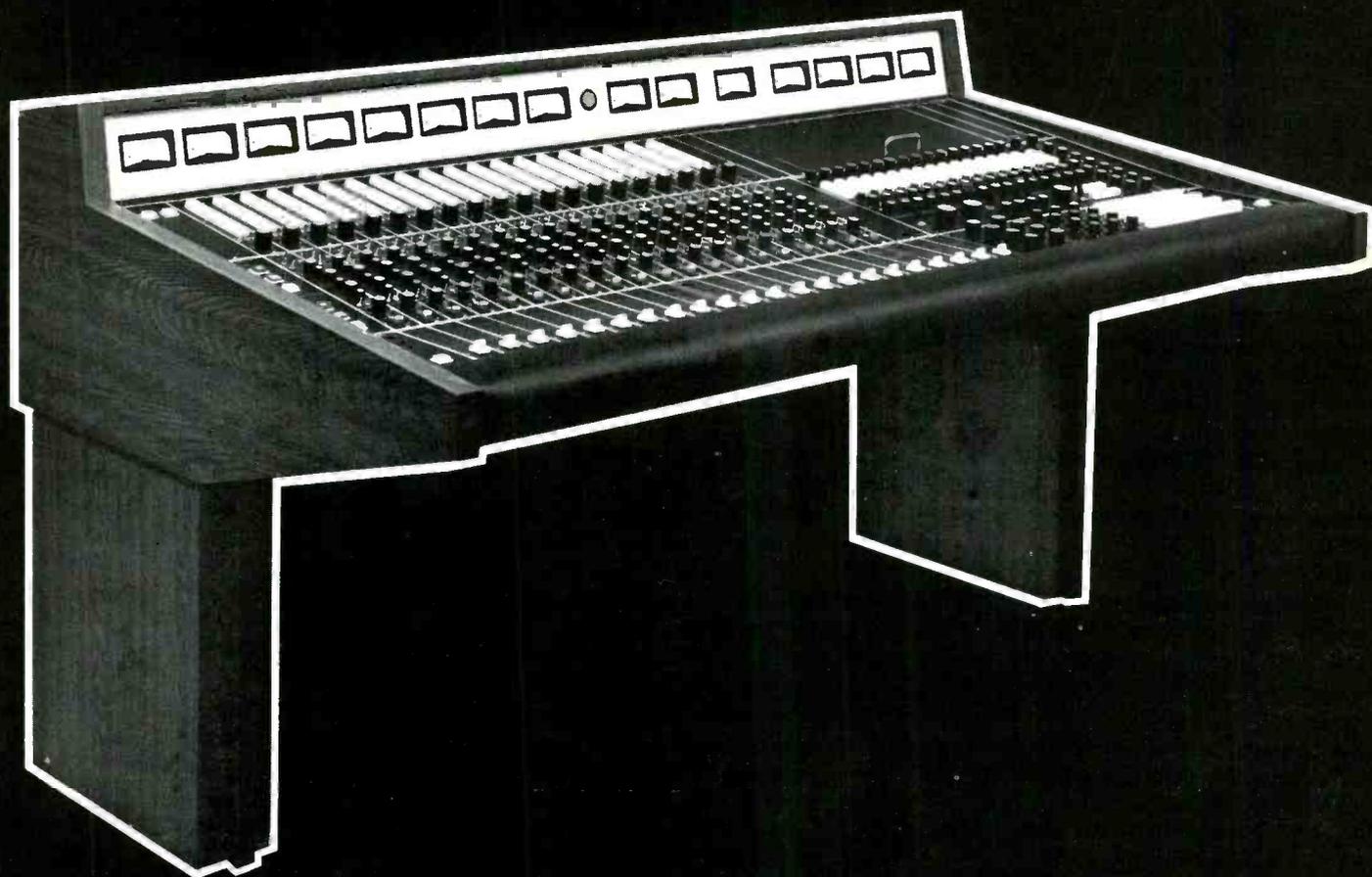
Figure 2 illustrates the unique design of the control center, the conductor's podium, affectionately (sometimes) referred to in Orwellian terms as GORG0 . . . *the all seeing one*. From GORG0 the conductor communicates with both studio A and studio B musicians, as well as with the engineer and producer in the control room.



FIGURE 2 - GORG0

Elevated high enough so that all of the players are able to see the conductor from behind their baffles, the podium is equipped with a built in Sony TV camera fitted with a wide angle close-up lens focusable on the conductor. The conductor's image is relayed to the 24 inch TV monitor facing the string players in studio B, thereby allowing the string players to see and follow the conductor for rubato parts and pick-ups as well as giving them the feeling of being part of the orchestra.





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**SPECTRA SONICS has, and will, continue to lead the audio industry in all specifications of; noise, frequency response, distortion, square wave response, and peak overload.**

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Also built into the podium, seen to the right of the TV camera, is a 10 inch TV monitor connected via a video transmission line to a TV camera mounted in studio B. This obviously allows the conductor to easily see the activity of the musicians in 'B,' especially the string concertmaster. The TV monitor in the podium is also switchable to the output of a video tape recorder for use when the Larrabee staff is working on either TV commercials or movie scoring. Visible in Figure 2, underneath the music desk, is also an UREI digital metronome which is set for click tracks as needed.

Audio communication between rooms is achieved by an intricate network of relays between both studios, both control rooms and the conductor's podium. A built in condenser microphone allows the conductor to communicate with the booth and all musicians' headsets by depressing one button on the podium. This action automatically mutes the monitor speakers in studio "A," but only slightly decreases the level in the headsets and at the same time does not feed the console busses. This allows the conductor the freedom of talking to the band, or the control room in the middle of a *take*.

Three cue systems are used. Cue system one feeds the rhythm section to

themselves and to one side of the conductor's stereophones, as well as to the string section. System two feeds only the strings to the other side of the conductor's phones, and also into the headsets of selected musicians in either room (any or all), at their request. Cue system three is a stereo feed of a balanced mix to the conductor. The conductor also has the option of hearing studio A alone, or studio B alone by merely using the mounted selector switch on the podium. Also at his disposal is the built-in digital metronome which can send any desired click to all headsets.

#### INTERSTUDIO RECORDING TIELINES

Using the 24 audio tielines built in between the studios and their control rooms, flat line level signals, raised from microphone level through Spectra Sonics 101 Amplifier Cards, can be sent a combination of 2 ways to the 16 buss control console in the Studio A control room. The signals from the players in Studio B can be sent either directly to the 16 buss control console in Studio A's control room, or to the console in the control room of Studio B for a sub-mix before being fed to the main console in the Studio A control room. The system offers complete flexibility.

#### MICROPHONES – STRINGS

With the string section completely isolated in Studio B a great deal of freedom is available in the selection and placement of the string mikes. Typically with the 15 piece string section four to seven microphones are used.

The two rows of violins are covered with three condenser mikes, either AKG C-12A's or Neumann U-87's. These are placed about 4 to 6 feet above the string players' heads. Because of the inherent presence enhancing characteristics of these microphones their overhead placement usually works well to provide the optimum ratio of room to directly played sound.

Because the sound from the cello emanates from a position lower to the floor the cello mikes are positioned no more than a couple of feet from the floor. Each Neumann U-87 used in Figure 8 configuration is placed between every two cello. This placement, in the figure 8 position, works out very well for capturing the resonant bottom of the cello while providing superior cancellation of other sounds attempting to leak into these mikes.

Viola are miked in similar manner to the violins, except that the microphone used, an AKG C-12A, is placed lower over the players' heads. Typically only 2½ to

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\*2082 console from the Village Recorders, Los Angeles, Calif.



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3½ feet above the players' heads. The string bass is miked in close to the base of the instrument with a Sony C-37A. The string bass is effectively baffled from the rest of the strings to keep the low end sound from filling the room

#### MICROPHONES – DRUMS

Miking drums is always a challenge at Larrabee because of the constant variation in types of drummers used on various sessions. Each drummer brings an entirely different sound into the studio with him. There are no hard and fast rules to apply to drum miking, although there is a typical starting point for the great majority of drum kits. Four microphones are used. A good quality dynamic mike is placed in front of or on the inside of the bass drum. Generally this mike is either an EV 666, an EV RE-15 or even occasionally, an EV-676.

The snare is miked with a Sony C-37A condenser. Since this mike also picks-up the high-hat cymbal it is placed so that it achieves a good natural balance between the snare sound and the high-hat sound, as well as in no way interfering with the drummer. Two additional overhead mikes cover left and right of the drums. These are KM-84's and are used because they offer a flat response without any top end boost. This enables the blend of the drums to come through without excessively bright cymbals.

#### MICROPHONES – PIANO

The grand piano at Larrabee is generally miked with two AKG C-451-E's. This kind of condenser is used primarily for its bright responses as well as having a good cardioid pattern. The piano lid is usually slightly opened with the microphones 12 to 14 inches above the strings, aimed at the hammers. This gives the sound a chance to expand somewhat, but at the same time insures maximum leakage control. The open side of the piano is opposite the drums and further protection is achieved by putting one or two covers on the lid.

The piano along with the drums is recorded in stereo because of the obvious advantages when mixing down. For example, the high or low end can be echoed, equalized or limited without affecting the entire piano sound. Also, and probably most important is the final product. The full complete sound of the stereo piano is heard, more often than not. A piano recorded monaurally cannot compare to the same piano recorded in stereo.

#### MICROPHONES – GUITARS & WOODWINDS

The electric bass guitar is taken direct with a high quality transformer (response down to 20 cycles, at least), along with miking of the bass amp using a U-87 up close. The ratio-mix between the direct and the mike is totally variable depending on the piece and the player. Occasionally the U-87 is eliminated entirely depending on the quality of the amplifier. The other guitars are played to EV RE 11's, RE 15's or Shure 545A's. These mikes are used to get good directionality in the live room, and to generally enhance the good middle range dynamics that these instruments possess.

The woodwinds, too use these good quality dynamics for many of the same reasons.

#### MICROPHONES – HORNS

Ribbon microphones, usually RCA BX77's or Beyer M-320's are used on the horns. These ribbons are noted for their warm sound. When the brass is seated, as diagramed, with the trumpets blowing directly across the baffle at the trombones, the trombone mike is set in the figure 8 pick-up pattern to reject any primary uncontrolled leakage from the trumpets.

If the horn part calls for a lot of brass, *in unison*, the sound is sent to stereo echo chambers, and the return of the trumpet part is put on the trombone channel, while the echoed return of the trombones is fed to the trumpet track. This makes for a beautiful full rich brass section sound.

#### MICROPHONES – PERCUSSION

Percussion is miked with three or four condenser mikes placed overhead. KM 84's, 86's, U-87's, MK 40's and C-37A's are used.

Any electric harpsichords, pianos or rocksichords are taken direct or miked closely as required.

#### CONCLUSION

Several criteria can be used for calculating the success and efficiency of the sessions done using this split-studio . . . simultaneous overdub . . . method. The sales results of the Sonny & Cher albums . . . and the Cher singles can be counted in part. Only in part, however, because their incredible talent would be evident if their recordings were done in a closet. Perhaps, more telling is the ease with which the arrangers and conductors . . . Marty Paitch, Gene Page, Al Capps and the top studio players accommodated themselves to the system.

*"GORG0 . . . is a gas."*

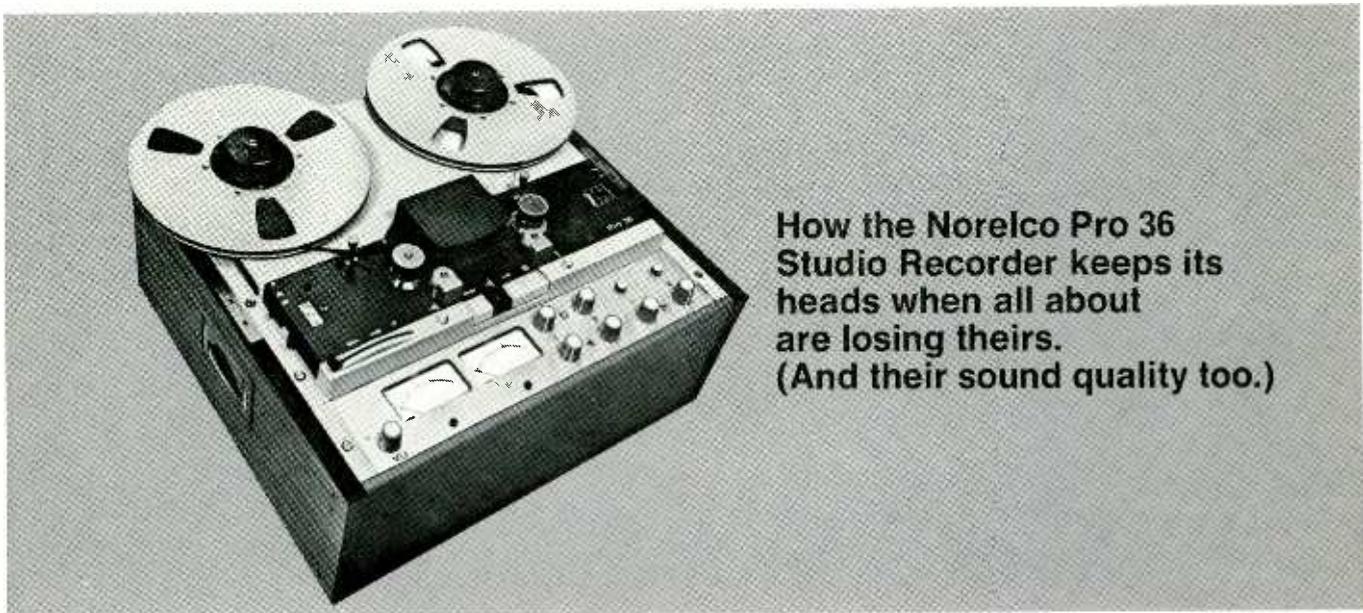
Even the simplest synthesizer can produce sophisticated modulation of amplitude. Now you can expand the capabilities of your synthesizer to include modulation of time, frequency and phase. The Type 968 delays an audio signal in time. This time delay can be continuously varied from 50 uS to 3 mS manually or with a control voltage from your synthesizer.

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Isn't it time you asked for complete information on the Type 968?

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Palo Alto, California 94301

# Announcing the recorder with 10 times normal head life.



How the Norelco Pro 36 Studio Recorder keeps its heads when all about are losing theirs. (And their sound quality too.)

Conventional recording and playback heads wear out within a couple of thousand hours of use. But long before then, their electrical characteristics change . . . so your sound changes too. With the Pro 36 studio tape recorder, these problems are non-existent.

Reason: Norelco's exclusive glass-bonded Ferroxcube heads. Made of material almost diamond-hard, they take 10 times the wear of conventional heads. But that's not all. The unique glass-bonded construction maintains precise gap width and electrical characteristics in spite of wear. Amplifier adjustments are virtually never needed. And precision head mounting also makes azimuth adjustment a thing of the past.

The rest of the Pro 36 lives up to the heads. It's the only professional tape recorder with 3 speeds. You get 15, 7½ and 3¾ IPS. Electronically switchable.

Then there's the new ultra-stable Servo tape transport control. A photocell counts capstan revolutions, compares them to line frequency, (or external 1 volt reference source) and provides instantaneous speed-correction signals. To this, Norelco adds constant capstan loading. Plus automatic tape tension control. All together, they hold wow and flutter down to 0.04% maximum.

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weighted peak value at 15 in/s: max. 0.04%

**Overall Frequency Response (NAB Specs):**

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at 7½ in/s: 30 . . . 15,000 Hz  $\pm 2$  dB

at 3¾ in/s: 50 . . . 10,000 Hz  $\pm 2$  dB

**Signal-to-Noise Ratio:** NAB unweighted (reference standard operating level)

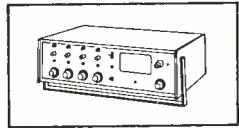
62 dB at 15 in/s

60 dB at 7½ in/s

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*What was it going to be . . .  
a great echo chamber, or . . . one of the world's best  
Roman sized swimming pools  
located in an attic?*

## WHAT HAPPENS WHEN YOU

## CERAMIC TILE AN ECHO CHAMBER?

by DON FOSTER  
Chief Engineer  
Bolic Sound

The particular chamber about which this article is written is our number one echo chamber at Bolic Sound which are the studios of Ike & Tina Turner.

Chamber One, as well as the other 3 smaller chambers were somewhat of an afterthought when the studios were originally installed in an existing building. The chambers were located in the available space, which remained, in the attic area. This meant also that the design was wooden frame dual wall construction (for good isolation) covered by plaster-board and plaster, and in turn covered by several coats of high gloss varnish. This had all

been done before my arrival on the scene at Bolic.

The chambers were very unacceptable to Ike, even though many experts had attempted many remedies including various placements of speakers and microphones, etc. Still the chambers did not sound right, and Ike was restricted to using electro-mechanical EMT's almost exclusively. He was not at all happy with the result.

The prevailing opinion was that we would have to live with what we had or burn the place down and start over using hard faced, sealed cement block to replace

the wooden frame construction. No matter how tight the wooden frame construction it still seems to have some *give* in it.

At the point of Ike's ultimatum that we do something to "make the chambers sound right," I had no real knowledge of how to improve their effect, except that most of the live chambers in my past experience were of the cement block type of construction. A quick structural survey told us that the frame building construction would not tolerate the static bearing loads in the attic which would have been imposed if the chambers were reconstructed of cement block. It was out of the question.

Acoustically, Chamber One, before reconstruction, had a decay time nearing 3 seconds. That was not really long enough, also it had to be driven very hard to get this long a delay.

We began to check out alternate materials for their properties of sound absorption. Terrazo is listed as having one of the smallest indexes of sound absorption which meant that theoretically it could yield the longest decay time, if properly installed. So at this time I decided to tile the echo chamber, using 4" bathroom tile which is a form of Terrazo. When Ike returned from the road trip he was on at the time, he was either going to have a great echo chamber or the world's best Roman size swimming pool (sans plumbing) in his attic.

The first day the tile men got about half of the walls done. When I heard what the room sounded like I got a little sick. Of course they had not grouted the seams yet. The room was *dead* instead of *live*; I left saying "It can't be! It can't be!" I

was accused of talking to myself . . . *no echo*. Finally, the walls were finished and grouted and were starting to dry. All of a sudden the chamber started sounding better. I tried the floor (wooden one) and it had a bounce to it — even though it was heavily varnished. So — tile the floor also! I did not tile the ceiling. Now, after everything is dry, the chamber really sounds great. The decay seems to be logarithmic instead of linear. And it sounds more like a large auditorium and not a tile room.

#### AN ANALYSIS

The room is not as large as the minimum size recommended in the Audio-cyclopedia but I believe the tile has overcome this requirement, also, it takes a lot less drive to get the reverb time up to or equal to other good chambers. Used properly there is at least 4 seconds available under normal conditions, but with the difference in decay time characteristic for the end of a passage, or the end of a number, there is 8 seconds available for complete fade out. This is dependent en-

tirely on the amount of drive.

The room (Figure 1) size and shape is approximately 15' long by 8' wide by 12' high. The ceiling slopes as it should and the walls are not parallel. The cost of the tiling was about \$1100. To construct the room originally was approximately \$500. At the present time a JBL speaker and an EV 635 mike are used. The present placement of the speaker is into the room with the mike behind the speaker.

At one time I had considered using glass, but glass is difficult to attach to the walls as it is not porous on one side as is tile. The only bond available was a form of rubber cement — which, of course, would allow the sound to move the glass and might end up with very odd characteristics.

I believe there have been chambers made with glass, but I don't know how the glass was attached or the size and thickness of the glass. Glass, of course, should be highly reflective, but the glaze on the 4 inch tile seems to give the same effect.

The coefficient of absorption of concrete or Terrazo and plaster are given here.

| FREQUENCY | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz |
|-----------|--------|--------|--------|---------|---------|---------|
| TERRAZO   | .01    | .01    | .015   | .02     | .02     | .02     |
| PLASTER   | .013   | .015   | .02    | .03     | .04     | .05     |

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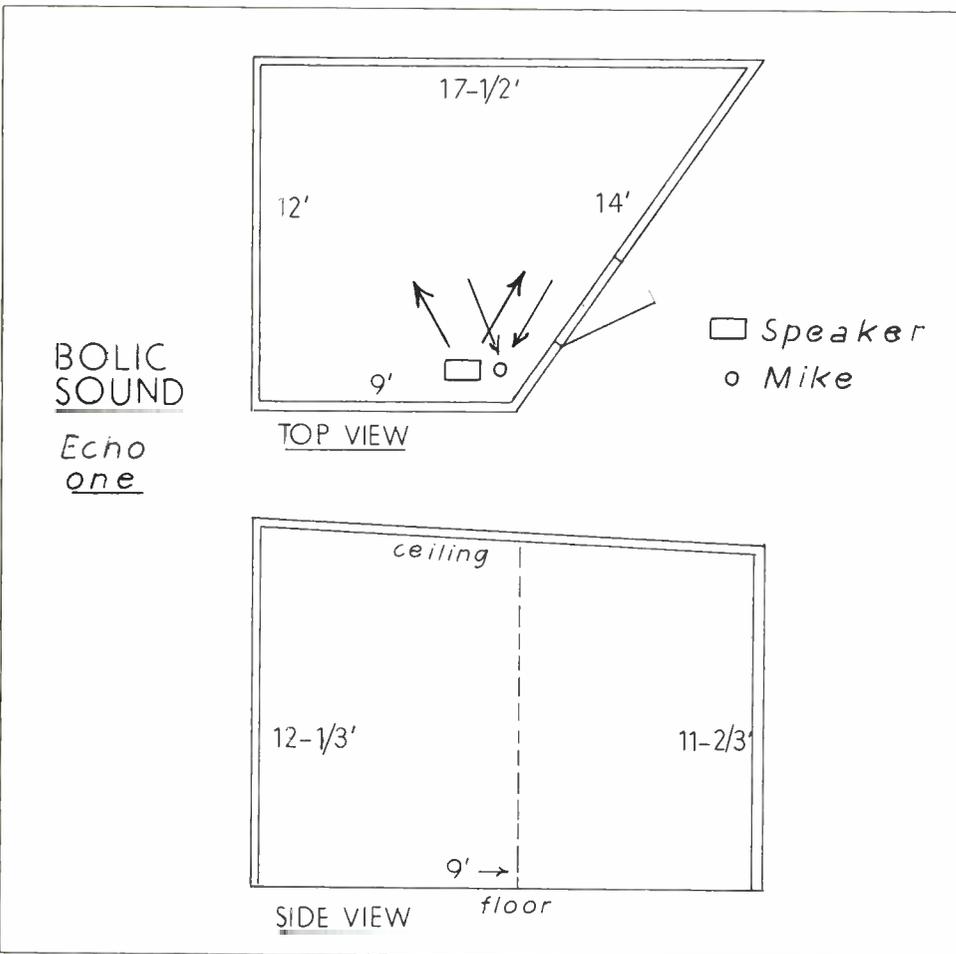


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Circle No. 110



The formula for decay time of reverberation is given as  $T = \frac{V \times .049}{AS}$

Where T = seconds in Reverb decay time to 60dB below operating level.

V = Enclosure volume in cubic ft.  
A = Average absorption coefficient of chamber.

S = Total surface.

The coefficient of absorption of concrete or Terrazo and plaster are given here.

**TABLE**

A room that is 18' long 15' wide and 12' high has a volume of 3240 cu. ft. The surface area is 1332 sq. ft.

Using the formula  $T = \frac{V \times .049}{AS}$  at

1kHz we have for plaster:

$$T = \frac{3240 \times .049}{.03 \times 1332} = 3.8 \text{ seconds decay time.}$$

The room that was tiled was 15' x 8' x 12'.

This is 1440 cu. ft. volume and 798 sq. ft. surface.

Using the formula  $T = \frac{V \times .049}{AS}$

$$\frac{1440 \times .049}{.798 \times .03} = 2.9 \text{ sec. for plaster.}$$

$$\text{For tile it is } \frac{1440 \times .049}{798 \times .02} = 4.4 \text{ sec.}$$

which is quite a change.

This does not take into account the varnish used on the walls, floor, and ceiling for the 1st figure, but I believe with a wooden floor there will be acoustical bounce or give, even though the floor is varnished.

Calculating for a 10 x 10 x 10 room, which is pretty small and not of the right proportion:

|        |  |
|--------|--|
| Volume | 1000 cu. ft.   |
| Area   | 600 sq. ft.  |
| So,    | $\frac{1000 \times .049}{600 \times .03} = 2.7 \text{ sec.}$ |

decay with plaster at 1kHz, or

$$\frac{1000 \times .049}{600 \times .02} = 4.0 \text{ sec}$$

with tile

This shows that tile will increase the decay time because of less absorption. The tiling technique certainly comes in handy where space is at a premium.

The grout between the tiles seems to be extremely important also. It might be that the slots between the tiles before grouting actually absorb sound and cut down on the reflection.

In conclusion, it looks and sounds like a great chamber! The Roman swimming pool will have to wait.

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# the first step toward standards

Two industry bodies of international standing have finally undertaken, after deliberate study, to lead the way out of the quadrasonic matrixing jungle. Without dictating a fully developed system to anyone, the Record Industry Association of Japan and the Electronic Industries Association of Japan have promulgated a set of basic standards and ground rules. The effect of these standards is twofold: First, they attempt to establish satisfactory compatibility among different systems while still permitting freedom for further development and ultimate refinement. Second, by establishing relationships between the direction for sound sources and corresponding vector directions of modulation, they attempt to point out the correct path to be followed in development while avoiding pitfalls that may lock serious anomalies into the system.

Most current matrix encoding systems but not all—as far as they go—fall within the standards prescribed for “regular matrix system disc recordings.” (The one conspicuous exception is pinpointed in the standards reproduced here, in the form promulgated by the RIAJ.) But only one of the acceptable regular-matrix systems now in actual use offers total realization of the defined capabilities.

It is our proud claim that the Sansui QS coding system faithfully reproduces every modulation condition set forth in the master diagram of the standards. Where other systems fall short in some directions, Sansui QS can accept and accurately reproduce all sounds in every direction of the sound field and at any point within the field, including sounds at the center. It is free of dropouts, cancellations, discrimination, shifts in position, false localization or directional ambiguity. It is the only fully developed system now in use with the same symmetrical, omnidirectional capability of a discrete tape system, and for which compatible decoding equipment is widely available.

## Standard of the Engineering Co

### REGULAR MATRIX SYSTEM DISC RECORDING

Promulgated on March 23, 1972 by the Engineering Committee of the RIAJ.

#### 1. SCOPE OF APPLICABILITY

This standard shall apply to commercially marketed regular matrix system disc recordings. JIS regulations set forth under S. 8502 (Disc Recording) shall apply to all aspects of such recordings not covered by this standard.

#### 2. RECORDING SYSTEM

The sound groove of the regular matrix system disc recording shall be modulated by two signals, left and right, in two directions at  $90^\circ$  to each other and at  $45^\circ$  to the record surface. These two signals shall be converted from multiple original signals in accordance with the regulations given under sub-section 2.1. The left signal shall be recorded in the wall of the groove which is closer to the center axis of the record, and the right signal in the opposite wall.

If the two signals are in phase with each other and identical in quantity, they shall be recorded in such a manner that they can be reproduced by the movement of a reproducing stylus tip in directions parallel to the record surface and lateral to the sound groove.

##### 2.1. Conversion of Signals

The two signals that modulate the sound groove shall consist of one left signal and one right signal converted from multiple original signals. The conversion of original signals into these two signals shall basically be achieved in the manner described below.

##### 2.1.1. Front and Back Signals

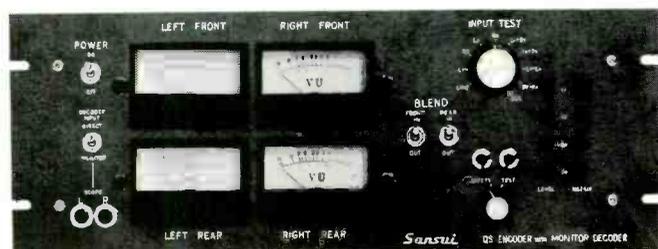
A signal originated at the front center shall be converted into a left signal and a right signal which are mutually in phase and of identical quantity. A signal originated at the back center shall be converted into a left signal and a right signal which are out of phase with each other by  $180^\circ$  but of identical quantity.

##### 2.1.2. Left and Right Signals

A signal originated on the left-hand (right-hand) side of the front and back centers shall be converted so that the left (right) signal is of greater quantity than the right (left) signal.

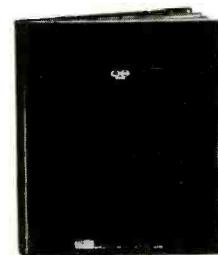
##### 2.1.3. Center Signal

A signal originated at the center of the original sound field shall be converted so that the left and right signals are of identical quantity but so that the former has a phase lead of  $90^\circ$  relative to the latter.



# QS

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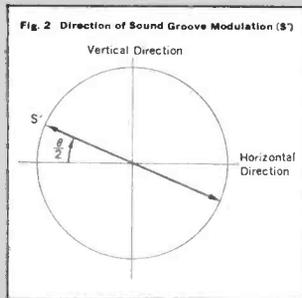
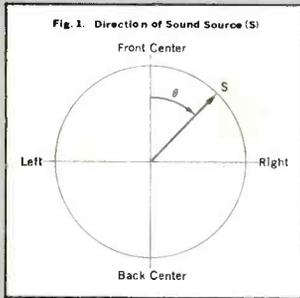


# for four-channel matrixing

## Committee, Record Industry Association of Japan

### 2.2. Relationship of Direction of Sound Groove Modulation to Sound Source Direction

The relationship of the direction of the modulation of the sound groove to the direction of the corresponding sound source in the original sound field shall, in principle, be such that the angular direction of the former is half the angular direction of the latter (See Figures 1 and 2).



### ELABORATION

#### FOREWORD

The Engineering Committee of the Record Industry Association of Japan has compared and examined the various matrix system disc recordings being marketed by various manufacturers to date. Results of such studies have ascertained that all of them, with the exception of the SQ matrix system, are based fundamentally on one and the same system, that they are encoded similarly, and that they possess satisfactory compatibility with one another. Hence the same committee hereby standardizes them as "regular matrix system disc recordings."

#### 1. SCOPE OF APPLICABILITY

This standard governs only those aspects which are peculiar to the regular matrix system disc recording. All other aspects, such as its physical dimensions and quality, shall be regulated by JIS. S. 8502 (Disc Recording).

The regular matrix system disc recording which this standard regulates encompasses all matrix system disc recordings that are cut by converting the information of sound source directions into linear modulations of a spiral sound groove.

#### 2. RECORDING SYSTEM

So as to ensure compatibility with two-channel stereo playback, this standard is formulated in compliance with the stereophonic recording system stipulated under JIS. S. 8502.

Thus the regular matrix system disc recording manufactured to this standard, when and if reproduced by regular two-channel stereo playback equipment, does not impair the relative sound image and sound volume balance between the left and right channels.

### 3. RELATIONSHIP OF DIRECTION OF SOUND GROOVE MODULATION TO SOUND SOURCE DIRECTION

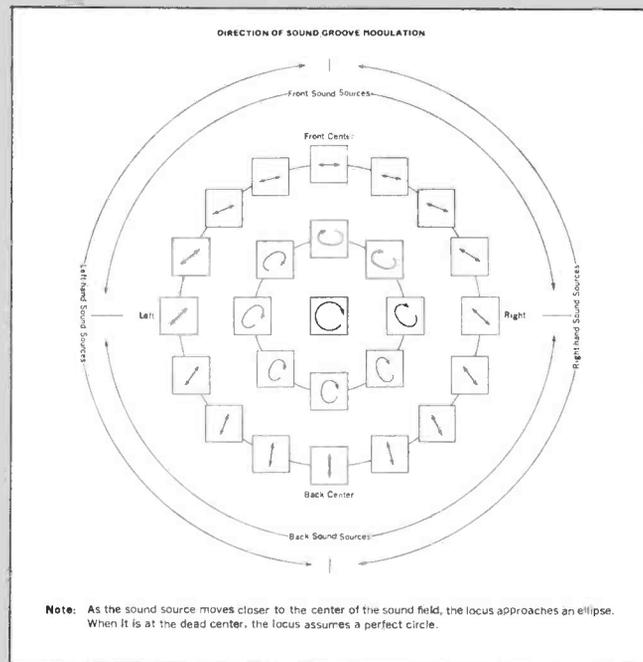
The relationship of the direction of a sound source in the original sound field to the direction of the modulation of the sound groove on the regular matrix system disc recording is set forth in Figure 3.

The term "the direction of a sound source in the original sound field" is used to describe the direction of a sound source intended at the time of recording, while the term "the direction of the modulation of the sound groove" is used to describe the locus of the vibration of a cutting stylus tip.

To reproduce the regular matrix system disc recording in more than two channels, it is thus possible to place three or more loudspeakers freely, depending upon the matrixing parameter of the decoder used (including a speaker matrix type).

### 4. ABBREVIATION

When there is a need to abbreviate the regular matrix system disc recording, it is recommended that "RM" be utilized.



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# NEED 24 TRACKS - 32 TRACKS - ∞?

## TRY USING TWO TAPE MACHINES IN SYNC

by GUY COSTA

DIRECTOR OF STUDIO OPERATIONS

MOTOWN RECORDS

During the past few months, there has been a growing demand for the availability of more tracks for the recording engineer/producer. Many things have contributed to this. One has been the demand for "consumer-quad" product and others include the growing application of electronic music to contemporary productions, an increased interest in preserving the acoustical recording environment (overhead microphones for delay and doubling) and the use of control techniques such as voltage controlled attenuators and sequential track selectors.

One way to try to meet these increased demands would be to record all product on 24 or more-track machines. Various manufacturers exhibited these and other multi-channel monsters at the last AES convention. One ambitious manufacturer even displayed a 40-channel unit. And it is hoped by these manufacturers that very shortly there will be an abundance of these electro-mechanical gems available at your local recording studio. However, as the laws of economy and wit of philosophy might have it, "The rich get richer while the poor have to do it another way."

There are some clear advantages and conveniences to be gained from converting to 24 tracks. Consider the producer who wants to add the final little gems to his production, only to find that he has to "ping-pong" a few tracks first, in order to add the new ones. Or he may find that he has to erase an extra vocal which he had wanted to save because the bridge on the extra track sounded better than the bridge on the master vocal. The advantage of going to twenty-four tracks is obvious. With eight more tracks at one's disposal, one need only take the tape to the local studio and "drop in" the additional tracks instead of going through all that erasing and ping-ponging. All that remains is mixing.

Mixing? Oh yes! We still have to play that little game of taking the 24 instead of 16 tracks ("What's that hiss?") and getting them ready for release. Twenty-four tracks and only two hands? No problem! Book time for some "automatic" electronic mixing if you can find it, yet, and then add the control signals to some of the tracks already opened. All tracks used up? Only one track left? Sorry Charlie, present automated mixing systems require at least two tracks in order to record and update previous mixes, and that's providing you don't run into some special mix problems which might require still a third open track. So, tracks are being eaten up like the national budget and if the history of recording exemplifies the future, requirements for 32 and 64 tracks are just around the corner!

Yes, the availability of 24 tracks will greatly aid the affluent Producer, but serious considerations must be given to alternate methods of satisfying the insatiable track appetite of the majority.

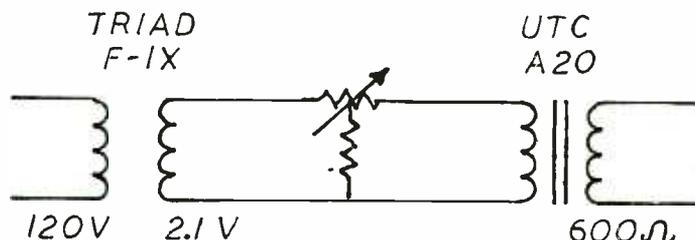
What I propose is that consideration be given to the technique of interlocking two or more tape recorders, utilizing one of the sync-lock devices currently available or recently proposed. There are many applications for such a procedure, all of which avoid the costly updating of studios as well as the *deterioration of quality which goes along with ping-ponging.*

The basic idea underlying all the applications (which we will get into a little later) is to provide a means of interlocking two or more recorders rather than increase the tracks on a single tape. Sufficient equipment is commercially available to accomplish an interlock between a 16-track recorder and one or more additional 16-track recorders, *or an eight-track or a four-track or whatever is available.* This has been standard procedure in the film and television industries for years, and the basic technique involved utilizes a single steady tone at a certain frequency, or in some cases, a pulse. Once this is accomplished, all the tapes which share this *sync signal* can be interlocked and the program material can be either mixed together or bounced back and forth in various pre-mixes. This technique has a distinct advantage over ping-ponging which is the combining of several tracks onto other tracks on the same tape using the sel-sync function of the recorder.

Ping-ponging or combining actually accumulates more noise than making a second generation copy of the same number of tracks. This is especially true when noise reduction equipment is used for all the recording and transfers.

A very simple sync generator which references to line frequency can be made from a filament transformer and pad (See diagram). This is recorded on one track of the 16 tracks at 7 to 10 dB below Ampex reference level.

FIGURE 1



## INTERLOCK SYSTEMS AND RESOLVERS

One system that few people realize is quite adept at synchronizing two tape machines is the standard resolver. All that is required is the installation of a standard resolver onto a 16-track machine. A recorded sync tone is fed into the sync-playback input of the unit. Next, the other tape recorder's sync tone is fed into the external-sync input on the resolver. The resolver will then compare the two signals and vary the output frequency

which changes the speed of the capstan and insures proper sync-lock.

In order to apply the interlock technique mentioned it is necessary to record some form of synchronous reference. This sync could be in the form of a sampling of the line frequency (60 Hz), a precision oscillator, serial time code generator or pulses which are recorded on one track of both machines.

### THE SYNC TONE

There are other sync systems that use tones below or above the audio frequen-

cies which can be recorded on one of the actual program tracks.

In order to facilitate the lock-up time before the start of the program, a piece of tape with a 60 Hz tone should be added to the head of both tapes and with the aid of a common start button and a trial-and-error determination of start marks, a start position can be found which will remain constant for over twenty starts.

Another resolver type is the RCA Unilock which automatically makes corrections for starting and stopping slippage by maintaining the sync-lock reference position in a form of comparator memory. The resolver then syncs the machines into position in about five seconds after starting. The advantage of this system is that the tape can be stopped and started at will without losing sync. Also by audibly "cueing" the two machines together it is possible to start at any location on the tape.

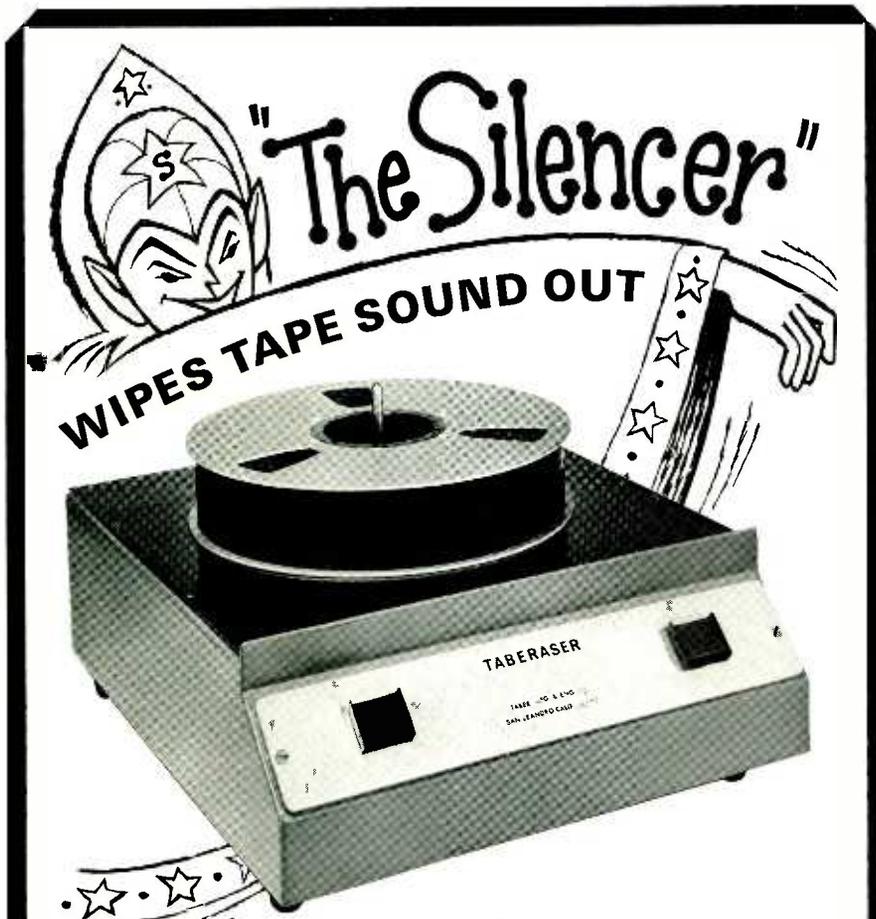
New recorders of the "servo" type have provisions for inserting external drives to the capstan motors enabling the synchronized operation of the machines without additional equipment. One manufacturer has recently demonstrated an add-on unit that would allow total interlock, including forward/reverse operation with two or more machines to film.

Still another system of the self-resolver type is the "crossed fingers" system wherein two machines are started simultaneously and the speed of one is varied manually by a variable speed oscillator (capstan drive amplifier) until the proper sync is achieved. The fingers of both hands are then crossed and everyone hopes that the machines stay in sync.

The newest types of electronic interlocking devices are designed to read and compare serial time code information from the tapes using the SMPTE format, and to automatically adjust the units for synchronous operation. Although these more expensive systems cost as much as a new 16-track machine, they include automatic search-and-run as well as programable start-and-stop with repeatable record in/out functions, and they are designed to interlock both video and audio recorders.

### APPLICATIONS

The following concepts should serve to stimulate the imagination of many a recording engineer and producer. None of these applications follows the "rules" of recording which, as this author sees it, were abandoned when the recording industry accepted acoustics and electronic technology as instruments in the composition of aural productions.



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## COMPARING NOISE CHARACTERISTICS

"Ping-ponging" (using the sel-sync function of the record head to combine tracks) vs. "bouncing back" (pre-mixing of tracks on tape-2 onto open tracks of tape-1)

All noise measurements made with standard professional audio equipment, using NAB "curve-A" filter. All channels equalized and levels matched, +7dB, from 60Hz to 15kHz, and then combined to one track.

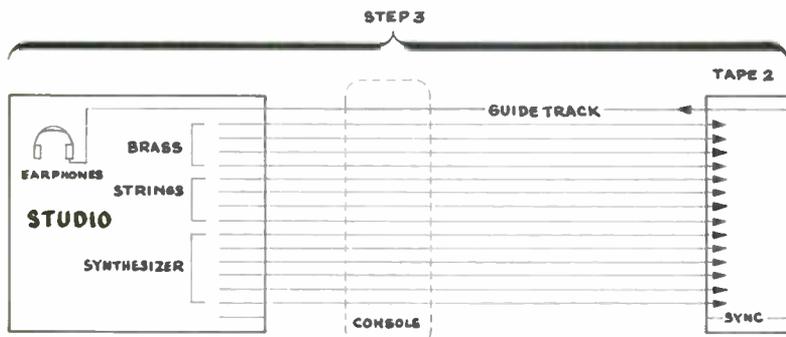
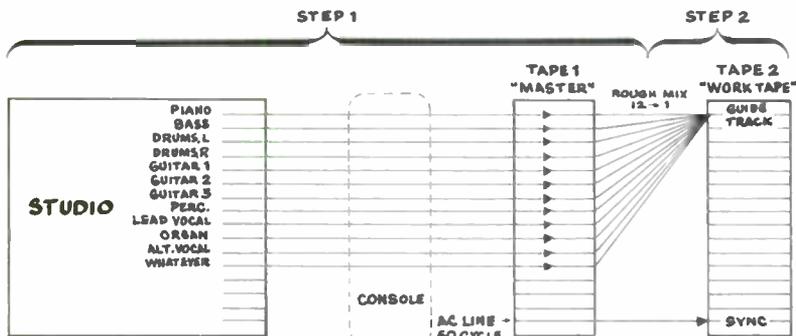
| NORMAL SYSTEM NOISE |               | NOISE  |
|---------------------|---------------|--------|
| 16-track recorder   | on standby    | -60dBm |
| 16-track recorder   | tape recorded | -54dBm |
| 8-track recorder    | on standby    | -62dBm |
| 8-track recorder    | tape recorded | -56dBm |

### BUILDUP NOISE

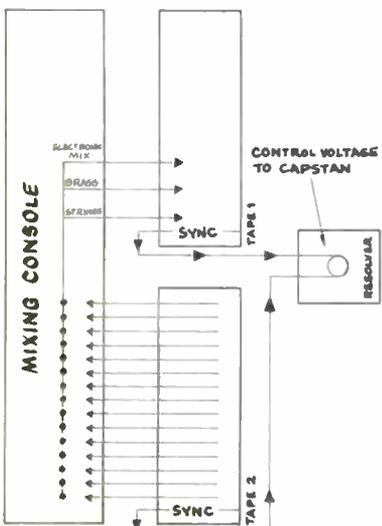
"Ping-ponging": 8 tracks combined to 3 (3 to 1, 3 to 1, 2 to 1) and then mixed to one track. -51dBm

"Bouncing back" 8 tracks onto original 16-track (tape-1) and then mixing to one track -53dBm

Pre-mixing 14 tracks of tape-2 to 3 tracks of 16 track (tape-1), then mixing to one track. (Total of 27 tracks used). -49dBm

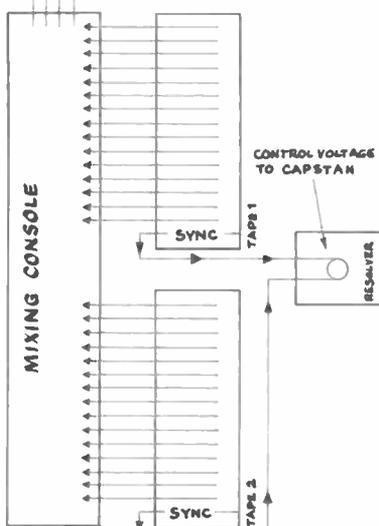


**STEP 4 - ALTERNATIVE 1**  
PRE-MIX INFORMATION ON TAPE 2, "BOUNCING BACK" TO THE CLEAN TRACKS ON TAPE 1.



(AFTER THIS STEP, MIX-DOWN TAPE 1 AS WITH ANY OTHER 16-TRACK TAPE.)

**STEP 4 - ALTERNATIVE 2**  
CUT TO 2-TRACK OR QUAD MIX



MIX UP TO 30-TRACKS USING 2 MASTER TAPES LOCKED TOGETHER, OR (ALTERNATIVE 3), RECORD VARIOUS PRE-MIXES ON A THIRD, "SECOND GENERATION" 16-TRACK TAPE.

Put an AKG on the job.  
It will sound better!



AKG CANADA • DIVISION OF DOUBLE DIAMOND ELECTRONICS • SCARBOROUGH, ONTARIO

DISTRIBUTED BY  
**MICROPHONES • HEADPHONES**  
NORTH AMERICAN PHILIPS CORPORATION  
100 EAST 42ND STREET, NEW YORK, NEW YORK 10018

**D-900E**  
Shotgun Dynamic  
Microphone  
\$149.00 Net

Circle No. 116

Re/p 25

To begin with, a basic 16-track master is recorded on all but (at least) three tracks, and simultaneously a sync tone or pulse is recorded on one of the open tracks. We'll call this original master tape "tape-1." Then a monaural, rough mix is made as a guide track for future use. This guide track is recorded on one track of a *second* 16-track tape (or 8 or 4-track) which we will call "tape-2," or the "work-tape." While making this guide track, the sync tone is simultaneously transferred to tape-2 as well. At this point, tape-1 can be placed in storage and all future production work will be done on tape-2, or the work-tape.

Now we can go any one of several directions. One way is to send the work tape anywhere you want, (with the master [tape-1] safely locked away in storage), and record as many tracks as you need up to 14 (assuming tape-2 is a 16-track tape). When the work tape is all filled up you can then come into a studio with both tape-1 and tape-2, hook up whichever resolver system you have settled upon, and mix (bounce back) all of the material on tape-2, recording on the tracks you left open on tape-1.

With this application, as with most, it would be desirable to use some form of

noise reduction equipment. But if you were to use a 24-track system you would need 24 Dolbys or DBX's in order to mix down. However, if you are using two synchronized 16-track recorders in this application, you would need only 15 units at one time and this would afford a significant cost advantage.

If you are using electronic music, it is usually necessary to have many tracks available. Here again, just as in the application suggested above, you can record a rough mix on your work tape and transfer the sync tone or pulse simultaneously. Since 8-track is more often used by the electronic music people, you could make an 8-track work tape. That would leave you six tracks for the synthesizer. Then you can bounce back your synthesized sounds to tape-1 selecting whichever mix you prefer or even record separate mixes on two of the remaining tracks. In the meantime, you haven't been playing your master with the risk of erasing part of it.

Another application of this technique is the most obvious. You can lay down 15 tracks and a sync tone on tape-1, then do a rough mix for a guide track on tape-2, simultaneously transferring the sync tone. Next you can add strings, brass, whatever you want on the remaining 14 tracks of

tape-2. Then you can go into a studio equipped with 30 faders and mix it using what is now your *two* master tapes. You would probably use automated mixing to handle the 30 tracks.

If you couldn't afford the automated mixing then you could do a basic pre-mix, using Dolbys or DBX's or something to keep the noise down. You would then mix tape number one together in some kind of workable grouping and spread and record it on a third 16-track (tape-3), (you never need a third machine.)

Having secured a mix and transfer of tape one you would then work on tape two. Tape three would be a second generation master with a nice pre-mix with balance. All that would remain would be a fairly simple final mix.

There are other benefits to the interlock technique in addition to the increased track capacity advantage. Suppose you have an artist who is on tour and your objective is to capture a live vocal or a performance. You lay tracks down in the studio, and then do a rough mix for a guide track and transfer the sync tone onto (for example) a 4-track. Then you record the live voice performance on the 4-track and come back into the studio and take the vocal off of that and put it back into the master.

The interlock technique is very useful for the multiple recording of voices. You can reserve just one voice track left over on a 16-track master. Then you make a work tape and you bring in three or four people and double their voices seven or eight times. After that you mix them all back together and bounce back to the original master. This way you have avoided picking up all the additive noise that you would get if you were ping-ponging back and forth and you have avoided the necessity of having to reserve seven or eight tracks for the vocal backing.

If you have an artist that you are really not too sure of, you can record eight or ten lead vocals on a work tape and then selectively, as you are mixing back to the original master, take the best of each track and you never have to worry about punching in, erasing, etc..

There is no question that tomorrow's recording process will require more and more track capacity . . . 24 . . . 36 . . . maybe even to the "Ajax 72" which R-e/p cartooned some issues ago. We at MO-TOWN are certainly preparing for this . . . with the new tape machines, and these sync techniques for using the machines we already have.

END

Going-

# 24 TRACK ?

Need a-

## 24 TRACK MONITOR SYSTEM ?

### HEIDER'S STUDIO 4 HAS -24-

#### WE DID THE MONITOR SYSTEM FOR HEIDER-

#### WE CAN DELIVER A SYSTEM TO YOU - on time

#### CAN WE MODIFY YOUR PRESENT SYSTEM ?

### YES!!

### CALL US FOR PRICE & DELIVERY - NOW!

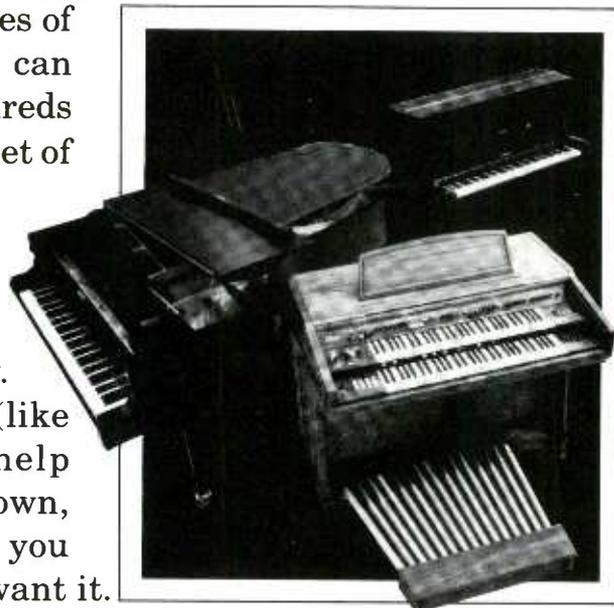
BUSHNELL

ELECTRONICS CORPORATION

18210 STAGG STREET, VAN NUYS, CALIFORNIA 91406 (213) 988-0760

# MIX MASTERS

The virtues of Yamaha Grands can be heard on hundreds of thousands of feet of tape. Clarity. Power. Rich, full tone. Textural versatility. Dynamic versatility. Yamaha Grands (like this C-7) will help you get it all down, exactly the way you and your talent want it.



The Yamaha Electone E-3 is more than a complete professional organ. It's literally a control center for hundreds of colors, rhythms, sound effects, and textures—some unavailable in organs costing twice as much. It can help keep unexpected problems or surprises in a session from turning

into glaring holes.

Yamaha Verticals are the closest you can come to grand pianos without grand pianos. The U1-D, for instance, has impeccable tone quality and response quick enough to please the most finicky talent. And Yamaha Verticals are made to endure, session after session, year after year.

 **YAMAHA**

Yamaha International Corp., P.O. Box 6600, Buena Park, Calif. 90620

|   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> C7 Grand Piano     | Name _____                       |
| <input type="checkbox"/> U1-D Upright Piano | Business _____                   |
| <input type="checkbox"/> E-3 Organ          | Address _____                    |
| <input type="checkbox"/> Other              | City _____ State _____ Zip _____ |

Send for complete specifications and dealer information.

# 3M Introduces the Series 79 Professional Audio Recorders.

With Servo Control. And an Optional Synchronizer.



**They're the first  
audio recorders that  
won't become obsolete.**

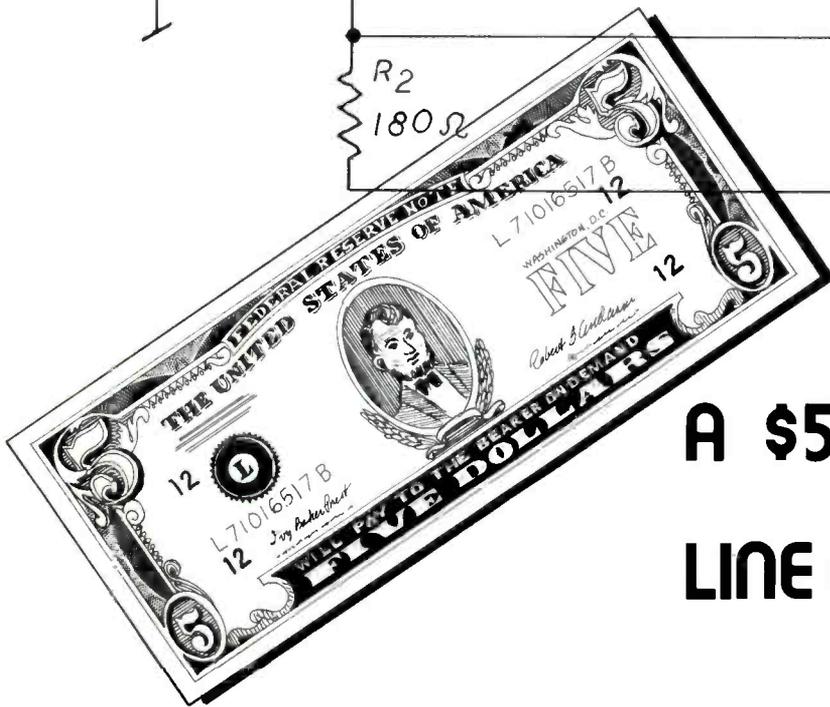
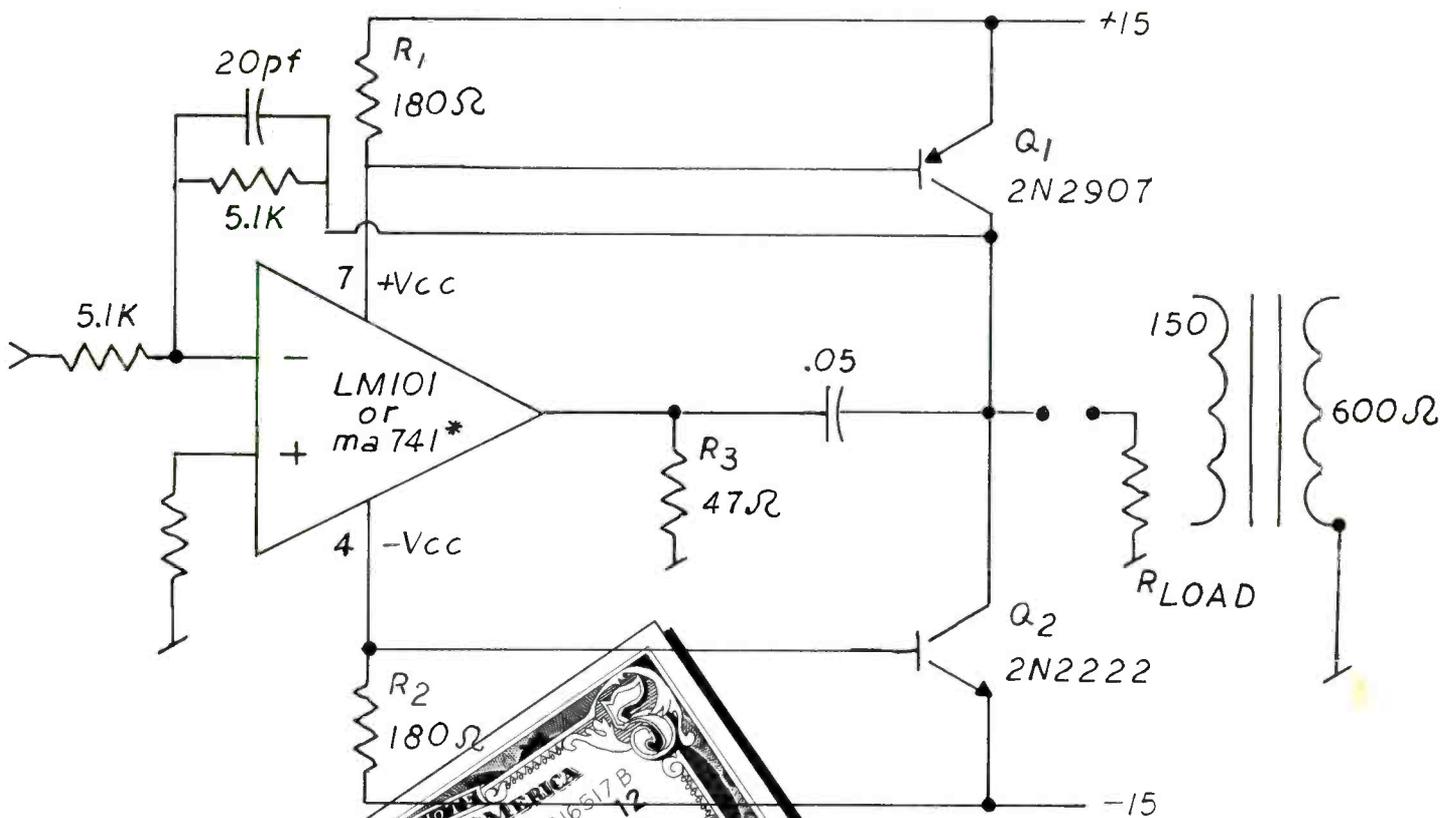
3M combines Isoloop® differential drive with a unique packaging concept to produce the smallest, lightest 24, 16 and 8-track recorders you can buy. Standard features include: servo control; selectable 7-1/2, 15, 30 ips speeds; 5 to 45 ips variable speeds; 50-60 Hz. 110V or 220V input for easy adaptation to domestic or overseas applications; remote transport control; broad equalizer ranges; single electronics card per channel; separate equalization for synch; remote that can be integral or at console.

*And they're updatable.* Series 79 won't become obsolete. Space is provided for state-of-the-art noise reduction circuitry. *They're expandable, too.* 16 and 8-track models can be quickly and easily expanded to 24-track. *With an optional, rack-mounted synchronizer.* It synchronizes to quadruplex or slant-track VTR, sprocketed machine, or another audio tape recorder.

So if you've been looking for recorders that can grow, and not grow old, take a look at 3M's new Series 79. Send for our information package. Professional Audio Products, 300 South Lewis Road, Camarillo, Calif. 93010. Telephone (805) 482-1911.



PROFESSIONAL AUDIO PRODUCTS  
**Mincom Division** **3M**  
COMPANY



## A \$5.00 LINE AMPLIFIER

by CHUCK DAVIS

This particular amplifier can be used in many areas of a sound system, and helps beat the problem of the high cost of parts.

One of the problems of working with op-amps is that most of them cannot drive the low impedences found in professional audio systems; 600 ohms. Low power op-amps most often call for operation into loads (impedences) of 2K or greater. As a result, some sort of current multiplier (amplifier) is added to increase the load, as seen in Figure 1, Q<sub>1</sub> and Q<sub>2</sub>.

This circuit is a moderate departure from those commonly found, in that it uses up to three fewer transistors and no offset diodes.

The circuit can be described as a Class AB amplifier. The op-amp operates 'Class A' driving a 'Class B' follower. As shown, R<sub>3</sub> presents a constant load to the op-amp. At 47

ohms it would appear that the load would be devastating to the IC. Not really. Observe that R<sub>1</sub> and R<sub>2</sub> are in series with the B+ and B- legs. As current is drawn by R<sub>3</sub>, a voltage drop occurs across R<sub>1</sub> and R<sub>2</sub> that is both voltage and current amplified in Q<sub>1</sub> and Q<sub>2</sub>, and fed back to the high gain op-amp. So, this seems to answer the question; why have all that external circuitry, when the op-amp itself contains enough stuff to maintain a high gain-bandwidth at low distortion?

The line amp, as it stands, will supply approximately +18dBm into 600 ohms and has a gain of 20dBv. By adding a transformer, T<sub>1</sub>, it will supply +24dBm by means of the 150 ohms to 600 ohms step-up (1:4) ratio. Of course, a 1:1 ratio can be used if all that is needed is isolation.

Have fun. Hope to have another goody for you in the next issue.

...pole signed a th...  
...ported \$600,000, steady...  
...the flamboyant Mays...  
...The Braves moved to Atlant...  
...landed in the seats, a solo blow...  
...in the first inning. It also lifted his...  
...lifetime total bases to 6,001.

### SUPER VOLKS STRIKES JERSEY

John Swartz, early today, stopped at his local gas station to fill up. By mistake a diet soda was dispensed into his tank. His Volkswagen sedan was last reported seen traveling 300 miles per hour on the New Jersey Turnpike.

### MAGNIFICENT MANUFACTURER MOVES

ALLISON RESEARCH, INC., creator of super powered nifty audio gadgets, has moved to Nashville, Tennessee. It was said they moved their multi-faceted manufacturing facility including their gigantic warehouse and showroom, their vast, but relatively untapped creative force, Bob, the parrot and Chunga, the mutant industrial vacuum cleaner.

Also seen inching along the interstates was their endless fleet of Edsel powered moving vans, heavily laden with absolutely astounding audio artifacts, 17 pairs of Paul Buff autograph model keel boat deck shoes, 1 gross of slightly bent batons, and 1 golden flag pole engraved with the names of gone but not forgotten AR employees.

Upon arriving at the new Allison Research facility, located at 2817 Erica Place, Nashville 37204, one of the vehicles in the above mentioned caravan crushed the prize winning petunia garden owned by neighbors, Buzz Cason and Bobby Russell. Visibly outraged, Mr. Cason immediately dialed (615) ALLISON to lodge a complaint against their new neighbors. The reply was heard as far south as Hoots Holler, Arkansas; Roses are red  
Violets are blue  
Your petunias are broken  
Will a KEPEX do?

### SOCIAL CALENDAR

It was reported that early yesterday afternoon, Mrs. Ira Wisbang (of the Nashville Wisbangs) was seen buying a dozen eggs at Bonscuzzo's Poultry Parlor. Mr. Bonscuzzo (Luigi) was reported to have retorted, "..."

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# NEW PRODUCT NEWS

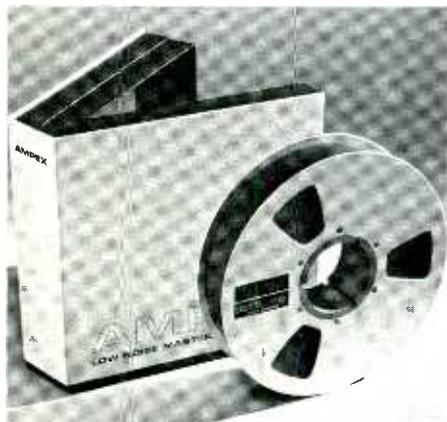
## NEW AMPEX MASTERING TAPE – SERIES 406 & 407

The backcoated tape features a new oxide formula and a new binder system to provide improved recording and playback characteristics and greater durability than previous Ampex mastering tape.

The 1-mil 407 Series and 1-1/2-mil 406 Series tape replaces the 444 Series and 434 Series tape in the Ampex line.

Extremely fine ferric oxide particles are used to achieve a higher packing density, resulting in a solid 3.5 dB improvement in undistorted output capability over that of previous Ampex tape.

The 406/407 Series tape is the first professional mastering tape offered on a 14-inch reel containing 5,000 feet of tape. The long reels will allow additional studio flexibility permitting a full 30 minutes of recording time at 30 ips or 1 hour at 15 ips.



The tape is offered in reel sizes from 7-inches to 14-inches and on 12½ inch hubs. It is available in tape widths of 1/4-inch, 1/2-inch, 1-inch and 2-inches to permit use on all mastering audio recorders. Completely new silver-grey packaging is also being featured providing greater protection and new ease in handling and marketing.

The price ranges according to tape widths and reel size, with typical prices for quantity lots of 2,500 feet (1/2-hour playing time at 15 ips) being \$7.00 per reel of 1/4-inch tape and \$51.80 per reel of 2-inch tape.

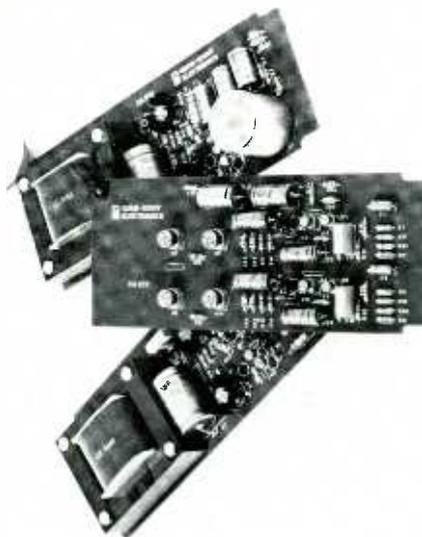
The new tape will be available in June.

AMPEX CORPORATION, 401 BROADWAY, REDWOOD CITY, CA. 94063

Circle No. 120

## NEW QUAD-EIGHT "CA" SERIES OF AUDIO AMPLIFIERS.

Using high quality components on military grade 2 3/4" x 7" printed circuit cards, the "CA" series allows the Quad-Eight Electronics standard of quality to be achieved in ancillary equipment, updating and expanding existing consoles, and in new custom console construction.



The first three "CA" series cards to be released are: (1) The CA 127; operational amplifier input, +30dBm transformer output, unity to 40dB amplification. May be used as a booster amplifier, active combining network (with CB28 accessory), and utility amplifier. (2) The CA 227; transformer input and output (+30dBm) 30 to 56dB amplification. May be used as microphone pre amp, line map, and booster amp. (3) The CA 272; dual amplifiers, operational amplifier inputs, single ended outputs, (+24dBm) may be used as utility and mixing amplifiers.

All three boards have 150% over-voltage and short circuit protection, low distortion (.2% THD, 20Hz to 20kHz), and low noise (-129dBm CA 227, -110dBm CA 127 and CA 272).

Accessories, including two card racks, a resistive combining network, and a remote gain switching device for the CA 227, have been included in the system.

QUAD-EIGHT ELECTRONICS, 11929 VOSE STREET, NORTH HOLLYWOOD, CALIFORNIA 91605.

Circle No. 121

## Sound pressure levels up to 140 dB.



Sony's new condenser microphones; ECM-64P (Uni) and ECM-65P (Omni) handle sound pressure levels up to 140 dB, with less than 1% distortion.

Both microphones shield the capsule with a unique double windscreens to reduce pop susceptibility when close miking is employed. In addition, they're designed to filter out unwanted extreme low frequencies, all but eliminating the proximity effect that can severely impair the performance of a hand-held microphone. Built-in battery interlock switch in the Cannon receptacle disconnects the battery circuit when mic cable is unplugged.

**SONY SUPERSCOPE®**

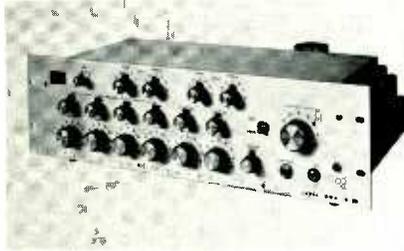
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Circle No. 122

Re/p 31

**BOZAK INTRODUCES NEW MIXER/PREAMP CMA-10-2D**

Latest addition to Bozak's family of professional audio electronics is the Model CMA-10-2D Mixer/Preamp, a simplified but versatile unit ideally suited to clubs, discotheques, small broadcasting stations, school and background-music systems (with paging facilities), advanced audiophiles, and similar applications.



Its versatility is evident from this outline of the four stereo and two mic/line inputs and other features of the 10-2D.

**INPUTS:** each with its own fader and balance controls, used with appropriate plug-in cards and transformer: Four pairs **STEREO**, two pairs low-level, RIAA-equalized for magnetic phono cartridges (A-603B input card); two pairs high-level, for tuner, tape deck, etc. (A-1017A card). Two **MIC/LINE** (mono) for microphones or line; each switchable to left, right, or both output channels: high impedance,

used direct; low impedance, used with A-1002C input card and CMA-481 input transformer.

**OUTPUTS:** two-channel **LINE**, +18 dBm, or 6V into 600 Ohms unbalanced, each channel with its own equalization controls; single dual ganged master gain control. **MONITOR**, 4V into 600 Ohms. **PL** stereo phone-jack, independent level control; switchable to Program, or to Cue any of the four stereo inputs. **TAPE-OUT**, Hi-Z, independent of master gain and equalization controls.

Gain with the A-1002C card and CMA-481 transformer (Hi-Z microphones) is 80 dB; with the A-1017A card (high-level, 50-kOhm), 34 dB.

Frequency Response  $\pm 1$  dB is 20-20k Hz; Total Harmonic Distortion 20-20k Hz, less than 0.2% at +18 dBm; Noise is -125 EIN.

CMA-10-2D is housed in a rack-mounting cabinet 19" wide with a satin-anodized panel 5 1/4" high, and the chassis is a standard 17" x 12". A carrying case is available for field use. The Mixer draws 12W, and is available for 120V 50-60 Hz or 220V 50-60 Hz operation.

**BOZAK PROFESSIONAL AUDIO PRODUCTS BOX 1166, DARIEN, CT. 06820**

Circle No. 123

**SHURE ANNOUNCES NEW SM61 "SILENT" MICROPHONE FOR PROFESSIONAL USE.**

Shure Brothers Inc., has introduced a new, rugged omnidirectional dynamic microphone that provides all the features and performance characteristics required for a variety of broadcast, recording, and professional sound reinforcement applications — and does so with a remarkable freedom from the problems of mechanically induced noise.



The new microphone, called the Model SM61, offers a smooth, wide-range frequency response and an extremely natural, uncolored sound. Frequency levels are held constant through varying distances between the user and microphone. This permits the performer to "work" the

# Neve

*the sound of Neve  
is world wide*

Now In  
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16 track facilities  
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Canada

Circle No. 124

SM61 without variations in tone or balance.

The SM61's shock-mount design eliminates or minimizes cable, handling, and mechanical noises. "Pop" and wind filters make the SM61 ideal for outdoor recording, public-address, and broadcasting applications. Its rugged design protects the SM61's performance characteristics, even against a crop on its nose.

Professional Net Price of the Shure SM61 Microphone is \$66.00.

SHURE BROTHERS INC., 222 HARTREY AVENUE, EVANSTON, ILL. 60204.

Circle No. 125

**TEL/AUDIO DYNAMICS NEW CONCEPT IN CASSETTE DUPLICATION SAID TO BE THE ONLY 5-SLAVE DUPLICATOR UNDER \$5,000 THAT LOADS THE CASSETTE AT THE SAME TIME IT RECORDS.**

The R-1017 utilizes professional masters on 1/4" reel format. It is a most flexible duplicator, capable of duplicating from bulk reel tape to pre leadered cassette or from the master directly into pre-loaded cassette. When going from bulk reel tape to pre-leadered cassette, the recording is accomplished out of cassette as the tape passes from the bulk reel to the cassette.

When duplicating into pre-loaded cassette, the tape is brought outside the cassette case, looped over the recording head, and duplicated out-of-cassette for highest quality standards.



Because of this unique feature, the R-1017 will produce duplicate cassettes in high speed production with the same professional quality as with the most sophisticated reel-to-reel duplicating equipment.

The R-1017 has 5-slave transports. They have the advantage of the common mandril capstan insuring uniformity and accuracy of speed between tape master running at 60 IPS and slaves running at 30 IPS.

The R-1017 will produce 5 C-60 cassettes in less than two minutes running time. One operator with reasonable practice can produce 350 to 450 cassettes in an 8-hour day.

Although this new concept was first created to meet the difficult conditions in remote areas, it has since become obvious there is an even greater need among commercial and educational organizations at home.

An announcement is expected later concerning modifications that will permit duplicating using a cassette master and also a model permitting reel-to-reel duplicating. Further modifications will make possible duplicating stereo with ultimate fidelity.

A demonstration can be arranged in your area by calling or writing:

TEL/AUDIO DYNAMICS, 10520 BURBANK BOULEVARD, NORTH HOLLYWOOD, CALIF. 91601

Circle No. 126

#### NEW INSTRUMENT MEASURES CASSETTES

Information Terminals has introduced its new M-400 Cassette Tester. The instrument was developed to enable tape cassette manufacturers, duplicators and users to follow American National Standards Institute specifications in checking cassettes and in servicing cassette drives.



The instrument measures the winding torque in cassettes under varied conditions, and also determines the amount of force exerted on heads by individual pressure pads. The user places a cassette on the instrument's deck, presses the "start" button, and observes the winding torque indicated by the meter.

An eight-gram-centimeter holdback torque may be switched in and out, and the winding torque when a head is penetrating a cassette may also be measured. A separate gram-spring scale is included for measurement of the force required to move the head into the cassette.

INFORMATION TERMINALS, 1160 TERRA BELLA AVENUE, MOUNTAIN VIEW, CALIFORNIA 94040.

Circle No. 127

**Variable-directivity  
condenser studio  
microphone provides  
130 dB dynamic range.**



**Dynamic range (130 dB)  
+ noise level (24 dB)  
= max. spl (154 dB)**

Sony's variable-directivity (Omni-Uni) C-37P\* contains an advanced FET amplifier. A switchable attenuator is placed between the capsule and amplifier to prevent distortion even at extreme sound pressure levels.

The combination of proven excellence in sound quality, and the very latest in semiconductor technology makes the Sony C-37P indispensable in today's quality-oriented recording studio.

Also Consider:

Studio standard condenser microphone model C-550.\*

**SONY SUPERSCOPE®**

\*Must be powered by Sony AC 148A or equivalent power source.

©1972 Superscope, Inc., 8132 Vineland Ave., Sun Valley, Calif. 91352. Send for free literature.

Circle No. 128

Re/p 33

**BGW SYSTEMS 1000 WATTS RMS QUADRAPHONIC POWER AMPLIFIER.**

Rated at 1000 watts RMS (4 channels at 250 watts/channel into 8 ohms). The Model 4X250 is ideal for upgrading to quad sound, biamping, or for large systems in which many channels are required.



This new amplifier features an ultra fast acting SCR crow bar, FET operational amplifier IC's, thermostatically controlled forced air cooling, over temperature protection, a circuit breaker and plug in circuit modules. The power supply is built around a 2.5KW 35 pound power transformer. The chassis features a welded steel frame for maximum strength and rigidity. The attractive front panel is brushed satin silver with large cast aluminum handles and a hidden display for status indicators.

Performance Specs: Power Output 250 Watts RMS continuous per channel into 8 ohms, 125 Watts RMS continuous per

channel into 16 ohms. Power Bandwidth 5Hz to 20kHz. Rise Time 2.5 microseconds. Harmonic Distortion Less than 0.1%, Typically .01%. Noise and Hum Level better than 100dB below rated output into 8 ohms.

List Price \$1450.

BGW SYSTEMS, P. O. BOX 3742, BEVERLY HILLS, CALIFORNIA 90212.

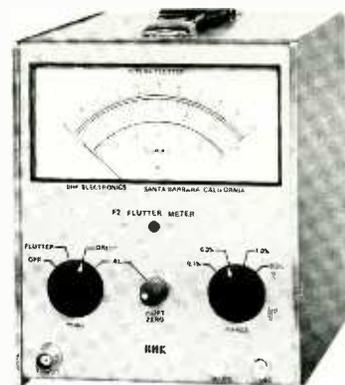
Circle No. 129

**BHK ELECTRONICS ANNOUNCES MODEL F2 FLUTTER METER.**

The model F2 Flutter Meter is designed for use by those requiring an accurate and functional instrument capable of serving research, production and servicing needs, and offers several features not previously available in an instrument of this type at relatively low cost.

Accurate flutter measurement is obtainable over a wide range of carrier frequency; static speed error does not influence the validity of the reading. The range of acceptable input levels exceeds 60dB; positive visual indication is given in the event of insufficient carrier level. Drift, or mean speed deviation may also be measured.

Model F2 Specifications: Internal Oscillator: Frequency 3150Hz  $\pm$ 0.1%, Output Level +4dBm into 600 ohms, Output



Impedance 10 ohms.

Input: Frequency 2-4kHz, Level 10mV to 10V, Impedance 300,000 ohms.

Flutter Measurement according to IEEE standard 193-1971; reads subjective peak flutter Ranges 0.1%, 0.3%, 1.0% and 3.0% F.S., Accuracy 5% of Full scale.

Drift Measurement Max.  $\pm$ 3% F.S.

Connectors BNC. Supply nom. 117VAC 50-60 Hz, 6 Watts.

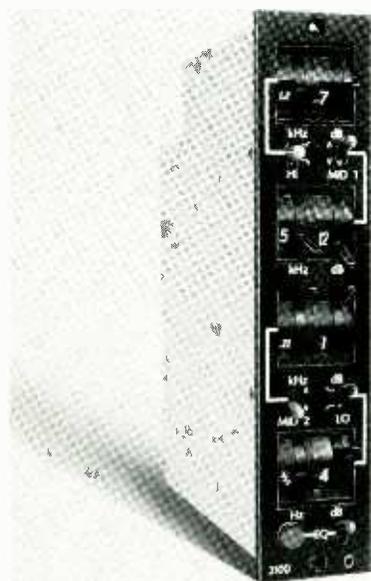
Option -01: F2 delivered set up for 1kHz carrier frequency, for low speed measurements.

Prices: Model F2 \$395.00.

Option -01 \$60.00.

BHK ELECTRONICS, 3931 HARROLD AVE., SANTA BARBARA, CA. 93105.

Circle No. 130



**Whenever there is a need.**

This is the Olive "motto". We live up to it in our constant attempts to push back the accepted frontiers of audio technology. In fact, Olive products represent a whole new concept in audio engineering excellence. Take a close look at our Series 2100 Equalizer for example. Notice the 4 sections. All capable of independent action. There are two mid ranges and a total of 48 frequencies to choose from. Just wait until you experience the speed of set up and feel the smoothness of lever actuated switching. There's no need

to compromise when the natural frequency range of any instrument can be located and brought out where you can really get at it. Quickly. Using only 1 section you can create 300 separate effects. Imagine how many effects you can get with all 4. Designed to answer any need, the 2100 Equalizer is available as you see it here or as a very important part of the Olive Console. Before you are sold on just any equalizer try the Olive 2100. We'll let the product sell itself. Specifications are available on request.



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Circle No. 131

**THE SYNTHESIZER 12, MOST COMPACT MOOG MODULAR MUSIC SYNTHESIZER ANNOUNCED.**

Simple, rugged and reliable, the synthesizer 12 consists of just two portable units — a case housing all modular instruments, and a keyboard controller. The Synthesizer 12 is highly versatile. In addition to being a small, complete studio in itself, its simplicity and portability makes it an ideal basic synthesizer for the teaching of electronic music or as a performing instrument.



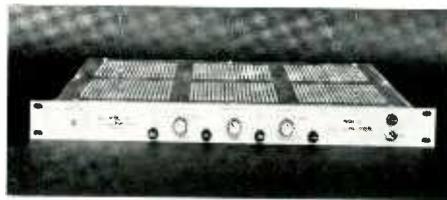
All components are of the highest quality. Performance is in keeping with the high standards of sound quality, low noise and reliability established by Moog. The three oscillators are highly stable, accurately voltage controllable and wide range. They include such state-of-the-art features as phase-locked synchronization, linear frequency modulation, triggered waveform clamping and voltage-controlled waveform width.

Audio signal modifiers include a bank of fixed frequency half-octave filters, a wide range lowpass/resonant filter and a voltage-controlled amplifier. The unit features a two-note keyboard, a four-input direct coupled mixer, an attenuator, jack multiples and connections to two manual controllers.

MOOG MUSIC, INC., ACADEMY ST., P.O. BOX 131, WILLIAMSVILLE, N.Y. 14221.

Circle No. 132

**BURWEN NOISE ELIMINATOR.** The Model 2000 Noise Eliminator is a record-play signal processor which extends the dynamic range of a studio tape machine or transmission link to as much as 110dB. A combination of high and low frequency preemphasis together with extreme compression reduce the input dynamic range to 55 dB at the tape. Upon playback



through the Noise Eliminator the original signal levels are restored with a typical accuracy of  $\pm 5$ dB. Three different record characteristics are optimized for 15 ips, 7 1/2 ips and slow speed recording, FM broadcasting, or disc records. Noise reduction is 50 dB for tape mastering and 35 dB for prerecorded tapes, records, and FM. Output is 18 dBm into 600 ohms at less than .1 dB total harmonic distortion and the response is flat  $\pm .2$  dB from 20 cps to 20 kc at all times. A single 1 3/4" rack panel contains 1 or 2 channels, each switchable manually or automatically to record or play.

BURWEN LABORATORIES, 12 HOLMES ROAD, LEXINGTON, MASS. 02173.

Circle No. 133

**NEW AEROSOL CLEANER FOR ELECTRONIC DEVICES AND COMPONENTS.**

A new aerosol cleaning fluid has been developed by Percy Harms Corporation of Skokie, Illinois. The new cleaner is specially designed to clean without any deleterious effects on plastics, rubber or painted surfaces. It will remove oils, greases, fingerprints, accumulation of dirt, waxy deposits, etc.



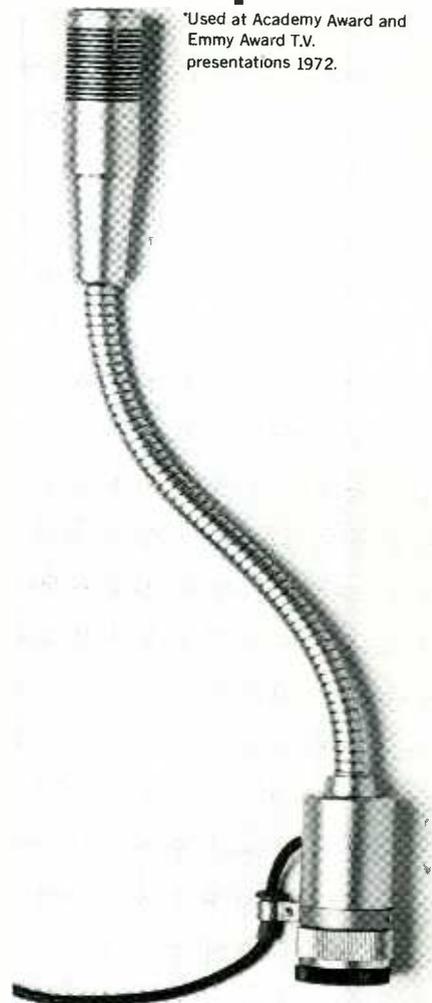
This new product, called Slide-Electronic Contact Cleaner, will leave no residue after evaporation. It provides a constant source of clean solvent for selective delivery to chosen areas to be cleaned. Electronic Contact Cleaner is recommended for use on circuit boards, tape heads, switches, tuners, motors and other precision components and equipment. It is non-conductive and non-flammable.

PERCY HARMS CORPORATION, 7349 NO. HAMLIN AVENUE, SKOKIE, ILLINOIS 60076.

Circle No. 134

**Sony's award presenting microphone.\***

\*Used at Academy Award and Emmy Award T.V. presentations 1972.



Featuring a high-performance condenser capsule of electret design, the ECM-53 is specifically designed for broadcast, recording studio, public address and similar applications.

The cardioid capsule assembly contains a permanently charged condenser capsule and FET/IC amplifier. A Cannon connector houses the battery supply.

- Frequency Response: (Frontal  $\pm 3$  dB): 40 Hz to 16 kHz
- Output Impedance (at 1 kHz  $\pm 20\%$ ): 50, 250, 600 ohms Balanced
- Maximum SPL (1 kHz): 134 dB

Also Consider:

Tie-tack/lapel condenser mic ECM-50.

Telescopic (from 7 3/4" to 17 1/2") condenser mic ECM-51.

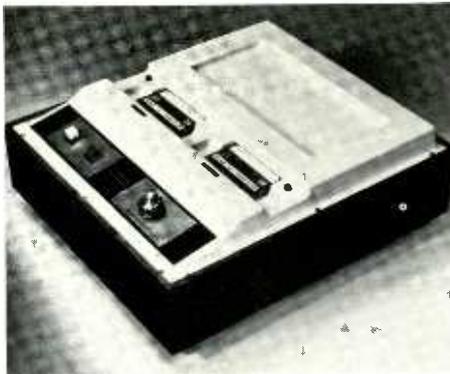


©1972 Superscope, Inc., 8132 Vineland Ave., Sun Valley, Calif. 91352. Send for free literature.

Circle No. 135

TELEX BOWS DESK TOP CASSETTE COPIER. The copier will be available in two configurations. The Cassette Copier I (master) provides all controls and makes one cassette copy from the original. It will have add-on capabilities for two Cassette Copier II (slave) modules. Each Cassette Copier II makes two cassette copies but relies on the Cassette Copier I for all power and control. Both units are identical in size and styling except for the control panel which is omitted on the Cassette Copier II. The Cassette Copier II has a single emergency stop button.

Two buttons and a track selector switch provide complete control of the Cassette Copier I and associated Cassette Copier II's, all other functions are automatic. Inserting a cassette in the original (master) position automatically turns the unit on. All the operator has to do is set the track selector to copy channel 1 or 2 or both, activate the REWIND button to assure that all cassettes are copied from the beginning of the tape and then push the COPY button to automatically copy the selected channel(s). Old material on the selected channels is automatically erased as the cassettes are copied, but existing material on other tracks is preserved. This feature eliminates the need for a bulk eraser. When copying is com-



pleted cassettes are automatically rewound to start and the Copier returns to stand-by or shuts off automatically when the original cassette is removed. Pushing the rewind and the copy buttons simultaneously activates a manual emergency stop which stops all tape motion.

The Copier is color coordinated in ivory, blue and charcoal and will be priced at less than \$900.00.

TELEX, 9600 ALDRICH AVENUE SOUTH, MINNEAPOLIS, MN. 55420.

Circle No. 136

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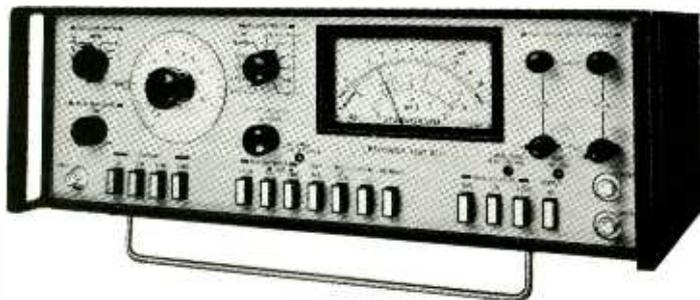
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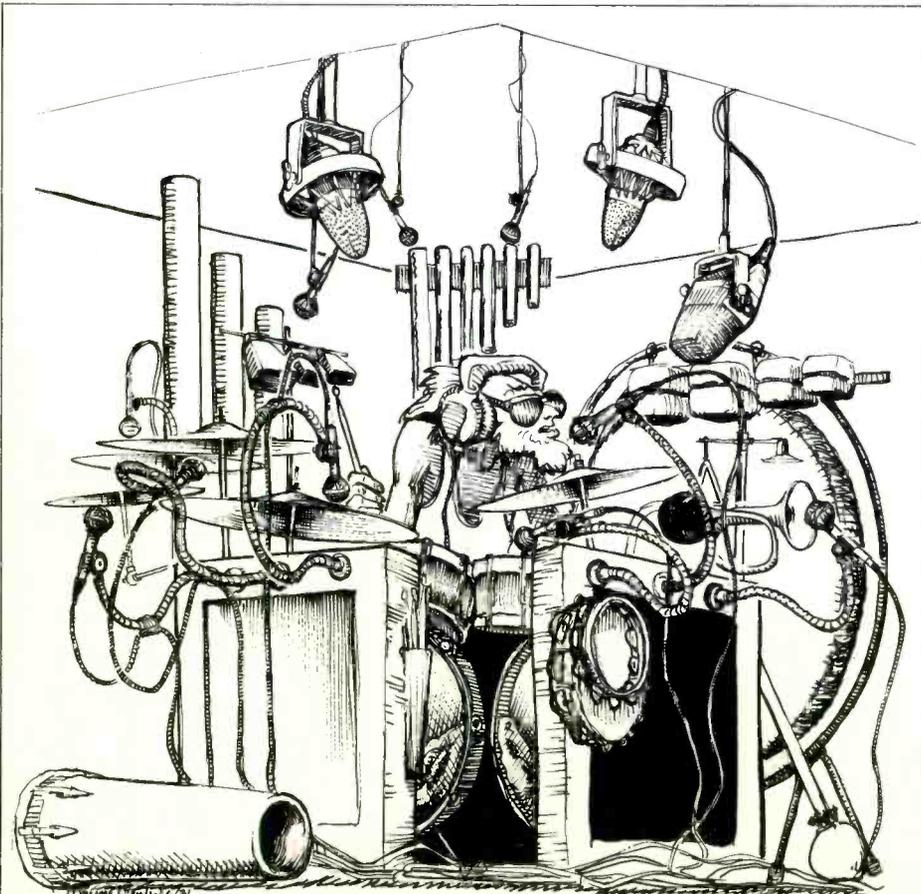
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