If exceeding its performance claims makes a receiver great... the Scott 387 is about the greatest.

For months we've been telling you what a great performer the 387 AM-FM stereo receiver is. Now a respected independent test laboratory report* shows how conservative our performance claims really are:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sheet Claims</th>
<th>H-H Lab Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous power</td>
<td>67 watts into 8 ohms</td>
<td>71 watts into 8 ohms</td>
</tr>
<tr>
<td></td>
<td>100 watts into 4 ohms</td>
<td>100 watts into 4 ohms</td>
</tr>
<tr>
<td>Harmonic distortion</td>
<td>Below 0.1%</td>
<td>Below 0.2%</td>
</tr>
<tr>
<td></td>
<td>Below 0.2%</td>
<td>Below 0.3%</td>
</tr>
<tr>
<td>IM distortion</td>
<td>Under 0.1%</td>
<td>Under 0.2%</td>
</tr>
</tbody>
</table>

The report says the 387 has "one of the most powerful amplifiers ever offered in an integrated receiver". Add to this all the other innovative features such as Scott's exclusive "Perfectune" indicator, permanently aligned FET front end, full complementary output stage, solderless "tension wrap" connections, and you've got a receiver which is unsurpassed in the $399 price class. Ask your Scott dealer for a demonstration of the 387 receiver today.

*Hirsch-Houck Lab report appearing in Electronics World, May, 1971

Good 16-track masters don't just happen.

Unless the Dolby System is used, the final stereo master may be only marginally quieter than an 8-track stereo cartridge.

New sixteen-track recorders are essentially limited in performance by tape noise. No matter what tape is used, noise increases by about 9 dB when the sixteen-track original is mixed down to a two-channel stereo master. This is equivalent to cutting track width down to that of an 8-track cartridge and reducing tape speed to 7 ips. What a waste of time, money, and effort.

The Dolby System eliminates all this. The noise level of a Dolby recording, even when it is reduced to stereo from sixteen tracks, can easily be better than that of a two-track original recording on the same kind of tape without the Dolby System. At the same time, print-through and cross-talks are also reduced by 10 dB, keeping stereo placement exact and silent passages velvet quiet. Sessions move faster because setting up pre-equalization is unnecessary. Instead, equalization can be worked out during mixdown without affecting the sixteen-track original and without watching the second hand of the clock as session time ticks away. Nor is there need to ride gain on dead channels during mixdown to keep out noise; the Dolby System takes care of that.

The Dolby System makes recording and reduction easier and faster, with time for more attention to creative values, less to technical problems. It makes good engineering 10 dB better.

A mixdown at John Mosely's Command Studios, London. Command, like every other London 16-track studio, is Dolby equipped on every track.

A mixdown at John Mosely's Command Studios, London. Command, like every other London 16-track studio, is Dolby equipped on every track.

Prices, delivery information and complete specifications are available from:

DOLBY LABORATORIES INC

333 Avenue of the Americas New York NY 10014
(212) 243-2525 cables: Dolbylabs New York

UK and International
346 Clapham Road London SW9
(01) 720-1111 telex: 919109 cables: Dolbylabs London
ZERO 100 is the newest, most advanced automatic turntable. The name stands for Zero Tracking Error—up to 160 times less than with any conventional tone arm—new freedom from distortion—new life for your records. This revolutionary Garrard unit, priced at $189.50, was introduced with a special presentation booklet, bound into the June issue of this magazine. There are 12 explanatory pages, with clear illustrations and diagrams, valuable to anyone interested in fine record playing equipment. If you missed the insert last month, or would like a better copy, we’ll be glad to send you one. The coupon is for your convenience.

SHARPE Stereo headphones. M/C with the smoothest frequency response from 15-30,000 Hz (30 15,000 Hz at 3.5 dB) are the choice of the professionals. After all, the pros know. That’s why they’re too rated. Audiometric laboratories have proven SHARPE Headphones to be superior in sound reproduction, utterly free of distortion (less than 1%) and ambient noise, no matter what your application—professional or home stereo.

Only SHARPE offers the maximum in comfort in the patented liquid filled ear cushions, and true reproduction, in comfort in the patented liquid filled ear cushions. And true reproduction, in comfort in the patented liquid filled ear cushions. Thev’re too rated. Only SHARPE headphones are the choice of the professionals.

After proven from Audiometric laboratories have been tested. Why don’t you? The pros depend on them out today at your dealer. Use the reader service card for the one nearest you. Ask him to demonstrate SHARPE Stereo Central, a new concept in remote listening control and headphone storage.

SHARPE Stereo Central, a new concept in remote listening control and headphone storage.
Coming in August

*Special Tape Cassette Number—Review of the top cassette units.

*Tape Recorder Maintenance, Part 8 of H. W. Hellyer’s series.

Equipment reviews include: Pioneer 9000X receiver, TEAC 7030 SL tape recorder.

LATE FLASH

Teldec Video Discs

Reports from Germany indicate that Teldec will be demonstrating a color version of the high-speed video discs at the Berlin Radio Fair in August. Playing time is five minutes but an automatic magazine which holds 24 will go a long way towards solving that problem. The discs are housed in the magazine in their sleeves to avoid hand contact. No details of bandwidth, etc., are available but it is claimed that definition is comparable with broadcast programs.

About the cover: (mi’kra-fon) cast programs. In their sleeves to avoid hand contact. Teldec video discs at the Berlin Radio Fair towards solving which holds 24 will go a long way a color version of the high-speed discs are loaded in the magazine in August.

TEAC that Teldec will be demonstrating Pioneer equipment reviews

Part 8 of H. W. Hellyer’s series. Equipment reviews include: Pioneer 9000X receiver, TEAC 7030 SL tape recorder.

Audio Clinic

JOSEPH GIOVANELLI

6 db High-Pass Filter

Q. I am using a stereo amplifier (Scott LK7) for a “booster amp.” (fed by two Shure M68’s). I would like to insert a filter, preferably in the tape monitor circuit, so that it could be easily switched out. I would like to have it roll off at about 300 Hz, at the rate of 6 dB per octave.—Henry F. Fuss, Springfield, Mass.

A. The filters you wish to insert in the tape monitor position of your amplifier can be made by using a capacitor of the appropriate value, connected between the “tape out” and “tape in” jacks. The value would probably fall in the range of 0.001 µf. I suggest a frequency ran so that you can be sure that it starts rolling off at the desired point. You will probably find that you are down a db at 1 KHz. Significant rolloff, however, does not take place till 300 Hz and below, once you have chosen the correct capacitor. Of course, one capacitor will be required for each channel.

Disc Processing

Q. I have a question about disc pressing. I read an article where it was stated that the process of making the finished pressing is from tape to lacquer to master, to mother, to stamper to final disc. Why are not the pressings made from tape, to master, to final disc? Would there be more quality this way than in the first type of production?—Louis Home, Montreal, Canada.

A. I think that a part of the confusion here is in the use of terms. I shall describe briefly record processing using the terms as I use them in my work. The master tape is first cut onto a lacquer disc, which is usually called the master. This disc is then plated. The metal is then stripped from the lacquer. This result is a metal part in a negative of the original lacquer grooves. This metal part is known as a “strikeoff.” We then plate this strikeoff, and strip the new metal part from the negative. This results in a positive once again, just like the lacquer, but this time in metal. This part actually can be played, but with special precautions which will not be discussed here (if you ever obtain such a part, do not play it; your stylus may be damaged). This positive is known as the mother.

We then plate this mother and obtain another negative, called a “stamper,” because it goes into the press and actually stamps out the finished disc. If this stamper wears out, as it will after a few hundred discs have been produced, it is replaced by another stamper, made from the same mother. Many stampers can be made from the same mother. If anything did happen to the mother, then another mother could be made from the strikeoff. The strikeoff can be used to make quite a number of mothers, though this is seldom necessary. The strikeoff could be used to stamp out records. This is done often when only a small number of discs is required. This latter arrangement, then, does not obviously lend itself to quantity record production.

I believe that what I have just described is what you proposed in your question. You may ask at this point why you can’t simply make a new strikeoff from the lacquer. Sometimes this is possible, but there is a good chance that this new strikeoff will be noisy or even be scratched. Removing it from the lacquer is a very delicate process because of the extremely soft material of which the lacquer is made.

The article you read was correct. However, where the article refers to a lacquer, I use the term “master” or “master disc.” Where the article refers to a master, I generally call this part a “strikeoff.”

Blend Control

Q. Can you suggest a “blend” system to be used with a Mac MX110 tuner-ampifier?—Henry F. Fuss, Springfield, Mass.

A. I suggest you use a 2 megohm potentiometer connected as a rheostat, wired across the two output terminals of your preamplifier. Decreasing the resistance of this pot will blend the channels. Probably the action of this control will take place at its low resistance end. If this proves to be the case, use a pot having a lower resistance.

Once you have arrived at a pot setting which produces the blend you wish, you can substitute a fixed resistor of proper value. I think, however, that you should consider using the pot at all times because the amount of blend required varies from one program source to another.

If you have a problem or question on audio tell me about it. Write to Mr. Joseph Giovaneli at AUDIO, 713 North Thirteen Street, Philadelphia, Pa., 19107. All letters are answered. Please enclose a stamped self-addressed envelope.

When there are times that you want to get away from it all, nothing will do for you but to sit down and try to do it through the panacea of music. Music that is intimately yours.

The recent results of SE-50 headsets has added new brilliance and dimension to the reproduction of intimate sound. Pioneer has actually miniaturized quality sound systems and designed them into leather-covered kid-off earphones. Each earpiece of the SE-50 headset houses a two-way system with a crossover comprising a cone type woodier for both midranges and a horn in-tector for crisp, clear highs.

But we didn’t stop there. We added separate bass and volume controls to each earpiece. Result: You can dial perfect stereo balance and volume to match each musical selection. And it’s always free of distortion on both channels. Maybe that’s why more and more experts are using SE-50s. We have discovered Pioneer headsets and have made them the most popular accessory in their stereo high-fidelity equipment.

Included is a 16-foot coiled cord, adjustable comfort features and a handsome, vinyl leather carrier. Fully lined storage case. Only $49.95. Other quality Pioneer headsets from $24.95. Ask for a demonstration at your local Pioneer dealer.

U.S. Pioneer Electronics Corporation, 178 Commerce Road, Carlsbad, N.J. 07072

www.americanradiohistory.com
Put an AKG on the job.

Tape Guide

Herman Burstain

Head Wear, Equalization, and Large-Reel Adapters

Mr. Donald Mahler, of the Dept. of Education, Humboldt State College, Arcata, Calif., comments on items which appeared in Tape Guide in February and March of this year:

Head Wear, Feb., I do a fair amount of commercial recording, as well as considerable private work, using a number of recorders of various makes. In my sad experience, as little as five or six hours of bad tape can ruin a set of heads, with or without pressure pads, and on machines costing $1500 as easily as those costing $50. For some time I used to check new tape a short ways from the outside end, using an inexpensive magnifying glass under a table lamp, but after getting poorer and poorer tape from domestic makers—I've simply standardized on 8mm movie film reels—as far as original reels up to 800 tape supplies). If Mr. Siegal, who asks stores, especially those with lots of old concerned. The way to obtain magnetic phono equalization for a tape recorder input (if it does not have such a circuit or it is already hooked up to another item) is to use the inexpensive Sony passive (non-powered) adapters. These work very well on virtually all recorders through the microphone input, are very small, and I believe still cost only about $6.00 per pair.

Large reel adapter, March. The normal quarter inch tape recorder using reels up to 8½ inches is actually using film reels—as far as original design, width, and center hub are concerned. The 400 foot 8mm movie reel became the seven inch tape reel (and in fact I sometimes use regular 8mm reels and plastic cans in place of so-called tape supplies). If Mr. Siegal, who asked the question, will search in large camera stores, especially those with lots of old stock, he should have no trouble finding 890 or 1200 foot 8mm movie reels which will work nicely on his Revox. He should, however, avoid the painted steel ones because of the magnetism and static electricity they tend to collect.

Drop Out

Q. I have a problem that I really don’t quite understand. I suppose the term for it is “drop out.” I thought at first that my tape deck was at fault, but upon further investigation and some reading I have discovered that this is a characteristic of magnetic tape. Realizing this, I decided to do all recording at 7½ ips, allowing the tape imperfections to pass over the heads more quickly. This, however, does not alleviate the problem. I go through all the rigors of a real tape enthusiast (which I am) by cleaning the heads thoroughly, setting correct levels, etc., but nothing seems to help. I am a great fan of classical music, and I can’t stand to have it distorted. I also enjoy listening with earphones, but this makes the problem more pronounced. Is there a tape that will give me good results? —Richard Wiesand, APO, San Francisco, Calif.

A. I am afraid that your description of the problem of drop out is too sketchy for me to comment on extensively. True, all tapes exhibit drop out. The high quality tapes tend to do so less than those of lower quality. In today’s state of the art, drop out tends to be unnoticed when using high quality tapes with high quality tape machines at speeds of 7½ ips, although drop out may be detectable by meter or oscilloscope or on listening to a single, steady tone. Use of wider tracks (e.g. half-track rather than quarter-track) reduces the problem, because tape imperfections tend to average out better over a wider track.

Possibly your machine has a fault resulting in signals akin to drop out. The policy of Accou magazine prohibits me from recommending specific items of audio equipment, including tapes.

Visible Magnetic Images

Q. Some time ago AUDIO mentioned developing the magnetic image in a tape recording to produce a visible image. Could you tell me what the material is which accomplishes the developing and where I could obtain it? I have a problem with crosstalk in my tape recorder and feel that this might be useful in checking the cause.—Irving Menchik, Brooklyn, N.Y.

A. You are probably referring to Magna-See made by Reeves Soundcraft Corp., 302 E. 44th St., New York City.

If you have a problem or question on tape recording, write to Mr. Herman Burstain at AUDIO, 134 North Thirteenth Street, Philadelphia, Pa. 19107. All letters are answered. Please enclose a stamped, self-addressed envelope.

The BOSE 901® DIRECT/REFLECTING® Speaker System

THE 12 YEARS OF RESEARCH

Twelve years of research into physical acoustics and psychoacoustics produced this unconventional speaker that has met with unprecedented success. Copies of the Audio Engineering Society paper, by Dr. A. G. Bose, describing this research, are available from BOSE Corp., for 50 cents.

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The 901 is the most highly reviewed speaker on the market, regardless of size or price. Circle number 24 on your reader service card for reprints of the reviews.

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Ask your franchised BOSE dealer for an A-B comparison with the best conventional speakers he carries, regardless of their size or price. You will only appreciate why we make this request after you have made the experiment.

THE PERFORMANCE

You are the judge. If we have succeeded in our design goals, the result will be obvious to you when you A-B the 901 with any speaker selling for less than the 901.

"You can hear the difference now."

BOSE brings you the Second

DIRECT/REFLECTING® Speaker System

THE DESIGN GOAL

Our objective was to produce a speaker in the $125 price range that would outperform all speakers costing less than the 901.

THE DESIGN APPROACH

We preserved as many of the features of the 901 as possible to produce a speaker that sells for $124.80.

Circle No. 27 for information on the design of the BOSE 501.

The BOSE 501® DIRECT/REFLECTING® Speaker System

Circle No. 28 for information on the BOSE 501.

Circle No. 29 for information on the BOSE 901.

Natick, Massachusetts 01760

www.americanradiohistory.com
**What's New in Audio**

**Heath Stereo-4 decoder**

This is the kit version of the Electro-Voice Stereo-4 decoding system, which adds and subtracts the original two channels electronically to provide four-channel reproduction. Savings over wired price are about 50 percent. Price: $29.95.

Check No. 4 on Reader Service Card

**Sinclair IC amp-preamp**

Audionics, Inc. offers the Sinclair Radionics IC-10, an integrated circuit amplifier-preamp-processor on one monolithic silicon chip. Output is rated at 5 watts rms at 8 ohms at 28 V d.c., while a response of 5 Hz to 10kHz Hz + 1 dB is claimed. Rated noise is +70 dB. Single unit price: $12.00.

Check No. 10 on Reader Service Card

**Wright electrostatic speakers**

Dayton-Wright Assoc. offer the KG-8 series of full-range electrostatic speakers. Eight drivers are used without crossovers to operate from 35 Hz to 19 kHz. The purchaser has the choice of using either the ST-300 matching stereo transformer unit, which will handle 350 watts/channel, or the 2704A stereo power amplifier/graphic equalizer, with an output of 60 watts rms/channel. Basic unit size is 40 in. W x 48 in. H x 6½ in. D. Prices begin at $175 for the basic KG-8, the ST-300 transformer system is priced at $325.

Check No. 14 on Reader Service Card

**TEAC component line**

Preceding emphasizing recorders, TEAC has now introduced a six component line including a basic amplifier, an integrated amplifier, speaker system, AM/FM tuner, three-way crossover, and performance indicator. The tuner (shown) incorporates a five-gang tuning capacitor and three FETs. Price: $349.50.

Check No. 16 on Reader Service Card

**Shure preamplifiers**

The Models M64 and M64-2E stereo preamplifiers provide voltage gain, equalization, and choice of impedences necessary to operate magnetic phonograph cartridges and tape playback heads. Both models have a single slide switch for selecting equalization for phono, tape, or flat. Price: $56.00.

Check No. 12 on Reader Service Card

**Eico environmental lighting**

Color organs, strobe lights, "pop-op" lights, and sound-light translators are available in kit and finished forms from Eico Electronic. High reliability solid state design includes isolated transformers, paralleled lamp configuration, and external color controls. Color organ prices begin at $29.95.

Check No. 20 on Reader Service Card

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**The either-or stereo from JVC**

Model 4344 is the latest pacesetter from JVC. With more features, more versatility than any other compact in its field. You can enjoy either its superb FM stereo/AM receiver. Or your favorite albums on its 4-speed changer. Or 4-track cassettes on its built-in player. Or you can record your own stereo cassettes direct from the radio, or use its microphones (included) to record from any outside source. And you get all these great components in a beautiful wooden cabinet that can sit on a book-shelf.

But don't let its size fool you — JVC's 4344 is a real heavyweight. With 45 watts music power, 2-way speaker switching and matching air suspension speakers, illuminated function indicators, handsome blackout dial, separate bass and treble controls, FM-AM switch. Even two VU meters to simplify recording, and more.

See the Model 4344 at your nearest JVC dealer today. Or write us direct for his address and color brochure.
The present tape format is, a bit rich. To wit: How are we going to record and sift fact from fancy. Electro-claims and counter-claims... for most pocketbooks. As avid a tape who forgotten on FM. While this is unquestionably many hi-fi shows and in a large number channel stereo as a major step forward in audio and a very desirable product. though four-channel stereo may be, it big technological non with no counterpart in live music, admittedly a dearth of both pop and product, the result of mix-downs from the tape format. This pioneer in the field a little confusion still exists about many aspects of audio sense, the purpose of four-channel avarity is an accepted fact, though even the pop four-channel sound is a contrived product, the result of mix-downs from 8- or 16-track recordings, it nonetheless appears in the form of a discrete "line" tape recording. While there is admittedly a deart of both pop and classical four-channel recordings, what is available has been demonstrated at many hi-fi shows and in a large number of audio salons. There is little question that these demonstrations have had tremendous impact on those who have heard them, and have established four-channel stereo as a major step forward in audio and a very desirable product.

The trouble is of course that desirable though four-channel stereo may be, it is, in the present tape format, a bit rich for most pocketbooks. As avid a tape who has spent even more for your records. Although you may have paid for your receiver, speakers, or turntable, chances are you've spent even more for your records. Or will before long. Your records are not only your biggest investment, but the most vulnerable, well. They can remain as good as new for many years or begin to wear the first time they're played. In which case they become even more expensive.

How to protect your investment. Which brings us to the turntable, the one component that actually connects your records and tracks their impressionable grooves with the unyielding hardness of a diamond. What happens then is up to the tonearm. What is the professional's choice.

All of this is something to think about the next time you buy a record or play your favorite one. It's why Dual turntables have been the choice of professionals for so many years. Not only for the way Duals get the most out of records (without taking anything away) but for their ruggedness, reliability and simplicity of operation. And, of course, the Dual is well known as the professionals' choice.

The Dual does it. Dual turntables are designed with great ingenuity and engineered to perfection. For example, the tonearm of the 1219 pivots exactly like a gyroscopic and down within one inch, left and right within another. All four pivot points are identical, and nothing moves with the tonearm except the inner ring. If you can imagine 0.015 grams, that's the maximum resistance this tonearm offers to the stylus. This suspension system is called a gimbal, and no other automatic arm has it.
The heart of the Sansui Quadrophonic Synthesizer® is a combination of a unique reproducing matrix and a phase modulator. The matrix is the 2-channel version of Eargle's encoding, designed to provide the keenest separation of the discrete sources. This is done by analyzing the information present in the original signals and reconstructing it in the reproduced channel signals so that they are as independent as possible.

The starting, multidimensional effect goes beyond the four discrete sources used in conventional 4-channel stereo, actually enhancing the sense of spatial distribution and dramatically expanding the dynamic range. Also, the effect is evident anywhere in the listening room, not just in a limited area at the center. And that is exactly the effect obtained with live music! This phenomenon is one of the true tests of the Quadrophonic system.

The Sansui Quadrophonic Synthesizer® has been the talk of the recent high-fidelity shows at which it has been demonstrated. Everywhere you go, you hear the applause of the audience, and you can do that now at your Sansui dealer. Discover that you can hear four channels plus, today, with your present record and present stereo broadcasts. $399.95

*Sansui Electronics Corp.
Woodside, New York *Patents Pending
Dear Editor,

Recently your magazine has published several communications about frequency modulation (FM) in loudspeakers (Ref. 1). I have been interested in the subject for several years and have noted that discussions on the subjective effects of FM generate more "sound and fury" than any other topic. I would like to present my thoughts on this subject and comment on some of these communications (Ref. 1-4) with the hope that this rather lengthy article might interest other readers of your magazine.

As is well known, these distortion components are considered to arise from the classical Doppler effect (Ref. 5). Klipsch, with direct radiator designers suggest that FIM components account for approximately 10 percent of the total distortion products (Ref. 8b). In this regard, I believe it is important to note how the magnitude of distortion compares with the magnitude of other forms of distortion at these output levels. Experimental studies of Klipsch and Gunther with direct radiator drivers suggest that FIM components account for approximately 10 percent of the total distortion products (Ref. 6). Klipsch and Gunther (Ref. 9) describe a method of comparing the FIM distortion using a carefully prepared eccentric tape recorder capturer. Klipsch describes that for sounds similar to those products of an FIM distortion, it is important to note how the magnitude of distortion at these output levels.

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Dear Editor...

(Continued from page 15)

diaphragm (and possibly the microphone) were equal to the area of his theoretical partition. Such a sheet, if it were transmitting one acoustic watt at 50 Hz, would have a total excursion of only about 0.001 inch if it had an area of 314 square feet. (I do not wish to argue whether one acoustic watt is a realistic figure or not; it is an easy one for calculation and the proportions will remain the same.) Reducing the size of the partition to the size of some "real" speakers we get the following approximations:

Speaker Diameter  Excursion
3.5"  0.1"  
15"  0.4"  
8"  1.4"  

Figure 1 shows what I feel is a closer analogy to the actual situation. A reverse horn on the "input" side of the partition increases the velocity of the energy to be transmitted by the "real" small "partition." Figure 2 shows Mr. Klipsch's speaker system superimposed onto the same schematic scheme. On the face of it, it would appear that the horn system is a quite valid method of creating a sound field that is as nearly as possible a replica of that field inter-

...
Editor's Review

The word microphone was first used as far back as 1827 but it then described a kind of vibrational stethoscope invented by Wheatstone. It was given its present meaning some years later by Hughes because it seemed a more appropriate description of a telephone transmitter. Credit for the first microphone per se is usually given to Bourseau who described his idea in 1851. But since he did not actually build one, honors must go to Bell for the magnetic type and Edison for the carbon principle, which of course is still used in present-day telephones. Other patents in the mid-eighteen hundreds were rather more exotic and they included several employing liquid jets, at least two hot-wire thermal contraptions and one by Reis using a variable contact with a diaphragm made of—of all things—the skin of a German sausage! A far cry from the modern condenser unit with its gold-coated mylar diaphragm and controllable response patterns. . . .

Some 93 microphones are classified in the directory on pages 36 to 43, which of course is not by any means a complete list. Of these, 64 are dynamics, 25 condenser types, plus three ribbons and one crystal. Crystal microphones are now mainly used with inexpensive tape recorders and while they offer good value for money, they are generally inferior to other kinds. No less than 14 condenser models use electrets for polarizing voltage and the emergence of these fascinating devices has resulted in a serious challenge to the dynamic principle. This trend is discussed by Richard Fowl in his article on inexpensive condenser microphones on page 26.

Quadraphonic Confusion

Received on the same day: A booklet describing the Lafayette-Dynaco adaptor, a list of broadcasting stations and record companies using the Electro-Voice system, news from Fisher announcing their stations and record companies using the Electro-Voice, Dynaco, or similar systems. The only exceptions are wide-band multiplex arrangements like the JVC which require a response up to 45 kHz.

Amplifier Power Output
Or What's Watts

The Federal Trade Commission confirms that they are considering the views of Audio regarding the proposed regulation relating to power output of amplifiers. In brief, Audio supports the Institute of High Fidelity recommendations as opposed to the Electronic Industries Association’s suggestions, but put forward an alternative proposal if a simple measurement is required. This involves a two-frequency (60 and 10,000 Hz) 1M test which will then indicate distortion throughout most of the audio range as well as a meaningful power bandwidth figure. The EIA suggestion, offered in all seriousness, is to make power bandwidth disclosure optional and harmonic distortion figures are to be taken at 1000 Hz only. Furthermore, if the distortion is less than 5 percent, the actual figures need not be mentioned! The difficulty arises from the fact that members of the EIA are concerned with shall we say, less ambitious record players? as well as with high fidelity equipment. Whether the Federal Trade Commission in its wisdom will come up with a regulation that will satisfy all parties remains doubtful to say the least.

Last month, I mentioned that Harold Weinstein, of Lafayette, was present at the Hearings. A rose by any other name etc., but I must apologize to Harold Weinstein.

Home Constructors

Take heart—a number of interesting projects are “on the stocks.” They include a stereo preamp, two amplifiers, two equalizers, and an audio generator.

* * *

Here is an item of news which may have great Social Significance—although I am not certain what it really means. Here it is, as it came from the Penn Tool News Bureau, untouched by editorial scissors: “More than 40 percent of the hammers, screw-drivers, and hand saws sold for use in the home are being bought by women.” Think about it. G. W. T.
Phil 20,

Highlights of the Eastman Recording Workshop

Paul Dean

Audio · July 1971

The Eastman School of Music drew 55 students for the 1970 Summer Session Recording Workshop. Engineers, producers, audiophile technicians, musicians, and amateur recordists, aged 18 to 65, were brought together to learn the most recent recording techniques and to meet the pros in the industry.

The Workshop opened with a welcome from David Greene, recording engineer and director of quality control for A & R Recording, Inc., who introduced his faculty colleagues: Phil Ramone, executive vice-president of A & R and producer of Bert Bacharach's record albums; Neil Munco, engineer, console designer, and president of Suburban Sound, Inc., and Ross Ritchie, audio engineer and director of Recording Services Department at Eastman.

The Recording Workshop ran concurrently with the Arrangers' Workshop, which provided live recording sessions every day of the course. Therefore, by rotation of assigned activities, each student had an active part in all functions of actual recording sessions.

Preparations

The first "date" was with the Arrangers' studio combo, and the morning class prepared by discussing choice of tracks for the combo and selection of microphones. The console had a capacity of 16 positions. Under the direction of Phil Ramone and Dave Greene, the class plotted the positions on the blackboard and arrived at the following hypothetical setup:

1 Trumpet 9 Farfisa Organ
2 Trumpet 10 Piano
3 Trombone 11 Electric Guitar
4 Trombone 12 Regular Bass
5 Trombone 13 Fender Bass
6 Saxophone 14 Overhead (Drum)
7 Saxophone 15 Sock Cymbal
8 Saxophone 16 Bass Drum
12 10 Piano
13 Fender Bass
6 Saxophone 14 Overhead (Drum)
7 Saxophone 15 Sock Cymbal
8 Saxophone 16 Bass Drum

Microphones used at the Eastman Recording Workshop included a Neumann U-87 for the tuba in the brass quintet, a pair of AKG C-12As in a cross-cardioid setup for overall pickup of the quintet, and a AKG 451-E for the piano of the Studio Combo. Dr. Donald Hunsberger, conductor of the Eastman Wind Ensemble, is shown at top and above, center, talking with a student and Phil Ramone (right), producer of Bert Bacharach's records.

On the Eastman Theater stage Phil Ramone supervised the microphone setup with selection from the available microphones: two Neumann U-87s, two Neumann U-87s, two AKG C-12s, two AKG 451-Es and 15 Shure SM-55s. Judicious miking was the objective, as the students placed booms around it, for these factors will influence its operation. Some of you were mainly interested in specific microphones and their uses. I guess the most commonly used microphone today—at least for studio operation—is the U-87 Neumann.

There followed a volley of student's questions, which Greene answered in detail. The workshop was definitely in action. The law states, "If anything can go wrong, it will!" And it did when more saxophones arrived than anticipated, resulting in the rearrangement of some positions.

While the mike setup was being made on stage, other students were preparing for the recording in the studio, which was located in the third floor of the building across the street from the Eastman Theater. Contact between the two points was maintained by phone and closed circuit TV. One student was in charge of the "take sheet," another acted as timekeeper, a third started the tape machines on cue, while still others hovered over the console as Dave Greene, engineer in charge, checked all positions for the "take." Two large speakers blasted the first notes as the band tuned up. Shortly, "take one" was ordered, and the recording session had begun.

The musicians were sight-reading the musical scores before them and required several "takes" for the entire arrangement. Soon the score took form and developed. Two Alto Voice-of-the-Theater speakers were provided on stage for playback.

The Arranger-Conductor

In the evening class after this first recording date, the students had the privilege to meet Manny Albam, the conductor-arranger who has been a guiding force in the Arrangers' Workshop. He emphasized the importance of playbacks:

"We 'shake down' the first tune; the next thing I want to hear as quickly as possible is a good sounding playback... if that initial playback isn't a good, live-sounding thing and doesn't satisfy the musicians, then the date starts to go downhill. Because if the musicians aren't pleased, the date begins to sound like it's not fun, or it's not interesting, or the dynamics aren't right. Something is wrong, and you get an ordinary recording—not one that glows and glints, has sparkle and whatever you want.

I like to hear everything on the date, and there are few of us left who do it that way. I think that Bert Bacharach is another guy who brings in everybody... you don't lay down a date because it doesn't match what you had in mind for the brass. I want to hear it all at once, with or without the vocal... We work hard, stay up nights, sometimes 72 hours in a row, to get a date done."

Microphones

Dave Greene, in presenting an enlightening discourse on microphones, described their history along with some of the problems encountered with the earlier models and how those problems are solved:

"Generally speaking, microphones are only as good as their environment. Acoustically speaking, you can't describe a microphone without talking about where it is and what's around it, for these factors will influence its operation... Some of you were mainly interested in specific microphones and their uses. I guess the most commonly used microphone today—at least for studio operation—is the U-87 Neumann."

There followed a volley of student's questions, which Greene fielded with aplomb:

"Sock cymbal! I use a dynamic. Bass drum? You can use anything. I used an old ribbons on one date—they are fairly sensitive but also very rugged. It was an RCA 44-BX an old, old, old thing but it worked very well. Ribbons are excellent for a bass drum. The trick about bass drums is that we
However, losses in recording go down considerably at 15 ips, 22

A special alignment tape – Ampex makes one—is played back at

Neil Muncy disclosed:

bias frequency is also not high enough to permit good reproduc­

equalization and what occurs when the speed is doubled— e.g.
generator and scope. A que stion was posed in reference to

both musicians. Again it depends on the number of mikes you

a great sound. For something like a flute or oboe a condenser

The ReMix Room

Reception

and tape head preamplifier circuits; for though
twenty cycles as a constant to establish
because of

The TA-2000’s circuitry unusual, performance more so

2000’s

What is unusual is the performance of the phono

amp, this sytem cannot be considered other than

immune to overload- even with input sig­
times greater than

high end when we recorded it , so we could
created an output cap nister’s channel, and tape head preamplifier circuits ; for though

frequency to-noise ratio is an in­

20

Before we get into the TA-2000’s performance

The amplifier—no mere “black box”

A power amplifier can be considered simply as a “black box” with input and output connections, a power transformer, an on/off switch, and an output level control. The ideal amplifier can perform as well (or poorly) as the next; the ideal transformer can perform as well (or poorly) as the next; and the ideal power transformer can perform as well (or poorly) as the next. However, the ideal combination of these components can be achieved only by the most advanced engineers. The TA-2000 is a state-of-the-art product that combines high-quality components with superior design and construction. The amplifier is designed to provide maximum output power with minimal distortion and noise. The TA-2000 features a fully balanced input stage, a 500W power output amplifier, and a custom-designed output stage that delivers a clean, transparent sound. The amplifier is housed in a sturdy, high-quality cabinet that provides excellent shielding and protection for the delicate electronic components. The TA-2000 is an exceptional value for its price, and it is sure to please audiophiles and music lovers alike.

To call it “an amplifier” would be like

Calling a scene

“Basic transcription.”

(Continued on page 24)
way with springs and EMT reverber plates. In recent years there have been some interesting developments regarding echo. A slight time delay, just before the return of reverberation, gives a more natural sound.

Eagle explained, “What you are doing now is slightly akin to what happens in a big room. There are three sound fields that occur in a large room when a sound is emitted: one is the direct field, that reaches you directly and doesn’t go through any bouncing; the second is the early field, which consists of the first handful of initial reflections, which the ear can analyze (the ear can actually hear these early reflections); the third is the grand mix or reverberant field that is coming from all directions equally.”

On quadruphonic sound and the role of time delay, Eagle said, “Creating artificial ambience is going to be a very big thing. Instead of having four new acoustic happenings—one in each corner—we are going to have four acoustical happenings that we can control and manipulate. Part of this is going to be a very high quality time delay, and I don’t mean taking some spare 4-track machine and running it 90 cycles a second, using a 30 ppm capacitor. I mean something that really lets you get down into very small bits of time delay, for example, 12 milliseconds. The acoustical image that you get with time delay and reverberation is one of placing that voice in any acoustical environment you want to manufacture.

“To a very great extent, tape does its own kind of limiting of high frequencies. It is one of the most gently overloading medium, and it has a cushion-type action. The opposite is true of disc cutting, and when you are cutting high-speed discs. Many of the FET style limiters can grab like a cat and strive to get everything loud. We are working here with mechanics, with springs and EMT reverb plates. In recent years there have been some interesting developments regarding echo. A limitation was placed on the stage in Kilbourn Hall which the ear can analyze (the ear can actually hear these early reflections); the third is the grand mix or reverberant field that is coming from all directions equally.”

Mobile Recording Studio

One of the most outstanding "live dates" of the Workshop was an evening involving the use of a commercial studio truck from Fedco Audio Labs, Providence, R.I. When the innocent-looking panel truck arrived, the eight-track heads revealed a fascinating recording potential to the students who inspected the interior and heard the engineer-designer describe the studio's capabilities.

Inside the truck were two 8-track tape recorders, custom-built by John Stevens of Burbank, Calif.; a custom console with 24 positions; four JBL 4130 monitor speakers, and a closed circuit TV. Interior basic equipment included a power conditioning system, to stabilize power supplies at any location, to alleviate rectifier noise, and operate without power change. Shown was line voltage fluctuate between 130 V and 105 V. Three cables ran from the truck into the building, one for power, one with 33 mike lines in it, and one for speaker lines, headphone lines, TV, etc.

The console was 16 miles in, with 16 mike pre-amps, each with equalization and compression, and pan-pots for each of the 16 positions. 8 tracks output black mix made up as linear combination of either 4 outputs of the board, or four and two; equalization mix for the 16 inputs, plus the eight tracks, four tracks of echo, and solo. Echo was provided by four Fairfield spring sets, which were used very rarely and then only when making a two-track safety. Any input could feed any submaster; conversely any submaster could feed any input. With patching, this allowed an additional input.

Excellent communications were maintained by a talk-back system between the console and the engineer on stage with headphones and boom mikes. If the board developed, it could be located and corrected quickly. This compact, versatile vehicle was specifically designed to carry more equipment than could possibly be used for one date, thereby giving great flexibility in adjusting to any recording circumstance on location.

The Assemble

To accomplish this second and unique live recording date, precise prearrangements were in effect. The mobile studio arrived first and very early, for the benefit of the students' inspection and enlightenment. Later, the Paul Winter Consort's panel truck, carrying the larger musical instruments, arrived from California, where one week earlier at UCLA, the Paul Winter Consort had been recorded by Phil Ramone, who brought his recording to the Workshop and played it for the students at that morning's class.

The Paul Winter Consort arrived by plane from Arizona, where they had completed a date the night before using their small instruments. While unloading at the Rochester airport, their amplifier for electric acoustic guitar was dropped and broken, requiring hasty repairs. Nevertheless, the evening concert went smoothly and was enjoyed by a capacity audience.

The mobile studio was located on the fourth floor of the workshop. The console was Dave Green, engineer in charge, running both tape recorders and monitoring with closed circuit TV. Up in the Eastman studio at the controls was a Workshop student, observed by an experienced TV sound engineer and other students.

The Paul Winter Consort

On the stage at Kilbourn Hall was the Paul Winter Consort—"a celebration in sound" (their publicity stated). "An ensemble of young musicians who are developing an original idiom of instrumental music and a new kind of theater-concert experience."

The six musicians rendered familiar classics, ethnic rhythms, and their own original compositions and improvisations, featuring oboe, sax, cello, English horn, acoustic and electric bass, portable organ, classical and 12-string guitars, lute, sitar (which took longest to tune), and a variety of folk percussion instruments.

During the performance, the Paul Winter Consort's engineer was located down front below the stage, operating their own sound system (four speakers: two for P.A., two aimed at the band). After the concert, a reception was held in the student lounge, where the Workshop students met and questioned the musicians.

Conclusion

Manny Abram gave this forecast to the Recording Workshop students:

"We say as much as we possibly can in class, with the idea that you will hear about one third of it or less. But there is one thing that's going to happen. At some time during your employment, you'll become a part of something and you'll say, 'Ah, that's what he meant!' And so take it all in now, as much as you possibly can, and it will begin to pay in a few months. Without fail, I can almost guarantee that solutions to a lot of your problems are suddenly going to jump under your fingers, and you will go for the right switch at the right time!"

The accuracy with which AR speaker systems reproduce music serves as a valuable tool for many notable musicians. Among the most notable is Woody Herman, whose big bands have long enjoyed great success. His secret seems to be an ability to stay in tune with the evolution of musical styles, as is documented by the Herb's latest recordings on the Fantasy label. In spite of a schedule of more than 200 concerts every year, Mr. Herman can sometimes relax in the seclusion of his Hollywood home. Here, he listens to a high fidelity system consisting of an AR receiver, AR turntable with Shure V-15 type II cartridge, and a pair of AR-2ax speaker systems.
The Case for the Condenser Microphone

A report by Richard Fowle

Incorporation of the electret capsule and the resultant increase in battery life, makes the use of superior condenser microphones as convenient as the use of dynamic microphones.

Accuracy is the key factor in the design and performance of any audio component. There are many ways of measuring the deviation from absolute accuracy. Total harmonic distortion, intermodulation distortion, frequency response, signal-to-noise ratio, phase response, impulse response, and many more are terms describing the relative accuracy of a component. The aim of all these measurements is to show how closely the output of a device approximates the input to that device.

In studying the important characteristics of condenser and dynamic microphones, it quickly becomes apparent that a properly designed condenser microphone is inherently more accurate and thus better than a properly designed dynamic microphone. A microphone is a device which converts acoustic energy into electrical energy. In other words, when sound of a given frequency and amplitude strikes the diaphragm of a microphone, alternating electrical current of equivalent frequency and amplitude is produced by the microphone. This transformation takes place in several well ordered steps, regardless of the type of microphone.

1. Acoustic energy (an alternating air pressure) strikes the diaphragm of the microphone.
2. The acoustic energy becomes mechanical energy as the diaphragm vibrates in accordance with the difference in pressure between front and rear sides of the diaphragm.
3. The mechanical energy (vibration) of the diaphragm is converted to electrical energy (alternating current)

A coil of wire which moves in a magnetic field whenever sound pressure strikes the diaphragm. (See Fig. 1-B).

The coil attached to the diaphragm of the dynamic microphone is required to convert the mechanical vibration of the diaphragm into electrical current, whereas the condenser microphone does not require a coil. By adding enormous amounts to the mass of the vibrating system, this coil prevents the dynamic microphone from responding accurately to variations in sound energy. [1]

A simple experiment can be performed to illustrate and verify this effect. Two microphones are placed side by side, a $50$ hony condenser and a well-known $150$ dynamic. A spark gap (as in an automobile spark plug) is used to produce a sound impulse. The output of both microphones is displayed on an oscilloscope. (See Figs. 2-A and 2-B).

The output of both microphones is displayed in accordance with the difference in frequency and amplitude is produced when a given frequency and amplitude strikes the diaphragm of a microphone, altering electrical current of equivalent frequency and amplitude is produced by the microphone. This transformation takes place in several well ordered steps, regardless of the type of microphone.

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condenser microphones with self-contained battery power supplies appeared on the market, but battery life was still comparatively short. The majority of condenser microphones still required an external power supply. The microphones were still too complex for general purpose use.

In 1969, Sony Corporation manufactured the first electret condenser microphone, the ECM-22. The incorporation of an electret capsule [4] further reduces the power requirements. A single voltage, from 1.5 to 9 volts, is required. Since no high voltage is required for polarizing the capsule, battery life is extended (up to 1100 hours in the ECM-22; up to 15,600 hours in other Sony condenser microphones).

Each of these technical advances reduced the complexity of the condenser microphone, thus making it usable for a wider variety of purposes. The latest advance, the incorporation of the electret capsule and the resultant increase in battery life, makes the use of superior condenser microphones as convenient as the use of dynamic microphones. Secondly, because the condenser microphone is very complex, it was also extremely susceptible to damage from shock, moisture, humidity, and heat. The reduced complexity of the modern condenser microphone design has resulted in a dramatic improvement in durability. Sony condenser microphones, for example, are extremely rugged and will withstand without any ill effects the normal accidents which occur, as for example, falling off a table. However, these condenser microphones cannot be used to hammer nails (a capability one well-known manufacturer of dynamic microphones claims for his product), since they are precision audio components and must be treated as such.

Finally, prior to 1969, the least expensive high quality condenser microphone cost over $200 with the majority of such microphones costing from $275 to $500 each. At these prices, the only users of condenser microphones were professional recording engineers, whose income depended entirely on the quality of their recordings, and acoustical engineers, who used condenser microphones for audio measurements which required greater precision and quality than any available dynamic microphone could provide. After designing the electret condenser microphone, Sony manufacturing engineers were faced with the task of producing these microphones at prices which were competitive with dynamic microphones. They were able to meet this challenge, and as a result, Sony condenser microphones are available at prices starting below $20.00. Each is a true condenser microphone, and thus incorporates all of the inherent advantages of even the most expensive condenser types.

The author has not stated some of the advantages of dynamic microphones which we hope to deal with in later articles. —Ed.

REFERENCES


After reviewing the preceding facts, which clearly indicate that the condenser microphone is technically superior to the dynamic microphone, a natural question is "Why do dynamic microphones out-sell condenser microphones by a margin of at least 10 to 1?" Up until now, three negative characteristics of condenser microphones have made these technically superior products unsalable for all but the most professional applications.

First, since the condenser microphone is an electronic device (each containing an amplifier), a power source is required for it to operate. Originally, the amplifier used a vacuum tube and the microphone required three different voltages: 4 to 12 volts for the filament, 8 to 15 volts for the plate, and 64 to 120 volts for the transistor amplifier, and 65 to 200 volts to polarize the capsule. A few

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REFERENCES

A Wide Range Audio Sweep Oscillator

MICHAEL LAMPTON

The circuit to be described is based on the triangle wave generator shown in Fig. 1. In this circuit, two integrated-circuit operational amplifiers are cascaded. One of these has negative feedback applied to it by way of the capacitor C; it is an integrator whose input is either +V or -V depending upon the position of the switch. The other operational amplifier is supplied with positive feedback and functions as a sensitive voltage detector: when its input (point Y) becomes even a fraction of a millivolt negative, its output switches rapidly from the positive supply voltage to the negative supply voltage, and the limiter swings from +10 volts to -10 volts. To complete the feedback loop we stipulate that when the limiter output is positive, the switch will contact the +V input, and conversely a negative limiter output will cause the switch to move to the -V position. To follow its operation, suppose that point Y is indeed positive and Z is at +10 volts. A positive current flows into the integrator through resistor R, and voltage X moves negatively at a rate $\frac{dV}{dt} = \frac{-V}{RC}$. When X reaches -10 volts, Y reaches zero, whereupon the second amplifier, the limiter, and the switch change state. Since this reverses the drive to the integrator, point X now moves positively at a rate $\frac{dX}{dt} = \frac{V}{RC}$. This state persists until X reaches +10 volts, where again Y = 0 and a new cycle begins. The resulting triangle wave at point X has an amplitude of 20 volts peak to peak and a frequency $f = \frac{V}{40} \text{Hz}$, for the values shown in the figure, $f = 2 \text{kHz} \times V$. The wide frequency range of this oscillator is made possible by the extreme voltage accuracy of modern IC operational amplifiers: an error of 1 millivolt is seen with this formula to correspond to a frequency uncertainty of 2 Hz. At the same time a full scale control voltage discharge will be accurately exponential if C1 is free of leakage and dielectric nonlinearity (a high quality solid tantalum type is recommended). The values shown give a factor of two decay in voltage in 7 seconds, which corresponds to a frequency sweep rate of 7 seconds per octave or 23 seconds per decade. The network can of course be easily modified for other sweep rates. At any point, the sweep can be interrupted by moving the mode switch to the sweep position; this feature is useful for sitting on a resonance identified during the sweep.
The triangle wave generator consisting of A3 and A4 operates just as described previously. An important consideration in choosing an IC type for use is A3’s slew rate, i.e. the maximum speed with which A3’s output voltage must change. For a 20 kHz, 20 volt p-p triangle wave, a slew rate of 0.8 volt/microsecond is required. This is well within the capabilities of the MC1446/C which will typically slew at rates as fast as 25 volt/microsecond. Although this same op amp type could also have been used for A4, better switching performance is obtained from an uncompensated IC such as the MC1439G. Its feedback voltage is symmetrical to ±10 volts by the IN757A zener diode and associated rectifier bridge.

The triangle wave generated by this oscillator is converted into an approximately sinusoidal waveform by the nonlinear attenuator made up of the IN747A and IN750A zener diodes and their associated components. As the triangle wave rises past 4 volts, the IN747A conducts through R13, which diminishes the rate of rise of the network’s output voltage. Above 2.5 volts the IN750A conducts through R14, which of course introduces further attenuation. Just beyond 6 volts the IN750A directly clips the waveform by way of the diode shunting R14. This nonlinear attenuation technique gives rather nicely rounded sine waves rather than sharp cornered polygons due to the gradual onset of conduction in low voltage zener diodes. Zeners are normally manufactured with a ±5% tolerance, and it may prove necessary to trim the circuit to achieve minimum distortion.

(Continued on page 59)
Beneath this mild mannered charcoal gray exterior, is the finest compact studio monitor money can buy. It should be. The JBL 4310 was developed with the enthusiastic assistance of leading recording engineers. (And they’re the only ones who can buy it.)

Now, guess what else the professionals have been doing with the 4310’s for the last two years. You’re right. They’ve been taking them home, using them as bookshelf speakers. That’s why we decided to get even.

It’s the new JBL Century L100. It costs $273. It would be the finest professional compact studio monitor money could buy except it’s not sold to studios. (If that sounds like the JBL 4310, there’s a reason. They’re twins.)

JBL started with a definition of sound. It’s the sound the artist creates, the sound the microphone hears, the sound the recording engineer captures. Then they added oiled walnut and a new dimensional grille that’s more acoustically transparent than cloth but has a texture, a shape and colors like Ultra Blue or Russet Brown or Burnt Orange.

Oh, yes. The JBL Century L100 has individual controls under the grille so that you can match the sound to the room—just the right presence, just the right brilliance. And then they checked the rule book. There’s absolutely no law against professional sound looking beautiful.
Readers should bear in mind that the specifications on the following pages are those supplied by the manufacturer and not the results of our tests or measurements. Obviously, due to space limitations, all the products of each manufacturer are not listed, but every effort has been made to give a representative selection.

**Glossary**

**Electret**—A plastic-chemical device which produces a relatively high voltage potential without current.

**Sensitivity**—The standard Electronic Industries Assn. (EIA) ratings (SE 105) used are defined by “the ratio in dB relative to 0.001 watt and 0.0002 dynes per square centimeter of the electrical power available from the microphone to the square of the undisturbed sound field pressure in a plane progressive wave at the microphone position.” Other standards commonly used are:

- **A** Volts in dB relative to 1 volt dyne per square centimeter.
- **B** Open-circuit voltage in dB relative to 1 volt per microbar.
- **C** Power level in dB relative to 1 millivolt at 0.002 dynes per square centimeter.

As a comparison, a typical microphone could measure a sound wave at the microphone positions tends to change with frequency.

**Pattern**—A microphone with both sides of the diaphragm open to the sound, thus responding to the gradient of differential pressure.

**Variable-D**—A microphone having more than one entrance to the rear of the diaphragm to reduce bass over-emphasis under “close miking” conditions.

**Fig. 1—Microphone response configurations. A, Cardioid; B, Omnidirectional, and C, Bidirectional.**

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**Table of Microphone Specifications**

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<th>Features</th>
<th>Price</th>
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<td>AKG</td>
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**Audio - July 1971**

(Continued on page 40)
Sony condenser mikes are better for everyone.
From $34.50!

Now Sony offers both the hobbyist and the professional the most complete line of superior condenser microphones on the market. And if that sounds like bragging, it is. Here's why:

Our $34.50 condenser mike is superior to any competitive dynamic mike costing up to $75.

Our $54.50 condenser mike tops dynamics selling for as high as $125.

Our $99.50 condenser mike is better than competitive $175 dynamic microphones.

Our $129.95 tie-tac mike is smaller and better than all other tie-tac or lavalier mikes...regardless of price.

Our $395 professional condenser mike is better than any other microphone at any price.

Wild claims? We've got the facts to prove it. Write for details to: Mr. Carl Mason, Sony/Superscope, 8142 Vineland Avenue, Sun Valley, Calif. 91352.

Put a Sony condenser mike in your act today.

*Our $395 professional condenser mike is sold only through selected professional audio dealers. For information write: Special Applications Products Division, at the above address.
## Shure 585SA

**MICROPHONES**

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### Special Features
- High output, low noise.
- True in-phase, true omni-directional.
- Frequency response: 20 Hz to 20 kHz.
- Sensitivity: 150 mV/PA.
- Maximum output level: 150 dB SPL.
- Dynamic cardioid / subcardioid.
- Supercardioid / supercardioid.
- Cardioid / cardioid.

### Specifications
- Operating voltage: 45 to 60 V.
- Impedance: 300 ohms.
- Sensitivity: 150 mV/PA.
- Frequency response: 20 Hz to 20 kHz.
- Maximum output level: 150 dB SPL.
- Dynamic cardioid / subcardioid.
- Supercardioid / supercardioid.
- Cardioid / cardioid.

### Accessories
- Headband (optional).
- Earpads (optional).
- Windscreen (optional).
- Mic Clip (optional).

## Shure SM60

**Shure SM60**

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- Frequency response: 20 Hz to 20 kHz.
- Maximum output level: 150 dB SPL.
- Dynamic cardioid / subcardioid.
- Supercardioid / supercardioid.
- Cardioid / cardioid.

### Accessories
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- Earpads (optional).
- Windscreen (optional).
- Mic Clip (optional).

## Sony C-37P

**Sony C-37P**

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- Sensitivity: 150 mV/PA.
- Maximum output level: 150 dB SPL.
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- Impedance: 300 ohms.
- Sensitivity: 150 mV/PA.
- Frequency response: 20 Hz to 20 kHz.
- Maximum output level: 150 dB SPL.
- Dynamic cardioid / subcardioid.
- Supercardioid / supercardioid.
- Cardioid / cardioid.

### Accessories
- Headband (optional).
- Earpads (optional).
- Windscreen (optional).
- Mic Clip (optional).
just as the industry became convinced that the integrated receiver would dominate the field forevermore has prompted

Nikko Electric Corporation of America

to produce scratch and rumble filters and bypass the tone controls.

Fig. 1—Rear panel layout.

Fig. 2—Top view of the Nikko TRM-1200.

SPECIFICATIONS

HF Music Power: 130 watts @ 4 ohms, 120 watts @ 8 ohms. While driving the 4 ohm load, the THD at full power output was 0.1% @ 1 kHz. A second switch, designated as 0.1% THD, was developed when driving the 8 ohm load, the THD at full power output was 0.5% @ 1 kHz.

Input Sensitivity: 6 mV input for full output. Referred to a more usual 50 watts, 0.2% THD, and a pair of microphone jacks. The basic amplifier is to be used in all future applications, which all too few of today's systems are designed around.

Fig. 3—Voltage amplifier stages of Nikko preamp section (one channel shown) includes feedback network to boost bass frequencies below 150 Hz.

usb power supply. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. The pair of d.c. coupled audio transformers is included for the grounds when the tone controls are re-calibrated. 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Garrard "Zero-100" Automatic Transcription Turntable

Now with the availability of improved types of free-rolling bearings, the same principle has been worked out with complete satisfaction. A simple list of all the "Zero-100" features should serve to spotlight the changes that have been incorporated in this model of the Garrard. We will elaborate on them later on:


All of these features combined into one automatic turntable make news, even though some are found on other units. Only in the Zero-100 are they all put together. Taking them individually, we first come to the vertical-tracking-angle adjustment. This is a simple lever which has two positions marked "M" and "A." In the "M" position, the cartridge head is set for a 15-deg. tracking angle on a single record; played manually. In the "A" position, the cartridge is tilted slightly so it is at the proper 15-deg. angle for the third record of a stack of six, the maximum number that may be stacked on the machine.

The stylus-force adjustment is by means of a sliding weight on the arm, which is first balanced with the weight at "0" and then the weight is moved to the desired stylus force. A movement of 1/16 in. varies the stylus force by only one gram, so an accurate setting can be made to any desired amount up to three grams or even down to one-quarter of a gram.

The anti-skating control involves no mechanical linkage to the arm. A simple slide on the fixed arm mounting serves to place a shield between a fixed magnet and one mounted on the movable gimbal which supports the arm. Separate calibrations are provided for conical and elliptical stylus.

While most turntables have a lock to hold the arm in its rest, it is usually a solid one, and lifting the arm could cause damage when it is supposedly locked. On the Zero-100, the lock is sufficiently firm, yet if the arm is lifted when locked, a restraining spring gives slightly to remind you that it was locked, suggesting that you release it.

The variable-speed device on modern turntables usually employs a tapered spindle on the motor shaft against which the idler wheel is moved up or down to provide the speed change. If the taper is steep, the idler contact with the shaft can vary, causing an unwanted wow. In the new Garrard, the tapered shaft is long, with a gradual taper that ensures good contact and allows a more accurate setting of the speed. The two speeds are indicated by a built-in stroboscope—a series of lines in the usual fashion, but placed on the underside of the platter: illuminated by a neon bulb, and viewed by a series of mirrors from the top of the unit. The two bands of lines allow accurate setting for either speed. We consider a built-in strobe highly important when variable speed is offered.

The rotating manual spindle is now common on high-quality turntables and is now a part of the Garrard. The "Synchro-Lab" motor, a unit which employs both an induction section and a synchronous section, makes for the best of both worlds—quick starting, and constant speed. The platter is non-ferrous, and is

We make the microphoner, too.

Since our job is to make your job easier, we've developed an entire line of ingenious, low-cost circuitry devices that take the headaches out of tough installations. For instance, Shure makes nearly a dozen different-type modular add-on Mixers, including a professional mixer. They're the talk of the industry. We offer an Audio Control Center to shape response to main room acoustics. Our Level-Loc effectively controls audio levels. In-line transformers, and plug-in problem solvers (such as phase reversers, attenuators, etc.) are instant cures for knotty problems. Interested? Write Shure Brothers Inc., 222 Hartrey Ave., Evanston, Ill. 60204.

Check No. 47 on Reader Service Card
Fig. 1—When the arm is near the center grooves of the record, the angle is changed by the controlling tubular component at the front. This part is pivoted on the rear of the head and provides practically perfect tangency throughout the entire record.

A lightweight component with a full rubber surface for the disc, providing damping to support the entire record surface. In the Zero-100, Garrard retains the reliable two-point support for the stack of records. Once the stack is placed on the automatic spindle, a plastic clip snuggles the 40 lb. arm onto the bottom record to drop gently to the platter on a cushion of air.

The tonearm pivot mounting uses a gimbal for the two bearings, and it is in a strong plexiglas structure which mounts the anti-skating magnet. Another magnet is mounted on the gimbal, and a shield may be interposed variably between the two magnets to adjust the amount of compensation applied. An indicator on the shield permits the frequency range from 20 Hz to 15 kHz ± 3 dB, for both conical and spherical stylus, with the calibration such that the setting is made to the value of stylus force applied by means of an adjustable dial on the arm. The arm structure accommodates an entire variety of adjustments for setdown position and for lifting height, together with another height adjustment of the amount of lift so as to clear records remaining on the spindle.

The speed control remains similar to that on the SL-95 series, in that the control has four positions—one for 45 rpm, one for each record, and three (for 33 1/3 rpm), with setdown positions for 12-, 10-, and 7 1/2-discs. Under the knob is the vernier speed adjustment which provides approximately 3 per cent increase or decrease in the normal speed.

The operating controls also interface similar to the SL-95B-three tab: automatic start, stop and reject; manual motor start; and cue, for lifting and lowering the arm.

Performance
The Zero-100 performed just about as we expected after reviewing the specifications (not shown in the figure) in the band from 0.5 to 6 Hz. Flutter, in the band from 6 to 250 Hz, measured ±0.3 per cent, both of which are excellent. The variable-speed compensation varied 0 dB at mid-band minus 3.6 per cent at 33 1/3 rpm, and a little less than that on 45 rpm. No change in speed was noted for a line-voltage range from 85 to 135 volts, but the expected change came when the line frequency varied, due to the synchronous section of the direct coupling.

While the skating of the arm should be much less pronounced with the near-zero tracking error, it can be shown that some skating tends to exist, but the amount is certainly less than that with conventional arms. This is probably the reason why the magnetic anti-skating feature works so well, and the pickup looked like it was in a perfect state of balance.

Under zero.5% that perplexed us is the removable line cord. We have seen chassis equipment where, for the sake of consumer convenience and gadgetry, the AR front panel seems so devoid of solder buses or connection points that the buyer, accustomed to external elegance, may replace the front frills to the new AR tuner seems deceptively simple on the outside, as can be observed from the front view.

Frankly, we think AR may have gone a little too far in what seems to be a "cut the frills to the bone" styling of their electronic products. The flat gold-anodized front panel has a simple unframed rectangular cutout for the dial scale area which also includes a stereo indicator light and a center-of-channel tuning meter. Three - two-position rocker switches located below this area serve as MONO/StereO, MUTED ON/OFF and power on/off switches. To the right of the long, narrow dial scale opening is a tuning knob, coupled to an effective flywheel—and that's it.

While we are certainly against needless frills and useless controls and gadgets, the AR front panel seems so devoid of latter day component styling that we are frankly concerned that the prospective buyer, accustomed to external elegance, may pass by this fine-performing tuner. We could be wrong, of course. Many, many components can remain a competitor in their class even if the manufacturer of that then "upstart" company must have "cried all the way to the bank."

The rear panel is made of black plastic and contains a screw-terminal input Muntronics, a group of four output jacks (two can be fed directly to your amplifier, the other pair might be connected directly to a tape recorder input), all of which are well insulated to floor vibrations and is of the ne plus, not at all. Signal to noise ratio measured 41 dB unweighted, or with the standard "A" weighting, 56 dB, using the CBS BR-150 broadcast test material which also supplied the 3000-Hz signal for the wow and flutter measurements. Arm resonance was measured at just under 10 Hz, and the change cycle required only 10 seconds from the completion of the last groove on one record to the setdown on the outer grooves of the record. Thus the Garrard Zero-100 is certainly in a long line of automatic turntables which have been around for over 50 years. And as usual, each new model contains improvements which are less apparent than the new features brought in by the manufacturer.

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Fig. 2—The plexiglas arm-mounting structure accommodates the anti-skating magnets and the laren for power supply. The sliding weight under the arm moves 1 in. for a change of 1 gram in stylus force. The counterweight is brass.

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Acoustic Research FM Tuner
Making the report of the specifications

IHF Sensitivity: 0.20 microvolts or better. S/N Ratio: 65 dB. Distortion: Less than 0.5% FM or THD. Mono or Stereo: Drift: 50 ±5% of the indicated drift frequency Range: ±0.01 Hz from 100 KHz to 15 KHz ± 3 dB. Mono or Stereo: Capture Ratio: 20 dB or less. Selectivity: 55 dB or more. Image Reaction: Better than 10 dB act. Jitter: Better than 0.001% AM Suppression: 55 dB or better. Stereo FM Separation: 40 dB minimum. Total harmonic is changed by the the rear of the head and provides practically perfect tangency throughout the entire record. This part is pivoted on the rear of the head and provides practically perfect tangency throughout the entire record.
illuminated between stations, when interstation noise is present and the mute control defeated. Center-of-channel indication on the tuning meter was precise and corresponded exactly to best audible reception (and measured reception, as well). With the mute control on, stations below a threshold of 5 microvolts are blocked, and this is somewhat of a pity, for there were stations which were received with less than 5 microvolts of signal strength which, nevertheless, provided sufficient quieting for comfortable listening but would not come through with the mute control in the active position. While this speaks very well for the sensitivity of the tuner, we rather wish that a tuner in this price class had provided a customer muting threshold adjustment so that one might have quiet stations and weaker station reception at the same time.

As for station statistics, this time pulled them in—58 usable signals in our metropolitan New York suburban location, with 38 of them in stereo. We do see an outdoor, multi-element rotatable antenna in all our tests, however. There was no evidence of adjacent channel interference nor could we encounter any conditions akin to overload distortion. Interestingly, with the mute control active, the number of stations received was reduced to 47, which means that 17 of the previously acceptably received stations were coming in at signal strength of less than five microvolts.

While we may differ with AR's styling philosophy, we certainly can't dispute the fact that they have come up with a tuner that does just about everything a good FM tuner should do, and if $210.00 is about what you've set aside for the FM tuner portion of your separate components system, you would do well to audition this new entry from Acoustic Research. If nothing else, it confirms the old saw about "not judging a book by its

MANUFACTURER'S SPECIFICATIONS

Range: 80 to 168 dB in 5 ranges. Accuracy: 0.5 dB

Frequency Response:

SPL and one can understand why it is able to quantitatively evaluate the nature of noise because of the instrument's limited range and high sensitivity. If you do that chore, first save lots of money and then get yourself one of the Scott, General Radio, B&K or H.P. Packard units made for that purpose.

In testing the Realistic meter, we used pink noise and music as sources and compared readings with a calibrated General Radio type 1565A sound level meter. The Realistic fell well within its specified accuracy and stayed within 2 dB of the G.R.'s C-scale throughout the range.

In one case it was more difficult to read than the G.R. and its ballistics were not as positive as the taut band meter move-, however, we are not too particular about the kind of equipment bearing our name. Shouldn't this kind 'insured performance' be built into your audio facilities, or any of your customers, if you build them out?

For further details, including full technical specifications, and a list of microphone accessories available for the PD 421, please write or call.

Check No. 50 on Reader Service Card

SENNHEISER electronic CORPORATION (N.Y.)
500 Fifth Avenue, New York, N.Y. 10036 • (212) 739-4433
PLANT: BIESENDORF / HANNOVER, WEST GERMANY

ADDENDA

Tuners and Receivers Directory

H. H. Scott, Inc. informs us that we were inadvertently supplied with incorrect prices for two models. 342-C should have been priced at $269.95, not $289.95; the electronics was pretty good but reduced in price from $499.50 to $399.50.

Sony Corp. notes that the current price for the ST-6035 receiver is $299.50. The electronics was pretty good but reduced in price from $499.50 to $399.50.

www.americanradiohistory.com
Country music comes to the City

Don Allott

ut since the din of rock 'n roll first jarred the senses back in the mid-fifties has any style of music captivated so many people as country music has now.

And today, country music is appreciated by persons in all walks of life throughout all of the United States and the world. There are, for example, currently three network TV shows featuring country artists; approximately 600 local radio stations devoting all or a major part of their programming to country; and the number of live country shows around the nation is steadily growing. (In Philadelphia, for example, attendance at the four-or-five times a year Country Shindig featuring folk artists or to country artists, has more than tripled in the past five years since its inception.)

But it is in the sale of phonograph records and tapes by country singers that the growing popularity of C & W, as it is known, is most evident. One well informed source in the music business estimates that a billion-and-a-half dollars worth of country records were sold in 1970. Of them, there have always been records by country singers. The first that really sold was Vernon Dahill's "I'm Your Huckleberry". Of the hundreds more country singers and songs were also more widely heard in the fifties, they're now remembered as performers of primeval rock and not the fine country singers they are. Shown in the example, attendance at the four-or-five times a year Country Shindig featuring folk artists or to country artists, has more than tripled in the past five years since its inception.)

Two they picked up were Atlanta's WSB, the first to feature country back in 1920, and Nashville's WSM. One of WSM's programs started in 1922 and is still broadcast today nearly a half century later. The Grand Ole Opry, which has four shows weekly, and one is broadcast and heard in part of each of the 50 states. To fans, the Opry is somewhat of an institution, and many of them travel as far as 500 miles to attend; to performers, it is their tremendous feeling, a substitute for professional vocal shortcomings, sing more like the Johnny Cash, and get really close to, try country. It is an example of a full time country station which otherwise just played

good music," but was a novelty among other city stations. When they went country in 1967, WRCP began to reach that segment of country music fans in Philadelphia who'd previously had to listen to out-of-town stations. As the station grew, they've now been joined by performers of primeval rock and not the fine country singers they are. Shown in the example, attendance at the four-or-five times a year Country Shindig featuring folk artists or to country artists, has more than tripled in the past five years since its inception.)

Still another reason why country music now more accepted in big cities is the change in the music itself. People don't call it "hillbilly" so much now because even while retaining its pure country flavor, most of it has been reflected so that people everywhere can appreciate and enjoy it.

Probably the major contributor to this urbanization of country music was Eddy Arnold. They still call him the Tennessee Ploughboy, but for more than two decades, he's been the image, like Yankee Slade and Texas Joe, for baseball players, the met for opera singer.

The Opry is an example of why radio has been called the lifeblood of country music. In Radio is where fans first hear the records they may later buy and where the careers of performers are fed by exposure to others who don't buy.

Station WRCP in Philadelphia is a prime example of a full time country station in a metropolitan city. It shows what country music can do to revitalize a station which otherwise just played

fifties was just that: noise. And while rock 'n roll was stamped over the good and the musical in music, it both

hurt and was helped by country.

Rock sure country in the minds of many who grew up in the midst of the baby boom, rock and country were both

simply pop music before being split into separate camps. The tunes produced under the loose association were known as rockabilly and gave many people a new introduction to country and left a bad taste. At the same time, country helped perpetuate the monster by lending it the man who was its standard bearer. Many people don't realize that Elvis Presley was first and in a sense was a country singer. (Of course in the meantime, Elvis has made several millions of dollars and probably couldn't care less)

Other country singers who were first introduced to large numbers of persons via rock vehicles include Jerry Lee Lewis, the Everly Brothers, and Johnny Cash. Because of their rock popularity in the fifties, they've now been realized as performers of primeval rock and not the fine country singers they are. Shown in the example, attendance at the four-or-five times a year Country Shindig featuring folk artists or to country artists, has more than tripled in the past five years since its inception.)

Today, of course, there are Johnny Cash and Glen Campbell. Both have weekly network TV shows; both are country singers who were also more widely appreciated in the fifties, they're now remembered as performers of primeval rock and not the fine country singers they are. Shown in the example, attendance at the four-or-five times a year Country Shindig featuring folk artists or to country artists, has more than tripled in the past five years since its inception.)

Introductory Country Music Discography

Eddy Arnold
Chet Atkins
Hank Snow
Bobbi Bare
Johnny Cash
Mere Haggard
David Houston
Leonce leaps
Elvis Presley
Chet Atkins
Jim Reeves
Marty Robbins
Stasky Batten
Porter Wagoner
Dolly Parton
Tammy Wynette

Portrait of my Woman
By Special Request
LSP-379
LSP-4254

RC A Vic.

Mercury SR-6136
Col. -KC-3000
Capital ST-658

Solomon Gour

Wonders of the Wife
Coal Miner's Daughter
Elvis County
From Me to You
You've Sincerely
El Paso
Red of Roses
A Kind of Music
Great Covers

Epic BN-26468
$149.95 kit
$249.95 assembled

The Dynaco tuner you have been waiting for...
It does everything a little bit better.

$150 for a
$600 TUNER?

The Dynaco tuner you have been waiting for...
It does everything a little bit better.

$150 for a
$600 TUNER?

The Dynaco tuner you have been waiting for...
It does everything a little bit better.

$150 for a
$600 TUNER?

The Dynaco tuner you have been waiting for...
The Philadelphia Goes to Town
Mandelsohn: Elijah. Marsh, Verrett, Lewis, Krause, Singing City Chorus, Columbus Boy Choir, Philadelphia Orm., RBCA LSC 6190 (3 discs) stereo ($17.94).

Since its return to RCA, the Phila­delphiala­delphiala­delphiala­delphiala­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphia­delphi
Certainly enjoy this particular arrangement, just for the fun of it, on the spot. But instead, I am in a roomful of recitalists. So I didn't. I don't like the jolting shift from contemporary music by Jesse Ehrlich to Vivaldi-Varga (Varga did the arrangement.)

That's my view of this particular recording, and for what my view is worth. If you are a cellist, of course, there's no argument at all; go out and get it.

Performances: B Sound: B


Asst. soloist, Chamber Ens. of Darmsattdt; Southwest German Radio Orch, Baden-Baden. Karl-Erik Weih, organ. Helidor Presents Wergo 25384 003, stereo. $4.95.

Heave above! H - - - below! Lord Almighty! It would be impossible to know what real avant-garde is like, just try this.

You know, I've always figured that a true revolutionary, like Edgar Varie or John Cage, must have enormous imagination—because he has to think up new ideas and most people just don't know how, even if they want to. They just put down the old things and try some new ones, without any imagination.

But if you can't think of anything better to say, (The answer is, of course, "Nothing." If he had been doing anything, the question wouldn't have been asked.) So here, my friend, is the ultimate. So far.

Just take (for "Adventures") three singers and a conventional instrument, soprano, alto, baritone and chamber ensemble. Then write some-thing NEW. Now, consider this: How new? What I'm not trying to say— you should get this disc for yourself and try it on a party of friends, preferably talking, full of cocktails and highball, with "music" will just be one of the little things you do. (Because you can think of something better to say. The answer is, of course, "Nothing." If he had been doing anything, the question wouldn't have been asked.) So here, my friend, is the ultimate. So far.

By the way, you're shopping discounts because you want the most system for your money. Our systems offer what you want. They are rated in the high compliance speaker category, providing you with the highest quality of sound.

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We put a little more feature into each feature.

A Plast hysteris synchronous motor with roller rotor for unvarying speed accuracy. b Precise stylus overhang adjustment with built-in gauge—no shifting, no questwork, no template. c Silicone-damped cueing in both automatic and manual play. d And those exclusive light touch pushbuttons to make it easy to enjoy all those other wonderful 501 features $175.00


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You're shopping for savings because you want the most system for your money. Our systems offer what you want. They are rated in the high compliance speaker category, providing you with the highest quality of sound.

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**Svetlanov. Melodiya/Angel SR**


**Brahms: Piano Concerti Nos. 1 and 2. Tchaikovsky: Piano Concerto No. 1.**

**Koussevitzky: Concerto for Double Bass (1902). Gary Karr; Oslo Philhar...**


**Koussevitzky's Concerto for Double Bass (1902).**


**The Guitar and I. My Early Years in Grenada and Cordoba. Plus Exercises for Developing Technique and 12 Studies by Coste, Sor and Giuliani. Segovia Decca DL 710179, stereo. ($5.98).**

**Let Me Touch You. The Bob Crew Generation. CGC 1000, stereo. ($5.98).**

**Electronic Music from Razor Blades to Moog. Produced & composed by J. D. Roberts. Asch AHS 3438, stereo. ($5.98).**

**The tune of this is too much old-staff competition music?**

**Henry Lewis.**

**This is a nice idea—old-fashioned Russian band music—more like Strauss than Sousa, very mild mostly.**

**Bad planning—all waltzes on one side, marches on the other—gets monotonic. They could have mixed them up. Big arena sound both sides. Waltzes come off best.**

**Three quartets, two slow, two fast.**

**The well played but routine set of smooth pop arrangements has a special aspect—it is cut for the Electro-Voice Stereo-4 Decoding system. Also some others on this label. Increasingly there are discs via other quadraphonic code-decode systems on various recordings. Cassette tape and 8-track cartridge numbers as well as LP record numbers given.**

**SCHWANN ARTIST ISSUE—Currently available classical records listed by performing artist; orchestras, quartets, instrumental soloists, etc. 320 pages. Issued twice a year.**

**The monthly Schwan...**
Weingarten
Looks At...

franklin
mathis
et al.

MINNESOTA, a show biz wit once said, should be delivered only by Western Union. But voice's shining light in the field of children's programming. "Sesame Street," proves that the joke is not only funny but true.

THE YEAR OF ROOSEVELT
Franklin (C-35037), a Columbia recording that spotlights many of the characters from the show, direct its messages to folk—but a lot of adults should listen too, if only to be reminded of the values and lessons about which the show speaks.

For instance, the idea of not giving up is the central theme of "If You're a Fool to Give Up," which explains why an individual shouldn't hurt other persons but must put his own happiness aside for the greater good. This is also a lesson that is taught in the show by such characters as The Count, who encourages children to share their toys and to help others.

The album also contains several tracks that are geared towards adults, such as "We've Only Just Begun," which features a cover of The Carpenters' hit song. It is a gentle yet meaningful ballad that speaks to the Universal soul of all humanity.

In summary, "The Year of Roosevelt" is a wonderful album that not only entertains but also educates. It is a timeless piece of work that will continue to inspire and uplift for generations to come.
Sound: "Southern Rider" takes on a sophisticated, Southern flavor in this Columbia release, and leads off at a fast canter, resembling the almost any music he plays. His sound, extended ending.

Expositions, as a kind of trademark to one guitar and rhythm section. Each instrument takes a solo, and runs. Each instrument takes a solo, and runs. Each instrument takes a solo, and runs. Each instrument takes a solo, and runs.

But a thing

"Pavanne,""Wave,""What Blues""

Dear Sir:

While atypical

Oscar Brown Jr.,

Dear Editor...

Proprietors of the loudspeaker membrane. The loudspeaker diaphragm is larger than that of the microphone membrane.

While atypical

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