VOLUME 3 - NUMBER 6
NOVEMBER/DECEMBER 1972

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RECORDING engineer/producer

relating recording science • to recording art • to recording equipment

PAGE 9

ARMIN STEINER recording NEIL DIAMOND

EQualization the highest most sustained expression of the recordists art

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RECORDING 1976

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A GLOSSARY OF AUTOMATION TERMS

PAGE 29

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VOLUME 3 – NUMBER 6
NOVEMBER/DECEMBER 1972

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–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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Sound Labs' ARMIN STEINER recording NEIL DIAMOND'S "Hot Summer Night" album — 9 — **an R-e/p interview**

EQUALIZATION . . . the highest, most sustained expression of the recordist's art — 17 — **Leo de Gar Kulka**

RECORDING 1976 . . . a facetious, fictional look into the future — 24 — **Paul Buff**

A glossary of AUTOMATION terms — 29 — **Wayne Yentis**

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LETTERS and LATE NEWS

From: Herb Chaudiere
Robin M. Towne & Assoc., Inc.
Consultants in Acoustics

A critical comment on Bill Putnam's Reference Data for Recording Engineers in the September/October issue.

Figure A7 shows Noise Reduction (NR) not Transmission Loss (TL). Refer to ASTM Standard Recommended Practice for Measurement of Airborne Sound Insulation in Buildings, E336-71, or Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions, E90-70. Noise Reduction (NR) is defined as the difference between the RMS Time-space-average sound pressure levels produced in the two rooms by a sound source in one of them. This is what Figure A7 depicts.

Airborne Sound Transmission Loss (TL) of a partition is defined as the ratio expressed in decibels of sound power incident on the partition to the sound power transmitted through the partition is a function of the area of the partition, and the sound pressure level in a space is a function of the sound power and the sound absorption in the space, area and absorption as well as noise reduction must be considered in determining transmission loss.

One other small item, Noise Reduction Coefficient (NRC) is the average of the absorption coefficients at 250, 500, 1000, and 2000 Hz., not 256, 512, 1024 and 2048. The former are preferred frequencies for acoustical measurements per American Standard S1.6-1960.

reply from Mr. M.T. Putnam:
President, The URC Companies

I gratefully accept Mr. Chaudiere's comments as constructive rather than of a "critical" nature. Since I am sure that his goal in sharing technical information with others is to accurately enhance their knowledge, as is mine.

For those who wish to be further enlightened beyond my inaccuracy as regards the ASTM definition, I suggest the following references:

ACOUSTICS — Rettinger, Chemical Publishing Co. 1968 pages 92-118.

ACOUSTICAL DESIGNING IN ARCHITECTURE — Knudsen & Harris, Wiley & Sons. 1950. Pages 228-254.

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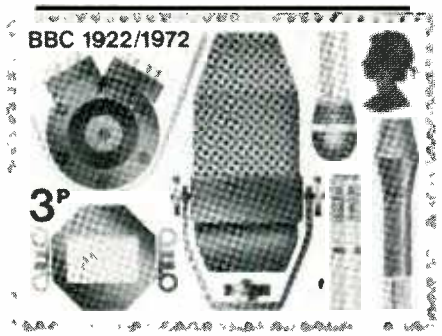
ACOUSTICS – Beranek, McGraw-Hill. Pages 324-331.

ARCHITECTURAL ACOUSTICS – Bruel & Kjaer Co. 1963. Pages 40-49.

A review of the foregoing will provide the proper perspective in the analysis of the quantitative relationship, i.e.: TL vs. NR, and will provide an even more comprehensive basis for understanding the methods of measurement and evaluation of sound transmission data which is beyond the scope of the American Society for Testing Materials (ASTM) definition.

Concluding, I would like to thank Mr. Chaudiere for his comments.



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Cetec Inc., a recently formed subsidiary of Computer Equipment Corp., El Monte, California, is now producing the Electrodyne, Gauss and Langevin lines of professional audio consoles, tape duplicating equipment and instrument loudspeakers at its plant in North Hollywood. The lines were acquired by Cetec from MCA Technology Inc. under a purchase agreement concluded October 1, 1972. Mr. Phillip L. Gundy, Executive Vice President of Computer Equipment Corp. has been elected to serve also as President of Cetec Inc. Mr. M. Ned Padwa is Vice President and General Manager. Mr. Keith O. Johnson and Mr. Don McLaughlin, founders of the original Gauss and Electrodyne Corporations, have joined Cetec Inc. as Vice Presidents of Advanced Development and Product Planning, respectively.

Cetec management states that plans to expand the existing lines have been formulated and a series of new product announcements can be expected in the near future. The existing brand names will be retained, and the high quality and advanced design which have made them leaders in their respective fields will continue to be emphasized. The company also expects to introduce some new products under the Cetec label. In addition, the company announces the establishment of a new Customer Service Group within its Marketing Department. Headed by Mr. Leigh Grafton, this group will handle all aspects of post-sale service and support for Cetec Inc. products.

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44th AES CONVENTION SET FOR ROTTERDAM, THE NETHERLANDS, FEBRUARY 20-22, 1973

In an announcement by the Board of Governors of the Audio Engineering Society it was decided that the European AES conventions will be numbered consecutively with the conventions held in the U.S. The 45th AES Convention is scheduled for May 15-18, 1973 at the Los Angeles Hilton, Los Angeles, California.

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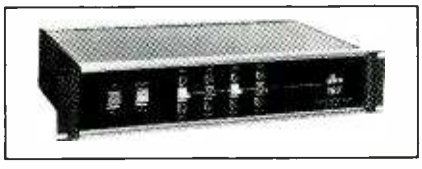

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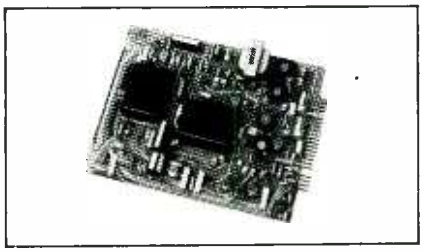

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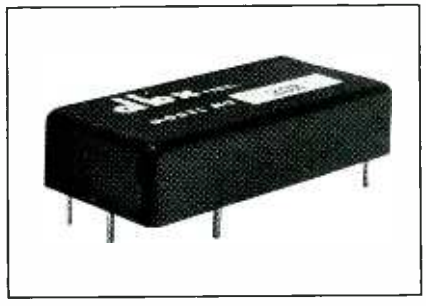

Model 202, linear dB gain vs: control voltage, −100 to +30 dB gain, noise 130 dB below peak level, low distortion, **$47.**

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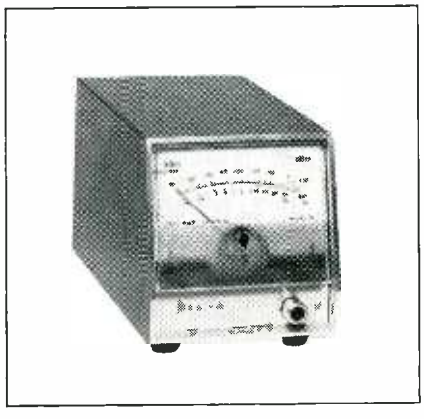

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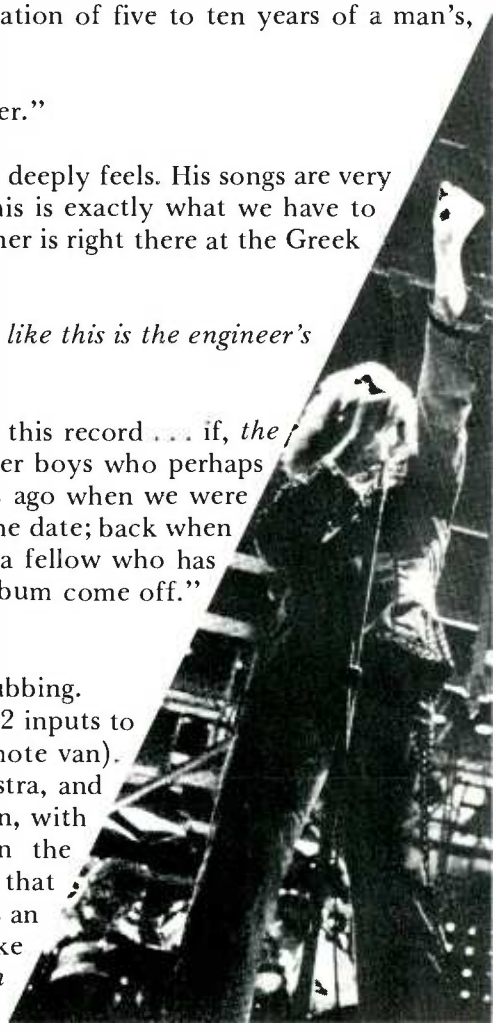
"You must understand, that's an enormous responsibility for an engineer."

"Neil is in every way an extraordinary talent. He writes about what he deeply feels. His songs are very personally experienced, and I think he makes his audiences feel that. This is exactly what we have to put on the disc, so when the needle is dropped onto the record the listener is right there at the Greek (Theater) with Neil" . . . *on that Hot August Night.*

R-e/p: Are you saying that an important ingredient in recording a job like this is the engineer's complete emotional involvement with the artist?

STEINER: "Yes . . . and the music, I must emphasize. Very definitely.

But, from a technical standpoint there was really no magic to doing this record . . . if, *the engineer knew what he was doing.* I think, basically, some of the younger boys who perhaps haven't been exposed to the earlier stuff we used to do 15 to 20 years ago when we were doing 40 and 50 piece orchestras live; where we had to get *it* right on the date; back when we were doing mono, two and three track recording . . . I don't think a fellow who has done only these isolated track things could possibly have made Neil's album come off."



R-e/p: You did use 16 track on the date?

STEINER: "Yes, but with very little mixdown, and certainly no overdubbing.

"It was a very complicated production. To give you an idea, we had 42 inputs to the control board in Heider's van (Wally Heider Recording's newest remote van). Remember, we were working with a magnificent 35 piece string orchestra, and they were positioned on scaffolding behind Neil and the rhythm section, with each couple of string players in a separate box or compartment in the scaffolding. They were separated from one another, so you can imagine that they would be very difficult to record; that is, very difficult to record as an ensemble. Our job was to balance them coming into the console to make ensemble happen. That's something of what I mean by *making it happen in the performance.*

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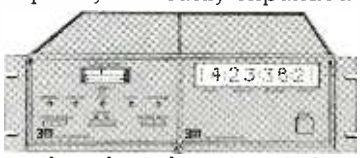

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"Then we had the rhythm section, in which the guitar player plays six or seven instruments, the piano player plays three or four different keyboards, the drummer, thank God, stays constant, the percussion man switches off on two or three or four instruments, and then the other guitar player plays another four or five instruments . . . and to complicate it further several of them sing in the background. This might give you some idea of just how complicated a production it really was.

"There was even the mental complication that I had because the tunes were not done in the same manner as when they were done originally as masters (in the studio), so therefore, flashing back in my memory was the original instrumentation which had been changed for these concerts. My mind was flashing back to say, 'hey, that wasn't played by a mandolin at that point . . . it was played by a French horn, or whatever.' So, this was definitely a highly complex production and these were just some of the reasons why it was highly imperitive that the engineer had to know the musical score and Neil's music."

R-e/p: You say there was very little mix-down?

STEINER: "Very little, we hardly spent any time on it at all. We only added a bit of EQ. Very little additional reverb. On the strings a little bit of echo, nothing severe, nothing severe at all. I think we ended up by limiting the bass a little bit, just to keep it tight. The mixing was mainly the selection of what to take from which night's performance, and making the overlaps from one tune to the next."

R-e/p: How many nights did you record at the Greek?

STEINER: "That whole week, Monday through Friday. But, about 70% of the album, I would say, came from the Thursday night performance . . . a very magical night.

R-e/p: How about noise reduction?

STEINER: "On Neil's album at the Greek I used a Dolby on the two track reduction. At the Greek we recorded at the regular 15 *ips* . . . and I think the noise was at a very low level on that tape. A lot of it has to do with the general condition and flatness of the machines, you know. And, these machines at Wally's were in very good shape. But, let me say that I am very fond of using 30 *ips*, especially now for 24 track . . . it gives us a little more headroom. But because of the length of the program at the Greek we recorded that at 15 *ips*.

"There is another thing that I want to say about mix-down and multi-tracks, 16 or 24 or whatever it is going to be in the end. I am really bugged when I hear engineers talk about 'a great mix,' 'a terrific mix' . . . as if the mix was more important to the record than the tunes or the music. And, it really bothers me to hear another line that is spoken so often by engineers, *we will take care of that in the mix-down.*

Steiner in his Sound Labs control room.

"What this means to me is that much too often, today, we are doing mechanical things and electronic things to records. Not musical things.

"I don't think there is any question that we are making somewhat more technically perfect records today, whatever that word perfect might mean. Nobody would argue the point that maybe we can produce a better bass drum sound, a better guitar sound, or whatever. It seems that we are always so preoccupied about this or that individual instrument leaking onto this or that track, or the need for more and more isolation and separation, and all that. In other words we seem to be overconcerned with making records in the control room, not in the recording studio.

"I think that it is a legitimate question to ask, who cares about all of that? Does the fellow who buys the record? I don't think these things necessarily make hit records. There isn't any real proof that they do.

"What concerns me is what we have done recently about making records with a greater musical integrity and understanding and feel. That's what I think the record listener wants to hear."

R-e/p: What, for example, is this thing you refer to as musical understanding and feel?

STEINER: "To understand how musical instruments go together. Let's assume we have 16 tracks, instruments that have been independently recorded with as much isolation as possible, as opposed to doing the orchestra under the same conditions, trackwise, in a live (reverberant) room. Now if the engineer doesn't have the feel, the musical understanding for putting the instruments together then you have got to end up with an artificial sound."

R-e/p: You seem to be saying that you see the engineer's role as that of simply removing as much of the electronic aberation and acoustic aberation as possible as the sound is transferred to the recorded medium?

STEINER: "That's certainly a big part of it, but there is a lot more that he can do. An engineer who hasn't been seriously exposed to music, other than maybe playing a guitar . . . for instance, many engineers have never even heard the way a string section sounds except over the monitors. It's amazing, how very seldom I have seen an engineer walk out into a studio in a recording session, even a sweetening date, and listen to what the instruments sound like in the room itself. Too many engineers only know what certain instruments sound like through a loudspeaker. It's very sad if that's what gets on a record.

"In my opinion, an engineer must know what a legitimate orchestra should sound like . . . the tonalities . . . the sonorities. This is something I think is greatly lacking today. This lack of fundamental musical experience is causing severe artistic and even economic complications for the record business today."

R-e/p: What exactly is the artistic complication?

STEINER: "If the engineer doesn't have the feel for putting all the instruments together in a proper perspective then he has got to get an artificial sound. I don't think anybody would dispute the fact that artificial musical sounds are a thousand times harder to reproduce than properly balanced music. So, while an engineer of some limited talent might get lucky and make one of those great mixes we talk about, and produce a hit with something artificial, his possibility for repeating that sound or mix is very limited because he is definitely dealing with a strained musical environment.

"We all know how many one-record successes there are in this business today. And, this is where records get as expensive as they have been getting to release these days. We have all seen or know of records where they have started out with a basic rhythm section, say 4 or 5 or 6 men all recorded on separate tracks. Then they have stripped it down to, say, 2 guys – just maybe the bass and drums, and then have rebuilt the whole

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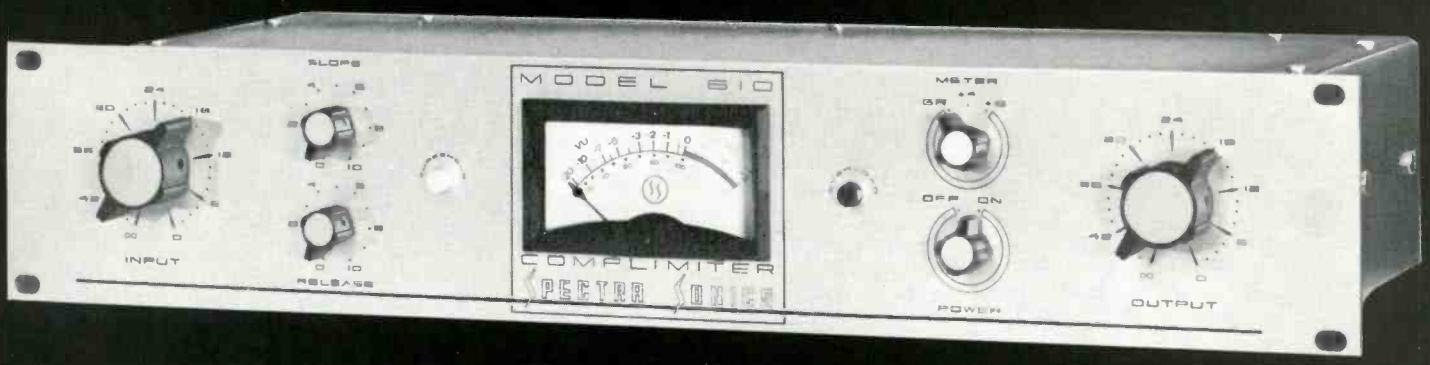

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thing again looking for this or that sound. And then they rehash the material again and again to replace this guitar, replace that voice, erase and replace over and over. You have to wonder if they knew what they wanted to do in the first place. An enormous amount of money is being spent in recording studios for this sort of thing. I think it is more than a little wasteful and, it is sad. There is little proof that these kinds of things . . . the anti musical things in the rock medium are selling records today. It's sad."

R-e/p: Don't you see rock music losing some of its manufactured essance?

STEINER: "Let's put it this way, happily I have seen certain influence along these lines starting way back with the Beatles. I think we can thank a great producer, Mr. George Martin, for starting it with the Beatles when he brought some of the symphonic influences together with rock. I hope we will continue to see a great deal more of that. Unless I am very much mistaken, or whether I am being extremely naive, I don't know how much more can be musically said using gadgets and gimmicks.

"I think that what we must say is that songs must continue to improve. There must be a great deal more formal preparation before we put anything on tape . . . by the artist and the producer before they come into the studio, and by the engineer in the set-up."

R-e/p: Aren't you assigning a lot of the producer's responsibility to the engineer?

STEINER: "Well, now, how many really good musical producers are there today? I mean who do we really call the producer in the studio? It all depends on the individual.

"There are some magnificent examples of great musical producers; the Lou Adler's, the Bones Howe's and in the R & B field Hollard Dozier, a man like Phil Spector for instance, who has certainly produced many tremendous records . . . these fellows, and I am omitting probably many others, come up with enormous hits time after time . . . they repeat their success. The engineer unquestionably performs differently when men of this caliber are in the studio.

"But you must understand, generally speaking, the producer is responsible for working with the artist . . . he is the liason between the artist and the record company. He hires the musicians. He books the studio time. He bears the brunt of a tremendous number of non-musical details. He has an enormous and varied responsibility. He is the whipping boy between all the trials and tribulations, yet very often his musical knowledge may only be of a *feel* nature. He may only be capable of saying, in the studio, 'that *feels* right' – 'that *feels* good' – 'I think it's going to sell.' With a producer like this, who then is going to make the decisions in the studio? Then too, we should mention, there are many times when the artist himself is the producer, and the producer in name is only a disciplinarian. I think that all artists no matter who they are need guidance, whether it's from the engineer or the producer or however you want to label it. No man, however talented, is an island to himself.

"So you see it's difficult to say what the relative functions are. I think each man has to work differently depending on the capabilities of the producer and the artist. But always the engineer should be the judge of the musical sound getting on the record . . . that is, as I have said, if the engineer really knows what the instruments sound like, and how they ought to go together in musical proportion.

"The engineer, and, I feel that some may disagree with me, has the obligation of filling in the weak spots in the recording team.

"Now with Neil and Tom (Catalano) there are no weak spots. We all work together. Alright, Neil writes the songs. I have already told you he is an extraordinary talent. He comes into the studio with the song, the idea; he conceives everything as a total picture. He understands the recording process thoroughly. Tom is the over all *seer*, the major force in putting it all together musically and otherwise . . . we have a true team effort. We all want the same thing; the very best musical product, and when it is all put together, when we get it all together, we have gotten a musical product that will always sound as real as possible. With Neil and Tom, we are not concerned with artificialities . . . What I am saying is that with Neil and Tom the records are made in front of the microphone, not in the control room.

"So I'd certainly like to see more preparation before groups go into the studio, and I think they can do it if they try. And, we may have to see this happen if the record business is going to remain healthy with the kinds of income that must be generated to cover the costs of 70 to 80 to $90,000 album production budgets. With that kind of money being spent on recording you can see you have to sell an enormous number of albums just to break even.

"Take, for example a Sinatra record where you would have a great man like Nelson Riddle on the date. Typically you would rehearse the song for a couple of hours, get all the bugs worked out of the music and the studio set-up. Frank would then come in, he would sing – you were lucky if he gave you two takes, and out it would go. What were the budgets? I don't know, but his albums will endure and sell for as long as we are on this earth."

R-e/p: What, then, do you feel is the function of multi-track recording in today's music?

STEINER: "Of course multi-track is the very basis of rock music, where those boys have a tendency to purposely push the music out of proportion. The rock medium is based on a lot of anti-musical sound. In doing that kind of work you must have the ability to play with the tracks. I used to do a good amount of it too, but now I kind of steer the other way because I am what you might call, with my long background as string player, a more pop-classically oriented type, and I am sure there are others who are better at that sort of rock thing than I am.

"But, as I have said before, I have come back strongly to the belief in recording the whole work at once in the studio. Here multi-track still gives us options to adjust the character of the music, but not as drastically as in rock. We make little changes; only a bit touch-up EQ here, maybe a little echo there, some additional reverb, if it's needed. With us, I like to think, multi-track works along with the things we do in the recording room. We don't like to use multi-track as a substitute for what we didn't do in the music or in the set-up. I don't think anybody would argue that multi-track, as well as all of the other electronic options we have in the studio today, many of which we didn't have many years ago, helps us to make a better recording technically."

R-e/p: Getting back to the recording at the Greek Theater, can you tell us about that little laugh at the beginning of the record. Was that real?

STEINER: "Yes, that was funny. Lee Holdridge, who is an absolutely magnificent arranger and conductor who works with Neil wrote a beautiful piece for the opening of the concert, before Neil's entrance. Now the problem was

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how to get into that, dramatically, when the needle goes down on the record. In other words how do the record listeners become aware that they are hearing a live performance. Well, on this one night we had the tape machines running a little before the opening piece with the audience mikes open. As you can see (in the stage diagram) I had three audience mikes (U-87's) on a 250 ft. piano wire running across the audience some 60 feet in the air and about 200 feet in front of the stage. So I could pick up what was happening in the audience and off the PA too, for overall feel. Well, when we played back that night's tape we were slightly annoyed to hear that crazy little laugh on the lead-in. We almost cut it off. Later, it was Tom's suggestion to leave it in – it made a terrific opening effect. You put the needle down on the record and all of a sudden the crowd noise comes up and you hear that crazy little laugh, and then the solo cello starts. Then it builds into the string quartet and gets bigger and bigger . . . until the whole string section is vibrating. Up to this time the stage curtains are still closed. Then the guitars come on in a tremendous build . . . then the organ builds . . . the curtains part . . . smoke is pouring from dry ice smoke pots . . . and Neil walks on stage. With the music, the lighting and everything it was an enormously dramatic opening. It wasn't just a guy walking on the stage with a drum roll. I think the beginning of the record captures the feeling and the excitement very well, it sets the mood beautifully. But let me assure you that laugh was a live part of the recording."

R-e/p: What about the actual stage set-up at the Greek Theater?

STEINER: "Well, let's start with the drums, Dennis St. John. They were on a platform about 18 inches high, center stage. We used three mikes fed to one channel. One Shure SM-55 on the bass drum. Then two Neumann KM-54's, using the 10 dB pad in the mikes themselves, pointing in and down to the snare and tom-toms and cymbals on each side of the drummer, low, about waist high as he sat. These were independent of STANAL'S microphones." (STANAL SOUND CO. of Kearny, Nebraska, the company which did the PA set-up.) Neil's vocal mike for the concerts was a Shure SM-57, normalled with the PA, with a wind sock on the gooseneck stand. Neil always works with his lips practically touching the microphone.

"In the studio I am using a Neumann M-49 on Neil almost exclusively. I have found after quite a bit of experimentation that the M-49 seems to be the best compliment to Neil's voice. He has a tremendous amount of sibilance in his voice. It's murder, but we have found a way with foam windsocks and a little EQ, which is nothing extraordinary, certainly, it's very simple, to eliminate it."

"We used another SM-53 to pick up Neil's guitar amplifier. He plays an electrified ovation guitar.

"Now it gets interesting. Emory Gordy, is just to stage left of the drums. He played electric guitar, mandolin, 6 stringed guitar, 12 string guitar, ukulele, vibes and bells (glockenspiel). On his electric guitar amp we normalled an SM 53 with the PA. For all the acoustic instruments he played to a Sony ECM-53 on a gooseneck stand, also normalled to the PA. There were two more ECM-21 Sony's on a 'Y' mount over the vibes, and another ECM-53 on the bells. Emory also sang background parts into another SM 57.

"On piano Alan Lindgren had a U-87 with the 10 dB switch on, strapped and centered between the two main sounding board rails facing the hammers. The piano lid was completely closed. It was an excellent way to mike the piano. He had several glissandos on the record and you could hear every note.

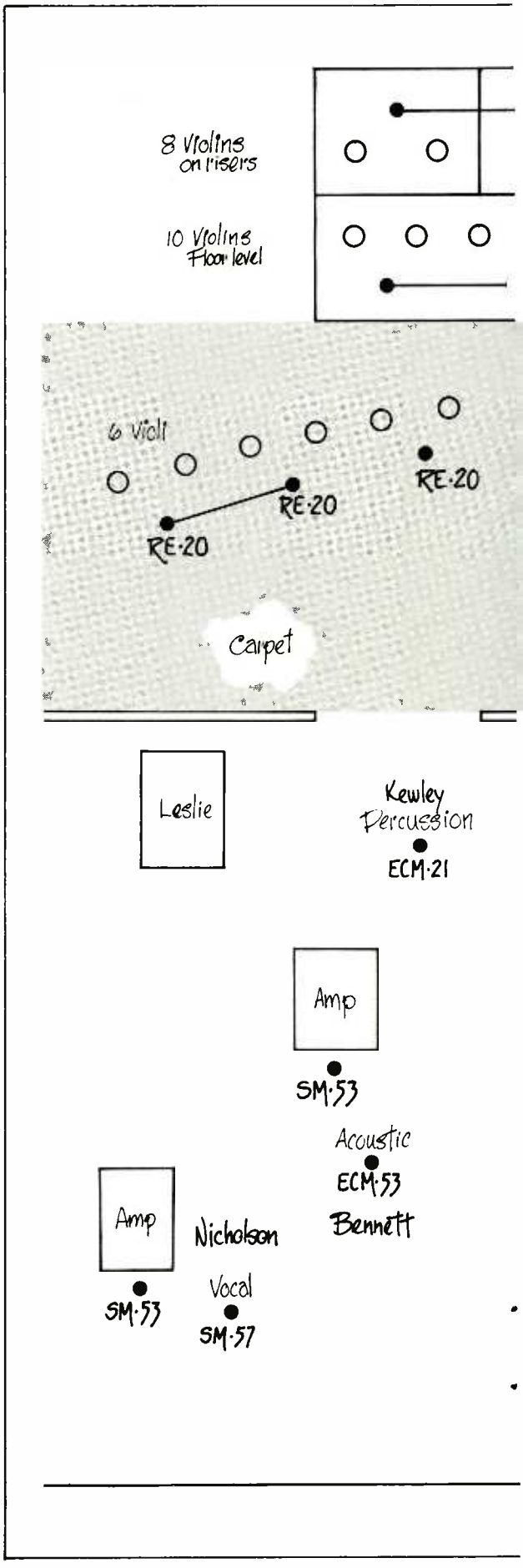
"Now Alan also played the organ. For our direct feed to the board we only picked up the SM-53 which the PA people had installed in the lower part of the left side Leslie cabinet.

"Then, additionally, an electric piano keyboard sat on top of the organ. That was easy, we took that direct.

"Another set of bells (glockenspeil) was on top of the electric piano. Remember the two Sony's on the 'Y' mount over the vibes? When they were needed for the second set of bells they were swung over very easily.

"Alan Lindgren also sang background parts to a Shure SM-57, the same mike that Neil used. This was hung in front of him at the piano.

"Now we move over here to the right of the drum where there was another guitar player, Richard Bennett. We used another SM-53 on his guitar amp. But, he also played acoustic 6 and 12 string. He played these to one of those Sony ECM-53's. And, he also played steel guitar . . . which was easy . . . we took it through the mike on his guitar amp.



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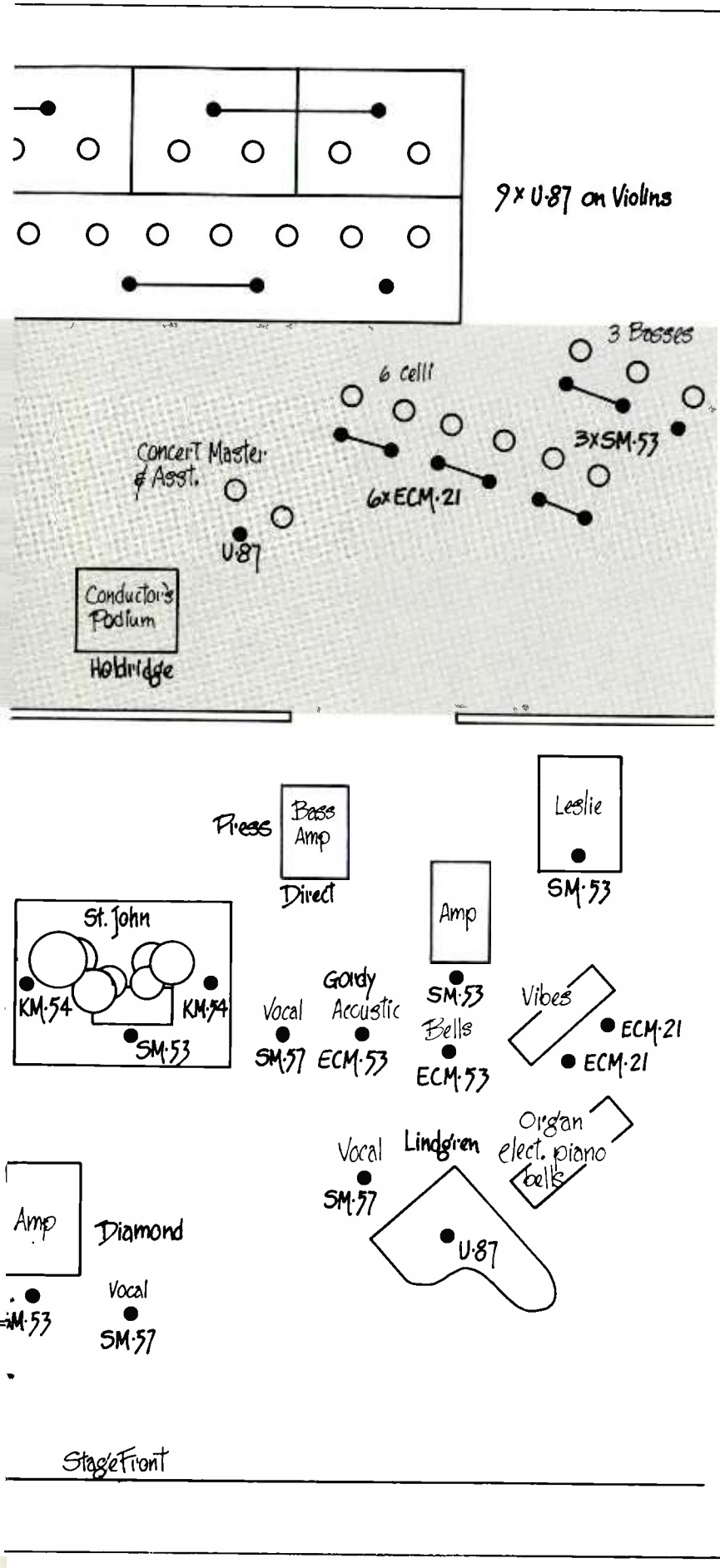

"Then, at the extreme end of the stage is still another guitar, Danny Nicholson, he used only an electric guitar. There was another SM-53 on his amp. He also sang background to a Shure SM-57.

"The percussionist, Jefferson Kewley, was a little to the right of the drums and back a bit. He played tambourine, conga, shakers, that kind of thing that you hear so much of in Neil's records. He used an ECM-21 too.

"To the other side of the drums was a marvelous bass player, Reine Press. He was easy, we took him direct because of the enormously powerful amplifier he used. With that much power it was a cleaner sound to take him direct.

"So, that was the rhythm section, and now to that magnificent string orchestra. Behind the three baffles, which were about 4 feet high, back to just in front of the scaffolding, a space of about 15 feet and clear across the stage, we found it necessary to have a carpet installed to help control bounce off of the hard stage surface.

"The conductor, Lee Holdridge, was centrally positioned on the podium, as shown, with the concert master and assistant just off to his stage left. Both of these excellent violin players were covered by one U-87.

"The six violi across stage right were positioned on the carpet and were picked up by three EV RE-20's; two in series and one wild. The mikes were pretty close down to the instruments, which typically don't produce that much energy.

"Then, on stage left, spread across the rear of the carpet were the low strings, six celli and three basses. Each celli was miked with a ECM-21, with the feeds going to the board in pairs. Three SM-53's were used on the basses, with two taken as a pair and one wild. All of these mikes were properly shock mounted to insure that we would get all the bottom we needed. Then between every two players on the bottom layer was six additional U-87's, again, with each two players taken in pairs of three individual feeds.

"So, that was it. And, you can't believe how smoothly everything went. It was a lot of work to begin with, but with the tremendous help of Wally Heider's crew, and the great cooperation of Stan Miller (STANAL) and his boys I think we lived up to our obligation. It was a thrilling record and we are all very proud of it."

AMPEX TAPE SALE

New Ampex 011 – Same as No. 611
Clear Plastic Reels–White Boxes

	50	100	250	500
7" 1200' 1.5 mil acetate	.90	.80	.75	.70
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And if all that seems like an awfully good buy for your money, here's what $1,770 for our Series 70 Recorder/Reproducer buys you:

½" transport, 4-channel modular electronics, with overdub, plug-in head nest with ferrite heads and scrape filter, remote control connector, touch-button solenoid/relay controls with anti-spill circuitry, heavy-duty 6-pole torque motors, and indirect drive 2-speed hysteresis-synchronous capstan motor.

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MAGNETIC REFERENCE LABORATORY, INC. FORMED

A new company, Magnetic Reference Laboratory, has been formed to produce and market test and calibration tapes. Initial products are designed for use with professional quality recorders used in the recording and broadcast industries.

The company claims that their test and calibration tapes are certified to meet or exceed all standards established by professional organizations.

The principals of the new corporation include John G. (Jay) McKnight, Antonio Bardakos, and William E. Seaman, all of whom have held senior technical and management positions with Ampex and other manufacturers of tape and professional recording equipment.

Initial products of the company, and those which are already being shipped, are tapes for checking and testing reproducer alignment; azimuth error, using a unique "self checking difference method"; and custom test tapes for specialized applications.

The company is located at 999 Commercial Street, Palo Alto, Calif. 94303. (415) 327-6724.

AUDIO DISTRIBUTORS RELEASES NEW CATALOG

A new 116-page catalog, designed strictly for professional audio, broadcast, television, recording and motion picture equipment specifiers, has been published by Audio Distributors, Inc., of Grand Rapids, Michigan which calls itself "the pro shop for the industry."

Listed and illustrated are top grade electronics from around the world including such items as recorders, duplicators, microphones, turntables, reverbs, amplifiers, attenuators, equalizers, compressors, speakers and broadcast and recording consoles.

Copies are free on request by writing to: Audio Distributors, Inc., Dept. C, 2342 S. Division Ave., Grand Rapids, Michigan 49507.

CUSTOM FIDELITY NAMED NATIONAL DISTRIBUTOR FOR AVTEC AUDIO PRODUCTS

In a statement by Art Moser, president of Audio Visual Technology, Inc. (AVTEC) of North Hollywood, California, he announced the appointment of Custom Fidelity in Hollywood as the exclusive National distributor of AVTEC's line of audio/visual processing and control equipment. The first product to be emphasized is the Model 100A Gain Reduction Amplifier.

EQualization

the highest most sustained expression of the recordists art

LEO de GAR KULKA
President
GOLDEN STATE RECORDERS
SAN FRANCISCO

The man in the middle; the *mixer*. Upon his proficiency, understanding, knowledge, as well as his aesthetic feeling for the music being recorded depends the outcome of the final release of the recording. Thus, it is the mixer's final responsibility to recreate the sound, in the control room, and therefore on the recording medium, which is as much like that created in the studio by the artist.

In an analysis of the mixer's activity he is vitally concerned with five areas:

1. MUSICAL RANGE. The equipment with which the recording engineer works is capable of reproducing almost the entire world of sound, a range of nearly 10 octaves, embracing vibrations from 20 to over 16,000 cycles (Hz). However, there are certain restrictions which are imposed upon the recording engineer in accomplishing this totality which are both physical as well as practical in nature. Many of these restrictions may be overcome by two methods: Proper selection and placement of microphones, and by equalization.

2. RHYTHM. The basic framework of a musical composition is rhythm. While control of the rhythm might seem to lie

Creative equalization cannot be accurately, yet arbitrarily adjusted with a few pre-determined switch positions on a control board. There are just too many variables to consider—area resonance, environmental factors, phasing effects, feedback—and many others with many differing characteristics. If you need 3db of equalization at 6510Hz, for example, maybe (just maybe) you can switch in 2 or 4 db at 5000Hz since they're pre-set on your present console.

The problem is—you're not satisfied because what you hear is just not right!

The solution? Full range equalization, giving you the right amount at the right frequency for the precise sound you require. This is the capability of ITI's new *Parametric Equalizer*, Model ME-230.

The Parametric Equalizer lets you vary parameters by ear—accurately and effectively. It combines the spectral response of a ⅓ octave graphic equalizer with the rapid access and economy of a "three knob" system. You can continuously vary frequency from 10Hz to 25kHz via three range controls, boost or cut any amount at any frequency center up to 12db, and adjust shape or "Q" range from 4-14db/octave. And, variation of any one control does not affect performance of any other . . . so you needn't worry about cross-compensating.

If you want more than just 'good enough' performance, start playing it by ear. Our new ME-230 Parametric Equalizer gives you exactly what you're listening for.

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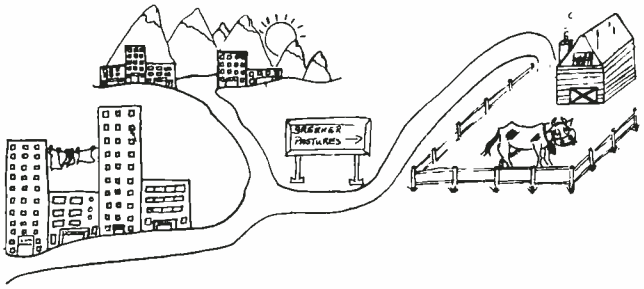
WHATEVER HAPPENED to ALLISON RESEARCH, INC. ?

(A LOT . . . . A WHOLE LOT)

Last June, the Allison machine was busily spewing out KEPIE, GAIN BRAINS and all its other goodies from its gigantic factory warehouse, located on the beautiful Sunset Strip in Hollywood, U.S.A.

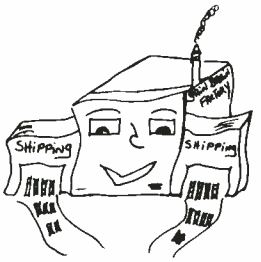
Something wasn't right, though. Perhaps Allison and her infamous cohorts were overcome by the intense abundance of crisp, clean air. Maybe, the serenity of the uncrowded streets and freeways was too much for them. Was it the overly friendly attitude of supercity people? Whatever the reason, it was decided that they would strike out for greener pastures. The destination . . . Nashville, Tennessee. Well, they did it. They loaded up their KEPEX machine, their GAIN BRAIN tools, a change of clothes and a few extra batons and they split!



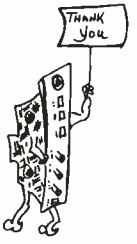
When they arrived at their new home, in Music City, U.S.A., they noticed a phenominal series of events was taking place. Some of the Allison people hadn't come with them. The famous KEPEX machine was wounded! GAIN BRAINS were coming out of the slot in dribbles. In spite of this, people all over audio land were clambering up to the counter and placing record orders for Allison goodies. Radio stations discovered GAIN BRAIN! The cupboard was going dry.

If this weren't enough, the Allison machine (in its constant endeavor to create super goodies) was smack dab in the middle of developing the super goodie to end all super goodies! It was creating the "ALLISON/AUTOMATED PROGRAMMER".

Well, at this point, something had to be done. New Allison people were drafted to help fix the tired and wounded KEPEX machine. New slots, for GAIN BRAINS to come out of, were built. Allison learned to apologize when orders were delayed. Slowly, the wheels began to turn again. Throughout Allison land, rumors began to circulate, "The cupboards will be full by Christmas", "KEPEX will conquer", "GAIN BRAIN will reign".



We, at Allison Research, want to thank everybody out there, customers and distributors, for putting up with us during our trials and tribulations. Thanks for your understanding and MERRY CHRISTMAS.



P. S. What happened to the super goodie to end all super goodies? It works, it works. Allison and Automated processes, Inc. Have joined forces (only on the automation project) to bring you the biggest thing in audio land since tape and Kate Smith. Allison/Automated automation systems are rolling off the assembly lines, this very minute.

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solely within the domain of the performer, the recording engineer is charged with the interpretation of the rhythm by controlling bass and mid-range balance in relation to the rest of the sound. (The amount and degree of bass and bass rhythm related to the rest of the sound also varies with the ethnic charachteristics of the music. Thus, Black Gospel and R&B requires a deep and heavy bass rhythm emphasis to sound acceptable and good, whereas this type of balance would be most objectionable to 'white' Gospel Music, etc.) This again is accomplished by choosing and placing the microphones, regulation of their intensity, and influencing their spectral sensitivity by equalization.

3. VARIETY. The brain, through the ear, delights in variety. Taking as a pre-requisite, that the orchestration has been properly arranged by the musical arranger(s), it follows, that the widest range accompanied by the best spectral balance delivers the most auditory pleasure! Through good judgement and careful regulation of the microphones by means of their volume and equalization controls, the recording engineer can insure maximum listener enjoyment.

4. DYNAMICS. The range from the loudest passage of music (or other sound) to the softest passage is defined as the *dynamic range*. This transition in music from a soft passage to a louder one is calculated by most composers to achieve a physiological effect. While the ear perceives a dynamic range of one in a trillion (120 dB) the recording engineer must limit this to one in a million, or 60 dB, as that is the maximum capability of present day equipment. However, such reproducing media as the 45 RPM record and cartridges and cassettes have a signal to noise ratio, at best, of approximately 50 dB. It therefore behooves the recording engineer to keep the lowest passages well above this floor of noise by compressing the dynamic range to approximately 30 to 40 dB. The experienced conductor or instrumentalist will realize this, and conduct or play accordingly. Nevertheless to accomplish this compression unnoticeably requires all the skill of the recording engineer at the volume controls, with the assistance of limiter-compressors and equalization. The spectral sensitivity of the ear changes when the volume level is varied from that of the original performance.

5. SPECTRAL CONTROL. This is a descriptive term for the process of *equalization*. It implies the option to raise or lower the intensity of critical sections of the musical range. Further, it connotes a subjective appreciation of the physiological effects achieved through these means to compensate for whatever limits the recording studio, the recording and reproducing equipment might have. Here the question often arises, is the recording to be mixed and equalized for a good hi-fi reproducer, or a cheap record player, a cassette or cartridge player, for AM broadcasting with its limited audio range, etc., etc. *Here, in this matter of spectral control, lies the highest, most sustained expression of the recordist's art.*

Multi-Channel recording techniques, which have become predominant these past few years, place extreme emphasis on the mix-down stage. Mixing the tracks becomes even more critical, as in many instances the instrument and vocal tracks have been recorded with emphasis on their volume and individual charachteristics only, instead of their place in the spaciousness of the final relationship of one part towards the whole entity.

OCTAVES & FREQUENCIES

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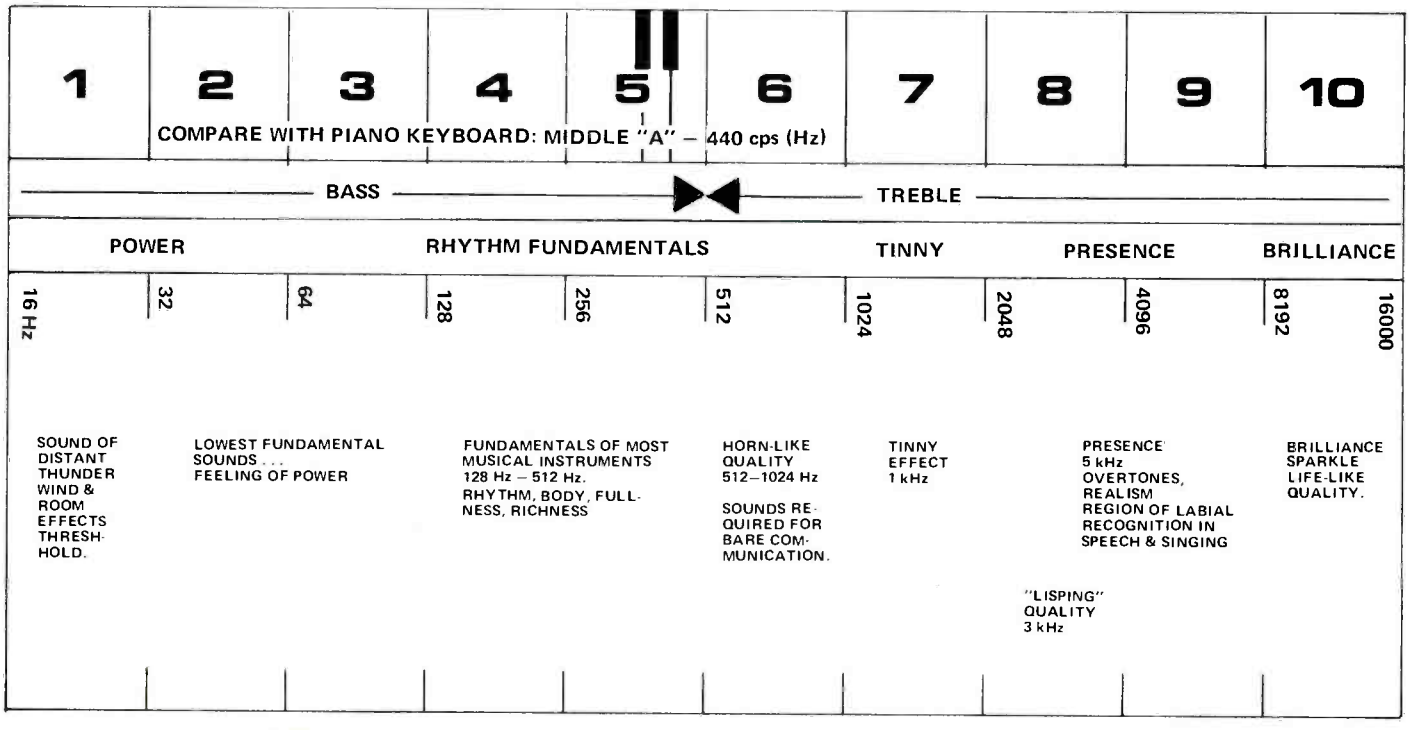

THE ENGINEER AT THE CONSOLE AS AN ARTIST – EQUALIZING FOR SPECTRAL CHARACTER.

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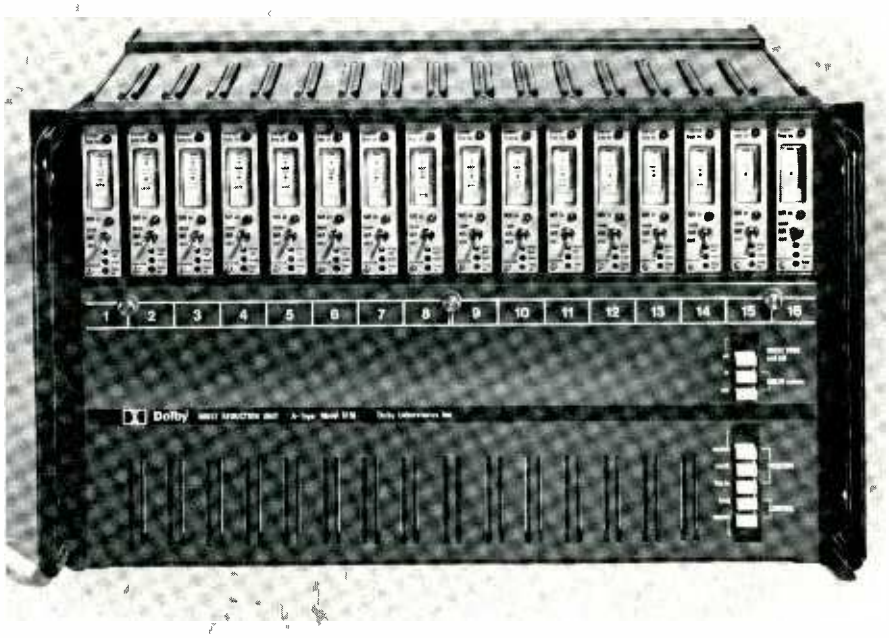
New from Dolby

The M16: a compact sixteen-track noise reduction unit



New monitoring facilities in record, play, and recorder rest modes.

All solid-state control logic and signal switching.

Simple remote operation of all functions from console and recorder.

Standard Dolby A-type noise reduction characteristics.

New, simplified line-up procedure.

Complete self-contained power supply and interface circuitry.

Add-on M8X provides simple expansion to 24-track operation.

Only $8,000 for full sixteen-track capability.

The Dolby system has become an integral part of modern multi-track professional recording practice. A new unit, the M16, has been developed for these applications and is now in production.

In addition to the obvious economy of space, installation time, and maintenance which the M16 offers, its cost per channel is substantially lower than that of other Dolby noise reduction units.

Full information about the M16, including accessories, auxiliary and independent eight-track units, and prices, available upon request.

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The technique of equalization is accomplished with a variety of tools, all generally referred to as equalizers. Most studio mixing consoles employ some sort of equalizers either in every microphone channel, or outboard mounted to be patched into any desired channel. Equalizers may be of the infinitely rising – cut off type, or others might have a shelving characteristic, while others might be peaking-dipping of either a narrow or broad range, and still others may be high-pass or low-pass filters combined with some of the aforementioned features, and others, still, may be of a wide frequency selection or graphic type. There is no good or bad equalizer per-se, as each is designed for a specific purpose by the designing engineer. And, although the final judgement of the equalization used lies with the aural judgement of the critically listening recording engineer, it is absolutely essential that he be thoroughly familiar with the curve characteristics of the equalizer he is using, as well as the octaves and frequencies of the instruments and certain peculiar sound characteristics of the material he is recording. (see chart "Octaves and Frequencies")

THE CRITICAL PORTIONS OF THE AUDIO SPECTRUM

VERY LOW BASS POWER RANGE 16-64 Hz 1st and 2nd OCTAVES

In this region from 16 to 64 Hz we find the threshold of feeling, where the lowest sounds such as wind and room effects, the sound of distant thunder are felt – rather than heard.

In the upper half of the first octave just below 32 Hz J.C. Steinberg (1) shows that the fundamentals of the piano, the organ and harp reach well into that range. He also shows that the *memory of the ear* for these lowest sounds is long. Consequently they need appear only seldom in a three to four minute passage to achieve the feeling of power and fullness, to balance aesthetically what would otherwise be a preponderance of higher notes.

Fletcher-Munson has charted the sensitivity of the ear to various parts of the spectrum at lower levels of real existance. *The compensation requirement for equal loudness in this range at lower recorded and reproduced levels shows requirements for tremendous boosts, on the order of 10, 20 and 30 dB,* or anywhere from 10 to 1,000 times!

Precise control of this range is required to subdue stage rumble, outside traffic noise, certain over-emphasis through improper microphone placement – especially those ribbon microphones which are velocity sensitive; all these have a tendency to 'muddy' the sound.

The option to attennuate this range is just as important as the ability to boost it.

BASS – RHYTHM AND MUSICAL FOUNDATION 3rd and 4th OCTAVES – 64 to 256 Hz.

Most of the low, grave, sensuous tones of the drum, bass, piano are generally found in this range. This is where the fundamentals of the rhythm section of the orchestra, the Pop-Rock Group lies, and it is the foundation of all musical structure.

The famous Conductor Leopold Stockowski is said to have stated that: "If I had a thousand bass viols, I would use them all."

This is not as extreme a statement as it might sound. For instance, such string instruments, while re-inforced by sounding boards, generally play single notes, are weak in level, and possess little dynamic range. In a large, comprehensive orchestra, as many as eight bass viols might be used. *A total of 1000 bass viols in this case would give only an additional 21 dB of level,* an amount that is certainly not too impressive, when one considers the characteristics of the Fletcher-Munson curves! Glory to the Recording engineer who can achieve the same effect by sliding his bass viol volume control pot up and make 1 bass viol do the job of 1,000!!!

Extreme attention must be given to equalization *or* attennuation in this range, for the musical balance of the entire program can be controlled at 100 Hz!

Many pressure type microphones are subject to the "proximity effect," or non-linear bass increase at low frequencies in close talking or singing positions. The use of attennuation for dialogue restores proper perspective and quality.

(NOTE: Many microphones have this feature built in. Look for it.)

MID RANGE – 256 to 2048 Hz 5th, 6th and 7th OCTAVES. "TELEPHONE-LIKE" QUALITY.

The ear is reasonably sensitive in this range, and almost all recording and reproducing equipment manages this mid-range with ease.

If the 6th octave is made louder with respect to the other octaves, the music will assume a 'horn-like' character. If the 1,000 to 2,000 Hz range is emphasised, a "tinny" effect is achieved.

The fundamental tones in most musical instruments lie equally above and below the middle "C", from 128 to 512 Hz. As most instruments are rich in the first overtones, the majority of the sound energy is found up to the 2,500 Hz range. Music editors and others engaged in listening to music over long periods of time find that "listening fatigue" can be reduced by attennuating the 5th, 6th and 7th octaves by about 5 dB from the normal level.

In reverse, if a grating quality is desired, such as was the habit with radio and television commercials, a boost of 5 dB in the 7th Octave will achieve that effect.

LISPING QUALITY BETWEEN THE 7th and 8th OCTAVES 3 kHz

The 3 kHz range delivers a generous stimulus to the ear! At very loud levels the region of the greatest ear sensitivity shifts downward from 5 kHz and accounts partly for the very high sensitivity of most public address loudspeakers in the 3 kHz band.

Characteristic of low-level signals peaked at 3 kHz is a "lisping" quality and the total disability to distinguish labial sounds, such as 'm' 'b' 'v'.

In wide-range lower level systems, a peak in the region of 3 kHz has a masking effect on important recognition-sounds and on others which lie above 4 kHz.

Brilliance and clarity are *lost* and without attenuation, an unconscious strain with increased fatigue is felt according to the height of the 3 kHz rise.

In mixing pop-rock music it happens sometimes that the instruments leave no 'room' for the vocals and interfere with the vocal on the same frequency area. The resultant in many cases is either a 'burying' of the vocals in the track, or the lowering of the instrumental tracks to allow the vocal to stick out. This reduces the excitement of the music and is therefore undesireable in most cases. Though the fault lies mainly in improper musical planning at the arrangement step, this can be partially corrected through an

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equalization compromise. Lower the 3 kHz range on the tracks, and peak the 3 kHz range on the vocal, being careful so as not to destroy the intelligibility, or introducing the "lisping" quality accompanying a boost in the 3 kHz range.

PRESENCE RANGE
BETWEEN THE 8th and 9th OCTAVES
4,750 Hz to 5 kHz

The usual band which affects man's speech and its clarity is 3,000 to 6,000 Hz. In a woman's voice, the fundamentals are roughly an octave higher than a man's voice and her range of consonant clarity is achieved in between 5,000 and 8,000 Hz a region, the higher end of which approaches the insensitive range of the ear. In addition, the total range of a woman's voice is about one-half that of a man's, stimulating fewer hearing nerves, and is consequently still weaker upon reception for this reason.

Wide range sounds, especially those of the singing voices, have fundamentals with harmonics in the 5 kHz region of good ear sensitivity. Voices, powerful or rich with harmonics at 5 kHz sound especially pleasing, clear and full. Male opera singers are especially favored with 5 kHz sounds; women less so, although there are a few notable exceptions. (Rosemary Clooney, Doris Day) It follows that defficient voices, especially those of women, can be enhanced in listening value by a generous boost at the 5 kHz point, on the order of 5 to 8 dB. Definition is increased by added power given to the recognition sounds like t, s, ch and k. A collateral benefit of this boost is the *apparent* increase in level. *A 6 dB rise at 5 kHz frequencies gives an apparent increase of 3 dB to the overall signal.*

In the constantly ranging war of louder 45 records (which is typical of the American record industry) many companies and mastering engineers have made it a habit of boosting this 5 kHz range by several dB to increase the apparent loudness of the records. It has been carried over to the LP and especially the tape industry, to compensate for the insensitivity (it is believed) of inexpensive re-play equipment and the narrow AM broadcasting band. This practice has made several European artists, such as for instance the Beatles very unhappy, as they feel that the American releases (which have been remastered in the US) lack the quality of their European counterparts.

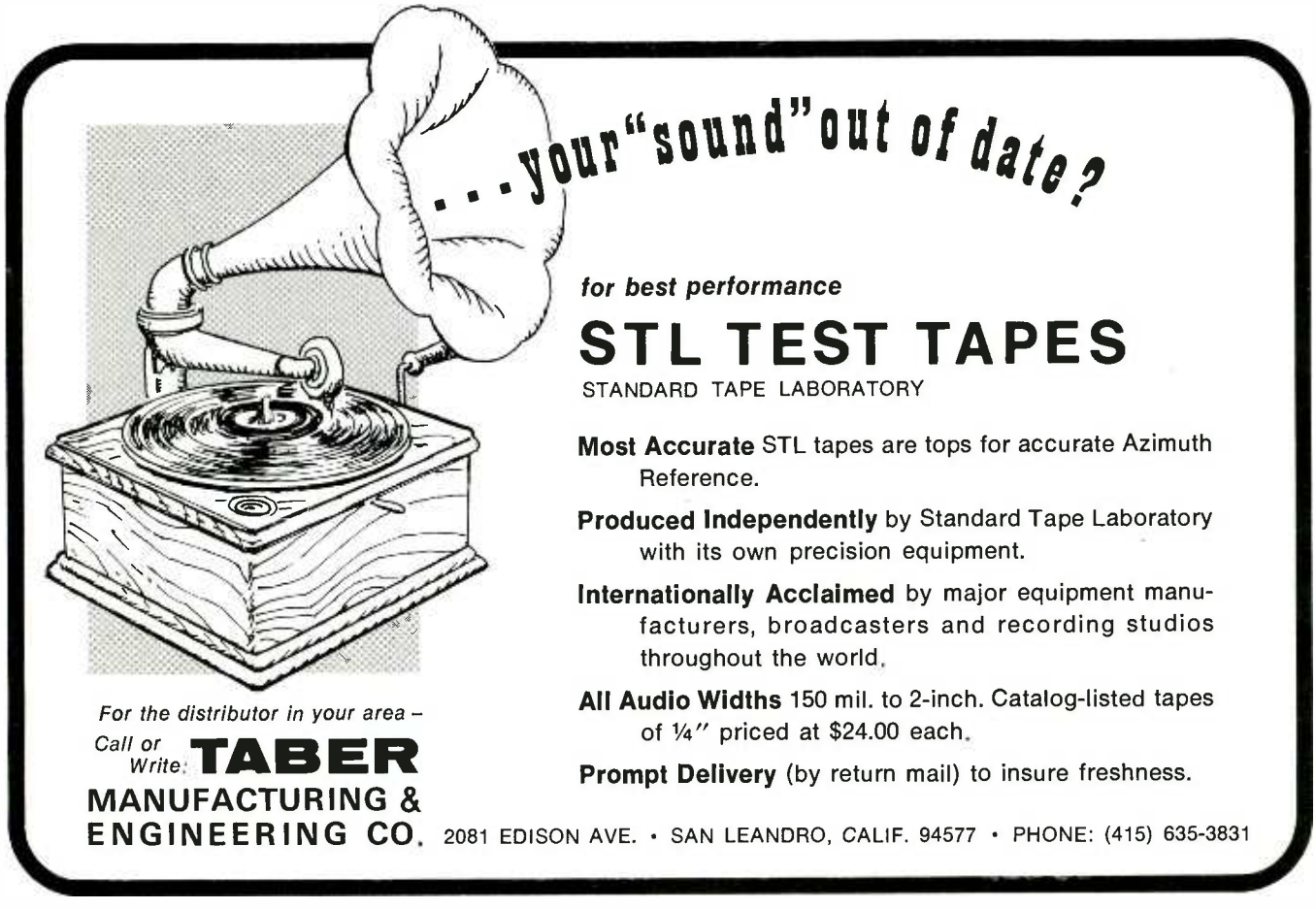
The attennuation of the 5 kHz range on instrumentals can give a "transparent" quality to the performance, provided that it is otherwise wide-range. *This quality is common to European orchestral recording, and has found some popularity and may be desireable.* Usually, vocals on microphones with a "saddle" in the presence range lack the "punch" or "presence" to which we have grown accustomed in this country.

BRILLIANCE
PART OF THE 9th THROUGH
THE 10th OCTAVE – 6,500 to 16,000 Hz

Unvoiced consonants attributed and created by the teeth, tongue and lip are high in frequency, and reach the 10 kHz range.

These frequencies account for some clarity and most brilliance, even though they consist of less than 2% of total speech energy. The same effect holds true to musical instruments and especially for percussion.

Thus, in order to properly convey all the effects in recording independently of microphone placement and sensitivity in the last octave, the ability to boost this range in an easy continuing slope which shelves at 10 kHz is most helpful.



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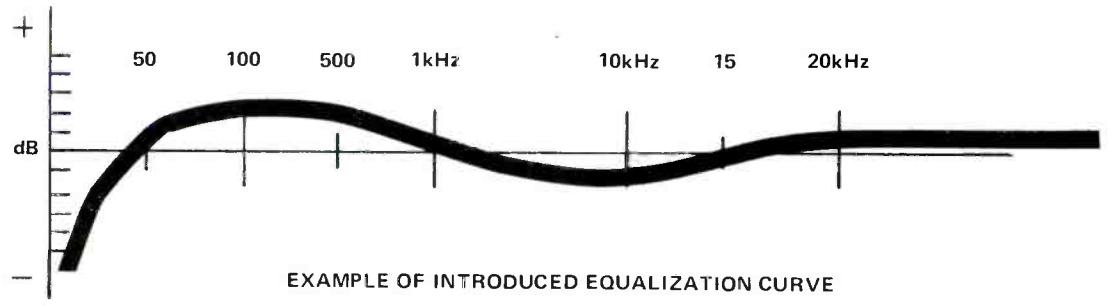

EXAMPLE OF INTRODUCED EQUALIZATION CURVE

On Latin and other types of music using gourds, and rattles, tambourines and bells, or the triangle peaking at 9 kHz result, frequently, in an astonishing and pleasing feeling of clarity.

GENERAL COMMENTS AND SUGGESTIONS

The equalizer, as any tool in this recording endeavor, should be thoroughly understood, and should be used sparingly and with discretion. Although ultimately the ear is the final judge of quality, the ear can easily be fooled by level differences, speaker shadings, listening fatigue, prolonged and concentrated listening or general exposure of prolonged periods of time to high monitor levels.

It is suggested, that the mixer draw himself a visual picture of the curves, peaks and dips introduced in the audio spectrum. The experienced engineer, familiar with the functions of his tools will draw this picture in his mind to analyze properly the effects to be achieved.

The guide to the Audio spectrum can serve as a constant guide to the Equalization process.

Supplementing this guide, should be the example of introduced equalization curve.

In closing, remember that if you boost the middle and therefore need to then boost the top and bottom range as well, you have done little more than increase the overall level of the program. Your experimentation, until more profficiency is achieved, should be to first analyze the program by extreme equalization in the available ranges, and seeing what effects (though exagerated) are achieved. Then do the same through extreme attennuation. After this analysis bring all controls back to normal and proceed in selected equalization or attenuation.

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RECORDING 1976

...a facetious, fictional look into the future

by PAUL BUFF
President,
ALLISON RESEARCH

The place is Rt. No. 1, Fairview Lane, fifteen miles from town (if you refer to Stumps Hollow, population 6,800, as "town"). Actually, the Fairview Music Complex is one of some 15 similar music centers now in existence in various parts of the country. The date is October 17, 1976. The Fairview site is particularly refreshing at this time of year. Some thirty seven acres of rock lined walkways lead to four studios, twenty two cabins, the general store, five rehearsal studios and a handful of in residence publishers, writers, etc.

There are no cars within the complex (of course not, there are no roads). Deliveries are brought to the dispatching warehouse, ont on the street, where they are transported, via electric golf cart type vehicles, to their destinations within the complex. These vehicles are also made available to the guests for transporting their instruments and such, but only with the condition that they are not used unnecessarily. The condition seems to work.

Most groups who use the Fairview facility will spend from 2 weeks to 2 months here, while recording an album. Why not? The cabin rent is reasonable, the atmosphere is most condusive to creativity, the stuiods are superb and the big city hassles are forgotten. The GENERAL STORE contains an

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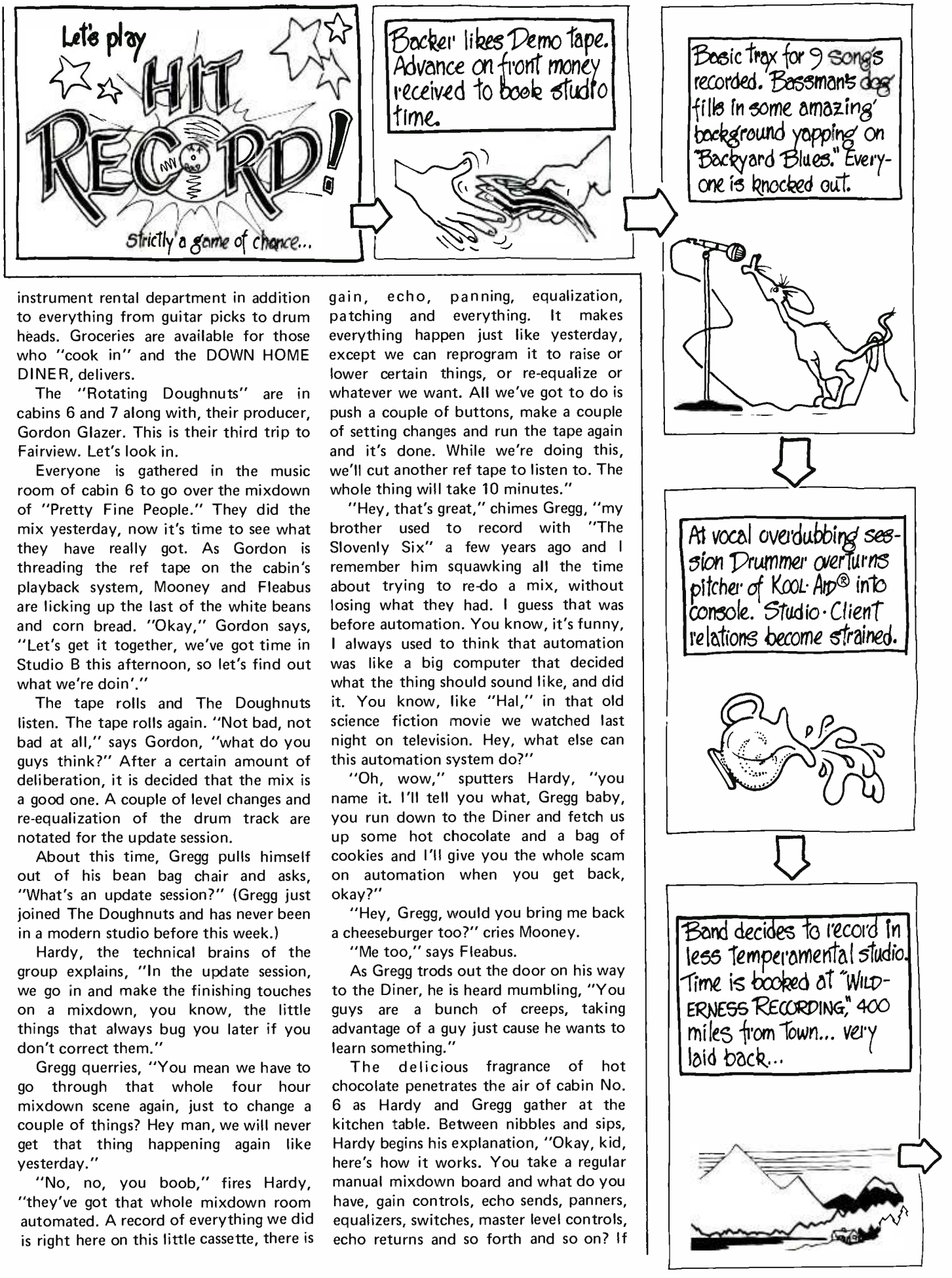

instrument rental department in addition to everything from guitar picks to drum heads. Groceries are available for those who "cook in" and the DOWN HOME DINER, delivers.

The "Rotating Doughnuts" are in cabins 6 and 7 along with, their producer, Gordon Glazer. This is their third trip to Fairview. Let's look in.

Everyone is gathered in the music room of cabin 6 to go over the mixdown of "Pretty Fine People." They did the mix yesterday, now it's time to see what they have really got. As Gordon is threading the ref tape on the cabin's playback system, Mooney and Fleabus are licking up the last of the white beans and corn bread. "Okay," Gordon says, "Let's get it together, we've got time in Studio B this afternoon, so let's find out what we're doin'."

The tape rolls and The Doughnuts listen. The tape rolls again. "Not bad, not bad at all," says Gordon, "what do you guys think?" After a certain amount of deliberation, it is decided that the mix is a good one. A couple of level changes and re-equalization of the drum track are notated for the update session.

About this time, Gregg pulls himself out of his bean bag chair and asks, "What's an update session?" (Gregg just joined The Doughnuts and has never been in a modern studio before this week.)

Hardy, the technical brains of the group explains, "In the update session, we go in and make the finishing touches on a mixdown, you know, the little things that always bug you later if you don't correct them."

Gregg querries, "You mean we have to go through that whole four hour mixdown scene again, just to change a couple of things? Hey man, we will never get that thing happening again like yesterday."

"No, no, you boob," fires Hardy, "they've got that whole mixdown room automated. A record of everything we did is right here on this little cassette, there is gain, echo, panning, equalization, patching and everything. It makes everything happen just like yesterday, except we can reprogram it to raise or lower certain things, or re-equalize or whatever we want. All we've got to do is push a couple of buttons, make a couple of setting changes and run the tape again and it's done. While we're doing this, we'll cut another ref tape to listen to. The whole thing will take 10 minutes."

"Hey, that's great," chimes Gregg, "my brother used to record with "The Slovenly Six" a few years ago and I remember him squawking all the time about trying to re-do a mix, without losing what they had. I guess that was before automation. You know, it's funny, I always used to think that automation was like a big computer that decided what the thing should sound like, and did it. You know, like "Hal," in that old science fiction movie we watched last night on television. Hey, what else can this automation system do?"

"Oh, wow," sputters Hardy, "you name it. I'll tell you what, Gregg baby, you run down to the Diner and fetch us up some hot chocolate and a bag of cookies and I'll give you the whole scam on automation when you get back, okay?"

"Hey, Gregg, would you bring me back a cheeseburger too?" cries Mooney.

"Me too," says Fleabus.

As Gregg trods out the door on his way to the Diner, he is heard mumbling, "You guys are a bunch of creeps, taking advantage of a guy just cause he wants to learn something."

The delicious fragrance of hot chocolate penetrates the air of cabin No. 6 as Hardy and Gregg gather at the kitchen table. Between nibbles and sips, Hardy begins his explanation, "Okay, kid, here's how it works. You take a regular manual mixdown board and what do you have, gain controls, echo sends, panners, equalizers, switches, master level controls, echo returns and so forth and so on? If

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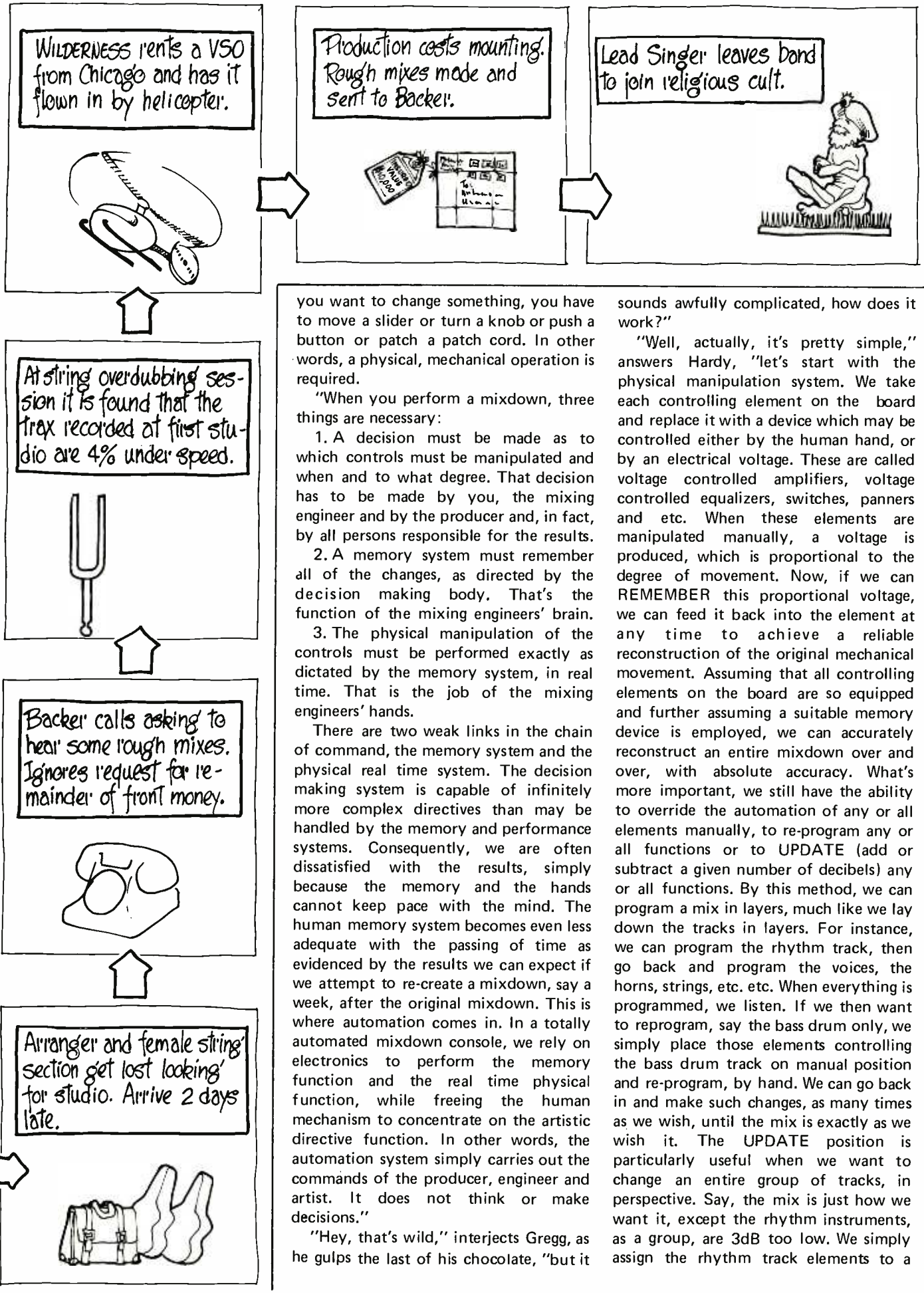

you want to change something, you have to move a slider or turn a knob or push a button or patch a patch cord. In other words, a physical, mechanical operation is required.

"When you perform a mixdown, three things are necessary:

1. A decision must be made as to which controls must be manipulated and when and to what degree. That decision has to be made by you, the mixing engineer and by the producer and, in fact, by all persons responsible for the results.

2. A memory system must remember all of the changes, as directed by the decision making body. That's the function of the mixing engineers' brain.

3. The physical manipulation of the controls must be performed exactly as dictated by the memory system, in real time. That is the job of the mixing engineers' hands.

There are two weak links in the chain of command, the memory system and the physical real time system. The decision making system is capable of infinitely more complex directives than may be handled by the memory and performance systems. Consequently, we are often dissatisfied with the results, simply because the memory and the hands cannot keep pace with the mind. The human memory system becomes even less adequate with the passing of time as evidenced by the results we can expect if we attempt to re-create a mixdown, say a week, after the original mixdown. This is where automation comes in. In a totally automated mixdown console, we rely on electronics to perform the memory function and the real time physical function, while freeing the human mechanism to concentrate on the artistic directive function. In other words, the automation system simply carries out the commands of the producer, engineer and artist. It does not think or make decisions."

"Hey, that's wild," interjects Gregg, as he gulps the last of his chocolate, "but it sounds awfully complicated, how does it work?"

"Well, actually, it's pretty simple," answers Hardy, "let's start with the physical manipulation system. We take each controlling element on the board and replace it with a device which may be controlled either by the human hand, or by an electrical voltage. These are called voltage controlled amplifiers, voltage controlled equalizers, switches, panners and etc. When these elements are manipulated manually, a voltage is produced, which is proportional to the degree of movement. Now, if we can REMEMBER this proportional voltage, we can feed it back into the element at any time to achieve a reliable reconstruction of the original mechanical movement. Assuming that all controlling elements on the board are so equipped and further assuming a suitable memory device is employed, we can accurately reconstruct an entire mixdown over and over, with absolute accuracy. What's more important, we still have the ability to override the automation of any or all elements manually, to re-program any or all functions or to UPDATE (add or subtract a given number of decibels) any or all functions. By this method, we can program a mix in layers, much like we lay down the tracks in layers. For instance, we can program the rhythm track, then go back and program the voices, the horns, strings, etc. etc. When everything is programmed, we listen. If we then want to reprogram, say the bass drum only, we simply place those elements controlling the bass drum track on manual position and re-program, by hand. We can go back in and make such changes, as many times as we wish, until the mix is exactly as we wish it. The UPDATE position is particularly useful when we want to change an entire group of tracks, in perspective. Say, the mix is just how we want it, except the rhythm instruments, as a group, are 3dB too low. We simply assign the rhythm track elements to a

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sub-master and set it to +3dB. This automatically raises the rhythm instruments, in perspective, by 3dB. Nothing else changes. Of course, we can UPDATE individual tracks without using sub-masters by using the UPDATE position on the individual gain controls. We would do this when we only want to UPDATE the rhythm guitar, while leaving the rest of the mix alone."

As Gregg ponders the conversation, he asks with a wrinkled brow, "What happens if you want to come in, in the middle of the song and pan the lead guitar in a quad circle without changing the volume and echo programming. What would you do?"

Hardy answers. "No problem. As I said before, you can make a change in any mixing parameter, at any time, without affecting any other parameter. All you would do would be to punch the MANUAL or WRITE button on the lead guitars voltage controlled joystick, at the point where you wanted to make the change. When you were through the part of the song that needed changing, you would simply press the AUTOMATIC or READ button and the panning would revert to the previously programmed position."

"Hey, wow," cries Gregg. "I can really see it now. You can do just about anything you want. You said there has to be a memory system, how does that work?"

Hardy answers, "The mixing data is stored on magnetic tape, just like the audio. It's all done with a thing called the PROGRAMMER. The PROGRAMMER is constantly scanning the control voltages present at the voltage controlled elements. It takes these control voltages, and through a process known as encoding, multiplexes them into a signal which can be recorded on a regular tape recorder. You see, all the mixing information for the whole board is stored on just one track of the tape recorder. It's really quite amazing when you consider that the encoder is capable of storing over 250 variable dynamic functions on one track of tape. It's also capable of storing literally thousands of discreet switching functions along with the variable functions. The decoding mechanism receives this signal from the tape and unscrambles the code to produce a replica of the individual control voltages and switching functions which were fed into the encoder. Each time you program a change in mixing parameters, the new information goes through the encode/decode process. A mix is built up by sort of ping-ponging the information back and forth between two data tracks. The actual audio information is never re-recorded, so there's no generation losses or other degradation."

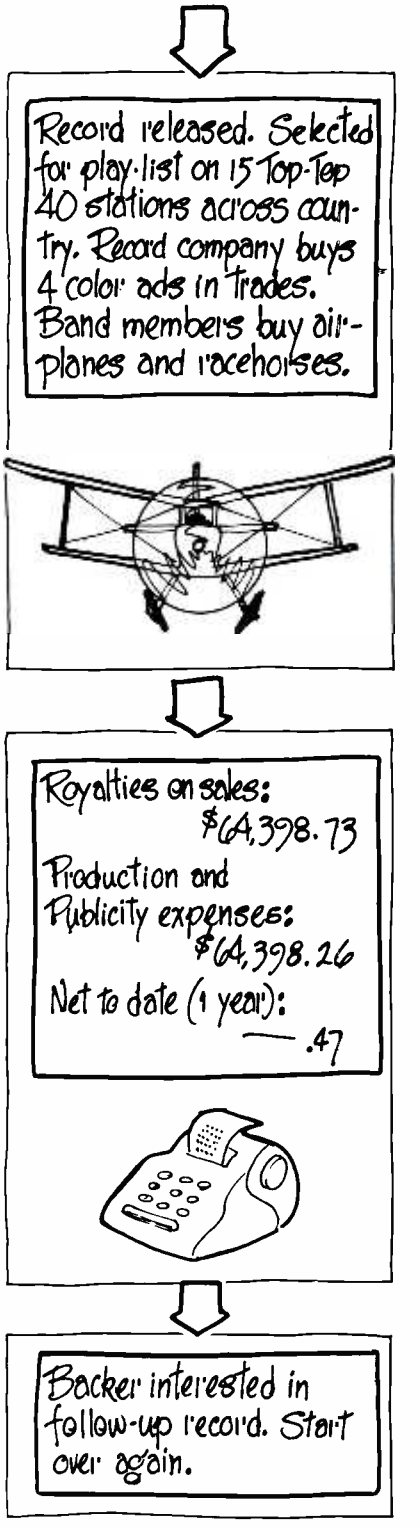
"How come you need so many functions, we're only recording 24 tracks of music aren't we?" asks Gregg.

Hardy fires, "Sure, you've got 24 tracks of music, but you're doing several things to each track. A console has more than 24 knobs doesn't it? Look, your fader takes one function, echo is a function, quad panning is two functions (left/right and front/rear) E.Q. is either several variable functions or a big bunch of switching functions. Multiply that by 24 and what have you got? Then you've got your masters, sub-masters and echo returns, too."

At this point, Gordon interrupts with, "Hey Guys, enough of this technical session, we've got work to do. Say, Hardy, are you sure we can pull off this direct mastering thing?"

"Oh wow, man," blurts Hardy, "where you been? All the good albums are direct mastered now! Look, we just leader all the songs on the 2" master just like a¼" album master. Everything is automated so all we have to do is run direct from the 24 track to disc. You've got to get rid of those generations if you want a really super clean record."

"OK, OK," cries Gordon, "let's do it then. Our session is in twenty minutes."



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A GLOSSARY OF AUTOMATION TERMS

by

WAYNE YENTIS
RAINBOW RECORDING
SANTA BARBARA, CALIFORNIA

Automation in professional audio is obviously a rather new science. As with any new science, new terms and parameters are involved. If we, the audio industry, are to realize maximum utilization of a new science it becomes essential that we fully understand the nomenclature and parameters involved. To this end, we submit the following list of my definitions of some of the newer terms.

GENERAL DEFINITIONS

Programmer — A device capable of converting control board mixing information to a signal suitable for storage on a magnetic medium, and further capable of retrieving the stored information and re-converting it to the original form present in the control board. Generally, mixing information will be represented as variable D.C. voltages within the control board. The storage medium, generally, will be one track of a conventional audio tape recorder.

Encoder — The portion of a "Programmer" which converts the mixing information for storage.

Decoder — The portion of a "Programmer" which re-converts the stored data to its original form.

VCA — Voltage controlled amplifier or voltage controlled attenuator. A device whose gain (or loss) is controlled by an externally applied "Control Voltage."

VCE — Voltage controlled equalizer. A device which controls the frequency equalization of an audio scource by externally applied "Control Voltages."

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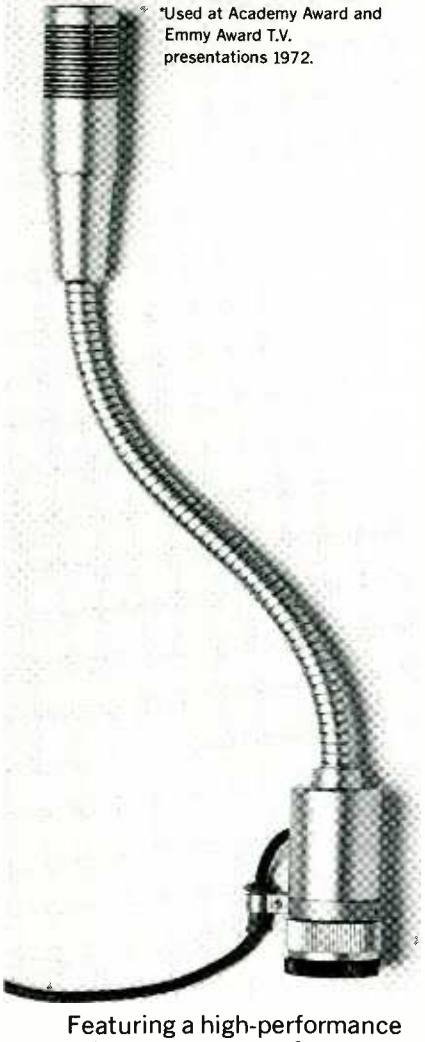

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CONTROL BOARD OPERATING MODES

Write mode or manual mode — A mode of operation wherein the console controls are manipulated in conventional fashion, while the resultant control signals are "Encoded" and stored as mixing data.

Read mode or auto mode — A mode of operation wherein the console parameters are controlled by a previously "Encoded" mixing data track.

Updating mode — (As applied to control board operation) (See also, "Updating" as applied to Programmer parameters) A mode of operation wherein the console parameters are controlled both by a previously "Encoded" data track and by physical manipulation of the controls. Updating is generally used to add or subtract a given number of decibels to a previously "Encoded" parameter.

Punch - in — The process of switching operating modes during the course of program material.

Level matching — The process of matching the level of a console control to that of the related, previously "Encoded" control signal, prior to "Punch In." "Level matching" is necessary if a smooth transition between operating modes is to be accomplished.

PROGRAMMER PARAMETERS

Function / Variable function / Dynamic function — A channel of programmed data which is variable in nature. Example: A D.C. voltage which is variable between OVDC and 5VDC. One (or more) "Functions" of this sort are necessary for the automation of each variable control board parameter, such as gain, panning or parametric type equalization.

Switching function — A channel of programmed data which has only two discreet states (on or off). A "Switching Function" may be used in applications such as turning a sound source on or off, or to control *one* step of a stepping type equalizer. A number of "Switching Functions" may be employed to simulate a "Variable Function," in step fashion. (See "Resolution")

Scanning — In order to be able to store a large number of channels of control voltage information on a single channel of tape, a sequential scanning of the control voltages is done. "Scanning," then, is the orderly process of counting through the control voltages, one at a time, and displaying a sample of each, in time sharing fashion, at the output of the "Encoder." Scanning. of this sort, is very similar to that used in producing a television picture.

Scan rate — The rate at which the "Programmer" makes each complete scan of all inputs or "Functions." For instance, in a system with a .1 second "Scan Rate" (100 milliseconds), all "Functions" will be reviewed 10 times per second.

Updating rate — Same as scan rate.

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Resolution — In a totally digital programmer, a "Variable Function" is approximated by the use of a number of steps of change. "Resolution," then, is the increment of these steps, usually expressed in decibels. Generally, in digital programmers, the steps become larger at higher attenuation settings, much like the steps in a conventional step type attenuator. Infinite resolution (continuously variable, stepless response) can be obtained with a combination of digital and analog techniques within the "Programmer."

Accuracy — The absolute accuracy of the systems response to a "Variable Function" which has gone through the sequence of Encode/Storage/Decode. "Accuracy," of course, cannot be better than "Resolution."

Long term accuracy — Same as "Accuracy" with the exception that the "Encode/Storage/Decode" sequence may be interrupted by the passing of time between events.

Drop-out protection / Parity correction — Since the encoded information is a sequentially counted representation of the control voltage inputs, a temporary loss of signal to the "Decoder" could cause an error in counting. Properly designed "Drop-out Protection" circuitry will insure that the "Decoder" will not respond in the presence of a counting error, but rather, will hold the last correctly received information at its outputs. When the drop-out, or error signal, condition is corrected, updating will proceed as normal.

Drop-out indicator / Parity indicator — A visual indicator which informs the operator that a drop-out has occurred and that the protection circuitry has performed its function.

Error signal holding time — The length of time for which the "Decoder" may hold the last correctly received information during the presence of an error signal or no signal. Usually expressed in decibels per second or seconds per decibel.

Dynamic range — "Dynamic Range" is the ratio of the highest control voltage to the lowest control voltage which the "Programmer" can process, within its linear range. Usually expressed in decibels.

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PML MULTI-PATTERN CONDENSER MICROPHONE FROM AUDIOTECHNIQUES

The PML (Sweden) Model DC-63 Condenser microphone is said to offer any of 44 distinct directional response patterns by positioning of the 3 internal switches and an internal pot to achieve any of 4 frequency response curves in either omni, cardioid or bi-directional modes, from pure omni to cardioid, and from pure cardioid to bi-directional. The PML DC-63 can be either conventionally phantom powered (SYMSI) or by battery power supply. Complete literature is available.

Price: $360.

AUDIOTECHNIQUES, INC., 142 HAMILTON AVE., STAMFORD, CT 06902.

Circle No. 118

FLAT RESPONSE AUDIO PICKUP (FRAP)

Designed for use with violin, guitar, bass, piano, harmonica, banjo, autoharp, sitar, dulcimer, African thumb piano, gong, conga or virtually any acoustic instrument, FRAP is easily mounted without tools, and without electronic or mechanical modification of the instrument or amplifier. The unit is flat from 5Hz to 100kHz, has low noise characteristics, and will not distort at

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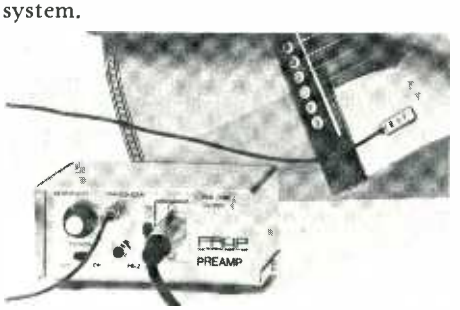
high volume. Transient response is limited only by the amplifier-speaker combination used. It may be used to feed directly into a console, PA system, instrument amplifier or tape recorder.

FRAP is available in two versions; studio and standard systems. Each includes a transducer, preamp and adhesive wax. The FRAP transducer is a handcrafted, precision, solid-state device, measuring 3/8" x 3/8" x 1". It is waterproof, shockproof, antimagnetic and extremely rugged. A thin application of FRAP wax adheres the transducer firmly to any instrument surface without damaging the finish.

The battery-operated preamp contains state-of-the-art electronics, and is housed in a rugged 14-guage stainless steel case. The studio FRAP has an additional output for connecting to a console or PA system.



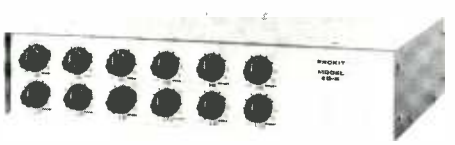
FRAP systems are available in most places where professional musical and sound equipment are sold, or may be ordered direct. Standard FRAP retails at $160.00; Studio FRAP at $225.00.

FRAP DIV. OF STROBOTRONIX, BOX 40097, SAN FRANCISCO, CA 94140.

Circle No. 119

NEW GATELY/PROKIT EQ-6 EQUALIZER

The Prokit Division of Gately Electronics announces the availability of the EQ-6 Equalizer, second item in the Prokit series of professional audio equipment available in kit form. The EQ-6 Equalizer has six independent channels of separate high and low frequency equalization. The EQ-6 Equalizer was designed to plug directly



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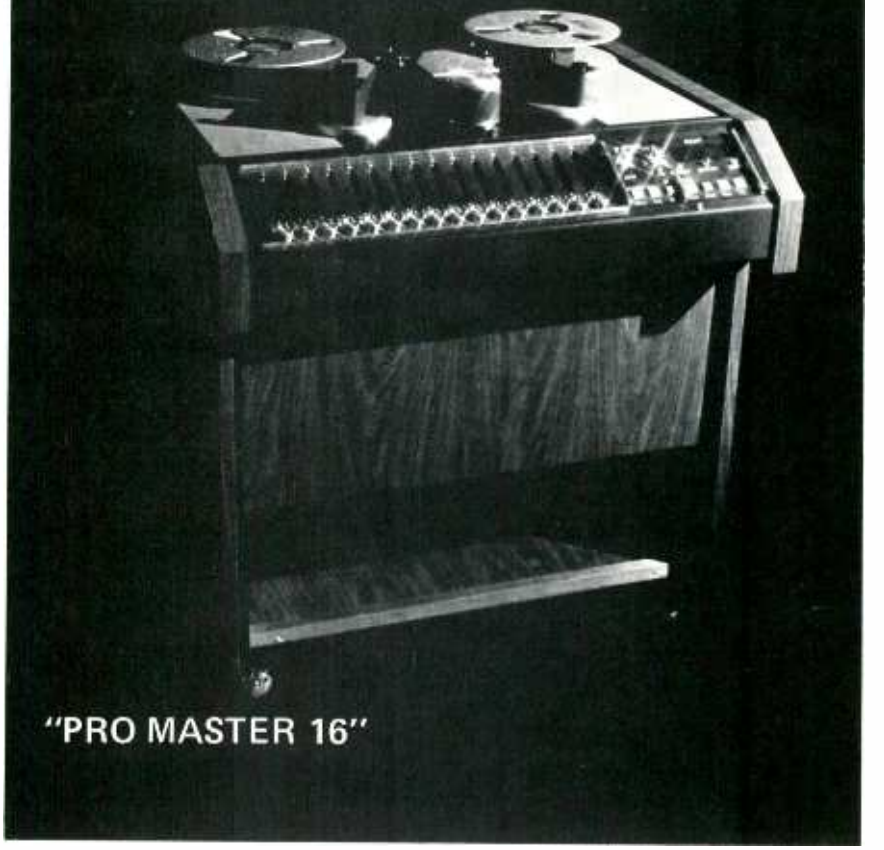

"PRO MASTER 16"

super-, *prefix* 1a (1): over and above; higher in quantity, quality, or degree than.

star, *adj.* 1: of, relating to, or being a star 2: being of outstanding excellence; preeminent.

Webster doesn't define the word **SUPERSTAR,** but by combining his definition of the prefix **SUPER** with that of the adjective **STAR** we arrive at a superlative which aptly describes the Custom Fidelity "PRO MASTER 16", multi-track tape recorder.

The "PRO MASTER 16" was designed specifically to meet the ever increasing demands of today's recording studio. Safer, smoother tape handling, better performance in all modes and a wider range of recording applications are all features found in this superbly engineered product, designed and manufactured exclusively for Custom Fidelity by PAK Precision Audio. PAK is a Southern California engineering and development firm whose collective background covers all phases of sophisticated tape and signal handling.

The Custom Fidelity "PRO MASTER 16" has been designed with the projected requirements of tomorrow also in mind. For example a kit is available as an optional accessory item, which will convert the "PRO MASTER 16" to full 24 track capability without sacrificing any of the qualities or features of the original concept.

For the dealer in your area, phone (213) 654-7267, or write:
THE CUSTOM FIDELITY COMPANY INC.
7925 Santa Monica Blvd., Hollywood, CA. 90046

Circle No. 127

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GATELY ELECTRONICS, 57 W. HILLCREST AVENUE, HAVERTOWN, PA. 19083.

Circle No. 122

AVTEC MODEL 100A GAIN REDUCTION AMPLIFIER

Whether employed as a compressor or a limiter, the Avtec Model 100A FET type gain reduction Amplifier is said to offer performance and operation not previously available. Noise generation is at least 86 dB below program level, as measured from 20Hz to 20kHz. There are no noise pulses due to control-voltage feedthrough.

Total harmonic generation remains below 0.3% regardless of degree of gain reduction. The figure does not include the normal distortion that arises at low frequencies due to control-voltage ripple. However, it is said, that this distortion may be suppressed to a very great degree by use of the "LO-D" switch feature. The degree of effectiveness of the "LO-D" switch is such that distortion of a 50Hz wave will be reduced to about one-tenth of its normal value. Use of the "LO-d"

feature will add 14 ms to all release time settings.

The gain reduction ratios (dB in / dB out) are selectable by use of a panel switch. Available settings are: 2.5:1, 5:1, 10:1, 15:1, 20:1. Unlike the usual tendency of a FET gain-reduction amplifier, the ratios do not change appreciably with the degree of gain reduction.

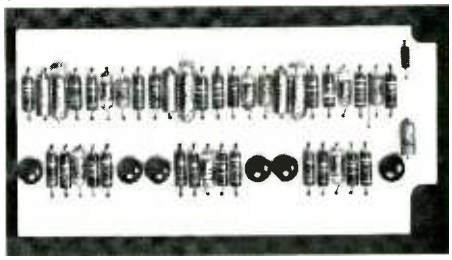
Complete specifications are available.

CUSTOM FIDELITY COMPANY, INC., 7925 SANTA MONICA BL., HOLLYWOOD, CALIFORNIA 90046.

Circle No. 123

SPECTRA SONICS ANNOUNCES A NEW SOLID-STATE AUDIO FREQUENCY FILTER.

The Model 506 is versatile in application and can provide three separate outputs from a single audio signal, using external switching. High pass and low pass configurations are produced (506H and 506L respectively). High pass frequencies are 40Hz, 70Hz, 100Hz; low pass frequencies are 10kHz, 12.5kHz, 15kHz. The selectable outputs will be -3dB at the specified frequencies and assures 18dB per octave roll off curve. The Model 506 is a miniaturized plug-in circuit card (2½"x5"x½") priced at $69.00.



SPECTRA SONICS, 770 WALL AVENUE, OGDEN, UT 84404 or 6430 SUNSET BLVD., HOLLYWOOD, CA 90028.

Circle No. 124

NEW QUAD/EIGHT NOISE GATE – $98.

Recently announced, the Model NS-120 is a variable noise gate/suppressor designed for maximum flexibility in applications ranging from multi-track mixdown noise gating, to noise

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you can afford two of ours
"Son of 36 Grand"

Son of 36 Grand is a complete recording/remixing console expandable to 26 in, 16/24 out. Full quad capability and flexible, pushbutton monitoring of any mode. FET logic record/play mode switching. Built-in patch bay. Prices start at less than $18,000 for 16 in, 16/24 out.

Write or call for the full story on Son of 36 Grand.

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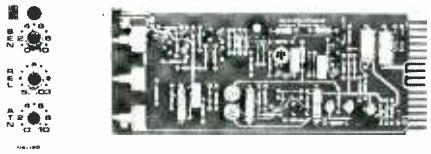

suppression for film dubbing and real-time background noise attenuation. A fast-acting all electronic device (no LDR's) with an attack time of less than 25 microseconds, the NS-120 has the following complement of controls and specifications:

Threshold control with L.E.D. gating status indication

Release time control – .03 to 5.0 seconds

Attenuation Range control – 0dB to -50dB normal

The release decay characteristics, attack time, and attenuation range, as well as the external keying input may be easily altered to allow for complete and individualized solutions to specific noise problems. A ±28 VDC Bipolar power supply is recommended for maximum output of +24dBm (600 ohms).

Sixteen channels may be mounted in one 3½x19" conventional rack enclosure accessory designated Model 1600.

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

Circle No. 126

ALL-IN-ONE IC, OP-AMP DISTRIBUTION AMPLIFIER FROM FAIRCHILD/ROBINS

Capable of feeding 15 Lines, a new integrated circuit distribution amplifier, in a rack-style package only 1 3/4" high, is offered by Fairchild Sound Equipment Corporation. With power supply built in, the unit, Model DA 1520, has only to be plugged in to 117 VAC for service in broadcasting, recording studios, PA systems, telephone networks, schools and other setups.

Signal is distributed into 15 balanced lines without intra-channel crosstalk. Output level remains constant, no matter how many lines are being fed.

Circuitry of the DA 1520 is based on an exceptionally reliable IC operational amplifier. While a transformer balances and isolates input, none is needed for output, which is balanced by direct coupling. The output circuit consists of two sets of complimentary symmetry current drivers with heavy negative feedback, assuring low distortion of .2% or less and low output impedance needed for channel isolation.

Metering of both input and output signals and gain is another DA 1520

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If you are thinking about mixdown automation...and you probably should be...here's something to consider. The programmer is the heart of any mixdown memory system, and we have one that works! It's called the Allison Research/Automated Processes Programmer, Model 256 E/D, with provision for up to 256 variable dynamic functions. This assures capacity to provide total automation of the entire console...not just level control, but automatic memory of the control functions of panning, equalization, echo sends, submasters, masters, switching, echo returns...the works! **THAT'S TOTAL RECALL.**

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- Operates on any audio recording medium with 5 KHz bandwidth and a 35 dB signal to noise ratio. Data recording level non critical.
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The programmer is only the beginning. Contact us for details on the Model 256 E/D and other automation components and systems.

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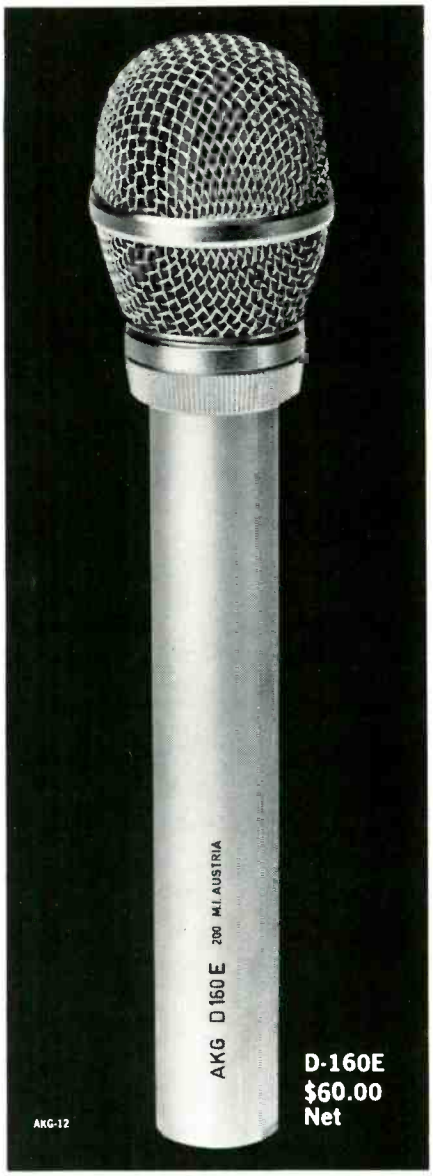

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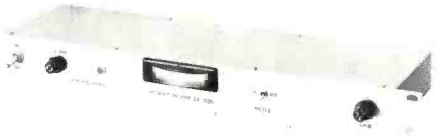
feature. Controls consist of an on-off switch, a meter switch and a gain control.

Input and output connections are made through screw-type terminals on a rear barrier strip.

Other DA 1520 specifications include: Maximum output +20 dbm/output channel; input impedance, 600 ohms; signal-to-noise ratio, 65 db or better below the 0 dbm level; frequency response, 20 to 20,000 Hz, ±½db; inter-channel crosstalk, 70 db or better, and gain, 0-40 db.



The price per unit is $295. Availability is six to eight weeks ARO.

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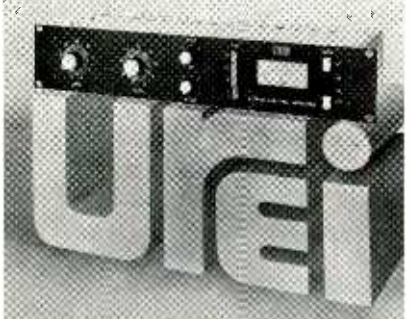

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