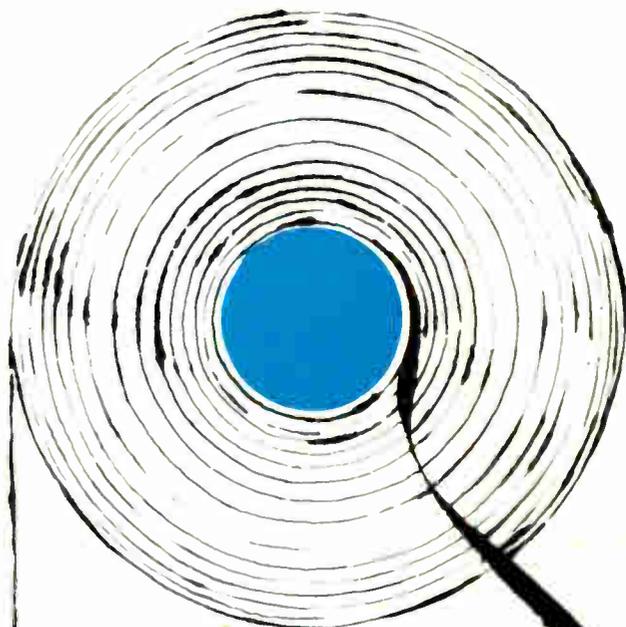




THE MAGAZINE
FOR THE
HI-FI ENTHUSIAST

AF-08
WM HARRIS
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JUNE 1966 Vol. 2 No. 6 FIFTY CENTS



**THE
NEW
TAPE CARTRIDGE
PLAYERS**

see page 6

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AF-08

Space-age Scott FET design improves AM as dramatically as it does FM



New Scott 382 Receiver lets you hear more stations, more clearly! 65-watts/Space-age FET circuits* in both AM and FM/Only \$339⁹⁵

Scott engineers are constantly on the search for new developments to continually improve a near-perfect product.

After experiencing the miraculous improvements FET's brought to FM, Scott engineers applied amazing new FET circuitry to Wide-Range AM. The result — the new 382 AM/FM stereo receiver — incorporating, for the first time anywhere, a Field Effect Transistor AM circuit along with Scott's astonishing FET FM front end. Introduction of this new model marks the first real improvement in AM circuitry design in more than a decade.

AM Comes of Age

Recent improvements in AM broadcasting equipment, plus the Federal Communication Commission's decision to split AM and FM programming, have given audiophiles renewed interest in superior AM reception. Introduction of the new 382 now brings Scott FET sound to the exciting news, sports, current events and music broadcasts available only on the AM band.

Scott AM Has Advanced FET Circuits

Advanced Scott 382 circuitry incorporates Automatic Variable Bandwidth, a unique feature which automatically adjusts tuner bandwidth to the quality of the incoming signal. The bandwidth automatically narrows for best reception of weak, distant stations, blocking out noise and interference. When tuned to stronger stations, the bandwidth automatically broadens, providing full frequency wide-range reception. In addition, the new Scott Automatic Gain Control circuit, which increases tuner sensitivity when incoming signal decreases, also increases resistance to cross modulation as the signal gets stronger.

Field Effect Transistor FM Lets You Hear More Stations, More Clearly

The 382 utilizes revolutionary new Field Effect Transistor circuitry for maximum FM sensitivity with virtually no cross modulation, no drift, no more problems caused by changing tube characteristics. Scott led the industry in being first to use this important advance in solid-state design.

Scott's all silicon IF strip provides three stages of true IF amplification for strong as well as weak signals plus three additional stages of IF limiting action, giving optimum selectivity and stereo separation.

Direct-Coupled Silicon Output Amplifier Section

Output and driver transformers, major causes of diminished power and distortion, are eliminated from Scott's radically new direct-coupled solid-state amplifier design . . . allowing more power over a wider frequency range, with virtually no distortion.

The 382 includes these popular features found in the most expensive Scott components: Tape Monitor switching. Speaker switching with provision for remote speaker selection, switched front panel stereo headphone output, front panel stereo balance switch, separate-channel clutched bass, treble, and volume controls, fully automatic stereo switching with indicator, and precision tuning meter.

382 Specifications: Usable sensitivity, 2.5 μ v; Harmonic distortion, 0.8%; Drift, 0.02%; Frequency response, 18-25,000 cps \pm 1 db; Music Power rating per channel (4 ohms), 32½ watts; Cross Modulation Rejection, 85 db; Stereo separation, 35 db; Capture ratio, 6.0 db; Selectivity, 40 db. Price \$339.95.

* Patent Pending

Scott . . . where innovation is a tradition



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EDITORIAL

*the
background
music
merry-go-
round*

The question, "May the general public receive FM's SCA multiplex transmissions of private background music for personal enjoyment without violating a law?" goes 'round and 'round without a clear-cut answer.

The Federal Communications Commission (FCC) says they do not wish to comment further because a civil action brought by an FM station against certain commercial organizations in California is pending. (A decision favorable to the FM station has since been awarded, but the FCC is still as quiet as a hush.) Besides, says the FCC, investigation of complaints on such violation and its enforcement falls within the jurisdiction of the Department of Justice . . . Talk about passing the buck!

And what does the Department of Justice have to say about all this, especially on the question of the legality of private construction and use of an SCA multiplex receiver which AUDIOFAN directed to the Department. SEE A LAWYER! they say, because the D of J is restricted by statute to rendering legal advice to executive departments and agencies of the federal government.

But this is where we started. First with private lawyers, who advised us to contact the FCC, who suggested we direct the inquiry to the Department of Justice, who tell us to see a private lawyer. Getting dizzy?

All this is disquieting because there is no harm or, more to the point, siphoning off of revenue, if an individual merely listens to private background music in the confines of his home.

It's little enough for FM broadcasters to give up in return for the barrel of money they're making through SCA services in restaurants, plants, and other commercial areas, all the while compromising main channel quality of FM stereo.

If airwaves aren't free for receiving broadcasts for non-commercial purposes, we might even find ourselves with "underground" SCA receivers. Wouldn't that be a shame?

Let's hear *your* views on the subject.

THE EDITORS

Up- grade your sound !

Whatever your receiver or amplifier is capable of doing, EMI loudspeakers have a unique way of making it sound better.

Perhaps it's the ease with which EMI loudspeakers project sound. So smooth and natural, it seems to float on the air in all its concert hall glory. Filling the room.

Or perhaps, it's the deep bass, the incomparable realistic midrange and the full, silky highs.

Or it could be the subtle detailing of their transient perfect response that catches you unawares.

So, for better sound from your receiver or amplifier, come on up to EMI loudspeakers.

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Letters

Send your audio questions, problems, comments and suggestions to the

Editor,
AUDIOFAN
25 West 45th St.
New York, N.Y. 10036

construction project problem

DEAR AUDIOFAN:

Ok! Who is nuts? Have just spent one week-end trying to put together the construction project that appeared in your April issue. It was the *Audio Neon Lamp Power Indicator*. On Saturday morning I purchased \$10.00 worth of parts and put the thing together in about an hour—but that is when the trouble started. It did not work. I took it apart, tested all of the components, they all tested great, I put the dam thing together again—nothing! I had my neighbor look at it and he ok'd the work; he tested everything on his test equipment. Still the thing does not work. Which brings me to the question, did the writer leave part of the schematic on his desk before or rather after he submitted it to the Editor for publishing?

In looking at the photo of the back panel view, his layout is different from the schematic which appears just below the picture, or am I nuts. Please advise.

G. M. Viscola
San Diego, Calif.

Don't believe anyone is "nuts" on this one. Fact is, the audio neon lamp power indicator works very well. There's nothing wrong with the schematic or wiring diagram. But, as you noticed, the photo is a bit different from the diagram. We used a center-tapped transformer (generally used for push-pull output circuits) instead of the component suggested in the parts list and drawn in illustrations simply because it was available to us. The third lead coming from the transformer's high impedance primary winding is not used, however, though it

appears in the photo. Suggest you double-check your wiring, put a hot iron on connections to make sure you haven't any cold solder joints. Be sure, also, that you didn't reverse wiring of the transformer. The low resistance side of the transformer goes to the speaker terminals, while the high resistance side is connected to the power indicator's parts.—Ed.

the spec mystery

DEAR AUDIOFAN:

Recently I purchased an Ampex 2070 tape recorder which is a very satisfactory and high quality machine. The reason I spent the extra \$100 on a 2070 instead of a 1070 was that the published frequency response specifications showed a 3 db tolerance for the 2070, while the 1070 showed a 4 db tolerance; 49 db S/N ratio compared to 46 db S/N ratio; 0.12% flutter instead of 0.15% flutter, etc. The discouraging thing is that the service manual shows that, except for the automatic reverse feature, the circuitry, heads and speakers are identical for both machines. Please clear up the mystery.

Robin Mackay
Palos Verdes Peninsula, Calif.

The specifications you read are minimum specs. The 2070 uses critically selected components, we're told, which assures that all 2000 models reach specs listed; the v000 series, while still using high quality components, doesn't maintain the tight parts tolerance of the 2000 series, so guaranteed minimum specs are somewhat poorer. (Note the word minimum. Specs can be better than listed, of course.) Add the automatic reverse feature and there's your extra money.—Ed.

bubble, glub, bubble

DEAR AUDIOFAN:

Got a gas out of an article which appeared in an older issue of AUDIOFAN, "How To Get Underwater Music." I do hope I have time very soon to do a tape on this idea; it intrigues me.

Gordon Myers
Columbia, So. Carolina

Scott's best solid-state components! Build them yourself and save \$160

Now you can enjoy the world's most advanced solid-state engineering, and save up to \$160, when you build these Scott solid-state kits. Scott kits give you the same features, performance, quality, and long-lived reliability you've come to expect from their factory-wired counterparts . . . the only difference is, you build them.

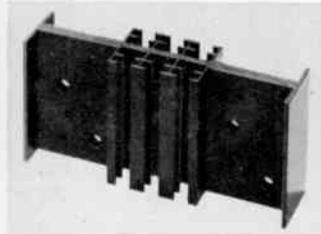
And building them is easy . . . Scott's exclusive kit construc-

tion book with full-size, full-color step-by-step diagrams reduces the possibility of wiring error . . . cuts construction time to a minimum. All critical circuits are pre-wired, pre-tested, and mounted on heavy-duty printed circuit boards at the Scott factory. All wires are color-coded, pre-cut and pre-stripped to the proper length. Here is a preview of the exclusive Scott features you'll find in your Scott Kit Pak:

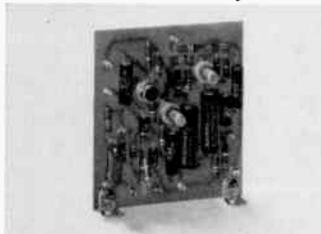
Power-Packed LK-60 120-Watt Stereo Amplifier Kit



Rugged silicon output transistors give full audio frequency performance at high power . . . drive even the most inefficient speakers.



Massive military-type heat sinks keep output transistors running cool . . . assure top performance under high power output conditions.

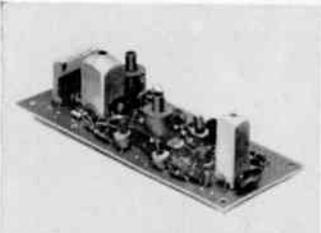


Rugged pre-wired, pre-tested printed circuit boards greatly reduce the possibility of error . . . stand up under years of strenuous use.



Exclusive Circuit Monitor allows you to set output stage bias and balance for absolutely minimum distortion, without external test equipment.

Ultra-sensitive LT-112 FM Stereo Tuner Kit



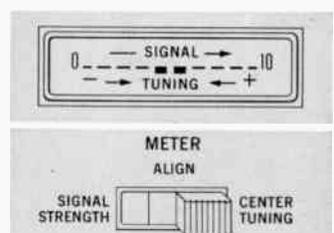
Patented Scott Time-Switching multiplex circuitry insures lowest distortion and best stereo separation. Multiplex section is pre-wired and pre-tested.



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Exclusive "Three-Way" front panel tuning meter serves as a signal-strength indicator, zero-center indicator, or highly accurate alignment meter.

Specifications LK-60: Music Power/Channel @ 4 ohms, 60/60; Frequency Response, 15-30,000 cps \pm 1 db; Power Bandwidth, 20-20,000 cps. Price, \$189.95.
Specifications LT-112: Usable Sensitivity (IHF), 2.2 μ v; Selectivity, 4.0 db; Cross Modulation Rejection, 80 db; Price, \$179.95.

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This is the Lab 80. Add up the galaxy of innovations which Garrard has developed and engineered into it...including built-in cueing... variable anti-skating compensation... ultra-sensitive magnetic tripping... and you will begin to visualize why this superbly performing automatic has revolutionized the turntable industry.



Dynamically balanced, counterweight-adjusted tone arm, built of Afrormosia wood for light weight, low resonance.

Full 12" anti-magnetic turntable—heavy and dynamically balanced for perfect speed. Anti-static mat.

Anti-skating control—with patented foolproof sliding weight design—does not use springs. The natural side pressure on the stylus which frequently causes distortion and rapid record wear is eliminated.

Calibrated stylus pressure gauge with precision 1/4 gram click adjustments for accurate audible/visible settings.

Two spindles—one for manual play, the other for automatic operation. Convenient short spindle interchanges with revolutionary center drop spindle, which handles 8 records fully automatically when desired. Exclusive... spindles remove for safety and convenience when taking records off the turntable.

Built-in cueing control eliminates all danger of accidental damage to records or stylus through manual handling. A great operating feature and a tremendous convenience which permits selecting any band of the record with complete safety.

Low mass cut-away shell—with extended finger lift—compatible with the most advanced cartridge designs.

Exclusive super-sensitive magnetic trip, with Dupont Delrin® to offset friction... performs perfectly with highest compliance pickups at correct minimal tracking force.

Silent Laboratory Series® 4-pole shaded motor with vibration-proof total isolation suspension.

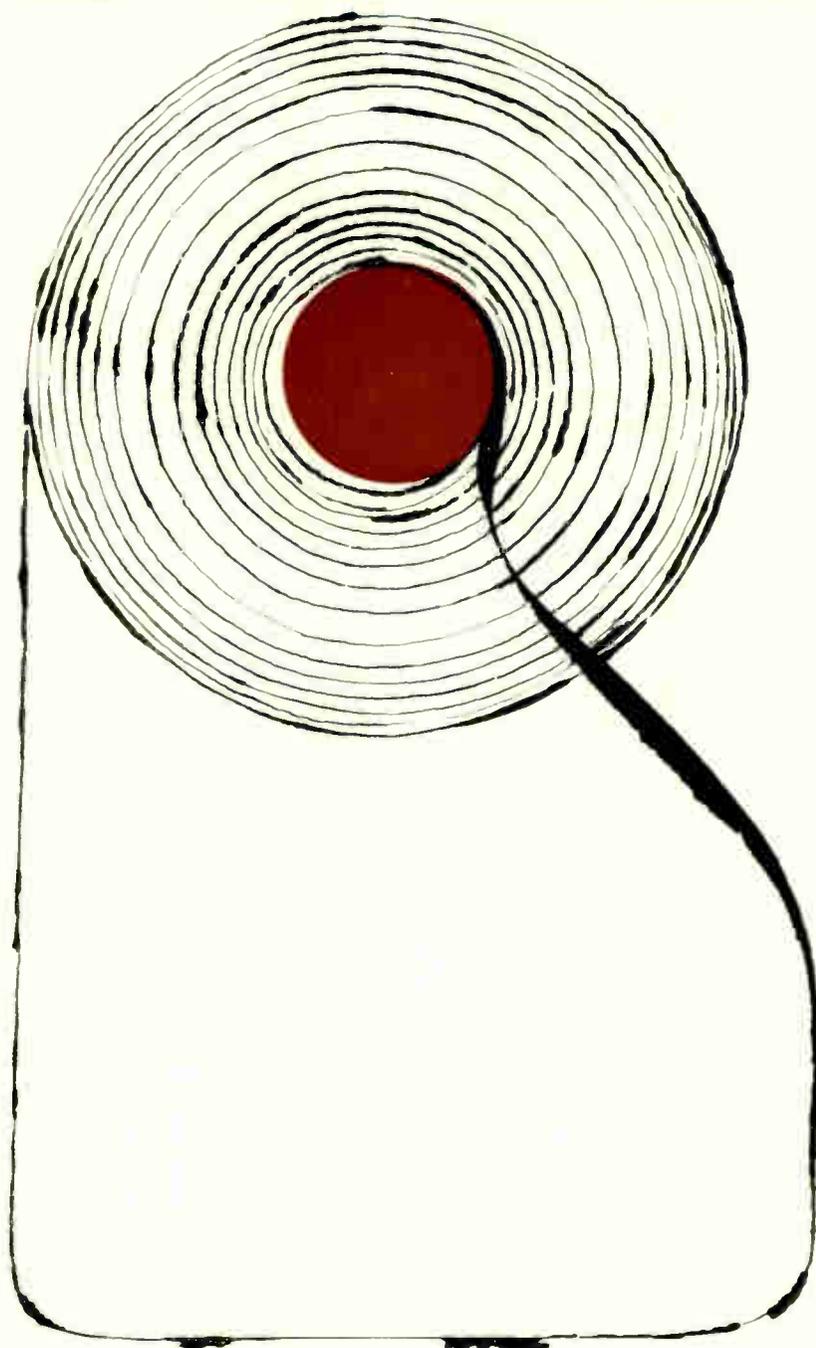
Important reading: 32-page Comparator Guide detailing all Garrard models. Write for complimentary copy to Garrard, Dept. GP-2896, Westbury New York 11591.

Only Garrard could have created the Lab 80. Only Garrard could have produced it to sell for \$99.50. This results from more than 50 years of leadership, supported by the great advantages of substantial international volume, vast manufacturing facilities, and truly exceptional engineering resources.



Garrard
WORLD'S FINEST

THE NEW TAPE CARTRIDGE PLAYERS



three continuous loop tape systems, supported by large pre-recorded music libraries, compete for mass market acceptance

 Continuous loop tape cartridges burst upon the audio scene last year with considerable fanfare. The Ford Company began an intensive advertising program which featured cartridge tape machines in its automobiles (reports say 40% of Thunderbirds sold thus far in '66 were equipped with the optional tape players), RCA Victor promoted cartridge tapes which featured popular artists and latest "hits."

Even before the "Big Boys" got into the act, however, cartridge tape players were moving along at a brisk pace, thanks largely to the promotional efforts of Earl "Madman" Muntz on the West Coast. So based on this success, it was clear that the potential for cartridge players and cartridge tapes was great.

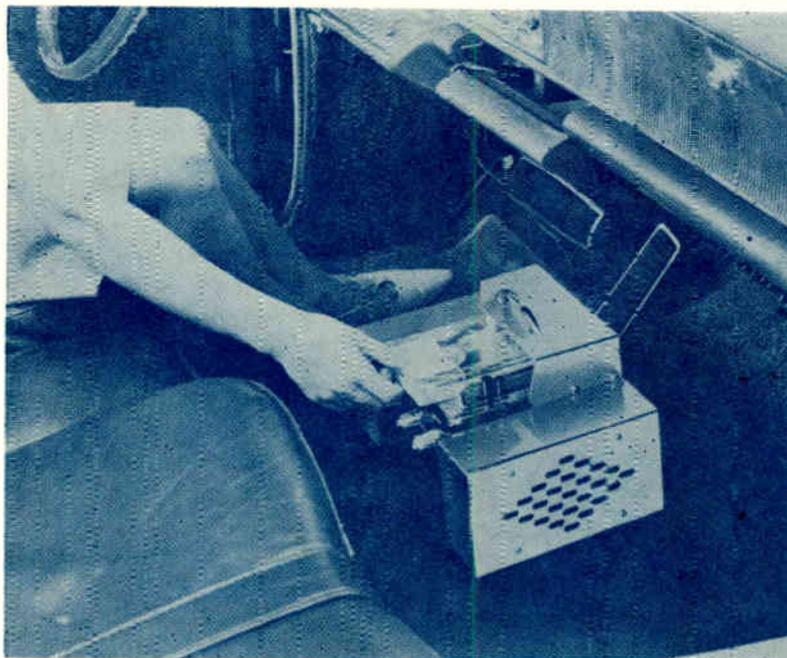
Before we continue further, let's be sure that we're all talking about the same cartridge tapes. The so-called auto cartridge tapes (a misnomer, really, because home cartridge players are available) are pre-recorded tapes which do away with separate supply reels and feed reels. Cartridge tapes employ a continuous loop system: magnetic tape feeds from the center of the reel, passes a tape head, and rewinds on the outside winding of the same reel.

Advantages of such a system are immediately apparent. In one swoop, you eliminate fumbling with tape ends to rethread it on a spool. Encased in a small, flat plastic package, the cartridge tape is therefore easy to handle. Consequently, you don't have to take your eyes off the road if you're driving a car to insert a cartridge tape into a player once you've accustomed yourself to the distance from your position to the player.

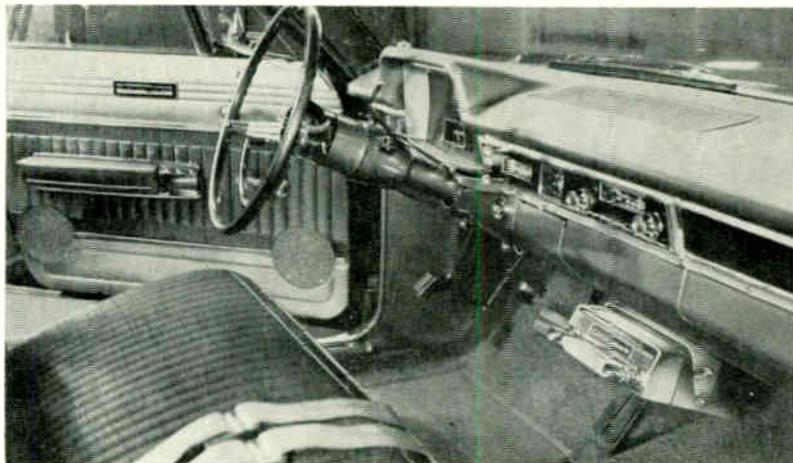
There are three types of cartridge tape systems currently available to confuse the issue: (1) The "Fidelipac" 4-track cartridge, which is the oldest type in terms of seniority; (2) The Lear-Jet 8-track cartridge, which, with RCA Victor's endorsement, started the mass-market cartridge tape ball rolling; (3) and the Orrtronics 8-track cartridge (which started life as a 4-track cartridge), which is not compatible with Lear-Jet's 8-track unit due to major differences in the way the tape travels and the tape heads are situated.

There seems no doubt that the Lear Jet Stereo 8 system is exhibiting the biggest potential for rapid growth of any product on the audio market today. Once General Motors announced that their Delco Division would go into the manu-

SBJ's 4-track tape cartridge player-speakers can straddle an auto's drive-shaft hump



A 4-speaker door installation is shown with a Lear Jet 8-track stereo tape player.



Orrtronics' 8-track player system is pictured here with a set of speakers.



facture of Lear-type players, the remaining major recording companies tumbled over each other to get on the stereo bandwagon. Thus, Lear Jet has got a corner on prestige. But not on playback units, the makers of Fidelipac-type equipment are quick to point out. The estimate of 600,000 4-track stereo players presently installed in American cars has frequently appeared in print. This surely means that a market will continue in prerecorded Fidelipac cartridges for some time no matter how well the Lear Jet system does.

Does all this remind you of the LP-45 rpm of situation yesteryear? Unless there's a shake-out, where all systems but one fall by the wayside, you might have to select one system and, as a result, be limited to recorded titles which can be played on that system. On the other hand, there is considerable talk about development of compatible cartridge tape players. That is, one cartridge player would be able to play any cartridge tape, just as many record turntables can play disks designed to play at 33 $\frac{1}{3}$ rpm, 45 rpm, 16 rpm or 78 rpm. One company, Livingston Audio Products, has already announced it has developed a fully compatible cartridge tape player.

The possibility of compatibility works in favor of the Lear Jet player and the Fidelipac cartridge, as against the opposite combination. Since 4-track heads would pick up two tracks per channel in playing 8-track tapes, the use of Lear cartridges in Fidelipac-type players would make a switch to an 8-track head a minimum requirement.

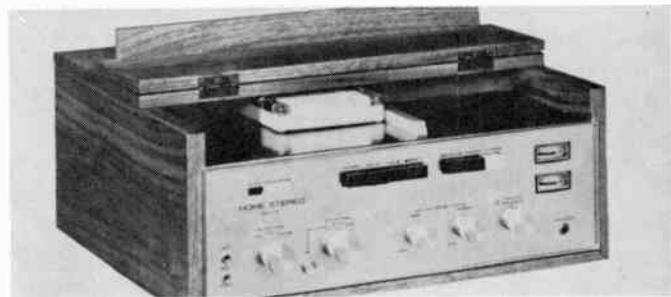
The other basic difference between the two systems—the presence of the pinch roller inside each Lear cartridge—presents no major difficulty as designers see the problem. A spring-loaded pinch roller could easily be constructed to pop up into a Fidelipac cartridge but stay down, out of the way below a Lear cartridge.

At least one feature of cartridge tapes is standardized: speed; they all use 3- $\frac{3}{4}$ inches-per-second. (The 1 $\frac{1}{8}$ ips, 2-track Dutch-developed Philips cartridge is a dark-horse challenger, however, now used by Norelco, 3M and Mercury.)

There's a bewildering choice of tape players available for auto use right now, with the number of in-home models growing by leaps and bounds.

But even here the tape players are not of the flip-a-coin/take-your-choice variety. There are systems that change tracks automatically, others which require some manual maneuver—depress a switch button, turn a knob, etc. Further, there are cartridge tape systems that switch tracks electronically and ones that switch tracks mechanically. You can weigh some other considerations, too, such as do you want a channel balance control, ganged or individual volume and gain controls, etc.?

Don't think that cartridge tapes solve all the



CARTRIDGE PLAYERS FOR THE HOME

INSTALLATION OF AUTO SPEAKERS

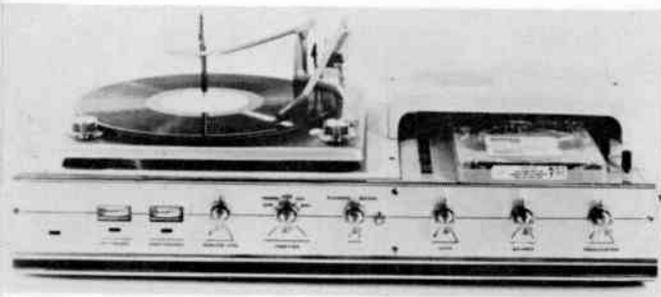
There are many ways in which to install loudspeakers to reproduce stereo music from cartridge tape players. You might use your existing auto radio speaker and an extension rear speaker; you could mount two speakers in a convenient location against the auto's front kick panels. The best location for stereo sound and the one that doesn't take up auto space, rip stockings, etc., is flushing-mounting the speakers in door panels.

Most cartridge tape players come with speaker installation instructions (drawings from Lear Jet's manual appear here). Before cutting upholstery to install speakers (4 ohm impedance types will do fine), be sure there's enough clearance for speakers between outer door panels and inner door panels. Also, mount speakers as low as possible to avoid window mechanism. Typical installation steps are as follows:

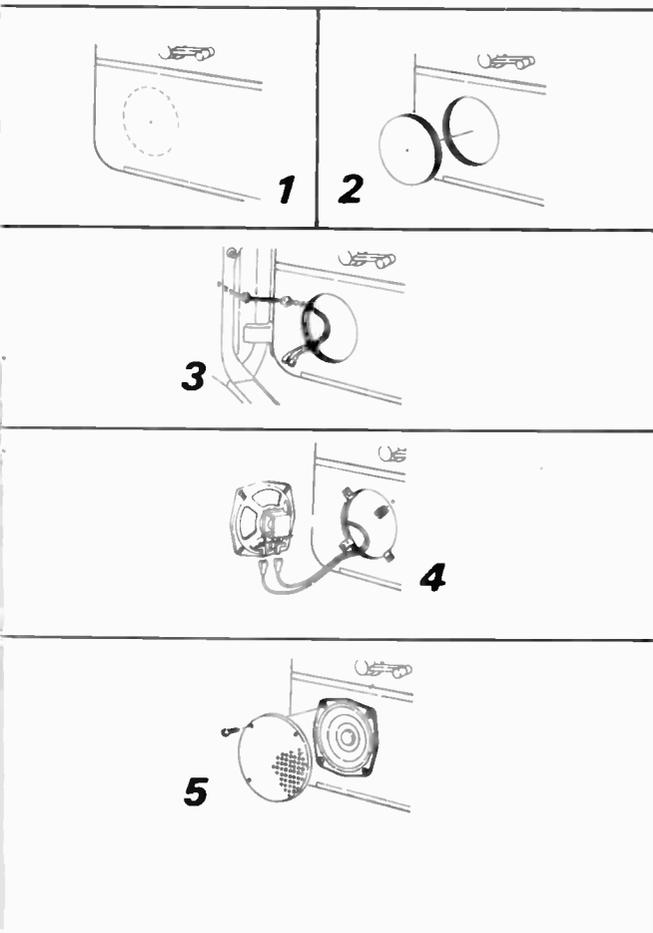
1. Layout center hole of the speaker's cone diameter using a sharp punch. With the hole as a guide, draw speaker cone circumference outline on the upholstery with a sharp pencil.
2. Cut away top layer of upholstery with a sharp knife. Cut through circular outline with a hole saw of the correct dimensions, using the center hole as a guide. You'll probably be cutting through fibre and metal.
3. Drill small hole through the door and opposite it on the car frame, as shown. File any burrs. Remove the kick panel to allow wires to be led under the dashboard.
4. Place speaker against large hole in the door, cone facing outward, and, with speaker mounting holes as guides, mark mounting hole locations with a punch or awl. Drill through the fibre and metal if you're using small mounting bolts and nuts. Drilling is unnecessary if you use Tinnerman nuts, as shown here. Attach speaker wires to speakers, as shown, observing any color code instructions given.
5. After placing speakers in door panels, place grille over speakers and mount the assembly to doors. (Grille panels should be made of metal to protect speaker cones from inadvertent kicks by auto passengers.)



There's no shortage of tape cartridge players for in-the-home, 110 volts AC use, as you can see here. The Roberts 8-track (Lear Jet cartridge) player at left was introduced last month at the L.A. Hi-Fi Show. Below it is Craig's very jazzy looking 4-track tape cartridge, replete with controls and flexible switching.



Muntz' 4-track tape cartridge/record player machine features stereo recording functions. At right is Viking's 4-track Stereomate 500 for home or office. It matches the company's 12 volt Auto-tape 500 for mobile use.



minor inconveniences that accompany reel-to-reel recorders. They don't by a long shot.

For example, most of the players are just that—players, not recorders. Though you can choose which track you'd like to play easily enough, you cannot choose a specific section of the tape because there are no fast forward or reverse provisions. Should you wish to repeat a particularly satisfying recorded section, you'll just have to play the whole track through until the selection is reached again. This might mean a 20 minute wait.

With 8-track cartridge tape systems shifting tracks four times, you might find breaks right in the middle of a symphony movement occurring too frequently.

Tending to blur the dividing line between the two front-running systems is the growing importance of the independent tape producers. Ampex particularly, carries the most impressive line of phono labels not presently making their own tapes. This catalog is now available to the Orrtronics cartridge system through Ampex dubbings. ITCC (International Tape Cartridge Corp.) also has a list of labels that includes many majors; some of this list is being made available in all three formats (Lear, Fidelipac, Orrtronics 8-track), although their Orrtronics list is smaller than are the other two.

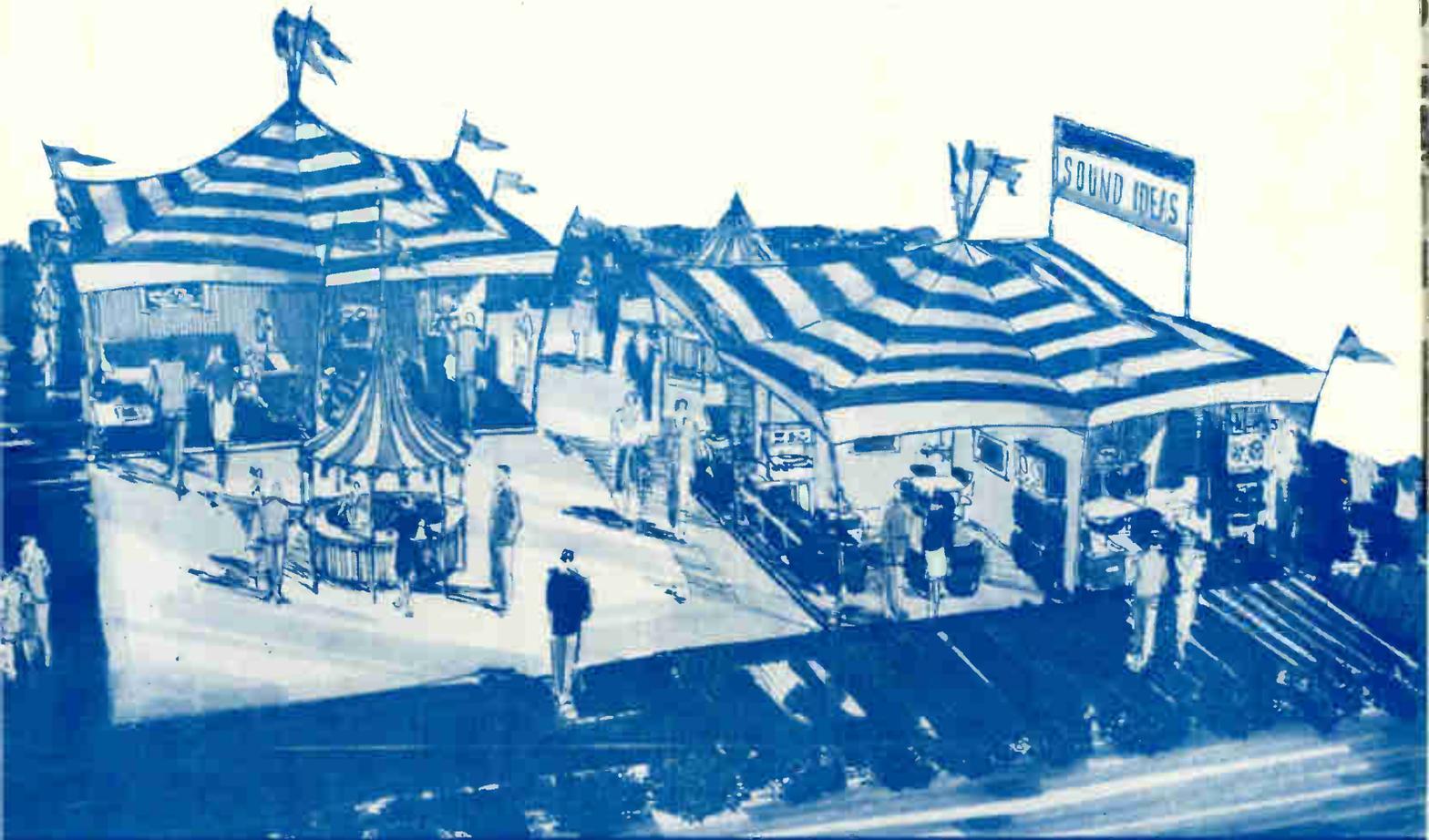
Producers of prerecorded tapes are, in general, tending to produce the same materials on both Lear and Fidelipac. Dubbings, Inc., who produce on a private label basis in both formats, hazzard a guess that their orders for Lear Stereo-8 may have overtaken 4-track dubs, although they hasten to add that the way in which orders are received makes a definitive answer impossible.

Home units are coming out from several sources. SJB introduced theirs at the New York Hi-Fi Show last year. Muntz is showing several, from one similar to his auto unit up to a console with record player and record capability. Craig's line, which is made by Pioneer, also includes a tabletop unit with record. Viking has had a home unit for some time.

There is considerable difference of opinion in the trade about the meaning of these features. Some sources feel the cartridge playback quality is too limited for home units to offer much of an extra dimension to cartridge owners. Others call cartridges a natural for the teenage trade and the "second set" market. Similarly, objections to the record capability revolve around the fact that quality of the recording is more difficult to control when the tape is already wound inside the cartridge than it is in a commercial operation, where the tape is put into the cartridge only after it is recorded. Tape lubrication and non-flaking characteristics become highly important factors in cartridges.

As a result of the above and other drawbacks, cartridge tapes are not expected to supplant reel-to-reel tapes, but, rather, supplement them.

Decorating With Hi Fi Music Equipment





Hi-fi components were once the interior decorator's bane. The instruments were bulky and unattractive.

This is no longer true, thanks to solid-state circuits that have shrunk size and reduced heat emission. Some kudos are due to industrial designers, too, for taking advantage of these changes and designing equipment to be seen as well as heard.

More than any other music playing equipment, components can be integrated into a room to meet a person's tastes. The IHF-sponsored California hi-fi music shows proved this by featuring component systems installed in home atmospheres. The decorator rooms, some of which are shown here, were topped by striped tents, Arabesque fashion (outdoors at the Los Angeles Hi-Fi Show; indoors at the San Francisco Show).

Component equipment is shown to harmonize tastefully with a variety of decors, from traditional to "Camp." Hi-fi systems can be placed in any area of a home, too: living rooms, dens, bedrooms, patios, as well as in an office.

At left, you can see a modern den with components lined gracefully on low-hanging shelves. Above is a den or enclosed patio with components located in a cabinet with a drop-front, speakers enclosed in the wall. In the center photo, you see a "Camp" style room, with Pop Art taking over. Hi-fi equipment is situated on a desk and shelves. Below, hi-fi equipment is built into a credenza, hidden out of sight unless doors are opened.





At top is a garden office in a contemporary decor. All the executive need do is reach behind him to play or adjust his hi-fi system. Components share shelf space with books.



A contemporary living room with a component system built into a wall closet with a sliding door provides a neat, attractive decor solution where furniture or shelf space is limited. Speaker systems incidentally, are enclosed in the wall behind two fabric pictures.



And here's a bedroom set up for hi-fi sound. A tuner-amplifier unit is built into a night table at the side of the bed, while speaker systems are built into the armoires against the wall. Armoire doors needn't be opened for best speaker performance if you choose the right material or open grillwork.

Note how well hi-fi components are blended with the overall decor in the room pictured below. Two groups of "sound towers" accommodate hi-fi components, a portable TV set, and records and tapes. Modular units rotate a bit to give best sound, best sight and maximum convenience, whichever the situation calls for.





1 You, your family and friends can have real fun playing audio games. We don't mean the "Guess what frequency this is?" exercise that generally bores the life out of people who don't know a bass note from an ultra-high frequency one . . . and couldn't care less.

We refer here to sonic games that do not depend upon participants having serious audio learnings. Therefore, you'll find it easy to share your hobby with others. All it takes is a tape recorder.

If you were lucky enough to receive a premium record, a 1962 Christmas LP produced by N.Y.'s Gotham Recording Corp., you won't even need a recorder. It's an ideal record for audio games. Side 2 of this record consists of a series of games and puzzles which may be used as musical aptitude and IQ teasers.

Not having this record (and you can't buy it, so don't run to a record dealer), you could use its basic approach to audio fun and games by developing your own tape recorded version of it. The disc features five games:

(1) Musical pitch differentiation. This is a continuous set of two tones that's played with a slight

pause between each set. Listeners have to guess whether the second tone in each set is higher, lower or the same in frequency as the first tone. You'll need an audio signal generator to record this one.

(2) Identifying songs played backwards. This is a silly one, but fun nevertheless. Familiar songs are played in reverse. The songs sound weird played in this manner, but it is possible to hit a few titles on the nose. Tunes are played the proper way afterwards so you can identify them easily. But, you won't be able to duplicate this game satisfactorily unless you have a professional tape machine.

(3) Voices of famous people. This is an interesting audio teaser. Speech excerpts by famous people who are not necessarily popular for their voices or speeches challenge the wits of listeners. Some hints are given before each famous person's voice is played. For example, one clue was: "A prominent Southerner" (turned out to be Huey Long). Another was: "A famous teacher" (Albert Einstein). Among some of the other voices recorded on Gotham Recording's record were Al Smith's, John L.

Lewis', and Mahatma Gandhi's. You can build up a collection of voices of famous people over a period of time. News format TV programs often include films and voices of famous people in the past, for example. You might even begin to record voices of elder statesmen, and others well on in years, so that many years from now you'll have your own personal library of famous peoples' voices.

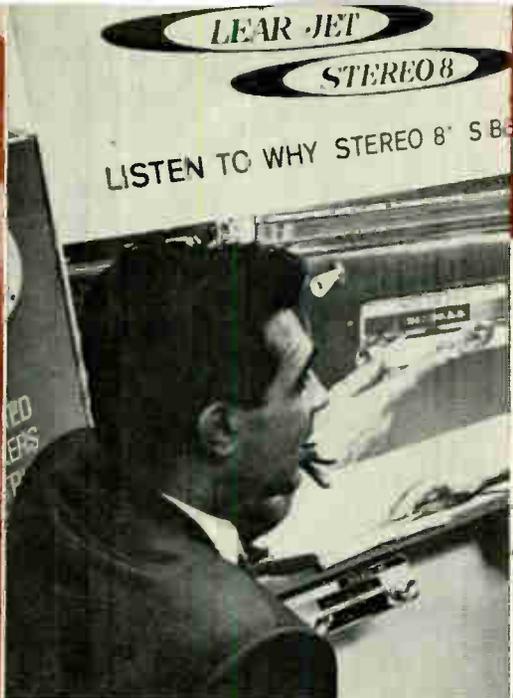
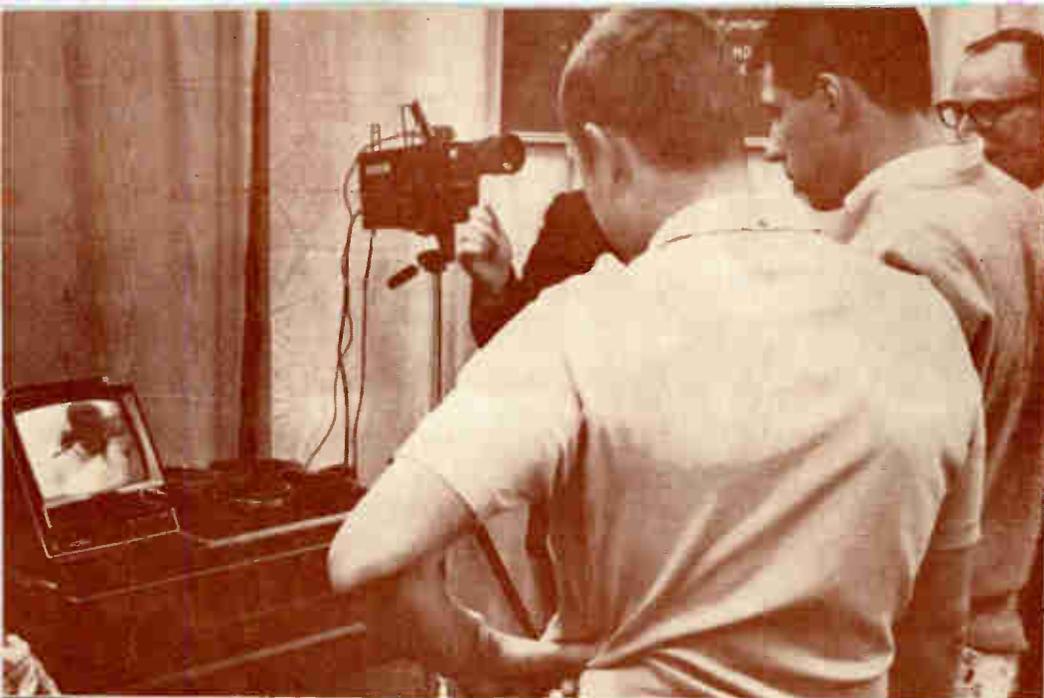
(4) Famous incidents in history recreated. We found this audio game to be the most entertaining of the group. Cameos of historic events are presented by a group of audio clues. For example, one teaser has a small bell ringing, followed by crackling sounds, followed by the bell clanging and siren of fire engines and the whoosh of jet streams of water. What do all these clues add up to? Why, the Chicago Fire, of course, which is said to have started when Mrs. O'Leary's cow knocked over a lantern.

The second audio teaser features the sound of footsteps climbing flights of steps, a door opening, the wind blowing, and a whistling sound to simulate falling of an object from a height. The answer to this one is the Leaning Tower of Pisa experiment by Galileo.

Another aural challenge is the sound of a wheezy airplane engine starting and, after it operates smoother, the sound of wind and thunder superimposed over it. This is followed by the music of the Marseilles, with crowds yelling and screaming. Obviously, Lindbergh's historic flight across the Atlantic to Paris, France is the answer.

(5) The last game consists of a string of tunes played by an orchestra, without pause. The challenge here is to count the number of different compositions, name the titles and composers. You can devise a point system for each correct answer.

So there you have a few ideas on material you can use to put together your very own audio game tape. No doubt you can think of other sonic clues that will make good puzzles to fascinate friends with.



Top to bottom: Camera-Mike-Action! at Sony's HVTR exhibit. Local installer mounted miniaturized, dummy "theatre" speakers atop Altec Lansing PA units. Shure's no-speaker record playing system (uses headphones) and Viking's headset-connected tape recorders attracted young and old. Kenwood's Bill Kesuga answers lovely hi-fier's questions.

The San Francisco Hi Fi Show

 In true circus fashion, hi-fi show exhibitors folded their tents and packed their entertainment gear for the northward trek to San Francisco, where the San Francisco Show Committee molded a new show for their city's people.

The tents, which house decorator rooms with components, were set up indoors at the Civic Auditorium in San Francisco, whereas Los Angeles had 'em pitched outdoors. Perhaps it was a bit less Arabesque indoors, but no one had to worry about rain spoiling it all.

Hi-fi equipment displayed at



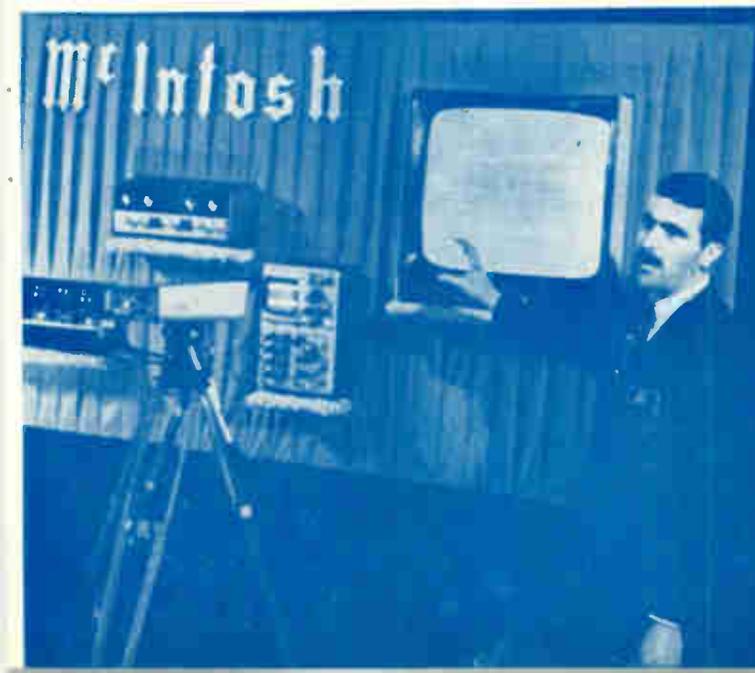


the show was essentially the same as shown in Los Angeles, but, of course, all the newest music playing components were located in a different show environment, with different people attending, in a city radically different than Los Angeles. The local flavor of the show included a hi-fi audio dealer broadcasting his regular Saturday FM radio program from the show and local FM stations doing the same, not to mention appearances by candidates for the title of Miss San Francisco.

Some highlights of the show are pictured here. A detailed review of products and more photos will be shown next month.

Top to bottom:
Auto tape cartridges pull in viewers.

H. H. Scott's "Field Effect" balloons lend gala air to the show. Headphone listening is a most enjoyable sensation, judging from the gleeful expressions of visitors to Koss-Rek-O-Kut room. Simultaneous scope displays of live music vs. amplified signals fascinate onlookers in the Mac room.



HOW TO CHOOSE A LOUDSPEAKER SYSTEM



It's more difficult to evaluate the performance of a loudspeaker system than of any other component in the high fidelity chain. Complicating matters is the fact that loudspeakers are not truly the last links in the chain. It's really the first link in the mechanical end, with the room becoming an acoustic circuit of sorts.

Even so, there are few accepted standards around to relate a speaker's performance to users. What should be known about a speaker system? Characteristics should, ideally, include: frequency response, efficiency, directivity, distortion, transient response, and acoustic power.

Even with all this information at hand, the final test would still have to be a listening examination due to so many intangibles, such as personal taste and environment.

An interesting rating proposal was made a few years ago by Lincoln Walsh in a paper presented to the Electronic Industries Association. The author presented a loudspeaker quality rating concept that, in three ratings, would give a clear idea of a speaker's capabilities. The ratings were Gamut, Power, and Fidelity Index.

Gamut, it was suggested, would be rated in octaves. For example, 10 octaves (20 to 20,000 Hz), 3.3 octaves (30 to 3,00 Hz), etc. Acoustic power output capacity would be expressed in milliwatts, say, 20 acoustic milliwatts. A fidelity index would be a number which takes into consideration all the measurable factors in a speaker's performance. A perfect speaker would earn a rating of 10; a fair speaker might get a 7 rating,

etc. To arrive at this rating, each characteristic would have to be divided into specific ranges, each with a point rating.

There's a whole lot to consider when buying loudspeakers, including speaker types. Direct radiator speakers are more popular than horn types. With a direct radiator's "open air" mountings the cone is acting directly on the air, whereas in the hornloaded, the front of the speaker faces into the small end or "throat" of a hornshaped structure.

The horn has the great advantage that it, in effect, "holds" the air tightly against the cone, so that the energy of the vibrating cone is much more efficiently transferred to the air. In a horn speaker, generally speaking, you get much more sound out for the same amount of electrical power going in. You can use a smaller amplifier, or run your amplifier at a lower level, which generally (not always) means lower distortion. In addition, the speaker itself has to work less, thereby minimizing design problems.

There are some offsetting facts about horns, however. A horn has a tone character of its own. Depending on how fast the horn enlarges as you travel along its length, it has a "cut-off" in the bass, a frequency below which very little sound emerges from the horn. The horn that enlarges slowly, with a slow "flare rate,"

has a lower cut-off than one with a fast rate. Then, the mouth or big end of the horn has to be at least a certain size to avoid peaks and resonances in its range, and this size goes up as the frequency goes down. To give you an idea of the scale, a horn to go smoothly down to 40 cps should be at least 5 feet across the mouth.

The combination of big mouth and slow enlargement makes a horn for the low-low bass a very bulky object. It must be long to get from the small throat to big mouth. Horns for the middle frequencies are naturally much smaller, and "horn tweeters," for the top third or so of the frequency spectrum, are very small indeed.

A most important fact about a cone speaker, particularly if it is going to be used for the low bass, is its "fundamental resonance." The cone and voice coil have a certain weight; they move in an elastic suspension. So we have a weight on a spring. At some frequency, determined by the amount of the weight and the stiffness of the spring, the cone will have a "natural period," so that it takes off in a large vibration with little push applied. In other words, it has a marked peak in its response at the resonance frequency.

A peak is always bad in any sound-reproducing unit. It upsets the frequency balance, makes

few standardized specs make speaker system buying a challenging adventure

Listen & Learn Tapes

If you own a tape recorder, and so many of our readers do, you can take advantage of records and tapes that teach you a second language. Ampex' Stereo Tape Library, for example has Spanish, German, Russian, French, Italian, Modern Greek, and its latest addition, English for Spanish-speaking people. The courses, prepared by the Institute for Language Studies, contains 40 lessons on two 7" reels of tape and a hard-bound instruction book-dictionary. With a 4-track stereo tape recorder and a sound-on-sound facility, you can record your own voice speaking a foreign language and compare your accent to the instructor's on another track. Courses are priced at \$9.95.

showing an especially strong magnet, is 10,000 gauss and up.

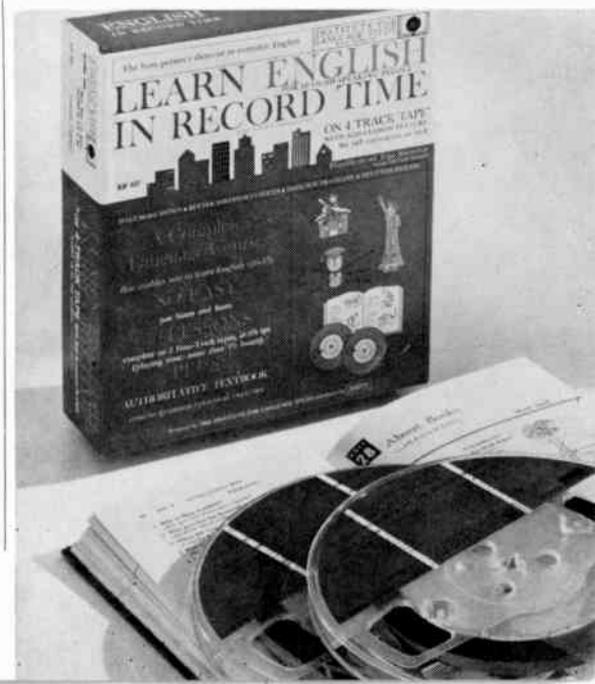
A factor in a speaker that you will often be called on to admire is some special arrangement of the cone to reduce "break-up." This action, which exists more or less in all cone speakers, is the tendency of the cone not to move all in one piece, but to bend and flap, particularly at the high frequencies. The cone is being pushed by the voice coil at one point, where the coil is attached to it. The thin paper cone is held around its rim by the flexible "surround," near the outer edge of the speaker. Naturally when the voice coil vibrates very fast, it is hard for the whole cone to follow it exactly—it would rather bend a little. What happens is that instead of the whole cone moving straight back and forth as one piece—which the engineers call "piston action"—waves of vibration travel through the material of the cone in complex patterns.

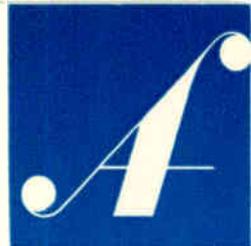
More or less distortion results from break-up. Many schemes have been used to reduce it. Horn tweeters can be designed for very low break-up. Some speakers have their cones divided into definite segments so that you get a controlled break-up: each segment tends to vibrate as a piston. Other speakers use the fact that the voice coil, at the very highest frequencies, tends to vibrate by itself, not moving much of the cone. On such speakers a small dome of metal, or a small extra cone, is added to strengthen the highs. The trouble with these schemes: (1) It is hard to make a small metal dome that does not itself break up at very high frequencies, and the sound of break-up in thin metal is particularly nasty; (2) Small extra cones that stick out from the voice coil may cause interference between the highs they produce and those of the main cone.

No doubt, the most important consideration in choosing loudspeakers is how it sounds to you in your listening environment. This requires a reasonably trained "ear," and a dealer who is willing to work with you on a brief home trial basis.

"transients" sound wrong and gives a false coloration to the tone quality. In a loudspeaker, it has the additional significance that, below the fundamental resonance, the speaker performs very poorly. The response falls off fast, and if strong energy at frequencies below the resonance is applied, the speaker produces a lot of distortion. For these reasons, a good rule to follow is: try to get a speaker with a resonance below the lowest frequency you plan to reproduce. In typical speakers, the resonance will be in the range from 25 Hz, for the biggest, heaviest woofer, up to about 100 Hz, with some small 6 or 8 inch speakers.

A strong magnetic field is vital to high quality performance. This is one of the most important ways in which an expensive speaker can be better than a cheap one. A big magnet costs money. The strong magnet makes the speaker put out more sound for the same electrical power; it makes the speaker "truer" in the low bass. In effect, it holds the cone more tightly to the ups and downs of the electrical power coming from the amplifier, so that it duplicates closely the signal variations. Magnetic strength is often specified in descriptions of speakers as so many "gauss" of magnetic flux in the gap. A medium flux is 5,000 to 10,000 gauss, and a high flux,





Despite the multitude of signal input facilities supplied on most stereo preamp-amplifiers, many people find that their growing music systems soon use up these facilities, filling every input jack

in sight.

For example, you may have a pair of inputs for your magnetic cartridge to which you have connected the audio leads of your manual turntable's pickup. After

a while you may decide that it would be nice to have an automatic turntable as well, for those occasions when you don't want to jump up to change a record after
(Continued on page 20)

HOW TO MAKE A PRINTED CIRCUIT BOARD

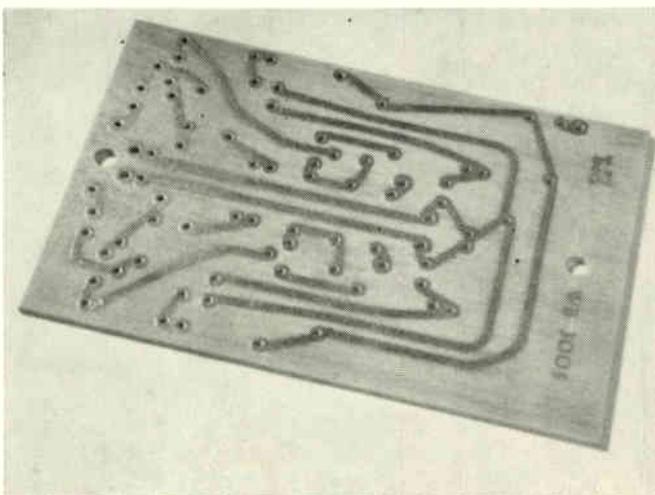
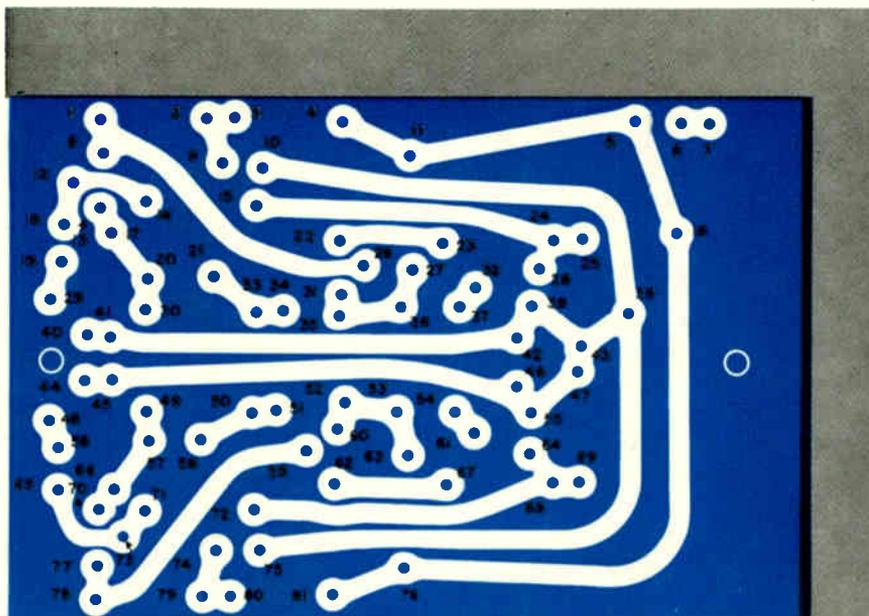


Fig. 1, above, is a full-size printed circuit pattern to be followed in laying out a printed circuit board for June's AUDIOFAN construction project. Holes are numbered for insertion of parts. (See assembly guide on page 19.) The pattern is viewed from the copper side of the board. The etched board, ready for insertion of parts, is shown in Fig. 2, at left.

Most electronic parts jobbers carry the necessary materials for making small printed circuit boards. For this project you will need the following:

1. A piece of bakelite, at least 4-1/8" x 2-3/4", with copper surface laminated to one side of it.

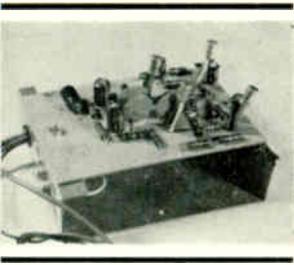
2. A roll of self-adhesive printed circuit tape, 1/16" wide.

3. A package of 100 adhesive tape "circles," 1/8" in diameter, for establishing larger surfaces of copper where the component leads come through the PC board.

4. A bottle of printed circuit "etchant," a mild acid solution which attacks the exposed copper, etching it away from the insulating material to which it's been laminated.
5. A glass dish or tray large enough to accommodate the board and etchant during the etching process. (A photo developing tray is ideal for this purpose, if you have one.)
6. A hand drill, equipped with a drill bit of anywhere from .040"-.050" diameter.

A full-size reproduction of the patterns of copper lines (which will be used in place of conventional wire) required for this

CONSTRUCTION PROJECTS



BUILD A SOLID-STATE 3-WAY PREAMPLIFIER

printed circuit is shown in Fig. 1. You may cut it right out and use it as a template, or trace the pattern onto your own sheet of paper. Cut the laminated board to exact size (4-1/8" x 2-3/4") and secure your pattern to the copper side of the board by means of transparent adhesive tape around the edges.

Next, drill holes right through the pattern and board, wherever you see a numbered hole in the pattern. There are a total of 81 holes required in this project.

After drilling, remove the paper pattern from the board and apply tape circles and lines to the board, following the original pattern. Circles are applied over each hole first. The circles are then interconnected by lines of 1/16" adhesive tape in accordance with the pattern. A single-edge razor blade is handy for trimming and cutting the lines of tape at their terminating points. After the pattern has been laid down, burnish the circles and lines down well, using a ball-point pen tip, to make sure that all circles and lines adhere perfectly to the surface of the copper.

Pour the etchant into the etching dish and insert the board into the solution, copper side up, so that you can determine when

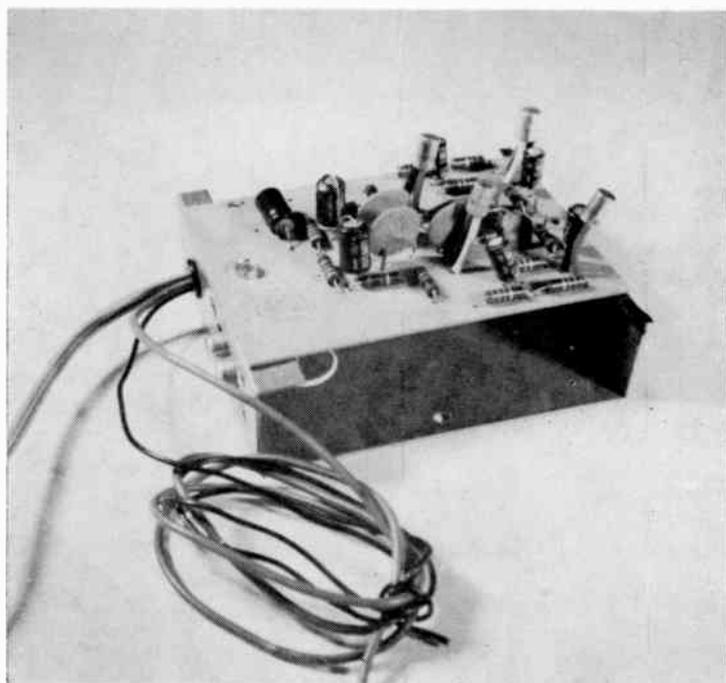
etching has been completed. Generally, etching will take place more quickly if the etchant solution is warmed slightly above room temperature. Gentle movement of the board back and forth in the solution also speeds up the etching process. (Though the etchant is quite mild, some people find that their skin may be allergic to this acid, so handle the board while in solution by means of a pair of tongs or long-nose pliers.)

After about ten minutes or so, the etching process should be just about finished. Check carefully to make sure that no thin film of copper remains on any exposed areas of the printed circuit board. Rinse the etched board for a full minute under clear water to remove all etchant. Blot the board dry and examine it under a strong light to make certain that not a trace of copper remains where it shouldn't be. If necessary, return the board to the etchant solution.

After final rinsing and drying, peel off the adhesive lines and circles and you should have a board that looks like the one in Fig. 2. This is the PC board you will use to build the 3-way preamplifier described in the construction section above and on pages 20 and 21.

PRINTED CIRCUIT BOARD ASSEMBLY GUIDE

FROM HOLE #	TO HOLE #	PART SYMBOL
.1	2	R2
3	4	R3
8	—	Q1—Collector
12	—	Q1—Base
13	—	Q1—Emitter
14	15	R7
9	10	C4
17	41	R5
20	21	C1
30	33	R1
34	35	C2
36	37	C3
11	27	R4
23	24	R6
25	43	R8
28	38	C6
16	19	C5
22	—	Q2—Emitter
26	—	Q2—Base
31	—	Q2—Collector
5	39	C13
29	—	Wire, to J1 center ("hot")
18	—	Wire to (—) volts. See text.
40	—	Wire to J1 shell "ground"
44	—	Wire to J2 shell "ground"
48	—	Wire to J2 center ("hot")
78	79	R9
80	81	R10
77	—	Q3—Collector
73	—	Q3—Base
70	—	Q3—Emitter
71	72	R14
74	75	C8
66	45	R12
57	58	C9
49	50	R16
51	52	C12
53	54	C10
63	76	R11
67	68	R13
47	69	R15
55	64	C11
56	65	C7
60	—	Q4—Emitter
59	—	Q4—Base
62	—	Q4—Collector
32	—	Wire (shielded) INNER to P1
61	—	Wire (shielded) INNER to P2 inner
42	—	Wire to (+) volts. See Text
46	—	NOT USED
6	—	NOT USED
7	—	NOT USED



PREAMPLIFIER PARTS LIST

PART NO.	DESCRIPTION
C1, C9	See Text
C2, C12	See Text
C3, C10	Capacitor, Ceramic Disc, .02 μ f, $\pm 10\%$, 200V
C4, C8	Capacitor, Electrolytic, 25 μ f, 15 volts
C6, C11	Capacitor, Electrolytic, 50 μ f, 6 volts
C5, C7	Capacitor, Electrolytic, 25 μ f, 6 volts
J1, J2	Jack, standard RCA Phono Tip type
Q1, Q2, Q3, Q4	Transistor, Amperex type 2N2429 (See text)
R1, R16	Resistor, 6.8K, $\frac{1}{2}$ Watt, $\pm 10\%$
R2, R9	Resistor, 2.7K, $\frac{1}{2}$ Watt, $\pm 10\%$
R3, R10	Resistor, 1.5K, $\frac{1}{2}$ Watt, $\pm 10\%$
R4, R11	Resistor, 10K, $\frac{1}{2}$ Watt, $\pm 10\%$
R5, R12, R6, R13	Resistor, 100 ohm, $\frac{1}{2}$ Watt, $\pm 10\%$
R7, R14	Resistor, 120 ohm, $\frac{1}{2}$ Watt, $\pm 10\%$
R8, R15	Resistor, 3.3K, $\frac{1}{2}$ Watt, $\pm 10\%$
P1, P2	Plug, standard phono tip, wired to lengths of audio shielded cable

Miscellaneous: Printed Circuit Board, 4-1/8" x 2-3/4", XXXP, laminated one side
 Chassis, mounting (if desired)
 Hook-up wire, solder, etc.
 Printed circuit preparation materials:
 See text.

Construction Projects

(Continued from page 18)

each side is played. Alas! *No more low-level, equalized' inputs.*

Perhaps you decided that it would be nice to "copy" some of your friend's pre-recorded tapes onto tapes of your own and, rather than purchase a second, complete tape recorder or tape deck including preamplifiers, you elect to buy a simple tape-transport mechanism for this purpose — *but your amplifier is not equipped with a properly equalized tape-head pair of stereo inputs!*

Finally, the talented member of the family may want to use the hi-fi stereo system as a sounding board for his or her instrumental or vocal prowess. *Hardly any home music reproducing system is equipped with a stereo pair of microphone inputs.*

A separate three-way, low-level, transistorized preamplifier can solve such problems in short order. Measuring only 4 $\frac{1}{2}$ " x 2 $\frac{3}{4}$ ", this four-transistor, printed circuit preamplifier can be added on to your present system as an outboard device suitable for use with a stereo magnetic cartridge, tape-playback heads of a tape transport, or a

pair of dynamic microphones having an impedance of anywhere from 10,000 ohms to 50,000 ohms.

At this point you must decide on the ultimate purpose of your preamp. A schematic diagram of both stereo channels of this circuit is shown here. Note that values for C1, C2, C9 and C12 have been omitted. These are the components which determine equalization for cartridge use, or non-equalized microphone use. A choice of values is on page 26.

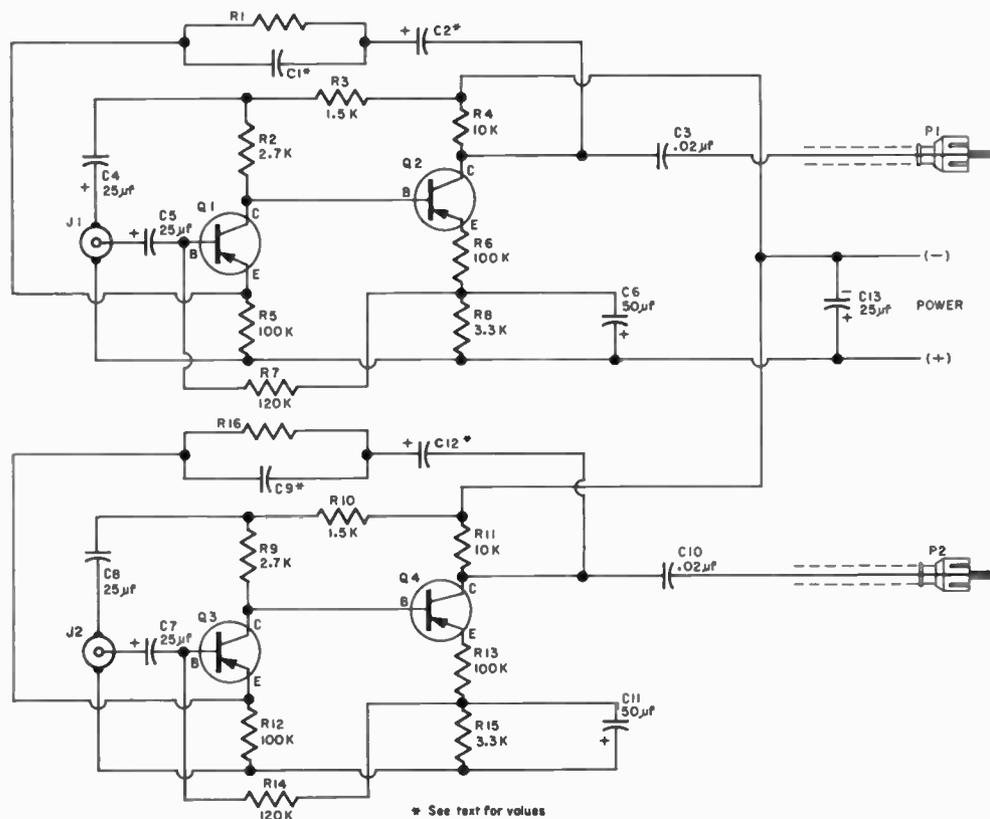
Instructions for making a printed circuit board for this project are given on pages 18 and 19. Most stereo hi-fi hobbyists tend to shy away from printed circuit construction projects. They imagine that such "exotic" techniques is best left to manufacturers. Actually, a printed circuit (PC) is often *easier* to work with than projects involving point-to-point wiring.

As most readers know, a printed circuit board is nothing more than a suitable piece of bakelite, formica or other insulating material, on which predetermined lines of copper are printed to substitute for hook-up wire normally used in conventional point-to-point chassis wiring. (Parts are mounted on the unlaminated side of the

board, while their leads extend to the opposite, copper laminated side.) At suitable points along these copper lines, small holes are drilled through the material into which wire leads of resistors, capacitors, and other components are inserted. Each component lead may be soldered to the adjacent copper circuitry surrounding its mounting holes. An alternate method is to attach all components to a board and then solder the entire assembly at once by dipping its underside into a "bath" of solder.

For home construction projects, the former method is recommended. A very small pencil-tip soldering iron should be used, however, because a heavy iron may actually burn a printed circuit board's copper lines or cause it to be lifted from its insulating base material.

In order to prevent errors which may be hard to trace later, install all parts in accordance with the component assembly guide on page 19, which references the numbered holes of the printed circuit pattern. Carefully solder each part into place, being certain the solder flows from the component lead to the copper "land" or circle, making a good



clean joint. As in all electronic wiring, use a good quality 60/40 rosin core solder. No external solder flux should be necessary. Snip off excess component leads *after* soldering each component.

The finished preamplifier is mounted onto a home-made metal chassis, as shown in photos here. Standard tip-jacks, schematic symbols J1 and J2, are used as inputs to the outboard preamplifier. Output plugs P1 and P2 are pin-tip plugs on the ends of short lengths of shielded audio cable. It is extremely important that these output cables have their ground shield connected only at the P1 and P2 shells and *not* to the printed circuit board.

powering the preamp

You will note in the table of connections that hole #18 references a wire to (-) volts, while hole #42 denotes a wire to (+) volts. No reference is made to the usual "chassis ground" for a very good reason. By "floating" the circuit in this manner, it can be powered from either a positive or a negative voltage, observing the following pointers.

If you plan to use the pre-

amplifier with other transistorized equipment, such as a preamp-amplifier, chances are the associated equipment has some well filtered negative voltage in its power supply distribution system. This can best be determined from a schematic of your equipment.

The voltage required for best operation of the newly constructed preamplifier is 15 volts DC, though satisfactory operation will result with voltages ranging from 12 to about 18 volts. If you are lucky enough to have a negative voltage of this magnitude, connect the wire from hole #18 to this voltage. The wire from hole #42 can then be connected

your amplifier to choose the proper mode of operation.

If you plan to use the preamplifier with a tube-type amplifier, there are two approaches possible for powering the preamplifier. If the cathode bias of the output tubes falls in the range between 12 and 18 volts DC, as it often does, you can use the point (fully bypassed to avoid AC signal currents) as an excellent voltage source to power your preamplifier.

However, this voltage is *positive*. In line with the PC preamp's circuit, therefore, the positive voltage should be connected to the wire from hole #42. The

Parts Values for Source Selection

	Mag. Cartridge	Tape Heads	Microphone
C1	.01 μ f, 10%	Omit	Omit
C2	.05 μ f, 10%	.05 μ f, 10%	1 μ f, 10V electrolytic
C9	.01 μ f, 10%	Omit	Omit
C12	.05 μ f, 10%	.05 μ f, 10%	1 μ f, 10V electrolytic

directly to "chassis ground" of your auxiliary chassis and the preamplifier is ready to work. Simply connect your cartridge (or tape heads, or microphone) to J1 and J2 and connect plugs P1 and P2 to an unused high-level auxiliary input of your amplifier. Use the selector switch of

wire from hole #18 should be connected to "chassis ground" of your associated equipment, since chassis ground in this case is the most negative point in the system.

In the event that no such low positive voltage is available from your amplifier, you will have to
(Continued on page 28)

ONE VOICE IS WORTH A HUNDRED LETTERS

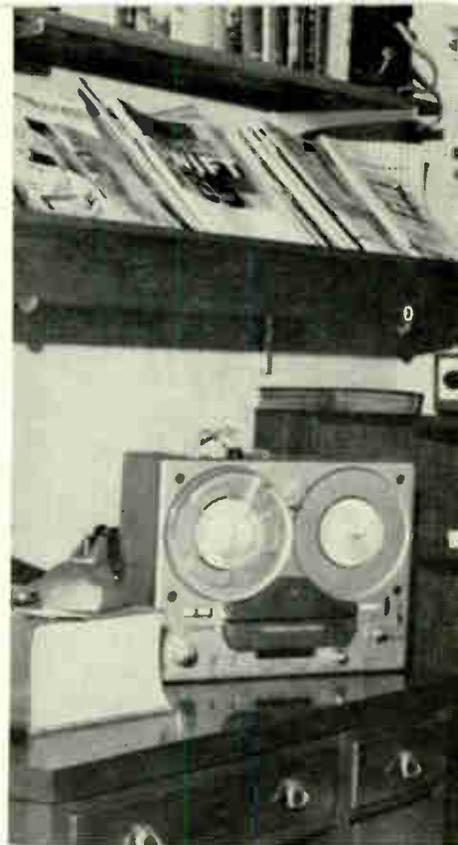
American servicemen in South Vietnam get a touch of home through tape correspondence. There are three United Service Organizations (USO) clubs set up with tape recording playback equipment and private tape rooms for this purpose. The tape program has proved to be highly popular for both exchanging recorded messages with folks and friends at home and for playing recordings to families from home.



GI takes a tape break in Danang, South Vietnam.

At right is a view of the tape recording room.

Below is some recently acquired tape recording equipment for Tan Son Nhut facilities.



 Retired U.S. Navy Department electronics man, George C. Fisher, has what he calls a "lazy man's hi-fi setup." Actually, it's a dual system that enables him to enjoy high fidelity music most anywhere in his Bar Harbor, Maine home should the urge come upon him.

One of his high fidelity systems is located in the basement on a home-made rack. Equipment includes a Sony 262D tape deck, Sony SRA-2 recording amplifier, Garrard Type A automatic turntable, an assortment of magnetic cartridges, Eico ST70 stereo amplifier, and an Electro-Voice 12-inch speaker.

The amplifier feeds stereo into two AR-3 speaker systems located in the living room. A center channel feeds the basement speaker (the 12" E-V), an 8" speaker in the dining room, and a duplicate speaker in the kitchen. Speakers in the kitchen and dining room are 8 ohms impedance types, connected in series; the basement speaker is 16 ohms. The combination is connected in parallel.

A variety of accessories makes life more pleasant for George Fisher. For example, he has an audio level meter which indicates the signal level being fed to his AR-3 speakers. An elapsed-time



meter shows the total time his amplifier has been in operation ("It now shows 1330 hours," says Fisher). And very much in line with his take-life-easy views, a Robins "Music Minder" switch shuts everything down after the last record has been played.

So much for the downstairs audio system. "If the 'old man' is too stiff to go to the basement," writes Fisher, "there's my 'easy chair' setup. Hi-fi equipment, mounted on brackets, is located in a den.

Equipment here consists of an AR turntable, Dyna PAS-3 pre-amp, Dyna stereo 70 power amplifier, Eico HFT-72 FM-AM tuner, and a Tandberg Model 64 tape recorder. This one is a "one room outfit," writes Fisher, feeding into a pair of Jensen speakers. The Dyna also has an elapsed time meter attached to it to let him know how many hours he has on tubes. The tape recorder is in constant use because he has weekly voice correspondence with children and grandchildren.

For complete sonic fill in the living room, he has an Electro-Voice Centurion IV speaker system. When this system is switched in, the dining room, kitchen and basement speakers are turned off.

PROFILE OF AN AUDIO FAN

hi-fi music is only a fingertip away in audiofan's home

Retired audiofan saves walking steps by having one hi-fi system in his den (top-left) another in his basement (top-right).

He gets stereo in his living room with bookshelf-type loudspeaker systems set at sides of a piano, while a large, floor-standing speaker system covers other areas in the room which require "sonic fill."

George Fisher's music library consists of 200 records, 31 pre-recorded tapes and 19 home-recorder music tapes. "Hobbies," our retired audiofan advises, "are hi-fi, photography (a complete darkroom setup), and loafing."



Share your hi-fi installation ideas with fellow audiofans. Send photographs (simple snapshots will do) and a few words—size of room, location problem, etc.—to AUDIOFAN Magazine, 25 W. 45th St., New York, N.Y. 10036

\$10 payment will be made for each installation used.



inquiring reporter

PLACE: 1966 LOS ANGELES AND SAN FRANCISCO HI-FI SHOWS.

QUESTIONS: (1) How do you like the show?
(2) Are you planning to have stereo tape in your auto?

CRAIG YORK (taller) & JEFF JONES
STUDENTS, 5 YEARS HI-FI INTEREST: IT'S A GOOD SHOW—PARTICULARLY THE EAR-



PHONES. I NEVER HEARD SEPARATION LIKE THAT BEFORE. I'D REALLY LIKE TO GET A PAIR. BUT I REALLY CAME BECAUSE OF A SCIENCE PROJECT I'M WORKING ON IN SCHOOL. I THOUGHT I MIGHT GET SOME INFORMATION FOR THAT. THE ANSWERS WE GOT WERE PRETTY GOOD. SOME OF THEM WERE ONLY PARTIAL ANSWERS, THOUGH. STEREO FOR THE CAR? BEAUTIFUL! WHEN I GET A CAR, THAT'S WHAT I WANT! I LIKE THE ROOM SETTINGS—PARTICULARLY THAT LIGHTING FIXTURE MADE OUT OF OLD BEER CANS. I'M GOING TO TRY TO MAKE SOMETHING LIKE THAT.

FRANK SCOTT

RESEARCH ENGINEER: THE THING THAT IMPRESSED ME THE MOST WAS THE BOZAK EXHIBIT. NOW I'M BEGINNING TO DO A LITTLE WISHFUL THINKING ABOUT THAT. MY IMMEDIATE PLANS ARE FOR A GOOD QUALITY TAPE RECORDER. NO, I DON'T CARE FOR ANY MUSIC IN MY CAR. I'M JUST INTERESTED IN THE SIG-ALERTS WHEN I'M ON THE FREEWAYS.

ROBERT HANNAH

FACILITIES ENGINEER: I CAME DOWN TO SEE THE MARANTZ DISPLAY. I WAS MOST IMPRESSED WITH THE SOLID STATE CONSOLE. I DIDN'T LIKE THE PREVIOUS ADJUSTMENT FEATURES, BUT THEY SEEM TO HAVE THAT LICKED NOW. THE NEXT THING THAT I INTEND TO GET IS A TV RECORDER. I'M GOING TO WAIT A WHILE THOUGH, UNTIL THE PRICES COME DOWN. I DON'T CARE FOR THE IDEA OF STEREO TAPE IN MY CAR. I CONCENTRATE ON DRIVING AND THAT WOULD BE A DISTRACTION.

HELEN MURPHY

U. S. CUSTOMS DEPT.: THE GREATEST IMPROVEMENT THIS YEAR IS THAT THEY ARE PLAYING MORE JAZZ. I DON'T DISLIKE CLASSICAL MUSIC AND I SUPPOSE THAT

IT MAKES A GOOD DISPLAY FOR THE EQUIPMENT, BUT I'M A JAZZ BUFF. THE DISPLAYS THAT IMPRESSED ME THE MOST WERE THE MARANTZ, WHARFEDALE AND SHURE. THE NEXT THING THAT I WILL ADD IS A TAPE DECK. NO, I'M NOT INTERESTED IN A TAPE CARTRIDGE FOR MY CAR.

R. L. DAVIS

CALIFORNIA DEPARTMENT OF MOTOR VEHICLES: I WAS MOST IMPRESSED BY THE NEW EQUIPMENT AND THE REFINEMENTS. I WANT TO UP-GRADE MY PRESENT EQUIPMENT, PRIMARILY BETTER SPEAKERS. THE SHOW HELPED ME MAKE UP MY MIND. I'M NOT PARTICULARLY IMPRESSED WITH STEREO TAPE FOR THE AUTOMOBILE. DON'T THINK THAT I WOULD BE INTERESTED IN IT FOR MYSELF.

JAMES SMITH

MECHANICAL ENGINEER: THE NEXT THING THAT I WILL DO FOR MYSELF IS ADD CABINETS FOR THE COMPONENTS I HAVE. I LIKE THE IDEA OF STEREO TAPE CARTRIDGES FOR THE CAR. I WILL PROBABLY GO FOR THAT AFTER MY CABINETS.

JOSEPH SETON

REACTION PHYSICIST, 5 YEARS HI-FI INTEREST: I GOT GOOD, SPECIFIC ANSWERS



TO MY QUESTIONS. WE FOUND THE ROOM SETTINGS INTERESTING, TOO. NO, THE IDEA OF PUTTING STEREO IN OUR CAR DOESN'T REALLY INTEREST US.

RICHARD DICKERSON (physician) and DIANE DU VAL

THIS IS THE FIRST SHOW THAT I HAVE ATTENDED. IT SEEMS TO BE LAID OUT VERY WELL. I HAVE A PRETTY GOOD AMPLIFIER, TURNTABLE AND SPEAKERS. I'M NOW WAITING FOR REVERE TO COME OUT WITH CARTRIDGES. NO, I DON'T THINK THAT I WILL BE INTERESTED IN STEREO TAPE FOR MY CAR. NOT FOR A LONG TIME.

DAVID T. WARREN

SALES PROMOTION, 6 YEARS HI-FI INTEREST: THERE'S TOO MUCH BEING



SHOWN. AT THIS POINT MY WIFE HAS JUST ABOUT HAD IT TRYING TO GET AROUND TO ALL THE MANUFACTURERS I WANTED TO SEE. EVERYBODY'S VERY HOSPITABLE, THOUGH; AND THERE ARE ENOUGH PEOPLE TO GIVE ME GOOD ANSWERS TO THE QUESTIONS I ASK. YES, WE MAY HAVE STEREO IN OUR CAR SOME TIME IN THE FUTURE—THE IDEA IS INTERESTING.

DR. STEVE BINDMAN

PSYCHOLOGIST: THE GREATEST THING I'VE SEEN HERE IS THE SMALL SPEAKERS. THESE HAVE THE FIRST PRIORITY ON MY LIST AND SECOND WILL BE THE AUTO STEREO TAPES. I'VE JUST GOT MY DOCTORATE AND WHILE I WAS IN SCHOOL I HAD TO SCRIMP AND SAVE AND CUT CORNERS ON EVERYTHING. NOW I CAN GO OUT AND GET THE THINGS THAT I WANT. A GOOD MUSIC REPRODUCTION SYSTEM IS THE FIRST EXPENSE ON MY LIST. I WANT THE COMPACT SPEAKERS AND I DON'T REALLY KNOW TOO MUCH ABOUT THE OTHER COMPONENTS, BUT I WANT TO GET THE BEST THAT I CAN.

ALFRED ASWAB

MATHEMATICIAN: THE TV VIDEO TAPE RECORDER WAS THE MOST INTERESTING THING THAT I HAVE SEEN HERE. ONE OF THE THINGS THAT I DIDN'T LIKE WAS THAT THERE ARE TOO MANY SPEAKERS IN THE EXHIBITS AND THEY'RE TOO LOUD. THE NEXT THING THAT I WANT TO GET IS BETTER SPEAKERS. MINE AREN'T THAT BAD, BUT I KNOW I CAN GET BETTER QUALITY WITH SOME OF THE IMPROVEMENTS THAT HAVE BEEN MADE SINCE I BOUGHT MINE FOUR YEARS AGO. I'M QUITE INTERESTED IN STEREO TAPES FOR MY CAR. I HAVE THE FM STEREO NOW AND I WILL GO IN FOR THE TAPE AS SOON AS I CAN.

ASK THE AUDIOFAN ANSWER MAN

Mismatched Mikers

FROM S.L.N., HARRISBURG, PA.:

Sometime ago I bought a stereo tape recorder, first using it only for playing pre-recorded tapes. Then I bought a single microphone, a ceramic type, which I have used for recording some family affairs very satisfactorily, in mono, of course. Now that I have a good deal more confidence in my technique with the machine, I would like to try my hand at stereo music. I understand that high-fidelity recording of music will probably require a better microphone than the one I have, but I want to work into it gradually, if I can. Could I buy a moderately good dynamic mike, for instance, and use it on one channel, with the ceramic on the other- (For awhile, at least.)

ANSWER:

Ideally, of course, your two mikes for stereo should be identical. Eventually, if you become strongly interested in stereo music recording, you will want matched mikes. You might have some fun and learn a lot about "live" recording techniques, however, if for a period you try using the ceramic on one channel. Here are some of the main problems with two different mikes. The levels will be different as they come out of the two mikes, and you must try to balance the signal reaching the tape by offsetting this, either with the balance control in your preamplifier, or by the two volume controls or balance control on the tape recorder. In other words, the volume setting in one channel is likely to be quite different from that in the other.

You must try, too, to get the frequency characteristic of the two channels as close to the same thing as possible. You won't be able to do this perfectly. The effect might be one of unsteadiness in the location of the stereo image, a tendency for solo instruments to jump from one side to the other because there is a high-frequency "peak" on one side not matched on the other. If you use

a fairly "blended" sound, however—mikes fairly close together, or a blend control—you might not get into this kind of trouble, and end up with a good stereo sound. To try for the best frequency balance, place the two mikes very close together, and listen first to one and then the other, on male and female voices, and with instruments such as the cello or, best of all, cymbals. Adjust tone controls until the sounds are as close as you can get them. This same technique might be a good one for balancing levels, too. Have your "musician" play a long, steady note with microphones right together in front of him. Adjust the balance control until the two volume indicators on your tape machine give the same reading. Now leave the balance control in that setting and adjust overall level, during a recording, with the volume control on your preamp.

Burbling FM

FROM S. T. W., CHICAGO:

I sometimes hear a low, burbling noise on my stereo recordings of one particular FM station here. I don't hear it on any other station, and it doesn't seem to come through when I listen to the offending station directly on my loudspeakers. The noise is more or less masked when loud music comes along but is quite disturbing in quiet sections, or between musical selections. What's going on here?

ANSWER:

A guess is that the station in question is putting out a SCA signal (a "background music" service to subscribers who pay for it), along with its broadcast stereo signal. This SCA signal is packed onto the FM carrier wave along with the stereo signal, and very carefully designed filters are needed to keep it out of the stereo music. It sounds as though the SCA signal may be beating with the 19 kc stereo pilot tone. You could call the station and ask them when their SCA will be off: try recording then, to pin this down. You might ask the manufacturer of your tuner what kind of "trap" you could use to prevent this.

NOW FREE!

STEREO INFORMATION

FM Station Directory

The directory lists 1571 FM stations in the United States and Canada. All the stations broadcasting in stereo are listed.

Test Reports

Test reports full of facts. The test reports were made by independent laboratories. Tests cover tuners, preamps, power amp/preamps. Read the facts from test experts.

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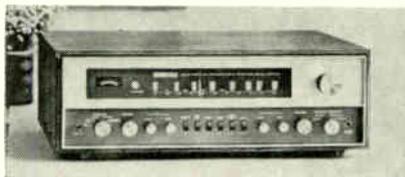
STATE ZIP

WHAT'S GOING ON

RECEIVERS/CONTROL AMPLIFIERS

Once upon a time there were devices called vacuum tubes. . . . Don't laugh! Truth is that, with rare exceptions, new electronic hi-fi equipment is strictly solid-state. This fact doesn't necessarily make performance better or worse—you have to judge equipment on individual merits—but it certainly results in smaller size and lighter weight. Here is some information on a bevy of new models, mostly receivers, that have been introduced recently.

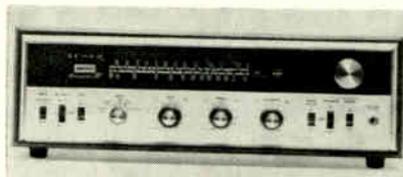
HARMAN-KARDON H-K's SR-600B all-transistor FM stereo receiver features 40 watts IHF music power per channel, 3 to 75,000 Hz power bandwidth and a frequency response of 2 to 100,000 Hz ± 1 db at 1 watt, 8 to 40,000 Hz at full-rated power. Harman-Kardon



is clearly a wide-frequency response advocate. Harmonic distortion is less than 1%; usable FM sensitivity is 1.95 microvolts IHF, image rejection is better than 40 db. Most any provisions you can think of are located on the front panel, including a variety of switches: contour, tape monitor, high and low frequency cutoffs, tone control in and out. Priced at \$369, with an optional walnut enclosure at \$29.95.



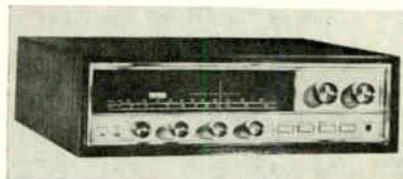
H. H. SCOTT The new 65-watt solid-state Model 382 FM stereo/AM



receiver is the first to use field effect transistors (FET) in both FM and AM front-end circuitry. (The expanded use of FETs is interesting. There are some audio experts, you know, who feel that FET devices will eventually replace tubes and transistors. And this means power output devices, too.) The 382 employs "automatic variable bandwidth," a feature which adjusts tuner bandwidth according to the noise-free quality of incoming signals. The FM section has a sensitivity of 2.5 microvolts IHF, with 85 db cross-modulation rejection. Output is direct-coupled; that is, driver and output transformers are not used. The amplifier stage delivers 22.5 watts music power per channel at 8 ohms, 32.5 watts per channel at 4 ohms. \$339.95.

ACOUSTECH Up till now Acoustech's line of factory-assembled and kit equipment included only one complete control amplifier, its wellknown Model V. Now there's a second one, a lower cost control amplifier dubbed Model VII. The \$249 unit, which is solid-state, naturally, is rated at 30 watts RMS per channel with under 0.25% IM distortion. Measurements were made into an 8 ohm load, with both channels operating, according to the manufacturer. IM distortion at 1 watt output is 0.15%. Plug-in circuit boards are used, as in other Acoustech equipment. There are lots of controls, including two separate sets of tone controls, tape monitor switch, headphone output, and speaker on-off switch.

SHERWOOD The new Model S-7800 FM stereo/AM receiver, an all-silicon transistor unit, is rated at



50 watts music power per channel at 8 ohms, 65 watts per channel at 4 ohms with 0.3% harmonic distortion. IM distortion below 10 watts is 0.1%. The S-7800 features 1.6 microvolt IHF sensitivity, interchannel hush, and a dual age system. The front panel has a full complement of controls and switches (rocker type) as well as a stereo headphone jack. Other specifications include AM bandwidth of 7.5 kHz, an s/n ratio of

70 db and a capture ratio of 2.4 db. The receiver incorporates 43 silicon transistors and 16 silicon diodes and rectifiers. Priced at \$399.50 or \$408.50 in a walnut grained leatherette cabinet.

SPEAKERS

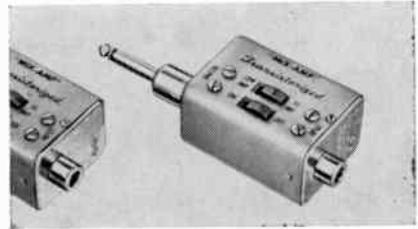
AMPEX Known largely for their tape machines, Ampex has been broadening its line by expanding into allied fields (as have other hi-fi equipment manufacturers). This includes a wide line of speaker systems. The company recently doubled its number of furniture style speaker systems by introducing four new models, all of which are full-range, multiple speaker systems. They range in price from \$158 a pair to \$420 a pair. Model 915, an 18" x 13½" x 9½" system which incorporates an 8" woofer and 3½" tweeter, is priced at \$79 each. Model 1115, 23¾" x 11¼" x 13½", has a 10" woofer, two 3½" mid-range units, and an ultra-tweeter; \$120 each. Model 2115, 24" x 14" x 12", has a 12" woofer and two 3" mid-treble units; \$140 each. Model 4010, at \$210 each, is the same size as the Model 2115. It has a 12" woofer, two 3" mid-treble units and an ultra tweeter. L-C cross-

over networks crossover at 1800 Hz and 8000 Hz. The 4010 also features two continuously variable controls for mid and treble ranges. The four new speaker systems all feature oiled walnut cabinetry with eggshell grille cloths and 8 to 16 ohm impedances. The new speaker systems are shown here with two models previously available.

ELECTRO-VOICE The budget-priced Michigan/Electro-Voice model MCS component loudspeaker, introduced in 1962, has been joined by two new 12" component speakers, the MC12 and the MT12. Both the MC8 and the new MC12 are dual units; the former at \$14 and the latter at \$17.50. The MC12 has a 14 to 14000 Hz response, 8 ohm impedance, and can handle 20 watts program material and 40 watts peak. The new MT12 speaker combines a dual-cone 12" speaker with a ring radiator tweeter, giving it a frequency response of 40 to 18000 Hz. Electrical crossover is at 4000 Hz. A continuously variable level control permits brilliance to be adjusted. It also has an impedance of 8 ohms and can handle 20 watts program material. It's priced at \$29.50.

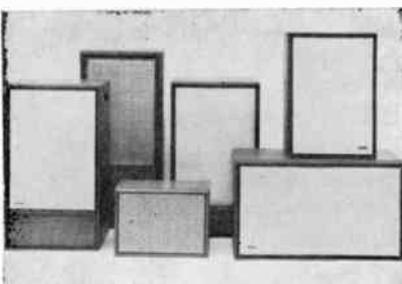
MISCELLANEOUS

SWITCHCRAFT Two "Mix-Amps," miniature transistorized preamplifiers to increase output of low level mikes and reduce high frequency response loss in long microphone cable runs, have been announced by Switchcraft. Both have 20 to 20,000 Hz ± 1 db re-

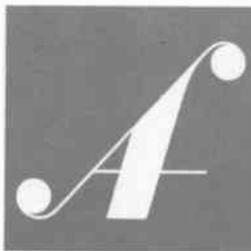


sponse, an impedance switch to allow selection of low Z output (2000 ohms) with 25 db gain and a high Z output (35,000 ohms) with 6 db gain. A standard AA penlite battery cell is said to provide up to 1000 hours of operating time; devices have a separate switch to control on-off functions. Model 503 "Mix-Amp" accepts a standard phone plug, while its amplified output is connected through a molded 12" 2-conductor cable; \$16.50. Model 504, illustrated here, has the same design features except that the output plug is a long-shouldered, standard phone plug; \$14.50.

UNIVERSITY The compact "Ultra-D", only 23¾" high x 11½" wide x 9¾" deep, is said to have a frequency response from 35 to 19,000 Hz. The 3-way speaker system uses a high-compliance, low frequency speaker, a mid-range speaker and a special tweeter. Using electrical crossover networks (6 db per octave L-C type), crossover points are at 1000 Hz and 5000 Hz. A ganged control allows highs and mid-range frequencies to be adjusted to room acoustics. Speaker system impedance is 8 ohms; it handles 32 watts of program material. The Danish Modern enclosed speaker system, with oiled walnut veneers on all four sides, is priced at \$87.25.



**SIMPLE
CHECK-UPS
THAT KEEP
YOUR
SYSTEM
TIP-TOP**



**HOLD
ON TO
HIGH
FIDELITY**

operate equipment intelligently

Some hi-fiers like to see how far they can push their hi-fi equipment every once in a while. It's analogous to "opening up" a car to see if it pings at 90 miles per hour.

You might be in for a big surprise if you turn up your amplifiers' gain controls to see how loud they play before noticeable distortion sets in. An unpleasant surprise could be some burnt out speaker voice coils. This is more likely to occur with tweeters, since they use very fine voice coil wire. That's why an amplifier with parasitic oscillation—oscillation that's way beyond your hearing's upper limits—can burn out a tweeter.

For those of you who are not guilty of the above, haven't you ever turned up the gain while playing a frequency response record run? If you practice this, you're exposing your speakers to damage. This is especially true at bass frequency (many test records caution you to turn down the level before playing lower frequencies by giving you a 1000 Hz level standard to re-adjust by).

Not all poor hi-fi operating practices ruin equipment. Some simply degrade performance. For example, boosting your bass control may give you the resounding thumps you like, as unnatural as it may be, but it also draws considerable power from amplifiers (some of which have inadequate power supplies to begin with). As a result, you could well drive the amplifier into areas of distortion, even though overall volume is not high.

Turning up your treble controls might take away the sheen of high frequencies and substitute a harsh sounding quality that, though not apparent, can cause listener's fatigue.

Be careful about the signal level going to your preamp. Most equipment, such as FM tuners and tape recorders, have level controls which will allow you to adjust level below the preamp input distortion-causing point. This is especially important with transistor preamps, some of which are more susceptible to overload on large input signals than tubed units.

CONSTRUCTION PROJECTS (Continued from page 21)

create your own. A series dropping resistor may be connected to the most-filtered, lowest B+ voltage available in your amplifier power supply. This voltage may be anything from about 150 to 300 volts, so the series dropping resistor's value cannot be stated exactly.

You can determine the proper value by connecting the wire from hole #18 to chassis ground of your associated amplifier. Then, connect the wire from hole #42 to one end of a 47K, 2 watt resistor. Connect the other end of the resistor to the selected, well-filtered B+ voltage point in your amplifier and measure the DC voltage at hole #42 of the pre-amplifier. If it reads greater than 18 volts (positive), you will need a dropping resistor greater than 47K. If it reads below 12 volts, decrease the value of the 47K

dropping resistor until the desired 15 volts is obtained. Use a two watt resistor regardless of its final ohmic value.

battery supply

If getting into the power supply of your power amplifier seems like a formidable task, you always have the third alternative of powering your printed circuit pre-amplifier by means of separate batteries. Use a 12 volt battery (such as is commonly used for small pocket radios), connecting the wire from hole #18 to the (-) terminal of the battery and the wire from hole #42 to the (+) terminal.

Since the entire stereo pre-amplifier uses a mere 3 or 4 milliamperes of current, the battery should last for hundreds of hours,

providing you remember to disconnect the battery when not using the preamplifier!

The completed preamplifier has a gain of over 35 db per channel at 1,000 Hz when built as a magnetic cartridge preamp. It will accommodate input signals of from 1 to 5 millivolts with no noticeable distortion. Signal-to-noise and hum ratio is better than 50 db. Transistors other than those listed in the parts list can be used, such as RCA 2N2613, but these may require a change in value for resistors R7 and R14 for lowest distortion and highest gain.

A final note. This little preamp has been used for several months now as a tape-head preamplifier. There has been no noticeable deterioration in performance whatsoever, indicating that the circuit parameters have been designed for long-term stability.

IS THIS ~~WAS~~ THE WORLD'S FINEST PREAMPLIFIER



PAS-3X
Kit \$69.95
Assembled \$109.95

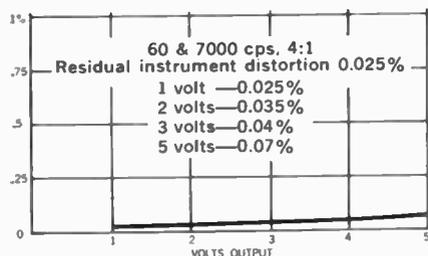
For years since its introduction, the Dynaco preamplifier design has been generally accepted as one in which the noise and distortion are so low and the quality so high that attempts to improve it would be laboratory exercises rather than commercial enterprises. Yet we have always been questioned as to why we did not gild this lily by adding step type tone controls. The enthusiastic audiophiles who ask this tell us that they want to be sure that their tone controls are out of the circuit when not being used. Our answer has always been that continuous controls give a range of flexibility which cannot be attained with step type controls, and that the "neutral" position of our con-

trols produces a flat response characteristic adequate for the most critical need.

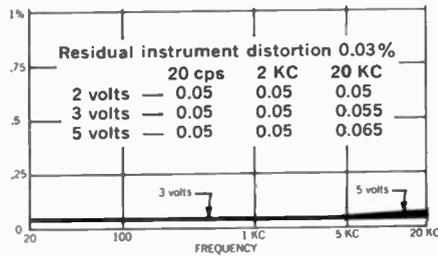
However, our avowed philosophy of perfectionism has kept us working on the possibility of some improvement in the circuit—and this work has now led to the first major change in our preamplifier design since it was initiated. This development (on which patents are pending) is applicable to all continuous tone control systems and immediately makes them superior to the far more expensive step type controls. What we have accomplished is to keep the infinite resolution capability of the continuous control, but to remove all frequency and phase discriminating networks from the circuit when the control is rotated to its mechanical center. This new design is incorporated in the PAS-3X (PAS-2X, too) which is now at your dealer's at the same low price.

Further, for the nominal charge of \$10.00, a conversion kit TC-3X is available to update any Dyna PAS-2 or PAS-3.

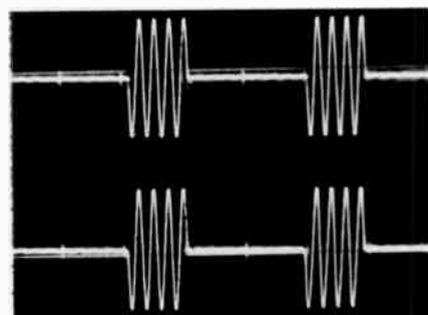
Can you hear the difference? We doubt it. The preamp was amazingly good in the past. We have improved it for the sake of improvement, not because we think it needed it. It has always surpassed every other preamp without regard to cost. And, it is superior on more than measurements—listening tests prove that the Dyna preamp adds no coloration to the sound and that its inclusion in the hi fi chain is undetectable. Partially diagrammed below is the performance you can expect from the PAS-3X—why you can never get better overall quality regardless of how much money you spend.



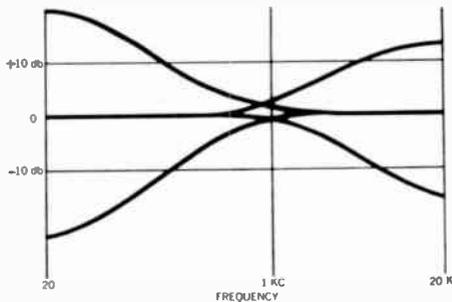
Intermodulation Distortion



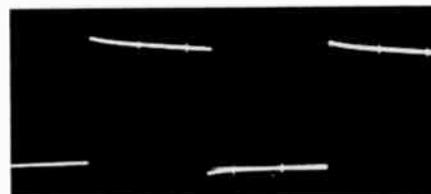
Harmonic Distortion



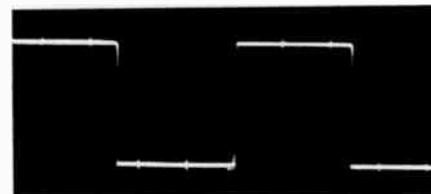
Four cycle 20KC tone burst from generator (above) matches PAS-3X (below)



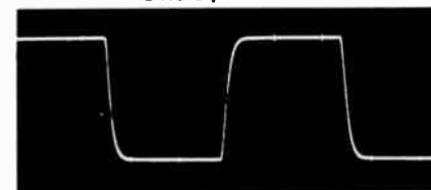
Tone Control Range



10 cps Square Wave



1 KC Square Wave



10 KC Square Wave

There are Dynakit amplifiers in all power brackets which will do justice to the perfectionist's preamplifier. All are rated for continuous power.



2 Mark III's
60 watts/
channel
Kits
\$79.95 each



Stereo 70
35 watts/
channel
Kit
\$99.95



Stereo 35
17.5 watts/
channel
Kit
\$59.95

Complete specifications and impartial test reports are available on request. In Europe write Audiodyne a/s Christian X's vej 42, Aarhus, Denmark.

DYNACO INC. 3912 POWELTON AVENUE, PHILADELPHIA 4, PA.

Compare these Sherwood features and specs! **ALL-SILICON** reliability. Noise-threshold-gated automatic FM Stereo/mono switching. FM stereo light, zero-center tuning meter, FM interchannel hush adjustment, front-panel stereo headphone jack, rocker-action switches for tape monitor, noise filter, speaker disconnect and loudness contour. 100 watts music power (8 ohms) @ 0.3% harm distortion. IM distortion 0.1% @ 10 watts or less. Power bandwidth 12-35,000 cps. Phono sens. 1.8 mv. Hum and noise (phono) -70 db. FM sens. (IHF) 1.6 μ v for 30 db quieting. FM signal-to-noise: 70 db. Size: 16½ x 4½ x 14 in. dp.

Sherwood Specs Speak For Themselves

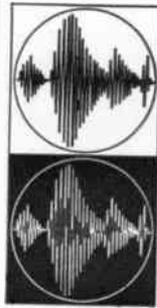


S-8800 100-W. FM Receiver
Chassis: \$359.50 Wal. Cab. \$9.00

No other FM receiver but Sherwood's new Model S-8800 has a pacesetter 1.6 μ v FM sensitivity, a remarkable 0.1% distortion rating and a 100-watt stereo output with **ALL-SILICON** reliability for the most true-to-life sound reproduction. Your proof of this reliability is our 3-year warranty—the industry's longest. How can Sherwood offer this warranty? Only because we said "No!" to germanium or nuvistor hybrid designs, and insisted on **ALL-SILICON** solid-state reliability.

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the technical quality of records and tapes

Reviews are concerned with audio reproduction qualities of recordings not musical performance, by James Quigley

Buffy Sainte-Marie: It's My Way! (Vanguard VTC-1690); Miriam Makeba: The Voice of Africa (RCA Victor FTP-1252); Peter, Paul and Mary: See What Tomorrow Brings (Warner Bros. WSTC-1615). All are standard-length tapes, 4-track stereo at 7½ ips.

When Anna Russel says, "Folk-songs are for the natural, untrained voice," it makes us laugh partly because of the "natural, untrained voices" it brings to mind and partly because she has put her finger on a paradox.

When Alan Lomax first climbed the steps of some rickety Appalachian front porch and asked the sharecropper he found in the rocking chair whether he might set up his portable recorder (at least, that's the way I've always imagined it as starting), he began the slow process of drawing traditional music into the mainstream of America à Go-Go. (Just think, if the sharecropper had said no...)

On those first Library of Congress recordings of American folk-songs, the drama and the soul of the music was all but obscured by wavering pitch and muffled consonants. These days, however, everybody knows what to look for in folk music.

The paradox stems from the fact that the performer can't sing as though he were sitting alone on his front porch (with only Alan Lomax's recorder) if he wants a nightclub full of people to get up and cheer when he's through. To say nothing of a Newport Festival. Folksong recordings are also a paradox. In the vintage days of Burl Ives and Susan Reed,

folk recordings were pretty un-selfconscious.

Now that the singer has got up from the rocking chair to go off to the hungry i, however, and the ballad has to a certain extent been replaced by the protest song, the folksinger is candidly reaching out for an audience. That means a new exploitation of the devices available to both the singer and the studio.

So—to come around at last to the three recordings at hand—here we have three ways of ap-



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proaching the paradox.

The most successful, perhaps because it is also the most conventional, is the Buffy Sainte-Marie tape. Vanguard has, of course, had plenty of experience with the recording of folk music: Joan Baez and The Weavers figure prominently in their catalog. They seem to have decided that the most effective way of presenting the solo singer, particularly, is to get out of the way and let the performer shine through.

And shine Miss Sainte-Marie does. Her voice is the least "trained" sounding of the three ladies in question. It can be rasping, raucous or breathy by turns; and Vanguard keeps whatever edge there may be. Her guitar, too, is sometimes rough, but has plenty of variety—suggesting at times a dulcimer or even a banjo.

With all the transients so cleanly recorded, the impact is very compelling. And as for that mouth bow she plays so uncannily in "Cripple Creek," . . . words fail.

Even when there is a second guitar or a bass, the effect is simply of liveness and immediacy. Outside of some print-through on my copy, this tape should sound excellent on most equipment.

Unfortunately, that can't be claimed for either of the other two tapes. Both are treated in a rather arbitrary fashion, savoring more of popular than of classical recording techniques.

Particularly curious is the Miriam Makeba tape. Outside of the notation, "Arranged and conducted by High Masekela," there is no clue as to the instrumental forces used. They include what seems to be a regular string bass with something loose. The rattling sound that accompanied a bowed bass part sent me searching my speakers for spare parts. When the bass returned (this time plucked) so did the buzzing.

While Peter and Paul's Mary has, to my way of thinking, the most attractive "natural" voice of our three ladies, she suffers from the poorest recording. How poor it actually sounds will depend on the separation of the system on which you hear it. With ear-

phones, one hears Peter in one ear, Paul in the other, and Mary somewhere in between. At times, the effect is downright distracting; and even with speakers with moderate physical separation, it persists. When the balance is altered between numbers, the change is jarring.

Center channel or separation control will help; but with a good system, neither will mask the distortion in the loud passages (an overworked mike, perhaps?) in Mary's voice, nor the print-through that sometimes goes with it.

Maybe it all goes to prove (if anything must be proved) that folksongs are still the province of the personality and that the best recordings therefore are those that most faithfully *reproduce* the music, rather than dramatize it—however much the singer himself may dramatize the material. The extra "sock" that a recording like PP&M's will provide on inexpensive phonographs—particularly when it is applied to larger groups

with more to gain from the extra separation—only tends to pull apart what should be a very unified, personal aural experience when it is reproduced (as pre-recorded tapes usually are) on quality equipment.

One final note: If you are used to hearing "wide range-full orchestra" you may find, as I did, that your brightest speakers seem to show up excessive hiss on these tapes. The effect was perhaps most noticeable on the Sainte-Marie tape, with its moderate level and fairly wide dynamic range. Since there is nothing in the program material to provide high-level high-frequency sound, there is nothing to mask the hiss. Makeba came off best in this respect, both because the recorded level was noticeably higher and because of the fuller sound of the accompaniments. With a good quality headset or with speakers that gave less emphasis to that end of the frequency range, the hiss was no longer objectionable on any of the tapes.

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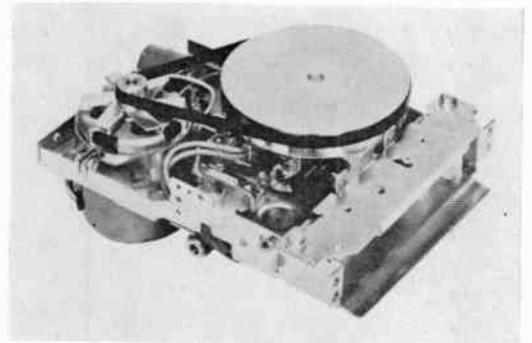
■ Soon you'll be able to take a home study course by FM radio. The new technique uses FM subcarrier channels and special receivers with four channels. It's said that the system will not interfere with an FM station's regular commercial programming. (The same thing was said about SCA programs, which, as you know, can degrade the audio quality of FM commercial programs.) The International Correspondence Schools is developing a variety of courses for the system. A four-track tape source will be fed through a four channel modulator, with FM carrier signals multiplexed with four channels that cannot be picked up by conventional receivers. The special receivers, built by Sylvania Electric, would be provided to subscribing students as part of a \$55 course enrollment fee. Each receiver is equipped with four response buttons. If a student depresses the correct button in response to an instructor's multiple choice question, he will be told that he answered properly; if he chooses an incorrect channel, he will be told it is wrong and an explanation will be given. The first course, on modern management, is to be given this month over an FM outlet in Philadelphia. The educational system is called Educasting.

■ If you think autos are the only vehicles using continuous loop tape recorders with pre-recorded tapes, you've got another think coming. The idea has spread to trucks: The White Motor Co. offers stereo and mono tape recorders for its line of heavy-duty trucks. Volume sales are still with autos, of course. As an example, the Ford Motor Co. says they sold 60,000 cars with stereo tape players installed at the factory during the first six months of 1966.

Breaking this down by auto lines, 20,000 were in Ford models, 12,000 in Thunderbirds, 11,000 in Lincoln Continentals and about 5,000 in Mercurys.

■ Free reels of tape were distributed by Irish Magnetic Tape to San Francisco Hi-Fi Show visitors for the purpose of taping messages to American servicemen in Vietnam. A manned tape recorder was available for making "tape letters." Hundreds of visitors took time to tape a one minute tape message to servicemen, so there'll be a lot of happier GI's who, reports indicate, number tape letters among their favorite past-times.

■ The \$500 sales figure for a home video tape recorder is expected to be broken sooner or later. The Par Limited Company expects it to be "sooner," judging from the company's recently unveiled prototype which a company spokesman predicts will retail in the area of \$450. The HVTR, developed by Robert Morrow and Stewart Hegeman, who is well-known in hi-fi circles for his development of Harman-Kardon's Citation Series of amplifiers, is a "brute force" type. That is, tape passes stationary heads at a rather high speed. In Par's system, it operates at 60 inches-per-second with 1/4" audio or instrumentation tape, or at 30 ips for a lower quality picture. Four-track audio type heads are used. Head life is predicted to be about 2,000 hours or about two years of average use. Of special interest is a video monitoring feature which enables an operator to see just what picture he's recording. Connecting the system to a conventional TV set involves less than a dollar's worth of parts and about an hour's work by a qualified serviceman.



Here's an inside view of an AC-powered tape cartridge player made by Motorola. It's similar to the auto stereo tape player developed by Motorola for the Ford Motor Company. The stereo 8-track home player, which is made available to private-label manufacturers, features a synchronous motor (controlled by the 60 Hz house current, much like an electric clock), a non-magnetic capstan, and a flat tape drive belt.

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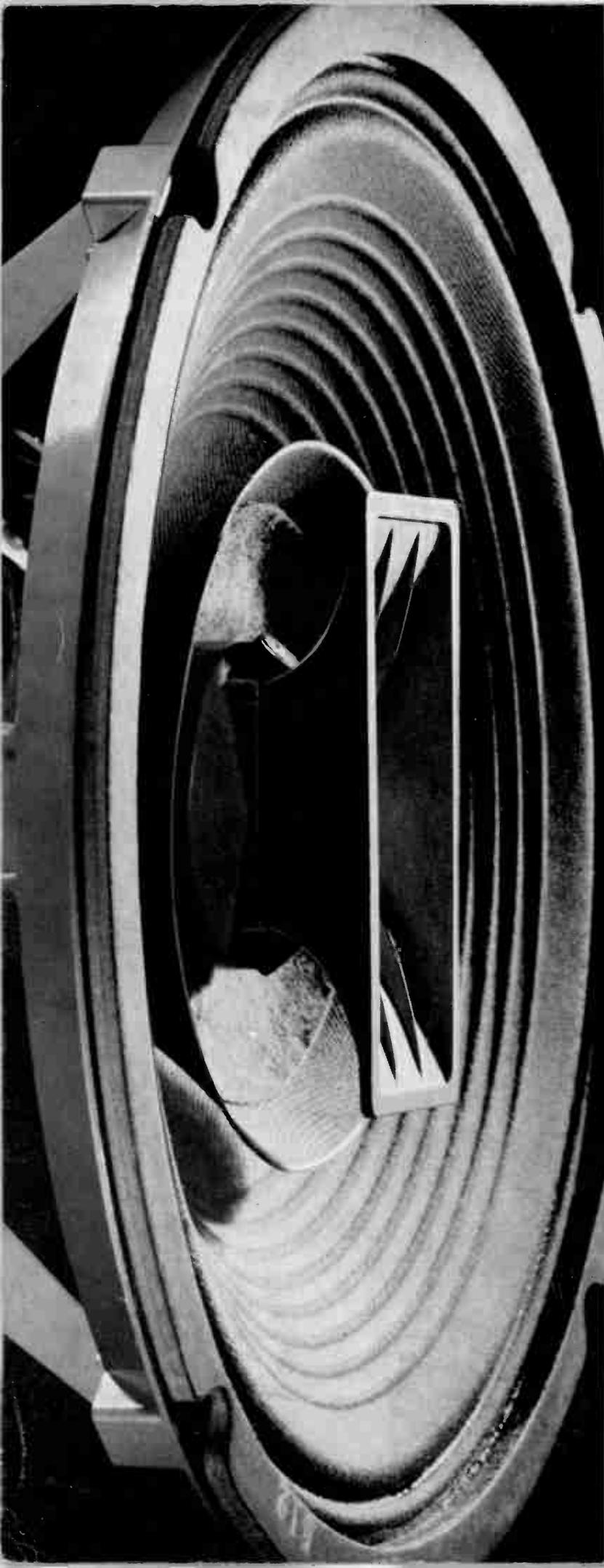
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But the similarity of the E-V/Wolverine LT12 to these fine speakers points up a basic advantage over all other competitively priced units — and a matter of deep-seated design philosophy. The question was not "What can we leave out?" but rather, "What more can we include in this remarkable speaker?"

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