

# How to Plan and Install

# HI-FI

## Systems

NUMBER 1 • 50 CENTS

*A Fawcett Publication*

By Irving Greene



Amplifiers—10 Watt or 65 Watt?



Adding Stereo Tape



FM vs. AM-FM Tuners



Turntable or Record Changer?



Pickup Arms and Cartridges



Remote Speakers



Built-In TV

Choosing and Buying Equipment • Understanding Specifications  
Adding to Your System • How To Get Free Hi-Fi Information

# REK-O-KUT

Leading high fidelity manufacturer... tells you

## HOW TO AVOID A COSTLY MISTAKE IN YOUR HIGH FIDELITY SYSTEM

Here are three decisions you must make — wisely — if you are building a high fidelity system.

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- Booklet — Turntable or Record Changer... which shall I buy?
- Catalog

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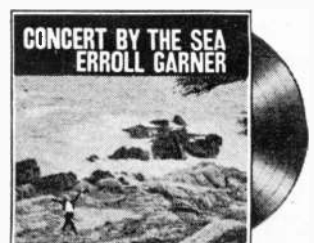
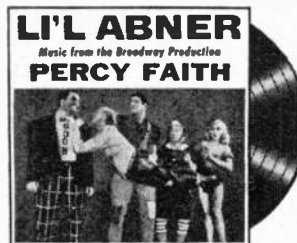
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# how to plan and install *HI-FI SYSTEMS*

By Irving Greene



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### The Cover

All color photographs by Grayson Tewksbury, Fawcett Studio. Pickering "isophase" electrostatic speaker Model 580, \$210; River Edge Model 450C corner enclosure, \$89.70, with Wharfedale W15 c/s 15" woofer, priced at \$76.15. Pentran Emperor tape recorder Model HF-400, \$249.50. McIntosh C-8M audio compensator, \$96.50; McIntosh MC-60 60-watt power amplifier, \$198.50. Metzner Starlight turntable on base, \$77. Pickering fluxvalve-unipole pickup arm and cartridge, \$59.95. Jim Lansing JBL 12" speaker, Model D-123, \$54.50. H. H. Scott Model 331-B AM-FM stereo tuner, \$229.95. Fleetwood 810 remote TV chassis, \$299.50 less picture tube. Fairchild Model 225 cartridge, \$37.50; Audak micro-poise stylus balance, \$4.95.

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## ABOUT THE AUTHOR

Irving Greene is a pioneer in high fidelity custom building and design. He is a member of the Audio Engineering Society, the Institute of Radio Engineers' Professional Group on Audio, and a lecturer and consultant on high fidelity. He has co-authored "Make Music Live" and "The New High Fidelity Handbook," and has written countless articles on high fidelity which appeared in many publications, including one of Fawcett's leading hobby magazines, *Mechanix Illustrated*.



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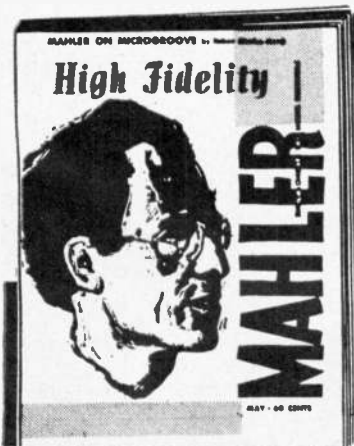
First, this Ticket brings you the new issue *free* so that you can see for yourself why **HIGH FIDELITY** circulation has climbed so quickly (now well over 75,000!) . . . and why it is far and away America's most popular *home-listener* magazine.

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- Plus popular regular features like *Music Makers* by Roland Gelatt . . . *The Tape Deck* . . . *Audio Forum* . . . *Trader's Marketplace* . . . *Books in Review* . . . and more!

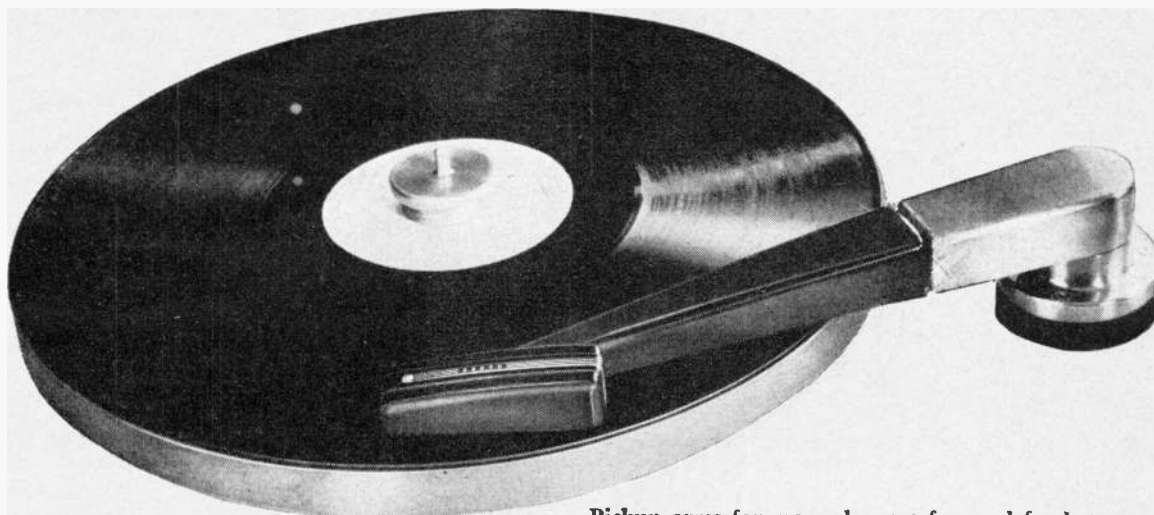


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**High Fidelity** • 1608 Publishing House • Great Barrington, Mass.

# High Fidelity in Review

The sound equipment used for reproducing recorded music is steadily progressing to the ideal point of in-person performance



Pickup arms for manuals were few and far between. The Brush arm and cartridge was a favorite of the phonophiles.

**R**ECENTLY noted with interest was an advertisement which contained the following excerpts—

“Ever since broadcasting became the vogue there has been a demand for a receiver which would fill a whole room with music of perfect tone quality but which would be so simple that anyone could tune in by moving a single lever.”

“When you hear the voice and the music . . .”—“. . . it is as if the lecturer or singer at the broadcast station were in your presence. The whole family listens and marvels.”

And then, the “ad” went on to advise: . . . “Present owners of this fine instrument have already enjoyed such programs as the whole opera *Cavalleria Rusticana* with *explanations*.”

Thirty five years ago, in 1922 when this advertisement appeared, all of this was welcomed as a great achievement. *Live, in-person* performances were enjoyed by relatively few music lovers. The advent of the radio brought great promise to the world of music. In the comfort of their living room, people could at last realize the splendid performances of great artists.

Even today, the opportunity to attend a *live, in-person* performance is not always realized by everyone, because the ratio of the increase in population has exceeded the increase of *in-person* performances. Proof of this is the long wait and astronomical prices of seats to top musical shows and the ever present midnight to dawn vigil at the Met box office prior to opening night.

In the early days, techniques used in recording and radio broadcasting were crude, as were the radios and phonographs. Thus, *quality* was realized only at *in-person* performances. Today—through the magic of modern high fidelity sound reproduction—everybody can enjoy the natural quality of a *live* performance at their own convenience in their own living room.

High fidelity had come into its own—with phonograph records, FM radio, television and magnetic tape—every form of entertainment is possible. In addition, high fidelity has the widest latitude of flexibility. The nature of high fidelity lends itself to installations that fit individual requirements. Thus, an added pleasure is realized in the form of *do-it-yourself* projects *plus* the opportunity to save money that would normally be spent on expensive cabinetry. This business of high fidelity as we know it today, is the culmination of a decade of remarkable progress made by a new industry that augmented its mechanical and engineering skills with a genuine love for music.

## A Look Into the Past

*In retrospect*—twenty odd years ago, the future of high fidelity looked quite dim despite the advent of the electrical phonograph and the amplified loud-speaker in radio consoles. Due to the crowding of AM broadcasting channels, the frequency range of these instruments and of phonograph records were confined to the 5,000 cycle audio limit. This seems quite incredible since the female voice has a range



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**Leading HI-FI**  
**"HOW-TO-DO-IT"**  
**Magazine**  
**audiocraft**

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 Fidelity system

If the current much-ado about hi-fi intrigues you — if you want to know how much hi-fi you can accomplish on your own hook — if you want the whole story on how-to-do-it hi-fi, you'll want to read AUDIOCRAFT. Here's the only monthly publication entirely devoted to do-it-yourself hi-fi — clarifying and simplifying the assembly and maintenance of a modern high fidelity system — or any part thereof.

Are you a little hazy on how to build an amplifier, a pre-amp, turntable, or speaker baffle? Can you trace the trouble if, when a unit is built, it won't work? AUDIOCRAFT supplies the answers!

To keep pace with continuous new developments in hi-fi . . . AUDIOCRAFT is "must" reading. It's the only distinctive, easy-to-learn-from monthly publication in its field.

**A few of the FEATURES . . . every month**  
**The Grounded Ear . . .** keeps an ear to the ground for new developments in hi-fi equipment and techniques, and evaluates their significance. for you.

**Audio News . . .** pictures and describes new products and tells about available catalogs.

**Tips for the Woodcrafter . . .** written by an expert, an excellent feature clarifying construction and finishing of hi-fi cabinetry.

**Tape News & Views . . .** speaks for itself, authoritatively.

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With the dearth of hi-fi amplifiers, many availed themselves of professional studio equipment, as McIntosh 104.

beyond 10,000 cycles and the violin or oboe can produce over 15,000 cycles. Yet, despite these obstacles, a great number of high fidelity enthusiasts continued their efforts to develop equipment for better and better transmission and reproduction of sound—and among these enthusiasts were some of the greatest scientists and engineers in the electronic field.

In 1936, Major Edwin H. Armstrong, a radio engineer who contributed countless important developments in AM broadcasting, demonstrated his new method of radio broadcasting . . . *Frequency Modulation*, better known as FM. This improved method provided a frequency range beyond 15,000 cycles with complete freedom from static and noise normally inherent in AM broadcasting.

Ironically, because of disputes within the industry and the repeated shifts of frequency allocations by the Federal Communications Commission to make room for newly perfected television . . . FM was finally given its present band of 88 to 108 megacycles *10 full years later*.

Major networks began conversion projects to transmit programs with this new medium—eventually scheduling their regular broadcasts for simultaneous transmission over FM. Fine Music stations appeared in many cities, with programs of classical music all day long—and, a pleasant absence of annoying commercial announcements.

The shift to the 88 to 108 megacycle band left many owners with FM sets designed for the old band of 42 to 56 megacycles . . . and for a short time, FM programs were broadcast on both the old and new bands. Then, General Electric produced the *GE FM Receiver* and Pilot Radio the famed, diminutive *Pilotuner*—both designed to receive the new FM band of 88 to 108 megacycles.

Yet . . . the audio circuits of radio consoles left a lot to be desired . . . the magnificent musical programs broadcast over this new medium were filtered through mediocre sound systems, reproducing only a fraction of the original program.

At the beginning, recorded transcriptions were the prime source of program material for FM broadcasts. To compete with the quality transcriptions supplied by the wired music services, phonograph record manufacturers stepped up the quality of their records. In short time, the public showed a greater interest . . . and, high fidelity shops made their appearance in the larger cities.

More and more products for high fidelity reproduction of music reached the consumer, the most important of these were the magnetic or variable reluctance phonograph cartridges produced by *Pickering* and *GE*. High Fidelity: circa 1947, had started and was growing by leaps and bounds. The assurance of a continued supply of high fidelity equipment was confirmed as manufacturers of professional sound equipment began making consumer models of record players, amplifiers, radio tuners, loudspeakers, etc.

*Columbia Records* then introduced the most exciting development in high fidelity . . . the long playing (LP) record. Here was a new kind of record that could very well obviate any need for an automatic record changer. Made of vinyl plastic (it is virtually unbreakable) and lighter in weight, this record played at a slower speed ( $33\frac{1}{3}$  rpm instead of 78 rpm) and used a “needle” with a smaller tip radius (.001” instead of .003”). Employing a new name . . . “stylus” (obsoleting the *needle* forever) engineers recommended that the new LP records be played with a stylus force of 6 to 8 grams instead of the weighty and cumbersome 1 to 2 ounces.

The diamond as a stylus material became more popular. Proof was offered that it actually increased record life by reducing wear . . . especially, with the smaller tip radius of the stylus. Music lovers were pleased. A 12” LP record could be made with a complete opera or orchestral concert recorded on both sides. In contrast to the heretofore required 4 or 5 records of the heavier 78 rpm variety . . . this was a blessing indeed.

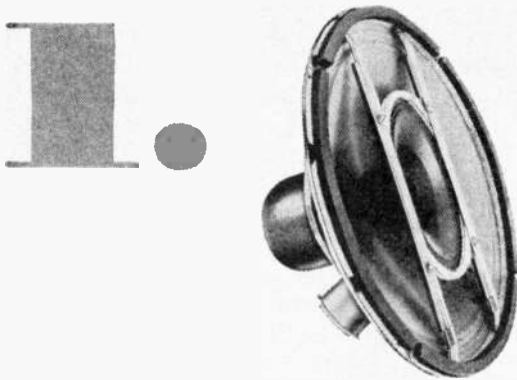
RCA Victor introduced a 7” record shaped like a doughnut (with a large center hole) that played at 45 rpm. Here was the *war-of-the-speeds* . . . between two of the largest recording companies . . . each claiming superior performance of their products. Soon, the storm calmed and other recording companies adopted *both* new records . . . even RCA Victor produced the larger  $33\frac{1}{3}$  rpm LP record.

The terms “LP” and “Microgroove” became synonymous and fast became a part of the music lovers vocabulary. Newer recording techniques were developed . . . newer brand names appeared . . . and, advertisements offered new high fidelity records with a new unbelievable frequency range to 20,000 cycles. People learned about the recording characteristic . . . which made it possible to manufacture a perfectly engraved record with the most intricate nuance of the original sound retained within the sculptured wall of the record groove.

Recording companies decided to retain their individuality and used a recording characteristic of their own choosing. Soon, a multitude of symbols ap-



# Two to build on- from SONOTONE

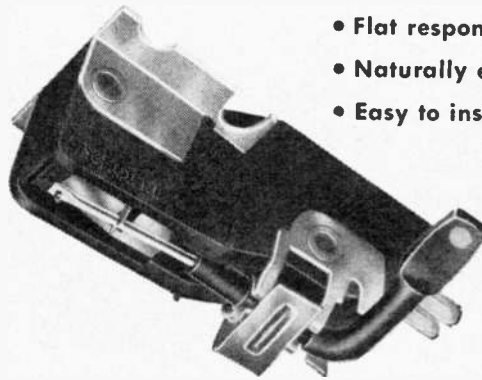


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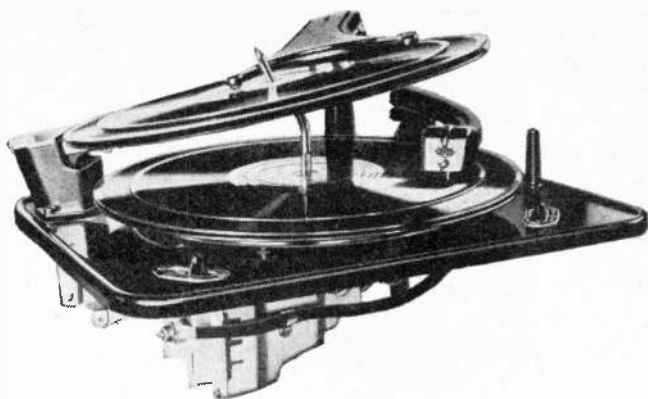
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the CA-12 LOUDSPEAKER       the 3T CARTRIDGE

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



The Garrard RC-65 with magnetic cartridge was prime hi-fi changer a decade ago. It intermixed 10 and 12" 78 rpm's.



Accessories like Pickering 132E record compensator were used to "modernize" old amplifier, with the advent of LP.

peared. Each one identified a particular characteristic. Audio amplifiers soon included switches which permitted selecting the proper compensating circuit for the various characteristics: AES, NARTB, LP, COL, EUR and ORTHO.

Recently, the recording companies formed a national organization—The Recording Industries Association of America. Thus the RIAA characteristic was developed to end a dilemma. But the need for compensators will remain, since records made prior to the RIAA will be with us for a long time to come.

In time three-speed automatic record changers were brought out . . . lived through a period of competition with the more professional manual record player . . . and then came into its own with improved mechanical design. The music lover was delighted with the improved performance and the added advantage of playing an average of eight records for a period of four to five hours of continuous music.

#### A Look Into the Future

In prospect—high fidelity has a bright and busy future. New and better developments have brought great promise of musical quality the tried and true hi-fi hobbyist has yet to hear. No longer the domain of the technically informed . . . high fidelity is for everyone . . . in every walk of life.

Television, with its *spectaculars* and wonderful musical programs has become a pivot of gracious living. It has exceptional merit in every sense—it is educational, entertaining and a great medium for bringing the greatest literary, dramatic and sporting events right into your home. Custom models make possible the double enjoyment of high fidelity sight as well as sound.

Magnetic tape recording (now beyond the experimental stage of recording the picture signals of TV broadcasts) affords the music lover an endless repertoire of great performances—to be had at the touch of a switch for playback in years to come. FM's *Multiplex* is ripe for consumer use and is promised for general use very soon. Binaural (stereophonic) fans will soon enjoy their high fidelity in the 3rd dimension. Presently, tape is the prime medium for binaural reproduction. Much is being done on other components—amplifiers, tuners, speakers, etc.—and in a few years binaural systems will be less costly and more

practical for all to enjoy.

While stereo reproduction of phonograph records has been troublesome and quite unsatisfactory (from a mechanical point of view); and, as a result has lost popularity . . . there is much promise that it will soon become a practical and successful medium for stereo sound. In an interview with *Sidney Frey*, President of *Audio Fidelity Records* of New York, the author learned that there was a new and startling development nearing successful completion. It is a stereo record with both signals in *one* groove which could be reproduced on a conventional record player equipped with a wide range magnetic cartridge. By means of a device added to the system, two signals, would be fed to two amplifiers, each connected to a speaker system and both speakers arranged for stereo listening. For those with stereo systems, the record could be reproduced by simply adding the small adaptor unit. For those with conventional systems, the addition of another amplifier and loudspeaker is all that would be required for stereo listening from this new record . . . and, no special record playing equipment is needed, permitting the original record player to be used for both conventional and stereo records.

The phonograph system continues to become more and more versatile and better and better in quality. *Pickering & Co.*, pioneers in the pickup and cartridge field, have introduced the 1/2 mil stylus with a revolutionary arm design. Here is great promise for longer record life and maximum fidelity from records.

The dramatic stage can now be brought into your living room. A new slower speed—16 rpm—provides a full hour on one side of a 12" record. The *Spoken Word* will be recorded with the priceless works of many great poets, writers, statesmen, etc. Even the works of the "best seller"—The Bible—has been put on LP records.

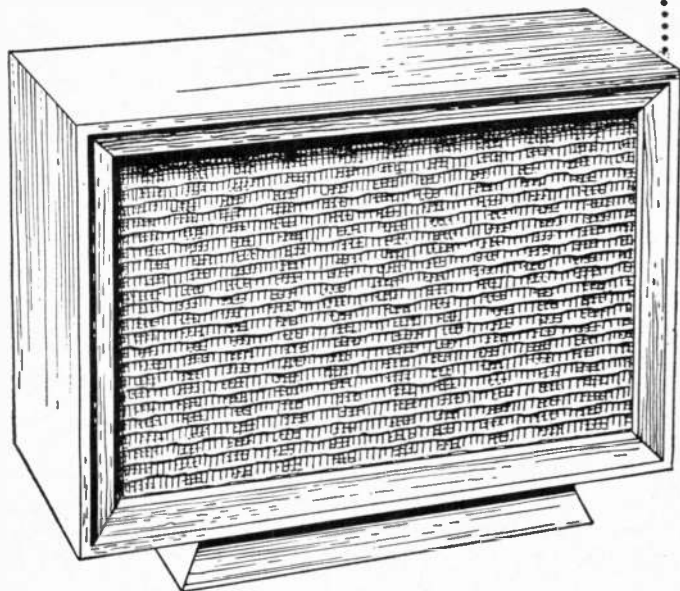
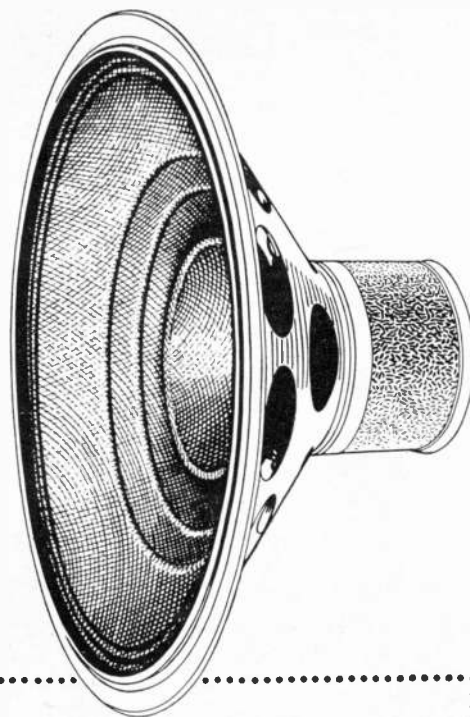
Yes . . . the prospects of high fidelity look bright for the lover of music and the literary arts. The coming years offer much in the way of improved appearance, facility, and even quality. But . . . the secret of success with high fidelity is planning. Its individual characteristic is the facility to build the entire system around your personal tastes and requirements. By intelligent planning . . . you need never settle for less than the best. It is the intent and purpose of this book to show you how to do just that. •

# You can have the finest sound reproduction throughout all frequency ranges without distortion

You will hear a remarkable difference in the clarity of Norelco \*Full Response Speakers. In a single speaker, twin-cones reproduce low frequencies, middle range, as well as the higher frequencies extending beyond the audible range—without distortion.

## WHY ARE NORELCO FRS SPEAKERS SO EXCEPTIONAL?

They have incorporated a number of technical refinements which are evident the moment you listen. The air gap has been made long so that the coil is completely enclosed in an even magnetic field at all times. A copper ring has been fitted into the deep air gap to keep the voice coil impedance constant over the whole frequency range; this avoids incorrect matching. High flux densities are obtained through the use of "Ticonal" magnet steel.



*Norelco FRS Improved Bass Reflex Enclosures are available in three sizes; FRS Enclosures I, II and III. Priced from \$33.75 to \$119.95.*

## *Norelco \*F.R.S.*

*speakers are available  
5", 8" or 12" sizes in standard impedances.  
Priced from \$6.75 to \$59.98*

*Blue prints are available for the  
do-it-yourself enclosure builder.*

Norelco speaker-matched enclosures are scientifically designed acoustical boxes which enhance the exceptional tone qualities of FRS speakers; bringing out their true performance values.

Norelco FRS Speaker Enclosures are available in three sizes to match the characteristics of the speaker in use. Supplied in either mahogany or blond, these enclosures incorporate a removable base permitting the enclosures to be placed horizontally or vertically to suit any room arrangement or decor.



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**Garrard RC 88**  
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**World's Finest Record Changer**

Full manual and automatic positions. True-turret drive... uses no belts. 4-pole "Induction Surge" motor. Foolproof Garrard Pusher Platform.  
\$54.50 net



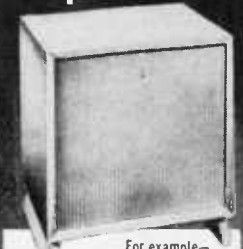
For example—  
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Britain's Finest Amplifier with "Point one" Remote Control Pre-amplifier B. B. C. standard setting! Amazingly low 0.1% distortion. Four master control dials, with exclusive plug-in tape jacks on front panel.  
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Super 12 /CS/AL 12" full-range Loudspeaker Built under the supervision of world renowned G. A. Briggs. Remarkably level response over entire range. Especially full-bodied, non-strident tone. Cone "floats" in hand-fitted cloth rim.  
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For example—  
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Super Changer. All RC 88 features, including full manual position and true-turret drive, PLUS continuous + or - variable speed control on all speeds  
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TL/12 Amplifier \$149.50  
Varislope Pre-amp... \$69.50



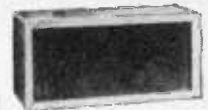
**Wharfedale**

Loudspeakers Built under personal supervision of G. A. Briggs Unique cloth suspension and felt buffer rim: Aluminum voice coils. 3" Treble model; 8", 10", 12" full-range models; 12", 15" woofers.  
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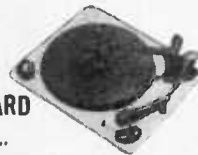
**R-J Shelf-model Loudspeaker**  
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# What IS High Fidelity?

Hi-fi is in actuality a tool by which the music listener can better (with more fidelity) hear his records and radio

**T**HE TERM HIGH FIDELITY has been bandied about to an extent which breeds confusion. Because of this, a great number of music lovers have spent good money with little to show for it. Many who have purchased so-called hi-fi—inferior mass produced radio-phonographs—in part, have become pessimistic and frustrated. They have concluded: that one must be *technically adept, reasonably rich, or in the business*, in order to avail one's self of a system which will provide the ultimate in high fidelity music reproduction. *Fortunately, neither of the conclusions are true!*

Indiscriminate labeling of non-high fidelity products as *hi-fidelity* or *hi-fi* has greatly contributed to this confusion. Low prices (many unfeasible) plus a program of high pressure publicity and advertising has saturated the public to the point where it becomes rather difficult to perceive any line of demarcation. It appears that some companies depend more upon *word engineers* than *electronic engineers* to develop their products. There also seems to be a misleading concept of the relationship between FM and high fidelity. Some *diminutive* table model FM receivers (with only a 4 or 5 inch speaker) have the words *high fidelity* in bold script across the cabinet front, or on the dial.

Now . . . FM is a *quality* method of broadcasting widely acclaimed for its full dynamic range, static-free reception and exceptional tonal quality. *But, FM alone does not constitute these characteristics!* The ultimate performance of FM reception bears heavily on the amplifier and loudspeaker.

Speaking about loudspeakers: A few years ago, there began a wave of publicity and advertising expounding the virtues of multiple speakers in the common variety portable, table model and console type phonographs, the performance of which . . . bore no resemblance to high fidelity. Obviously, this was an emulous take-off on the authentic, *quality-made* high fidelity 2- and 3-way multi-speaker system. True, low cost, ordinary phonographs have multiple speakers—2 or 3 or more—but, not a *high-fidelity multi-speaker* system. And, as you will learn later on in the book, *there is a difference!*

## Getting to Know High Fidelity

*High fidelity in its simplest terms means quality—a quality of a faithful sound reproduction equal to*

*a personal experience at the actual performance—barely indistinguishable from the real thing.*

An ordinary radio-phonograph and a high fidelity system operate in much the same manner. Electrical impulses from a radio (FM or AM) broadcast, or the record player, are conveyed to an amplifier where they are increased in strength (amplified) great enough to actuate a loudspeaker mechanism causing its diaphragm (cone) to vibrate, creating sound.

This all takes place in a series of steps, which are technically referred to as stages. *It is the design of each of these stages* (electronic, mechanical or acoustic) that is the *criteria* for quality performance. Each stage is a determinant link toward the end result—there can be no compromise—it *is*, or it *isn't* high fidelity.

*High fidelity in its broadest terms, means flexibility too!* Present day designs affords the user the widest latitude for installation. Systems need contain only what the user desires. The avid hobbyist can avail himself of the whole works from radio to tape. While . . . the record collector—concentrating on the finest of components—can assemble a record playing system *virtually* custom-made to his own personal tastes, esthetically and economically.

Many different combinations of high fidelity component chassis can be assembled to suit individual listening requirements. In all combinations however, two components are perpetual: the amplifier and the loudspeaker. The other components provide the signal source and may be selected optionally, depending upon the individual. A pictorial outline of a complete high fidelity system is shown. It represents one of many combinations of deluxe full complement systems. Every facility for faithful reproduction of music and speech is possible: FM and AM Radio, Phonograph Records (all speeds and sizes), Recording and Playback of Magnetic Tape, Television Programs.

In high fidelity, the music lover can write his own ticket. If a complete system is not economically feasible at the present time, a *starter* system can be planned. In time, additional units could be added until the complete system is assembled. In this way, there need be no compromise with quality. Depending upon individual taste, you may choose from five basic starter systems. Note that none of the five systems shown have facilities for *both* radio and phonograph. Two are for record reproduction and three

## There has never been a wider variety of Hi-Fi components available

are for radio reception. In each of the systems, the loudspeaker used is a wide range unit, a basic speaker which can be built up to a 2 or 3-way multi-speaker system. The intent here is to present a basic starter group which allows a minimal investment (depending upon the quality and price level you choose) and a maximum facility for expansion and growth to the extent of your individual requirements. You may stop at the basic starter group, or build over a period of time until you have achieved your needs.

### Analysis of High Fidelity Components

There are six unit sections the music lover can select from for his high fidelity system. Two basic units which must be included in every system are: the amplifier and loudspeaker. The other four, are the signal sources: record player, radio tuner (FM, AM, or FM-AM), television chassis, tape recorder/player. Each of the units are available in a variety of types and styles. Understanding the differences is essential in planning for high fidelity.

### The Radio Tuner

As its name implies, it tunes in radio broadcasts. The sound picked up by the microphone at the broadcast studio is transmitted through space via a carrier wave whose frequency corresponds to the station number on the dial, e.g.: NBC in New York, on AM is 66 or 660 denoting 660 kilocycles; on FM is 97.1 denoting 97.1 megacycles. The signal picked up by a radio tuner is composed of the sound signal and the carrier signal. In operation, the radio tuner separates the two signals, discards the carrier signal and passes the isolated sound signal on to the amplifier. Reception of FM is different from AM (as is the transmitted broadcast) and a radio tuner must be designed and constructed to receive either or both types of broadcasts.

### The AM Tuner

This tuner receives *only* Amplitude Modulation (AM) broadcasts. Modern high fidelity AM tuners provide a band switch for selecting *broad, medium* or



Functional design of H. H. Scott FM tuner (311-B, \$120) and amplifier (99C, \$100) is most outstanding.



Complete cabinet unit includes Bogen FM-AM tuner, 10-watt amp, Garrard player, and University speaker. Cabinet by F. B. Arthur



Photo courtesy Heathkit

Tuner and amplifier chassis in matching cabinets are on wall shelf; power amp and player are atop storage cabinet.

narrow band reception. Band-width determines the sound quality but also affects selectivity (station separation). Narrow band reception is highly selective, but compromises sound quality. Broad band reception is best for high fidelity performance, but compromises selectivity. In most urban areas, within reasonable distances from the broadcast station, medium and broad band reception will provide good selectivity and quality of sound. Because of the present widespread use of FM broadcasting, the AM tuner is not used in many high fidelity systems. Only in remote sections where FM is not available, the AM tuner equipped with broad band tuning is popular. In areas which have limited, but good quality FM programs, it is practical to select an FM-AM tuner.

#### The FM Tuner

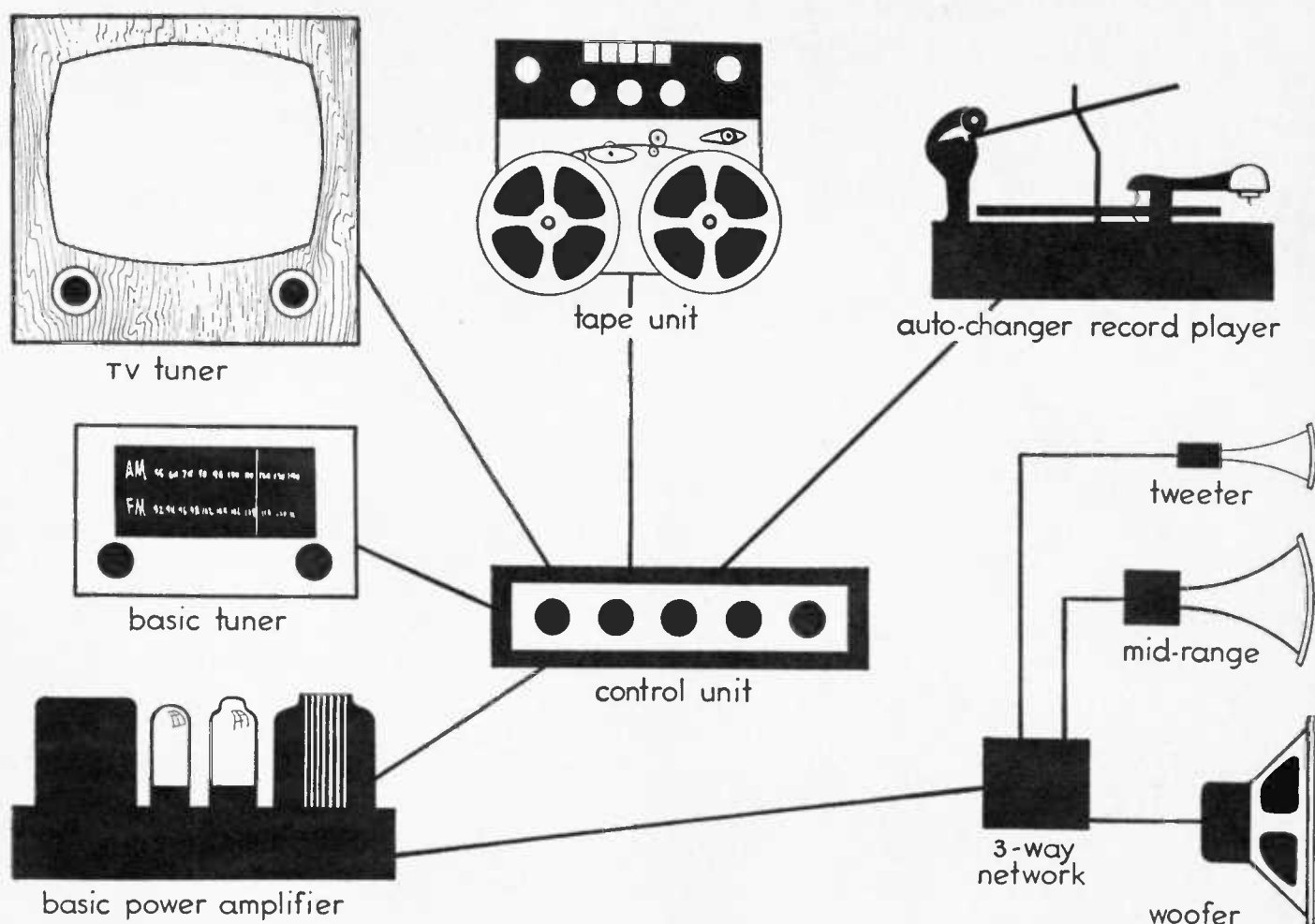
This tuner receives *only* Frequency Modulation (FM) broadcasts. FM reception is superior, because unlike AM, it offers these advantages: freedom from static and noise, no fading or distortion, same quality of reception day or night and in any kind of weather,

no interference from adjacent stations, wide frequency response to 20,000 cycles, greater dynamic (loudness) range. Today, with coaxial telephone lines, higher powered transmitters, and coast to coast network programs, FM has achieved tremendous popularity. Many programs are *live*, featuring great artists in the popular, jazz, and classical categories of the musical arts. With a good quality FM tuner, programs have been received from distances more than 100 miles. For these reasons, many music lovers select the FM tuner for their high fidelity system. Plus the fact that it is usually more compact than the FM-AM tuner . . . and, more economical.

#### The FM-AM Tuner

This tuner receives *both* FM and AM broadcasts. It comprises the circuits of both the AM and FM tuner. There are two types of FM-AM tuners. The first type is the basic tuner with radio frequency circuits only. It must be used with an audio amplifier containing an audio control circuit and a preamplifier-equalizer. The second type has complete audio

Here is the ultimate in hi-fi—a 7-component visual-sound system



Deluxe full complement hi-fi system could be selected and installed at one time, or this ultimate system could be completed by adding a component at a time, beginning with the speaker system, the amplifier, the pre-amp and tuner.

controls in addition to radio circuits. It contains, in addition to its circuits for FM and AM: tone controls (bass and treble), loudness control, phonograph pre-amplifier for magnetic cartridges, record compensator, auxiliary inputs for tape or television and a selector switch. It is intended for use with a basic power amplifier.

#### The Record Player

Originally named the phonograph, the record player consists of three equally important elements:

- (a) The motor and turntable which supports the record and rotates it at a prescribed speed.
- (b) The pickup arm which supports and guides the cartridge as it rides in the groove of a record.
- (c) The cartridge (also called a pickup) which has a micrified stylus tip that rides in the record groove. The undulations in the groove vibrate the stylus within a magnetic circuit (in the cartridge) changing its mechanical motion into electrical currents. These currents are

experienced as the recorded music (or speech).

All high fidelity record players are designed with one common objective: *To faithfully reproduce sound from a phonograph record, without introducing any form of distortion, or causing undue wear to the record or stylus tip.* Depending upon the make and model, record players are equipped for two, three or four speeds. There are four types of phonograph records for high fidelity use, each one requiring a different speed:

(1) *78 rpm*: Referred to as the *shellac*, or *old 78*. This is the original electrically recorded phonograph record developed in the late 1920's. Still in use, many record collectors have valuable libraries of 78's which contain the works of artists that have not been re-recorded on the newer LP record. Despite high surface noise, poor recording techniques, and distortion, they hold a revered position in any collector's library. The 78 rpm record is still being manufactured, but these are limited to "pop" tunes and children's records.



(2) *33 rpm*: The Long Playing record, usually referred to as the LP or Microgroove record. Requires a stylus  $\frac{1}{3}$  the diameter of the stylus used for 78 rpm records (1 mil instead of 3 mil). Developed by Columbia Records in 1948, the LP record opened a new vista for high fidelity. With its slower speed and narrower groove, the contents of as many as six 78 rpm records could be recorded on both sides of a 12 inch LP record, providing up to a full hour of music. More important, this record has spurred the greatest engineering development in the history of electrical recording. With perfected techniques, the LP record has brought the listener wide dynamic (loudness) range with a frequency response from 20 to 20,000 cycles. Surfaces are quiet (no annoying scratch) and there is constant fidelity from the outside edge to the innermost grooves of the record.

(3) *45 rpm*: A seven inch record with a large center hole, introduced by RCA soon after the LP record made its appearance. The 45 is a microgroove record and is played with a 1 mil stylus. Particular advantage over the 78 is its vastly improved sound quality. The seven inch disc contains about the same amount of music recorded on a 12 inch 78 rpm shellac record. Designed for extremely fast change cycle when used on the RCA 45 rpm automatic changer. Not too popular in high fidelity circles, the 45 rpm record has gained wide acceptance in the "pop" field taking the place of the 78 rpm "single" (dance, jazz, vocals, folk song, children's, etc.). Many companies list 45 rpm classical records in their catalogs, but so long as the same composition is available in the 10 and 12 inch LP record, the music lover will choose the single 33 rpm LP record in favor of a "stack" of 45's.

(4) *16 rpm*: Developed for the *spoken word*. With the advent of equipment to reproduce speech as well as music with breathtaking realism . . . drama has been added to the already tremendous repertoire of musical recordings for high fidelity. In addition to Bach, Brahms, and Beethoven . . . the music lover can avail himself of performances from the world's

greatest literary classics . . . from the poems of T. S. Eliot to Shakespear's Hamlet. At the beginning, *spoken word* recordings were made at 33 rpm. The 16 rpm speed permits twice the program material, or one hour of playing time on one side of a 12 inch record. And, there is virtually no difference in fidelity of the human voice. Presently, many of the recording companies specializing in this type of record are in the process of preparing a larger repertoire of 16 rpm records.

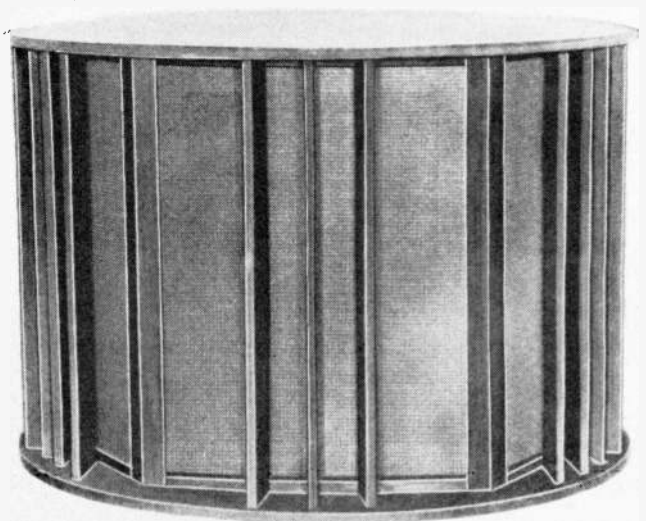
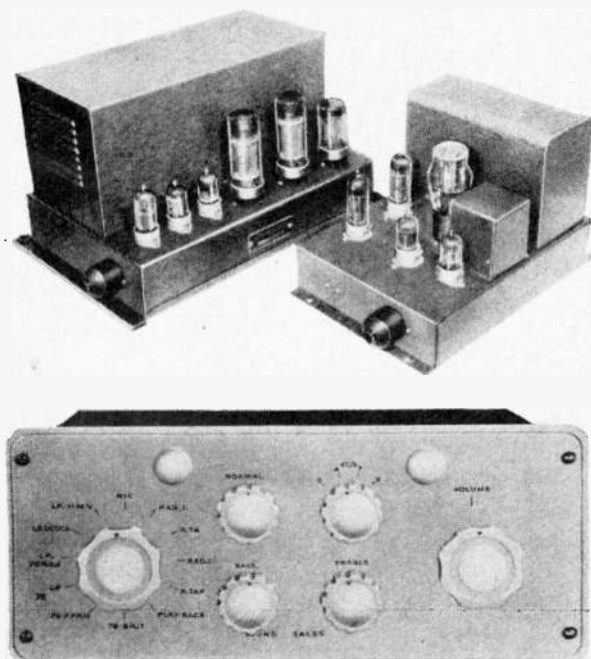
There are two types of record players for use in high fidelity systems: (a) Automatic. (b) Manual. The automatic player is built on a unit chassis which contains the motor and turntable assembly and the pickup arm. The manual player affords the purchaser the opportunity to select each of these components with greater discrimination and study. Of the two, the manual type of player is the more expensive, but also more precise mechanism. Excluding the cartridge, we must consider that we are dealing with a mechanical device . . . one which must be silent and not produce or reproduce the slightest sound for the cartridge to pick up and transmit to the amplifier. It is important therefore, to examine the differences between the two.

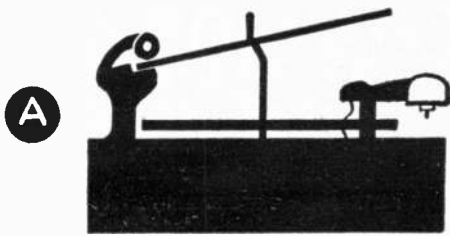
#### The Automatic Record Player

There are actually two different automatic record players: (1) The Automatic Record Changer. (2) The Automatic Single Record Player. The latter is often referred to as a manual player . . . but since all models employ some degree of automation, they should rightly be regarded as automatic record players . . . as opposed to the more precise and elaborate manual player.

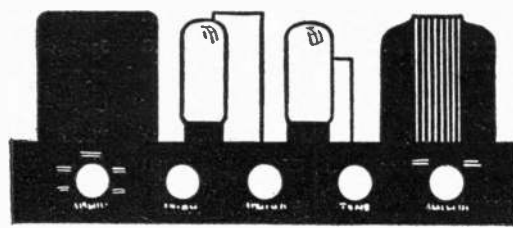
In addition, the performance characteristics of the single record player are similar in all respects to those of the automatic record changer, with the single exception that it does not stack a number of records and drop them automatically. Some models of single record players require only the placing of a record

Sound Sales tri-channel system is a complete system with control unit for bi-amplifier circuit. Requires the addition of only a signal source such as radio tuner, record player or tape recorder. Price, \$795.

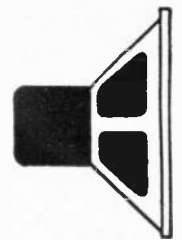




**A** auto-changer record player



single chassis audio amplifier

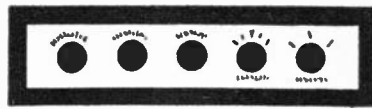


speaker

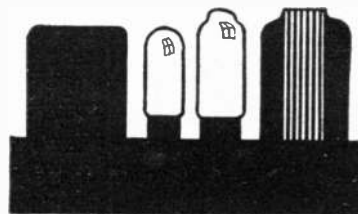
ON THIS PAGE YOU SEE FIVE BASIC STARTER SYSTEMS. ONE OF THEM WILL BE IDEAL FOR YOU.



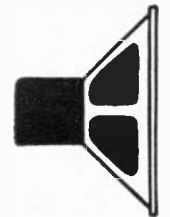
**B** manual record player



control unit

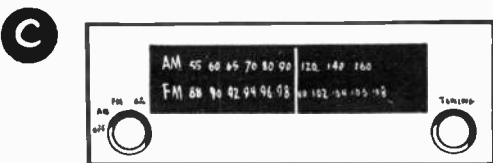


basic power amplifier

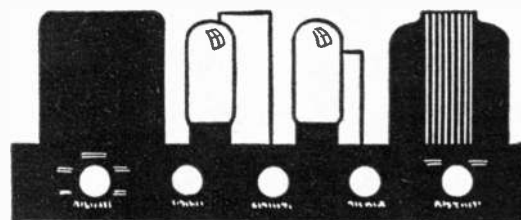


speaker

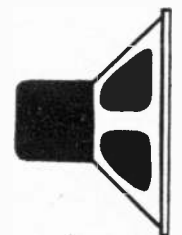
Depending upon individual tastes and requirements, a basic starter system can be selected as a measure of economy to achieve the best possible quality in an ultimate system with a minimal initial investment for the individual.



**C** basic tuner (FM or FM-AM)

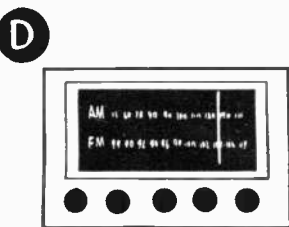


single chassis audio amplifier

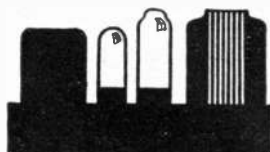


speaker

In systems A, B, and C, the initial amplifier can be single or dual chassis model. In A and B, the player can be an auto-changer, auto-single player, or a manual player. In C, tuner can be AM, FM, or FM-AM.



**D** tuner control unit



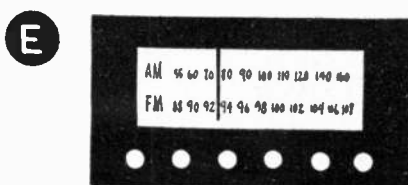
basic power amplifier



speaker

Ultimately, the enthusiast may desire the system shown on page 14; above, tuner, amp and speaker.

Below, a combination tuner-amplifier and speaker may be the answer to your hi-fi problem.



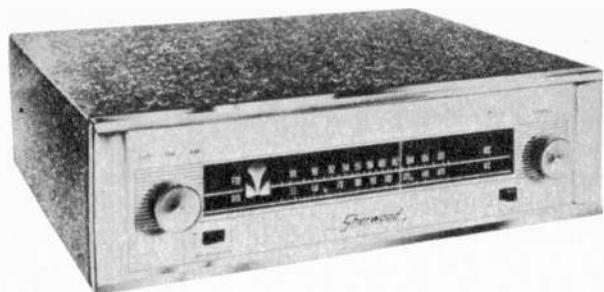
**E** tuner-control amplifier unit



speaker

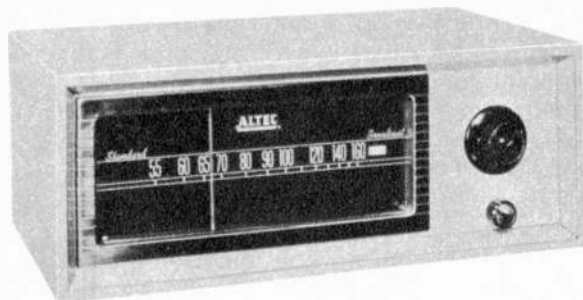
on the turntable and a push of a button. Operation is then fully automatic, the pickup arm automatically moves onto the record, and after the record is finished, the arm is returned to rest position and the motor shuts off. In other models, lifting the arm starts the motor which shuts itself off after the record is finished. The automatic record changer offers the added convenience of stacking from 8 to 10 records for many hours of listening, with only a few seconds of interruption during the change cycle. Many models of auto-changers have facilities to switch to single record operation if desired.

The automatic record player is a highly efficient instrument specifically designed for high fidelity application. In contrast to earlier models of a few years ago, present day models are easy on records and have features which have obviated both the mechanical and electrical problems such as: wow, flutter, rumble and hum. Modern units include: Improved drive assemblies for all four speeds; Interchangeable spindles for all types of records; Heavy-duty four pole motor

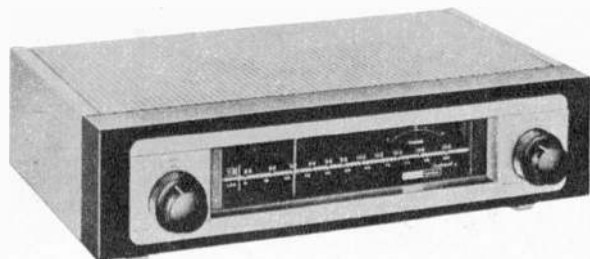
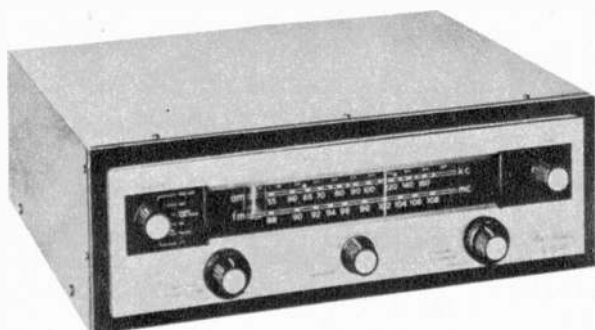


Above, the Sherwood AM-FM tuner (\$140) is available in six types of enclosure combinations.

Altec 305A AM tuner sells for \$93, employs a single optimum bandwidth, is one of the best.



Below, Pilot FA-550 FM-AM tuner (\$160) also includes input for reproducing direct from tape-head with the proper equalization.



Harmon-Kardon FM 100 measures only 3¼" high, sells for \$95, has automatic frequency control.



Above, Fisher 500 has audio control, preamplifier FM and AM, 30 watt power amp on one chassis (\$240); below, Fisher AM80 with variable band selection, \$120.



with shock mounts which isolate motor from rest of assembly; Improved pickup arm designs for high compliance and lightweight accurate tracking; Plug-in heads which accommodate most types of cartridges; Reduced overall size which permits greatest flexibility in installations. Some makes and models also include: Variable Speed Control; Built-in Noise Filter; Pause and Repeat Controls; Intermix of 10 and 12 inch records. The choice between an auto-changer and a single record player should be weighed by two factors—the auto-change feature and cost. The difference in price between the auto-changer and the single player ranges anywhere from \$10 to \$30—often this difference can be used to obtain a diamond stylus or a better cartridge.

#### The Manual Record Player

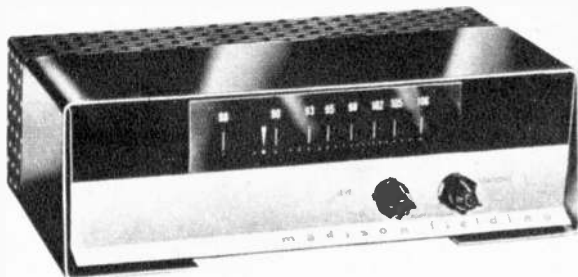
Professionally, this type is known as a *transcription player*, since its performance equals that of the types used by professional broadcast and recording studios. It is more costly than the automatic player, and it

requires a little more space in an installation. However, its superior performance warrants serious consideration by the record enthusiast. In time, its extra cost can well be amortized by longer record and stylus wear and the little extra space it requires will soon be justified by the added enjoyment from its conspicuously better performance. The manual record player is composed of a precision motor and turntable and a professional pickup arm. Because of its superior performance, the manual record player has earned tremendous popularity. Today, the selection of available models of turntables and pickup arms is greater than ever before in the history of high fidelity.

#### The Motor and Turntable

It is designed to provide precise speed with complete absence from annoying mechanical and electrical distortion (rumble, wow, flutter, hum). The motor used in such assemblies is of the heavy-duty four pole induction type, well shielded and shock-mounted. Deluxe models employ the more costly and

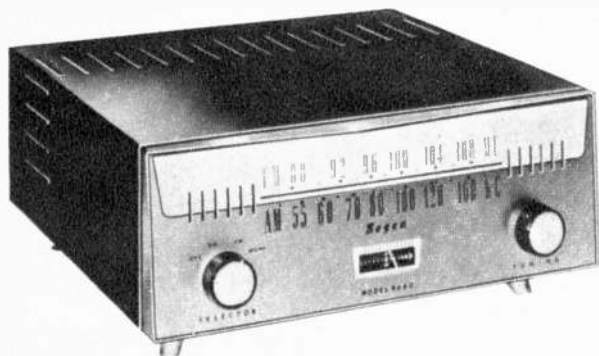
## Will you want to purchase an AM, FM or combination AM-FM tuner?



Madison Fielding FM-15 employs new *Micro-Beam* tuning system, is priced at \$80.



Bogen R775 AM-FM tuner has filter sections for eliminating rumble and record scratch, is \$250.



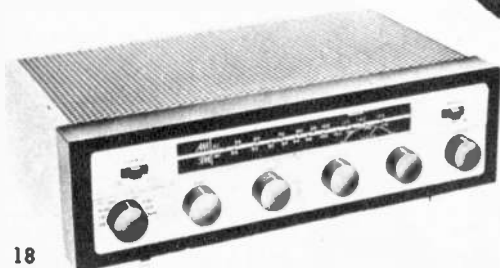
Bogen AM-FM features unique dial design on decorator-styled panel, is \$120.



Left, H. H. Scott uses separate tuning dials for FM or AM, sells at \$231.

Below, H. H. Scott Model 310B is FM only. Sells for \$160.

Below, Harmon-Kardon TA-1040 has "the works" in one chassis, including a 40-watt amplifier; \$225.



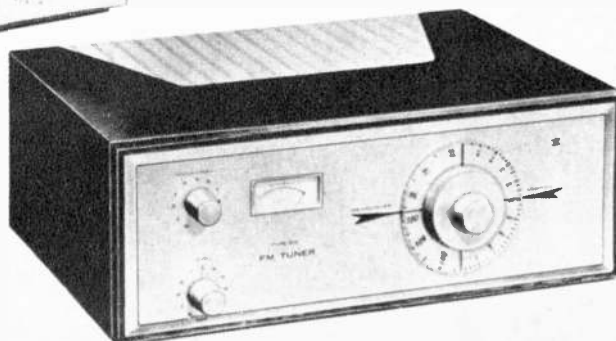
superior hysteresis motor. The precision machined turntable itself is heavy and well balanced. About the greatest difference between the various makes is the linkage between the motor and the turntable. The many linkage designs used in turntable assemblies are: idler wheel, gear-drive (usually governor controlled), and belt-drive.

Turntable assemblies are available in all price ranges and sizes. Size is usually determined by the diameter of the turntable itself, 12 or 16 inches. Since the greatest percentage of music lovers rarely have an occasion to play 16" transcription recordings (these may even be played in a 12" table) it is practical to only consider the 12" unit.

Moreover, the 12" table is more suitable for average installations, requiring less area. Prices of professional quality 12" turntables range from about \$40 for a single speed unit to as much as \$150 for a deluxe unit with hysteresis motor and three speeds. No longer drab, modern day turntables are attractive and are available in smart color combinations which are easy to blend into a unit of furniture in the home. Many have new features which simplify operation to child's play. Installation of a turntable and pickup arm is not difficult. It requires only a moderate amount of skill with woodworking tools and the ability to make accurate measurements. Manufacturers supply templates for installation, and once instructions have been followed and the cutouts made, assembly is as simple as an *Erector Set* project.

### The Pickup Arm

This unit is also referred to as a tone arm (from the original *tone arm* of the acoustic phonograph). Singularly, it is the most important *mute* component in a record player. Its role of supporting the cartridge and *riding with it* as it spirals through the record groove must be executed with immutable precision. Upon it, depends: the extent of tracking accuracy, correct stylus pressure, and proper seating of the stylus tip in the record groove. The arm must provide



## Should you buy a record changer or turntable?



Below, one model of Garrard automatic record changer; Garrard "Crown" RC98, below, has pusher platform, variable speed, is \$67.50. Above, the Garrard Model T, Mark II (\$32), has four speeds, automatically starts and stops.



Above, the Miraphon XM-110A (\$37.50) features recessed turntable, starts when arm is lifted, shuts off after record is finished. Below, Miracord XA-100 is fully automatic, includes a built-in scratch filter, is priced at a moderate \$67.50.



a damping action to avoid mechanical resonances (which can occur during crescendo passages, or when playing a badly warped record). These resonances can mix with the signal generated by the cartridge and result in distortion. It must also be compliant, permitting the stylus complete freedom of motion, yet it must guide the stylus tip with a minimum of divergence so that it is closely tangent to the groove at all points of the record surface. No arm provides *perfect* tangency in tracking. Theoretically, it would require an arm of infinite length. Therefore, the longer the arm, the better its tracking characteristics. Professional pickup arms are made in two basic lengths: 12 and 16 inches. To more closely approximate *perfect* tracking, manufacturers bend or offset the front end of the arm which supports the cartridge. Selection of the pickup arm should be considered on



the basis of available installation space, cabinet or enclosure.

### The Pickup Cartridge

A highly sensitive transducer, the cartridge has a stylus which rides along the undulated walls of the record groove, vibrating in tune with the recorded program. These vibrations (lateral, or side-to-side) move within a circuit in the cartridge and generate minute signal currents which are then conveyed to the amplifier.

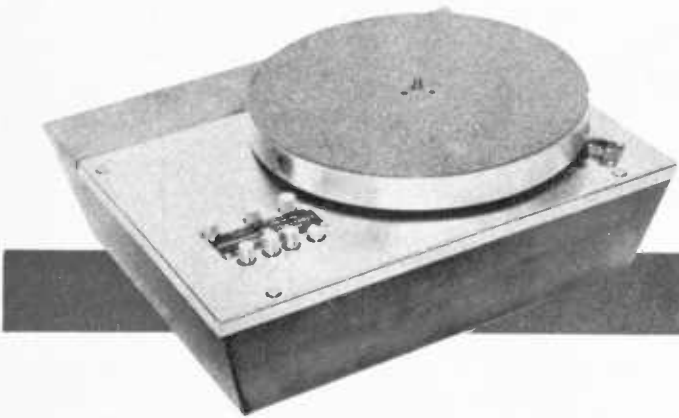
There are a number of cartridge designs employed for reproducing the engraved sound of a phonograph record. The crystal, a forerunner of the very early days of high fidelity, has been superseded by the *ceramic* element which operates under the same piezo-electric principle. Because the ceramic type of cartridge is



Rek-O-Kut B12H Rondine Deluxe turntable (\$130), wood base (\$27), Model 120 pickup arm (\$27) shown.



Metzner's Starlight (\$59.50) has variable speed from 16 to 78 rpm, has illuminated strobe.



H. H. Scott's 710-A stroboscopic turntable (\$125) has acoustic filtering, vernier speed adjustment.



Garrard's Model 301 (\$88) has three speeds, suspension mounting, turret drive mechanism.



Components Corporation's Duo-Speed has belt-drive unit, retails at the moderate price of \$49.95.



Presto T-18 Pirouette (\$66) has three speeds, hysteresis or 4-pole motor.

## Know what goes into a pickup cartridge before buying one

more economical to manufacture, and does not require preamplification or equalization, it has enjoyed widespread use by manufacturers of commercial radiophonographs. Thus, it has reflected upon itself a degree of indifference by the high fidelity hobbyist. Ceramics are made in a variety of quality levels. Those in the low-cost bracket (below \$10) should definitely not be considered . . . and, to obtain a *quality* ceramic cartridge involves an expenditure that does not differ too greatly from that of the more acceptable magnetic cartridge. High fidelity ceramic cartridges are reputed to have a wide frequency range. With every amplifier manufacturer providing preamplification and equalization facilities, the ceramic's characteristic high output and *built-in* equalization does not present any particular advantage. On the other hand, where a better quality record player is desired it is ideal for use in existing amplifiers which do not have these circuits.

Magnetic cartridges are tiny *electrical* generators. A mechanical motion (vibrations in the record groove) of the stylus generates electrical currents. There are two types of magnetic cartridges: (a) Variable Reluctance or *moving-iron*. (b) Dynamic or *moving-coil*. Both employ magnetic induction but use a different principle to achieve it. In the Variable Reluctance cartridge, the stylus is linked to a metal arm which moves within a magnetic field consisting of a strong permanent magnet and a coil, both of which are stationary. In the Dynamic cartridge, a tiny coil of wire is wound around the arm holding the stylus and this coil of wire is moved within the magnetic field of a stationary permanent magnet. The Variable Reluctance cartridge is capable of higher output levels than the Dynamic which has an inherent low output (about 3 millivolts compared to 25-30 millivolts). For this reason, the Dynamic cartridge requires the use of an input transformer when used with amplifiers

not designed to operate at such low level inputs. The Variable Reluctance cartridge will operate into the preamplifier circuit of all modern amplifiers. Magnetic cartridges have gained wide acceptance in high fidelity circles, and are in most popular use.

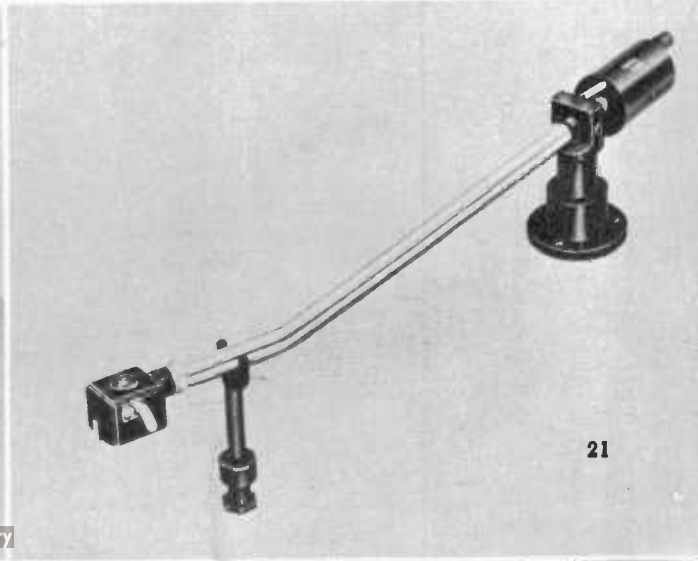
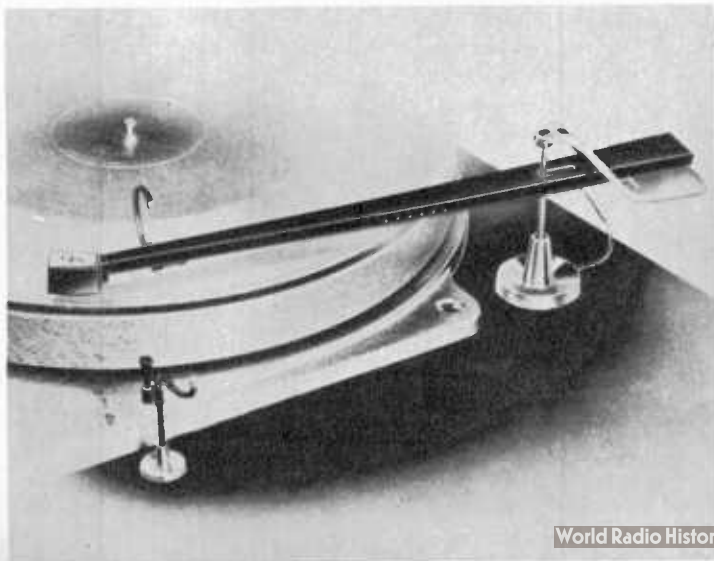
Another type of high fidelity cartridge is the FM pickup which is a system made up of several components. The principle of the FM pickup cartridge made by *Weathers Industries*, is that of a capacitor with the stylus coupled to one of the plates. The cartridge is connected to an oscillator in a miniaturized FM transmitter. Connection from the oscillator is then made to the amplifier. This type of pickup cartridge, because of its lightweight (2 grams or less) tracking, is not generally used in automatic record players. The *Weathers* pickup system consists of an arm with integral cartridge and an oscillator power supply.

### The Phono Stylus

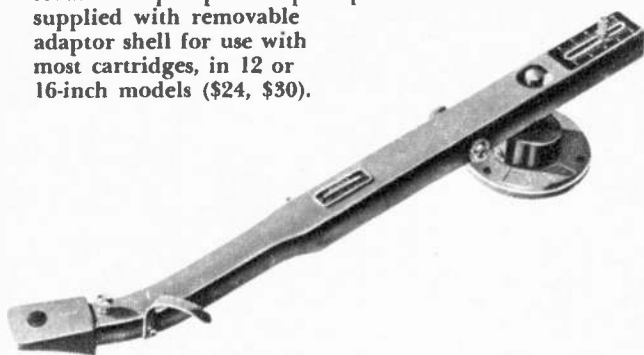
To avoid wear on a record, we must first use a stylus that itself, is highly resistant to wear. For microgroove records (16, 33 and 45 rpm) the use of anything but a diamond stylus is unheard of. Once the stylus itself begins to wear, this wear is transferred to the crests and mounds in the record groove which represent the actual recorded sound. The surface of the stylus tip must have perpetual smoothness and retain its even, conical shape. The diamond is preferred because of two important properties:

- (1) Resistance to wear—Tests have been conducted which proved the diamond 90 times harder than sapphire.
- (2) Heat causes deterioration of both the stylus and record groove surfaces, and a great deal of heat is generated at the stylus tip. Diamond is an excellent conductor of heat, while the sap-

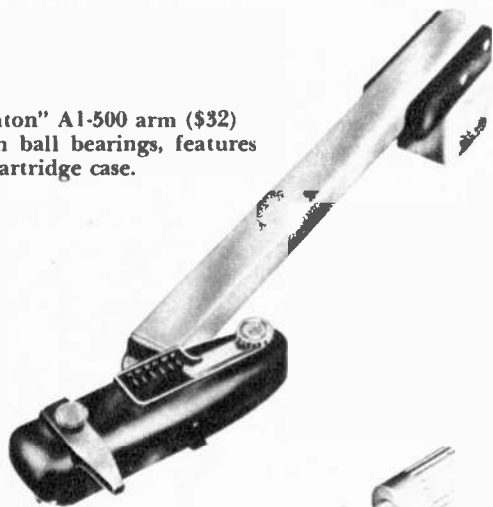
Pickering Unipoise (\$60) has the Fluxvalve cartridge built in; T-shaped stylus assemblies are interchangeable to provide tip radius of 1/2, 1, and 2.7 mils; it pivots on a single bearing. Electro-Sonic 310 arm (\$107) is suitable for ESL pro series cartridge, is Danish made, pivots on ball bearing in a gimbal structure.



Audax compass-pivoted pickup arm is supplied with removable adaptor shell for use with most cartridges, in 12 or 16-inch models (\$24, \$30).



GE's "Baton" A1-500 arm (\$32) pivots on ball bearings, features hinged cartridge case.



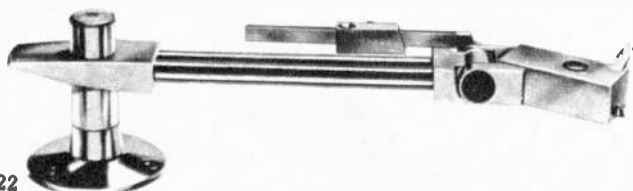
Rek-O-Kut 120 arm (\$27) employs Versa-Twin bearings, removable cartridge case.



Fairchild 280A (\$34) uses gyro pivots and arm is hinged close to pivot point.



Metzner's push-button control of the "07" arm (\$23) has hinged cartridge case that raises.



phire is not. Thus, the diamond will more easily transfer excess heat from the fragile record groove, avoiding any possibility of deterioration.

Moreover, looking at it from a long range point, the diamond is actually less expensive. Diamond will outlast sapphire about 90 to 1 . . . and, the diamond is not nearly that much more expensive to begin with. If one stops to calculate the difference, the total cost of 90 sapphires is about \$180 . . . while *one* diamond costs about \$16 to \$20 (depending upon make of cartridge). Thus the diamond proves to be the lesser expensive over a period of use.

The use of osmium for high fidelity record playing is a cardinal sin and should be avoided if you have any regard for your records. Sapphire is still accepted in hi-fi circles, but mostly for the occasional playing of a 78 rpm standard-groove record. If a record collection contains a fair-sized amount of 78's which are played frequently, then a diamond is essential to avoid possible damage to the records. Tests (made on a good quality record player with a stylus pressure of less than 9 grams) have proved that the comparative life of the three stylus materials are:

- (1) DIAMOND—retains smooth surface over the conical shaped tip even after 800 hours of playing time, and is reported to last well beyond 1200 hours before showing only the slightest wear.
- (2) SAPPHIRE—(synthetic) usually begins to wear after 10-20 hours of playing time.
- (3) OSMIUM—will wear after from 3 to 5 records.

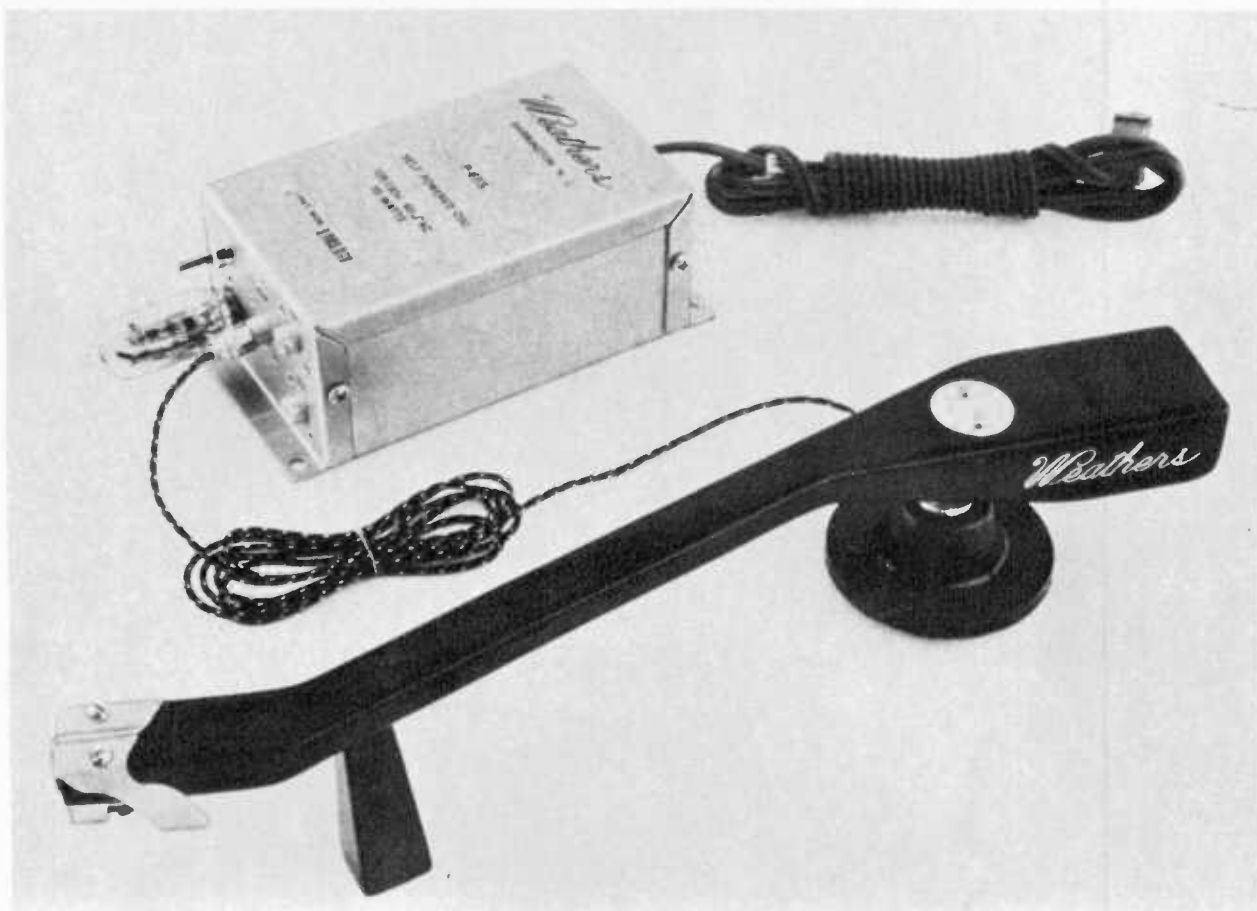
There is no such thing as a *forever-permanent* stylus material . . . not even diamond. *But*, for practical purposes the diamond is by far the most permanent of materials.

#### Mechanics of the Cartridge

Unlike so-called hi-fi phonographs where the cartridge is part and parcel of the record player, the high fidelity system may use any type or make of cartridge, selected to suit individual listening requirements. Almost every type and make of cartridge can be used in any of the pickup arms . . . professional type or the arm of an automatic record changer or single record player. Mounting facilities are universal (even with imported products), and with modern plug-in designs, more than one type of cartridge may be used with the high fidelity system . . . easily interchangeable . . . whatever the purpose may be. The four types of records now in use require two styli, each having a different tip radius. To provide a convenient means of selecting and positioning the correct radius stylus, cartridges are made in a number of mechanical designs.

(1) *The single cartridge:* Available for standard-groove (78 rpm) with a 3 mil stylus, and for micro-groove (16, 33, and 45 rpm) records with a 1 mil stylus. Usually used with plug-in shells that can be interchanged. Many people who play only micro-





Weathers FM pickup system uses a miniaturized FM transmitter and a cartridge to a capacitor base pickup.

groove records use the 1 mil cartridge only. Recently, *Pickering & Co.*, introduced a new single cartridge which effects a change of stylus by simply inserting a "T" shaped assembly containing the proper radius stylus. This permits using a single cartridge permanently in an arm, for all types of records. Other single cartridges must be changed as a unit to provide a change of stylus radius.

(2) *The dual cartridge:* This is a single element cartridge with facilities to change styli by means of a mechanical change assembly. *General Electric* makes the "triple-play" which has a dual stylus assembly that is spring mounted and is turned to bring the correct radius stylus into operating position. Each of the styli are independently replaceable. *Pickering & Co.* makes a single element cartridge known as the *Flux-valve* that uses two independent stylus inserts which slide into two sockets located at the front of the cartridge. Stylus change is effected by turning a lever in front of the entire assembly.

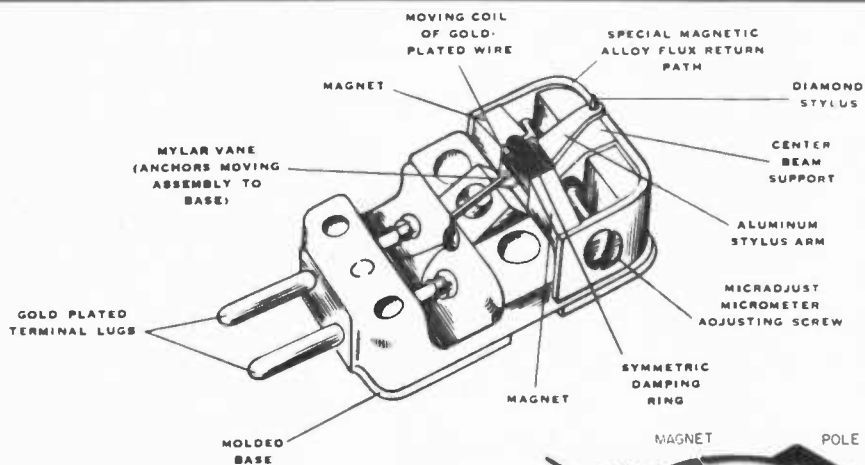
(3) *The turnover cartridge:* This is an assembly that contains two separate cartridges. Both cartridges are seated in a turnover mechanism which provides a common electrical terminating point for connection to the amplifier. In many models, the stylus in each cartridge is replaceable.

#### The Television Tuner

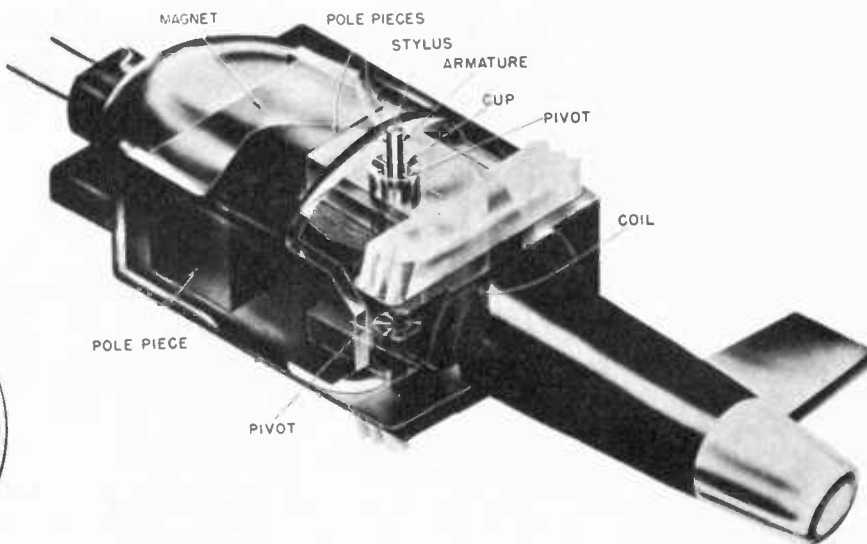
Television has become the pivot of family activity in many homes. True . . . the music lover shunned TV for his high fidelity system at the beginning . . . which was about a decade ago. It was at this time that both TV and hi-fi began to interest the public. Of the many hundreds of high fidelity custom installations made then . . . only a handful included TV . . . and, they were ordinary TV receivers modified to play through the high fidelity system. Today TV has become an essential part of a home entertainment center . . . *the high fidelity system*. Commercially, there are only a few TV tuner chassis specifically made for a custom hi-fi installation. Two companies have been most prominent and make the most widely used models. One is *Conrac* who manufactures the *Fleetwood* TV tuner which is available in a remote model that can have more than one picture tube chassis operate from one tuner unit; and a non-remote model with the controls built on the chassis front. The second is *Tech-Master*, who makes non-remote models based on the famous "630" circuit.

As a measure of economy an existing TV receiver can be modified so that the sound portion of the program is reproduced through the high fidelity system. When including such a unit into a wall built-in or

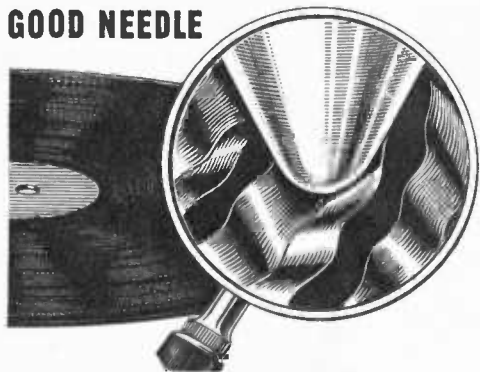
When planning, leave room in your unit for the TV chassis—



Left, phantom views of the mechanism and magnetic circuit of the Dynamic (moving coil) and the Variable Reluctance (moving iron). Pictured are the Pickering 350 (\$36) and the Fairchild 225A, priced at \$37.50.

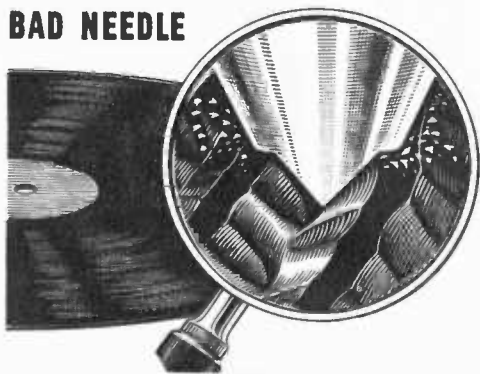


### GOOD NEEDLE



DIAMOND BALL TIP GLIDES SMOOTHLY  
LASTS LONGER — PROTECTS GROOVES

### BAD NEEDLE



ORDINARY NEEDLE WEARS QUICKLY  
CHISELS RECORDS — DISTORTS SOUND

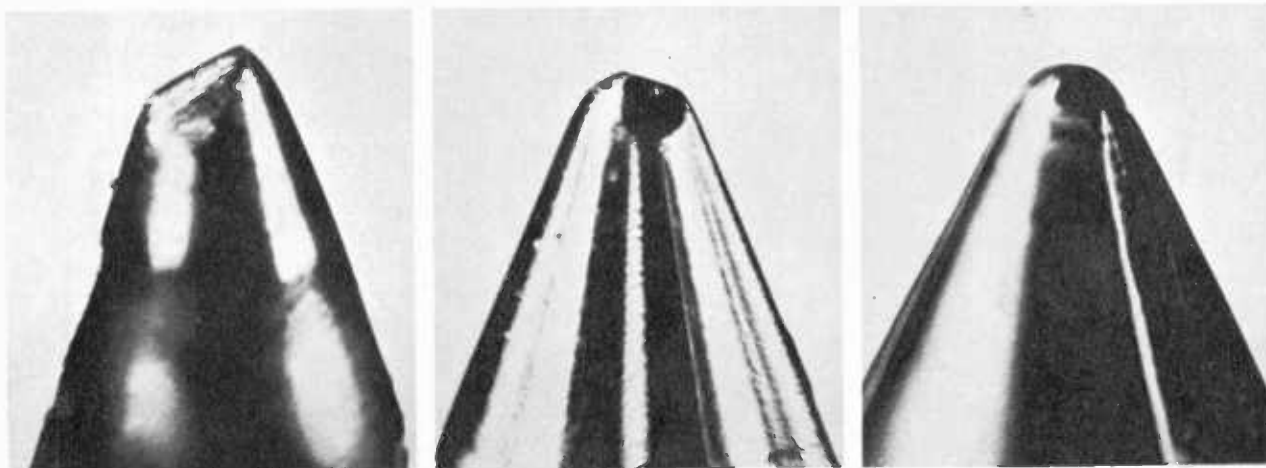
other custom installation, it is practical to make the area for the TV unit larger than presently necessary. The installation of a custom chassis at a later date would probably be considered with a larger picture tube. Information regarding the requirements for preparing adequate space may be obtained by writing to one of the companies for literature.

Almost all makes of hi-fi audio control units and audio amplifiers provide an input socket for connecting the sound of a TV tuner chassis. Present day TV tuner chassis are smaller than their predecessors, and the newer picture tubes with 90° deflection require less depth. For example: A 21" tube requires about 22 inches and a 27" tube about 24 inches. With the many wonderful "live" spectaculars and fine musical programs, TV and high fidelity have found a very compatible meeting ground.

### The Audio Amplifier

The audio amplifier has oft-times been referred to as the *heart* of the hi-fi system. More so, it is the pulse

Experts agree it is especially wise to invest in a diamond stylus—



Microphotographs of styli after a comparative test made on a good quality record player using a stylus force pressure of less than 9 grams show (l to r) osmium after 5 hours, sapphire after 20, diamond after 400.



Magnetic type single cartridges: left, Fairchild (\$37.50) of dynamic (moving coil) principle; right, Miratwin MST-10 (\$34.50) is of moving iron principle.



of the system, for through it runs the program material from radio, phonograph records, television and tape recordings. The amplifier must satisfy the needs of all of these units plus . . . the loudspeaker system. Its job is to take a micrified signal and increase it great enough in strength to actuate the motor mechanism (voice-coil and magnet) of a loudspeaker or loudspeaker system. The functions of an amplifier system (preamplifier, control unit and power amplifier) are easy enough to understand.

(1) The amplifier includes a network to provide inputs from the many signal sources. Controls make possible the adjustment of volume level, tonal balance, selection of signal source, equalization, etc.

(2) It must compensate for any *distortion* developed at the signal source. Distortion in this sense, is not noise, hum or other unpleasant sounding element (although it can result as such). In the process of recording, engineers alter the characteristic of the sound by attenuation (cut) and accentuation (boost) at different frequency points. This is done to obtain

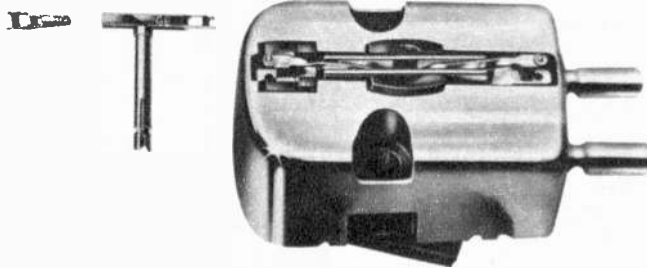
mechanical control of the record groove in order to properly *engrave* the sound signal. This process is called *equalization*, and an amplifier must provide a means of compensating for this by inverse equalization, removing this *distortion*, restoring the sound to its original characteristic. Compensation takes place in the preamplifier circuit of an amplifier.

(3) It must amplify the signal millions and millions of times, without affecting the signal. Once the signal has passed the preamplifier-equalizer stages, the amplifier must add or subtract nothing from the sound.

(4) It must convert the sound signal from its electrical state (volts) into power (watts) and couple this power to a loudspeaker. In this respect, it must handle all transients (bursts and surges of power resulting from a crescendo passage or the instantaneous dynamic sound of the tympani or other percussive instrument) as easily as it handles the soft pianissimo notes of the flute or oboe. An amplifier with good power handling capabilities will handle all programs equally well, from a string quartet to a full 100 piece



General Electric cartridge (\$20) is of the variable reluctance (moving iron) principle.



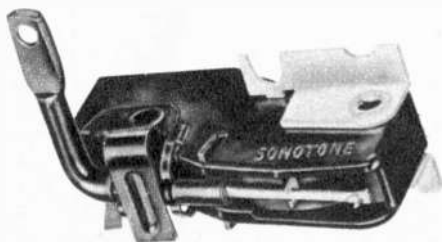
GE 052A magnetic dual cartridge (\$23) uses twist motion to bring correct stylus into position.



Pickering 350 magnetic dual cartridge (\$36) uses a turnover motion to bring stylus down.



Above, Pickering fluxvalve single series 370 cartridge (\$17.85) uses T-guard stylus which easily slips in place.



Sonotone "3" series ceramic cartridge (\$20) is single unit with turnover stylus assembly.

symphony orchestra, without distortion. It never is called upon to operate at full power for long periods of time, mostly it "loafs" at a *fraction* of its power, but it should have ample *reserve* power when needed to handle the short transient intervals.

Of the many circuit stages in an amplifier, the music lover need only be concerned with two: (a) The Preamplifier-Equalizer Control. (b) The Power Amplifier. These two parts are directly related to the manner in which amplifier equipment is purchased. Amplifiers are made on a unit chassis (complete), or on two chassis which can be purchased in combination or individually.

(1) The unit chassis amplifier is complete with preamplifier-equalizer control and power amplifier on a single chassis. Depending upon the make, design and power rating, the unit amplifier is made in all sizes and shapes . . . from a petite 10 watts to a compact (but heavy) 60 watts. Such a unit is suitable for installation into almost every type of installation because of its one-chassis design. Where dimensions permit, it may be placed within a limited space in a bookcase, on top of or in an end table, and behind a panel in almost any type of installation. Many models are supplied in attractive cabinets or enclosures and may be used with a companion radio tuner. Both units can be placed side by side or atop one another. This amplifier has all of the facilities necessary to function as the *center* of the high fidelity system: inputs for most signal sources, preamplification for low level magnetic cartridges, equalization for recording characteristics, tone controls, volume control, and selector switch. Some makes provide such added features as: a loudness control, rumble filter, independent level controls at each input, etc.

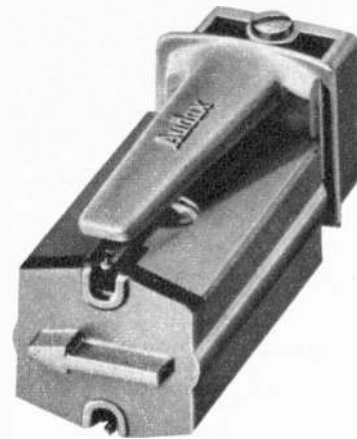
(2) The audio control chassis (also know as a front-end) is designed to work with a basic power amplifier, which is on a separate chassis. It is usual to use an audio control and power chassis of the same manufacture, however some hobbyists combine the control unit of one make and a power amplifier of another. This two-chassis combination is usually more costly than the single chassis unit. Often, it is of much better quality in performance. Hum level can be kept low since the massive power supply of the power amplifier is remote from the sensitive input circuits. Many types of control units have more elaborate features than the unit amplifier and because of their extreme compact design, are more suitable for use in wall or built-in installations. For one thing, they are light in weight which permits hanging on a panel. In such an installation, the power amplifier can be located in a remote place such as the cellar or attic, or in an otherwise unusable place in the built-in. The control unit has often been confused with a remote control. It is remote . . . but, *only from the power amplifier itself*. Remote placement is made possible by the use of cathode follower or low impedance output circuits in the control chassis. With such circuits, the two chassis may be located up to 200 feet apart. By contrast, the signal source components, especially the record

player, should be in proximity to the control chassis . . . about 15 feet.

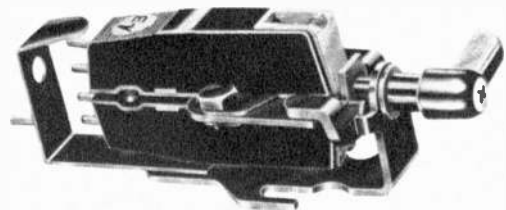
(3) The basic power amplifier is essentially an automatic device. Once connected to a control unit, the power amplifier increases the signal from the control unit and converts it into power to actuate a loudspeaker. Many have no controls . . . not even a manual on/off switch . . . and depend fully upon the control unit for all adjustments. Some have an input level control which varies the voltage level of the signal from the audio control unit. Almost all have a hum balance control and some designs include a control to balance the output tubes. In all cases, the power amplifier is dependent upon the control unit for all of the normal adjustments of tone, volume, equalization, etc. The power amplifier is normally used with the preamplifier-equalizer control unit as explained in (2). It may also be used with FM-AM radio tuners which include audio control, preamplifier and equalizer circuits. In the case of the latter, all signal sources are controlled at the panel of the radio tuner. This type of arrangement *simplifies* matters in installation and operation.

Basic power amplifiers are made in power capacities of from 15 to 125 watts. They each have a specific purpose and should be selected on the basis of individual needs. Amplifier power is directly related to distortion, and amplifier specifications are usually given as . . . "30 watts with less than 1% Harmonic Distortion" . . . or, "50 watts at less than 1% Distortion"; "30 watts with less than 0.25%." Note that the 50 watt amplifier has a lower distortion figure at 30 watts . . . even lower than the 30 watt amplifier. Briefly, it means that an amplifier of greater power capacity will have a *cleaner* undistorted response at a given listening level. It also means that it can handle transients better. The sounds of music have a tremendous ratio between average and maximum power demands . . . thus, reserve power is required to *handle* these transients which are maximum power demands . . . without distortion.

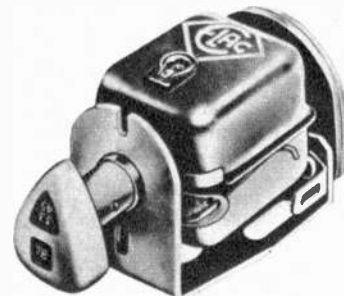
The selection of an amplifier is closely related to the selection of a speaker . . . or, for that matter, all of the speakers in the hi-fi system. For example: Different speakers have a different *efficiency* rating. Now percent efficiency is the ability of a loudspeaker to produce a given number of acoustic watts for a given number of electrical watts from the amplifier. Percent efficiency in loudspeakers range anywhere from 2% for a cone speaker to 50% for a horn tweeter. Supposing you selected a speaker system which, after many concentrated listening tests, had the most pleasing and natural qualities. If the efficiency rating of this speaker system was 5%, the amplifier would have to deliver 5 watts to develop  $\frac{1}{4}$  watt from the speaker. But, depending upon the music, it may vary a great deal. During a transient interval . . . the amplifier may be called upon to produce as much as 200 times average power . . . if there is not enough reserve power, distortion will result, even for the shortest instant. If many speakers are to be used, one for the main



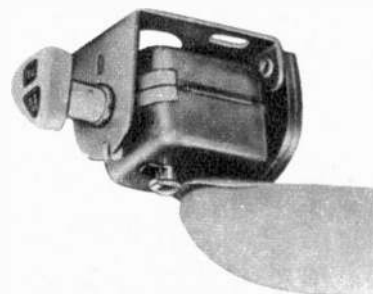
Audax polyphase pickup cartridge (\$47) employs turnover principle with two styli in single mechanism.



Electro-Voice series 80 ceramic cartridge (\$23) is also available with turnover assembly (\$34).

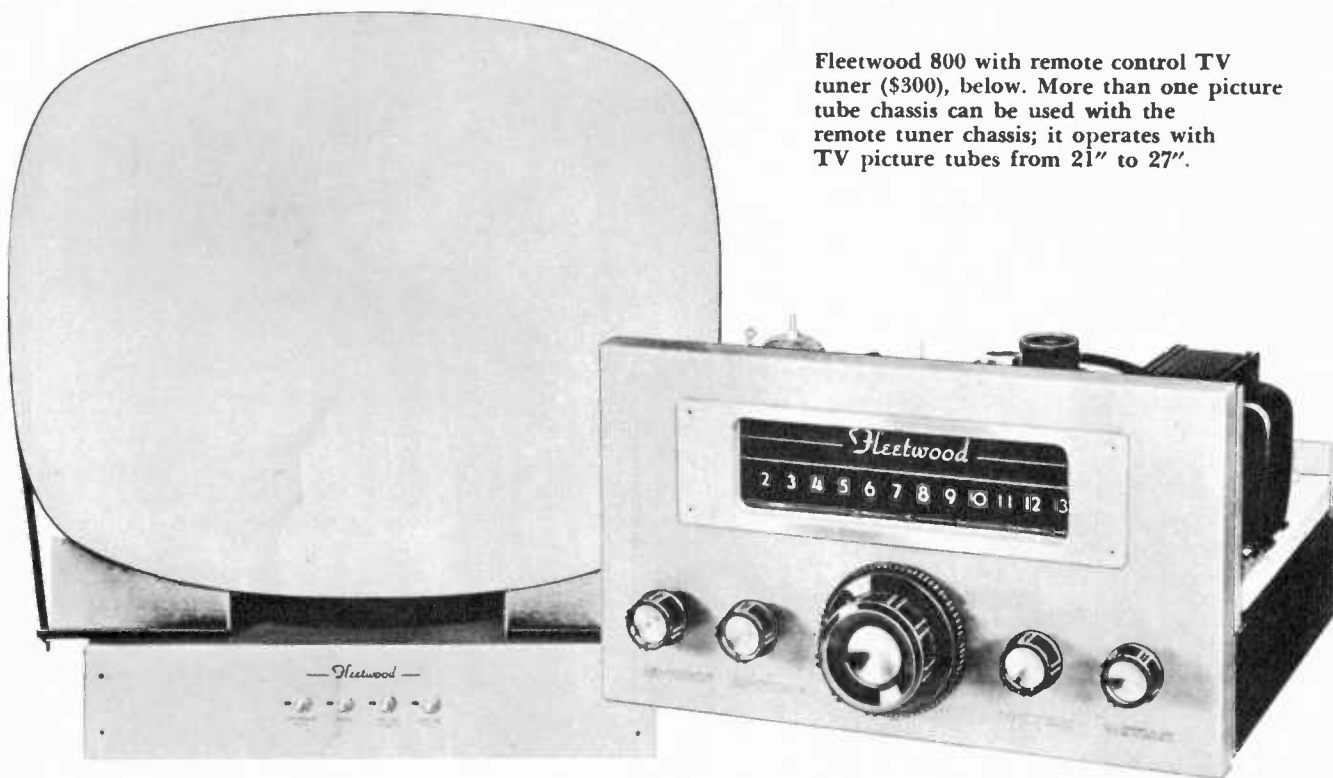


Miratwin MST-2D (\$45) magnetic turnover cartridge uses two separate cartridges mounted back to back.



Shoulder around Miratwin stylus makes it easy to remove entire assembly with fingernail for replacement.

Remote control TV is now available at moderate prices—



Fleetwood 800 with remote control TV tuner (\$300), below. More than one picture tube chassis can be used with the remote tuner chassis; it operates with TV picture tubes from 21" to 27".

system and others for remote placement in other rooms of the house, ample power should be considered to operate all of the speakers. For this reason, amplifiers are made in a wide range of power capacities.

#### The High Fidelity Receiver

With high fidelity gaining more and more recognition . . . designers have been faced with the demands from every phase of everyday living. At the start of high fidelity, people lived by a rigid set of rules. Record players had to be elaborate to earn the authentic badge of quality. Tuners and amplifiers were big, wide and heavy. Speakers were housed in huge mysterious enclosures. In short, high fidelity lacked considerably in the light of modern and intelligent industrial design. Almost all equipment retained the "professional" studio appearance and was ill-fitted to domestic decorative schemes. But, high fidelity has come a long way. Manufacturers have improved industrial design. Units are more compact, attractive for even the most elaborate decorative schemes, and designed with the ultimate purpose in mind . . . as part of the domestic scene.

Separate chassis was the rule because of many technical and engineering problems . . . foremost of which . . . was hum. Today, this problem has been obviated by improved circuit design and the high fidelity unit receiver chassis has been added to the list of quality high fidelity products. On one chassis, there is: (a) An

Audio Control complete with preamplifier-equalizer and input circuits. (b) An FM-AM radio tuner. (c) A power amplifier. The prime advantages of such a unit is compact and unit construction for limited space installations, and cost since the multiple chassis systems are generally more expensive to assemble. On the other hand, there are disadvantages too. For one thing, separate component chassis in most cases are of better quality. They will have a still lower hum level and they can be assembled to provide higher power capacities. For another, separate components permit greater flexibility. Aside from the feature of more elaborate and precise control facilities, they afford a greater choice and do not limit the buyer to all products of one manufacturer. In some cases, the individual tastes of a person may choose the radio tuner of one make and an amplifier of another. Nonetheless, the unit receiver chassis does have a place in high fidelity . . . it should be considered in the light of individual requirements . . . this will be fully covered in another chapter.

#### The Loudspeaker

Of all the components in a high fidelity system, the loudspeaker has the closest *kinship* to the listener. No matter how costly or elaborate the other components may be . . . the loudspeaker determines the measure of performance quality. *It is the only component you hear!*

Like the phono cartridge, it is a transducer, but it

## Low-cost tape decks can be installed within the compact hi-fi unit



Revere T-11 tape deck handles up to 10½" reels, is \$285, measures 19x14", has push-button operation, is for monaural record playback only.

Right, the tape recorder can always be added; modern tape mechanism chassis are called "decks"; shown is the Viking tape deck (\$106) and RP-61 preamplifier (\$77) installed in built-in unit.

operates in an inverse manner converting electrical energy into mechanical motion. The loudspeaker used today is a PM (permanent magnet) Dynamic reproducer. It consists of a motor-mechanism (voice-coil and magnet), a diaphragm (cone), and a sturdy frame or chassis. The voice-coil is positioned within a tiny area (gap) in the magnet and is coupled to the diaphragm. When electric currents (signals) are fed into the voice-coil, it affects the magnetic field in a manner which causes it to move back and forth with the diaphragm, creating sound, which you hear as music or speech.

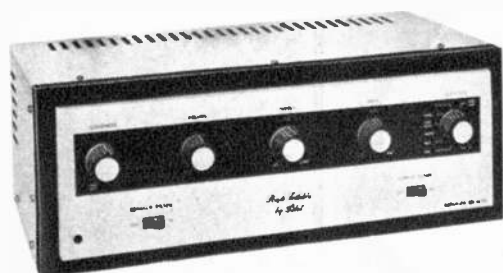
The basic loudspeaker is known as the *wide-range* or *extended range* speaker. It uses a single motor-mechanism and, depending upon make, employs a special cone design to reproduce the widest possible range of sound. The more popular type of reproducer is the multi-speaker system. It employs two or more speakers, each designed to handle a specific band of frequencies, in order to efficiently reproduce the entire musical range. The wide-range speaker does not reproduce the *entire* musical range. But, this speaker plays an important part in building a high fidelity system. It may be used as a *starter* speaker . . . to be expanded into a deluxe multi-speaker system at a later date. Or, it may be used initially as a mid-range speaker component in a complete system. It is ideal for use as a remote speaker installed in other parts of the house (bedroom, den, playroom, the basement or attic).



Below, photo (courtesy Ampex) shows compactness of three-unit system which includes tape and twin speaker enclosures with binaural effect.



Amplifiers now have a new look; they're made to be seen—



The unit or single chassis amplifier is made available in a wide range of sizes, shapes and power capabilities. Almost all include some form of loudness (compensated volume) control and record playback compensation. Clockwise from the top left: Tech-Master 19, 60 watts, \$130; Harmon Kardon A-1040, 40 watts, \$125; Altec 339D, 18 watts, \$115; H. H. Scott 99-C, 22 watts, \$100; Bogen DB130, 30 watts, \$115; Sherwood S-1000, 20 watts, \$100; Pilot AA903, rated at 14 watts and priced at \$70.



### The Wide-Range Speaker

Also known as the extended-range speaker, this unit represents the most economical investment and reproduces over a wide frequency range. Depending upon make or model, it will handle from 40 to 13,000 cycles (average). This type of speaker normally has a high percent efficiency characteristic. To devise a mechanical means of frequency separation (lows from highs) the different manufacturers employ various methods of decoupling the high frequency vibrations from the low frequency vibrations. Some of the methods include: extra-large voice-coils further stiffened with a small aluminum or dural diaphragm, a light but stiff smaller inner cone fitted at the apex of the large cone, a folded diffuser coupled to the apex of the large cone. In all cases, the objective is the same—to effect a mechanical crossover and achieve two-speaker performance, using a single voice-coil and magnet. The results are very good. Many makes of wide or extended range speakers are considered superior in performance to some 2-way systems employing two

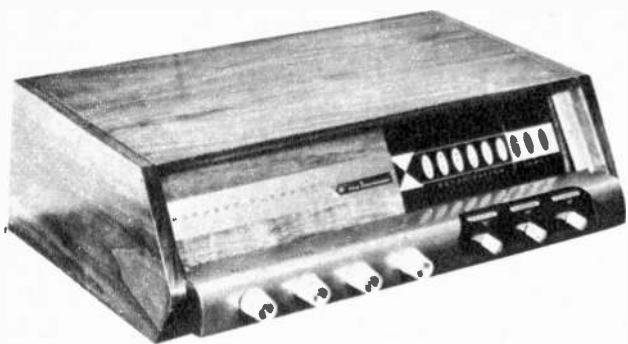
speaker units. Moderate cost . . . \$24 to \$85 . . . and remarkably good performance makes the wide-range speaker ideal as a foundation for starting a deluxe multi-speaker system. Providing immediate listening satisfaction, it enables you to devote the bulk of the hi-fi budget for the best quality record player, tuner, or amplifier you can afford.

### The Multi-Speaker System

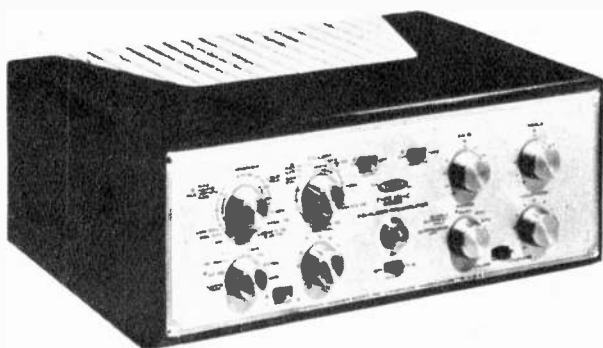
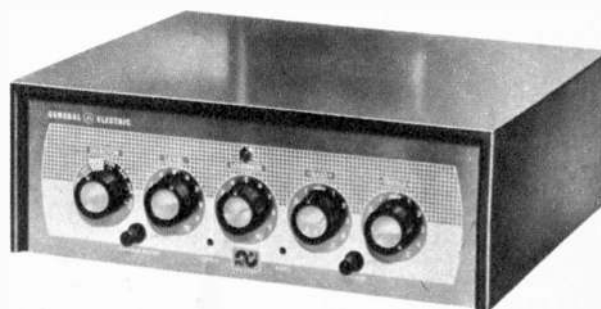
A single loudspeaker, like a single musical instrument cannot reproduce the entire frequency range of music. A multi-speaker system employs two or more speakers. Each speaker is designed to operate within a specific range and they are connected to the amplifier through a network which channels the proper range to each speaker. In a 2-way system, the range is divided at an optional point which may be anywhere from 500 to 5,000 cycles. This is called the crossover point. In 3-way systems, two crossover points are chosen to divide the range into three sections, these may be optionally chosen by the design engineer (350 and 5,000 or 300 and 3500 cycles, etc). There aren't



The amplifier must be selected to aurally match other components—



Clockwise from top, Sargent-Raymont of California has brought a new look to amplifiers—their Claremont SR-200 is \$150, 20 watts. Fisher CA-40 master control amplifier (\$140) features visible ToneScope, is 25 watts. Marantz Audio Console (\$162)—self powered—features separate a.c. chassis for auxiliary inputs plus complete record equalization circuits. H. H. Scott 121C audio control unit include noise suppressor, tape-head playback with tape monitor switch, sells for \$160.



many 4-way systems commercially available. The *Patrician* made by *Electro-Voice* uses 200, 600 and 3500 cycles, dividing the range at three crossover points.

Multi-speaker system components consist of a low, mid and high frequency speaker. The 2-way system uses the low and high . . . while the 3-way system also includes the mid-range unit. In addition it employs a *mute* component . . . the crossover or dividing network. Creating no sound, the network is the heart of the system, routing the correct bands of frequencies to each speaker with precision and coupling the speakers to the audio amplifier.

**The Woofer**—A low frequency speaker, named for the low pitched *woof* of a dog. Depending upon make, this speaker reproduces a frequency range of from 20 to 5000 cycles. Optimum crossover points (highest cut-off frequency) chosen for this type of speaker run from as low as 200 cycles up to 3500 cycles. It is made in three sizes: 8, 12, and 15 inches. There are some 18" woofers available for large professional speaker systems. The only system in the high fidelity home

music field at present that uses an 18" woofer is the *Electro-Voice Patrician*. Because of its mechanical design, the woofer is unsuitable for use as a single speaker and should be used only in a multi-speaker system.

**The Mid-Range Speaker**—As yet, there is no official *pet* name for this speaker in the industry. However, Paul Klipsch an eminent designer of loudspeaker systems, refers to his mid-range unit as a "squawker." Any good cone speaker may be used as a mid-range reproducer. In fact, the wide-range speaker used as a basic starter speaker in hi-fi systems often *graduates* to the esteemed position of "squawker" when the multi-speaker system is completed. Again, depending upon manufacturer, the mid-range speaker component in a 3-way system may be one of two types. Some use a horn type speaker with a compression driver that has a low frequency cut-off from 200 to 350 cycles. Others use a cone speaker for mid-range and cut-off at around 600 to 1000 cycles. Of the two, the horn type is the more efficient (roughly 50% compared to 5%). This speaker is closely related to the *presence* of the speaker system. Mid frequencies are much



Above and below, the McIntosh dual chassis deluxe amplifier is a matched instrument consisting of the C-4 audio compensator and control (\$65) with the MC-30 30-watt power amplifier, priced at \$143.50.



Above, the McIntosh audio control unit features push-button equalization with separate rumble filter; step-type loudness control and precision calibrated variable load resistor match any magnetic cartridge: \$89. Below, McIntosh MC-60 60-watt basic power amplifier, priced to sell retail at a modest \$199.



easier to reproduce than lows or highs and therefore are more predominant. To effect good balance with other speaker components and the acoustics of the room in which the system is used, a *presence* control is often employed. This control is a variable resistor and is used to attenuate the mid-range level if it is too predominant (see discussion of networks).

*The Tweeter*—Designed to reproduce the very high frequencies, this speaker's colorful name signifies the high pitched sound of a bird—the tweet. Truly, it is a precision instrument whose diaphragm vibrates thousands of times a second transforming complex instantaneous electrical currents into silky smooth brilliant sounds. Like the mid-range unit, the tweeter speaker may be a horn, loading a compression driver, or it may be a small (2" to 5") cone speaker. The cone type tweeter has the drawback of low efficiency and when used singly, it has a limited angular response pattern. High frequencies, because of their extremely short wavelength, are highly directional, therefore they must be widely dispersed in a horizontal arc in order to adequately cover a listening area. Some manufacturers of cone type tweeters, like *Bozak* and *Lorenz*, mount two units on a special bracket which angles the diaphragms for the widest possible horizontal dispersion. The horn loaded compression driver type of tweeter is most efficient and some models handle up to 60 watts compared to the maximum 15 watts of the dual cone type unit. There are many types of horns used in this type of tweeter, effecting a horizontal dispersion pattern of from 90 to 120 degrees. Because of the compression driven horn tweeter's higher efficiency, many multi-speaker systems employ a "Brilliance" control to adjust high frequency level to balance to room acoustics and the other speakers in the system.

*The Crossover Network*—Also known as a *dividing network*, this unit is a *silent partner* in a multi-speaker system. Without it, the speaker system would not function properly. Woofers would distort at high frequencies . . . tweeters would be exposed to the dangers of burned out voice-coils and damaged diaphragms while attempting to reproduce the more powerful low frequency sounds . . . and mid-range speakers would run rampant attempting to reproduce the entire range of music. The *network* is a distribution center and a safety device. It channels the correct band of frequencies to a respective speaker and it protects the high frequency tweeter from damage. Its circuits combine a low and high pass filter . . . keeping lows out of the tweeter and highs out of the woofer. A 3-way network also includes a band pass filter to channel sound to the mid-range speaker. Networks are made for 2- and 3-way speaker systems. Skillfully used, they may be combined to provide a means of channeling sound in a 5-way system, if . . . a stretch of the imagination so demanded. Some makes and models include built-in controls for adjusting for "Presence" (mid-range) and "Brilliance" (treble). Others provide accessory controls to be used with the network for this purpose. In a multi-speaker system, all speakers are connected to the network which in turn is connected to the audio

amplifier. The multi-speaker system has been discussed on the basis of separate speaker and network components. The most practical feature of this type of speaker system is the flexibility it offers and the economy of building the ultimate system in stages or steps from a basic single wide-range speaker (this will be discussed in detail a bit later in the book). The multi-speaker system is also available as an integrated unit . . . constructed on a single chassis.

### The Integrated Multi-Speaker

This is a *true* multi-speaker system . . . but, all components, even the network are mounted on a single frame or chassis. Its most practical application is simplicity of installation and conservation of baffle space. The multi-speaker system employing separate speaker and network components usually requires a great deal more space than a unitary integrated system. It must also be understood that the system with separate components has greater physical separation which provides better acoustic perspective and a realistic spatial effect. The unitary multi-speaker must project the reproduced sound from one hole in the cabinet. For all practical purposes however, the integrated speaker system is capable of high quality performance. It is more economical than the separate component system, and serves a much needed purpose. Choice between the two types of systems should be measured by budget and your ears. It may be that the integrated system sounds more natural to you than the best of deluxe systems employing separate components.

The integrated speaker systems are made in two- and three-unit models. The 2-unit speaker is known as a *coaxial*, *duplex*, or *dual concentric*. The 3-unit speaker is a *triaxial*. The only integrated 3-way speaker using three motor mechanisms (voice-coil and magnet) is the *patented* Triaxial made by *Jensen Mfg. Co.* Other 3-way units employ a mechanical crossover design between the woofer and mid-range sections and a separate tweeter with an electrical crossover. Such units are the *TRX* made by *Electro-Voice* and the *3-Way Diffaxial* made by *University*. The *Jensen Triaxial* does not have the network built into the speaker chassis, it is a separate unit which plugs into the speaker.

### The Electrostatic Speaker

At this writing, the Electrostatic speaker has been introduced to the high fidelity field and has gained wide interest. This principle of sound reproduction is really old, and has been brought back to the attention of the public with newer developments in its design. The intent of present day makers of the Electrostatic speaker, is to ultimately develop a *full range* unit which will reproduce the entire musical range. However, thus far it has proven to be a very good mid and high frequency speaker. Because of size and inherent mechanical limitations, its range runs from 400 cycles to beyond the limits of audibility (25 to 30 thousand cycles). Its sound quality can best be described as "sweet," and it is admittedly "clean" without any shrillness in the reproduction of mid



Basic power amplifiers are all large and heavy and designed to be located four feet or more from the control unit. They come in a variety of power output capabilities. Below, the Fisher 90-A, 90 watts, \$230; above, the Fisher 80-C audio control unit (\$100) features individual channel level control on the front panel.



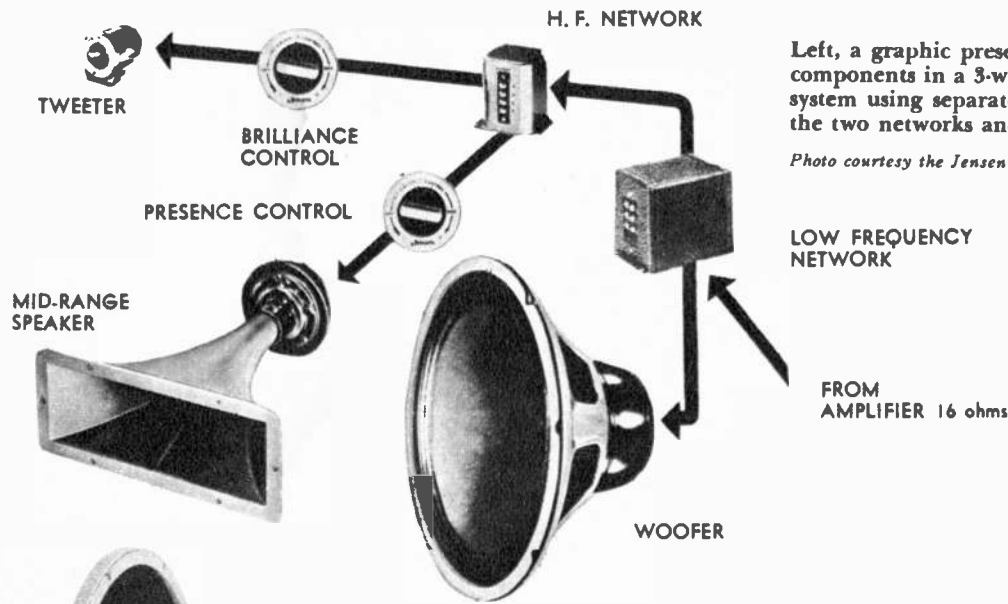
Below, the H. H. Scott 280 power amplifier has an output of 80 watts, is priced at \$200.



The Fairchild 255 power amplifier has an output of 30 watts, retails for \$100.

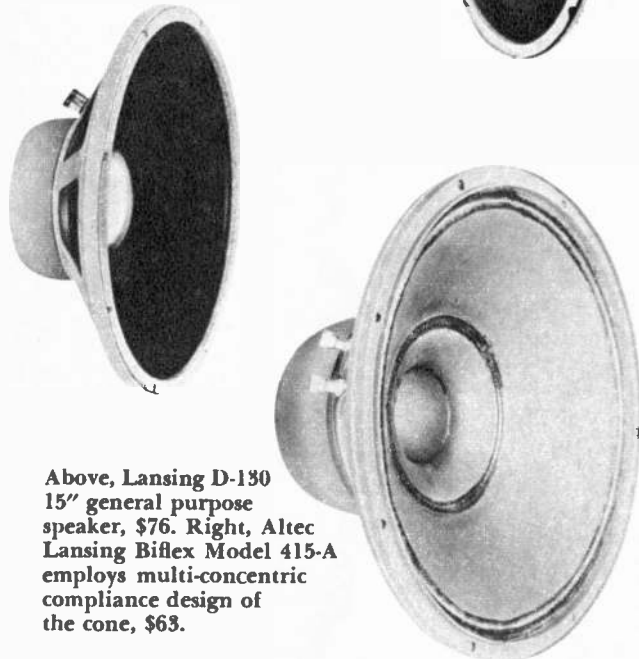


The "ideal" speaker system can be had to fit any budget—



Left, a graphic presentation of the components in a 3-way multi-speaker system using separate components. Note the two networks and level controls.

Photo courtesy the Jensen Mfg. Co.



Above, Lansing D-130 15" general purpose speaker, \$76. Right, Altec Lansing Biflex Model 415-A employs multi-concentric compliance design of the cone, \$63.



Right, JBL D123 Jim Lansing speaker employs stiff dural center dome with 3" voice coil, sells for \$55.

Left, Jim Lansing JBL 075 uses a ring radiator, is \$55.

and high frequencies. To extend the range down to the ultra bass limits would entail huge impractical dimensions based on the physical design requirements. Consequently, this speaker must be used with a conventional cone woofer. One experimental model (made by an English firm) reputed to cover the full musical range is roughly 6 feet high and a foot and a half wide. It is unlikely that this type of speaker will reach the high fidelity market for another 3 or 4 years, and by that time it is hoped that design developments will effect a means of using a smaller and more practical size.

The Electrostatic loudspeaker is quite different from the conventional PM speaker we are familiar with. The one thing both have in common is that both generate sound by means of a vibrating element. In place of a voice-coil and magnet it employs a huge capacitor (condenser) and a polarizing d.c. voltage to create motion. The basic speaker consists of a stationary plate (electrode) and a movable plate (diaphragm) which are fitted into a frame insulated from one another. When the two plates are charged with the same polarity of d.c. voltage they repel one another and remain apart (just as 2 like poles of a magnet repel each other). When the signal (a.c.) voltage is superimposed on the polarizing voltage it changes the polarity in proportion to the music or speech in the signal. This in turn causes the fixed plate to attract and repel the movable plate resulting in a vibrating diaphragm. This is known as a single-ended or two element type of electrostatic speaker and is suitable for frequencies above 5000 cycles. The newer and high-quality units employ 3 elements in push-pull arrangement. In this type, two fixed electrodes are used and a movable diaphragm is stretched between them. By means of a power supply and transformer, an electrostatic force is created between the diaphragm and each electrode. Such an arrangement is superior to single ended design because it can more

## A speaker is no better than the enclosure you use—



Left, Jim Lansing JBL D-130A 15" low frequency driver, \$72.



Right, University dual range impedance woofer, Model C15W, \$75.



Above, the Jensen P15-LL 15" low frequency speaker, priced to sell at \$57.



Right, the Bozak B-199A woofer, a 12", \$50 unit.

efficiently harness the motion of the diaphragm providing greater clarity and definition. Made in a reasonably larger dimension, it is capable of handling greater power (up to 50 watts) and will handle frequencies as low as 400 cycles.

### The Loudspeaker Enclosure

The enclosure is actually one half of a speaker system, whether it contains a single wide-range speaker or a deluxe 3-way speaker system. Its purpose is directly related to the operation of a low frequency cone speaker (woofer) or the bass performance of any cone type speaker. When a cone speaker operates, sound waves emanate from the front and rear of the cone. If these waves were to merge at the periphery of the speaker frame . . . cancellation of many low frequencies would take place and the resultant sound quality would be thin and without quality. Basically then, the enclosure acts as a baffle to separate the front and rear sound waves.

But, the enclosure plays many parts in a high fidelity system.

- (1) It enables a speaker to reproduce its full bass range.
- (2) It adds acoustic efficiency to the speaker, increasing its power handling ability.
- (3) It provides a housing . . . which can be designed to blend in any decorative scheme.

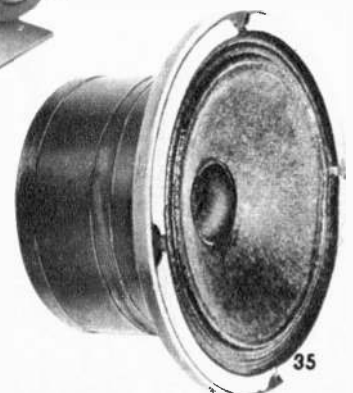
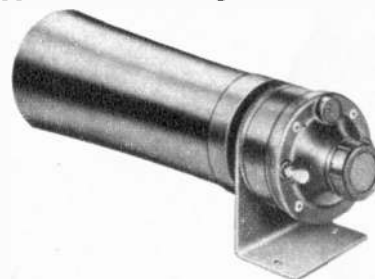
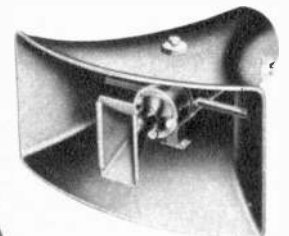
There are three schools of thought in loudspeaker enclosure design and each has its strong proponents.

*The Infinite Baffle*—This method of housing a speaker or speaker system is most flexible. It provides the basic requisite of preventing front and rear wave motion of the loudspeaker from merging. Infinite baffles are usually completely enclosed and have an almost infinite cubic area within them. For practical purposes, the minimum should be 10 to 12 cubic feet.

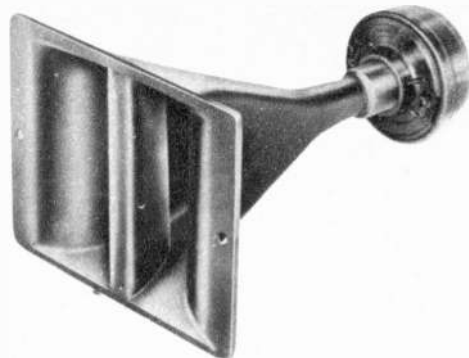
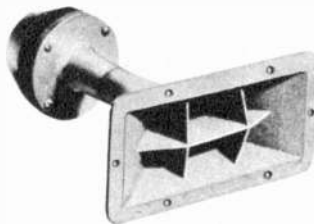
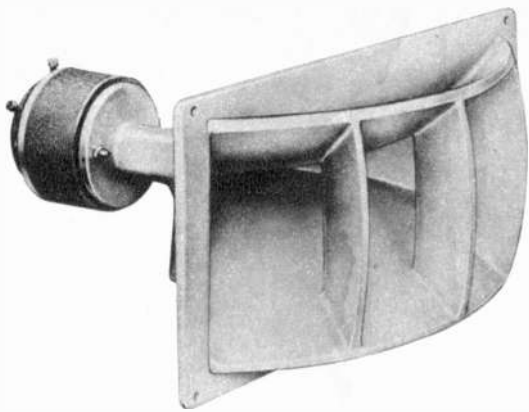


Left, University C63W adjustable response woofer. It has a built-in inductive device which serves as part of a crossover, price \$48.

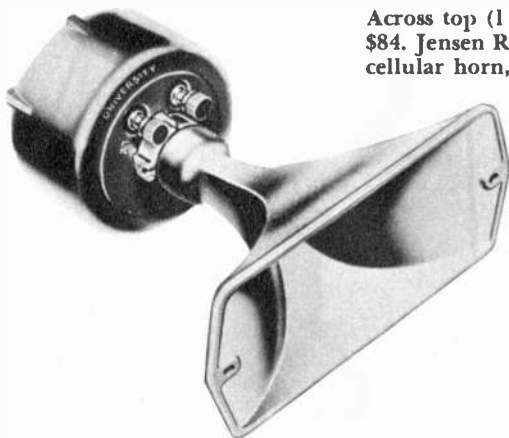
Right and below, Electro-Voice mid-range horns; 828HF, (\$38); 848HF (\$52) is a coaxial type that covers upper, lower mid-range.



Bozak cone type mid-range speaker Model B-209.

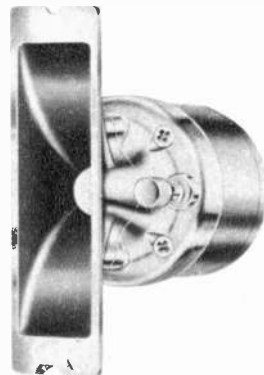


Across top (l to r), Altec 802C with 811B multi-cellular horn, \$84. Jensen RP-102 high frequency unit employs wide-angle multi-cellular horn, \$28. University wide angle tweeter 4408, \$21.



Above, University HF-206 (\$27) employs reciprocating flare principle.

Right, Electro-Voice T-35 employs a diffraction horn, has list price of \$33.

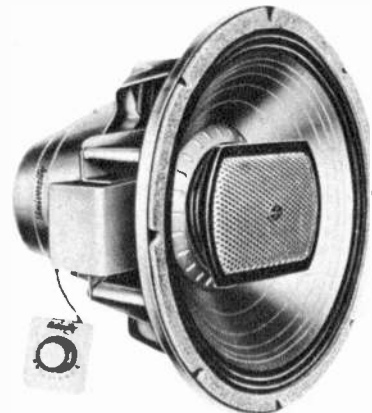


Left, Bozak B200X dual tweeter unit; \$30; units are angled for widest possible coverage.

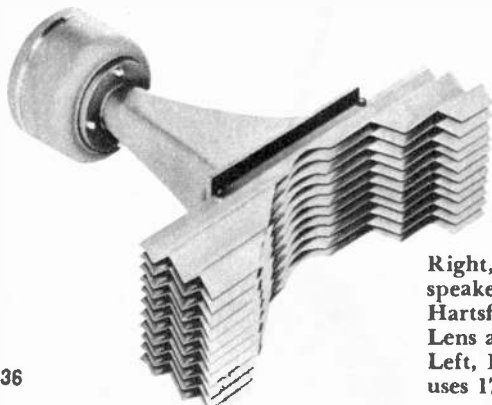


Above, Electro-Voice 15TRXB 15" triaxial speaker has pre-amp control.

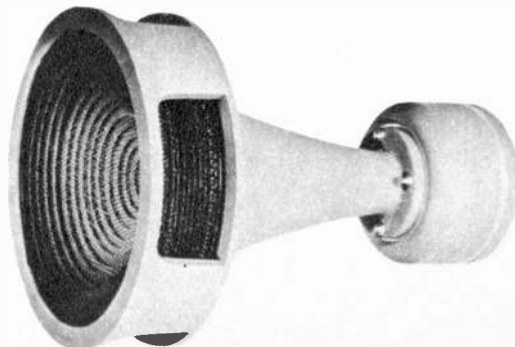
Right, University 3-way diffraxial speaker, model 315, has brilliance control.

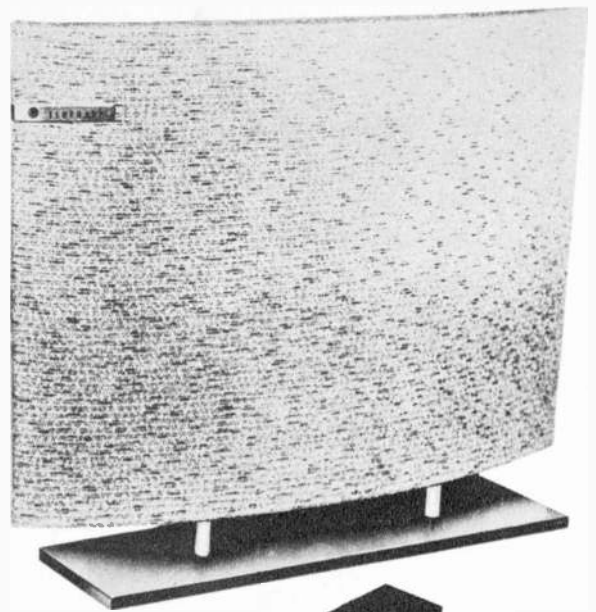
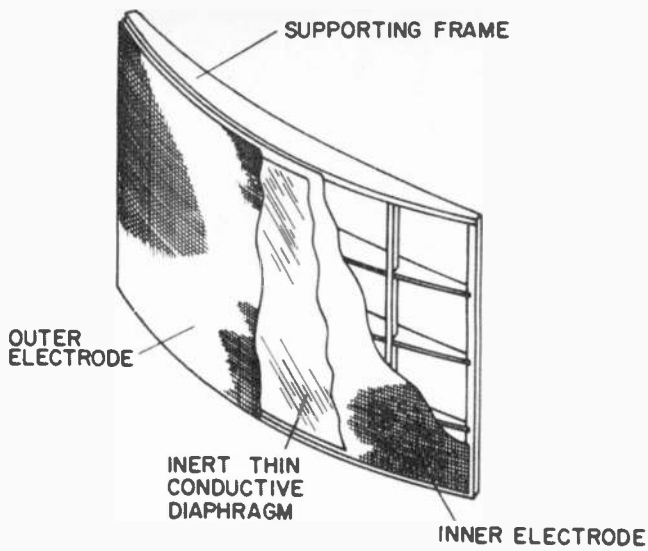


Left, GE A1-404 direct radiator high frequency tweeter, retail lists at \$19.



Right, Lansing high frequency speaker with 375 driver and Hartsfield Koustical Serpentine Lens assembly, lists at \$252. Left, Lansing HF speaker uses 175 driver, is \$118.

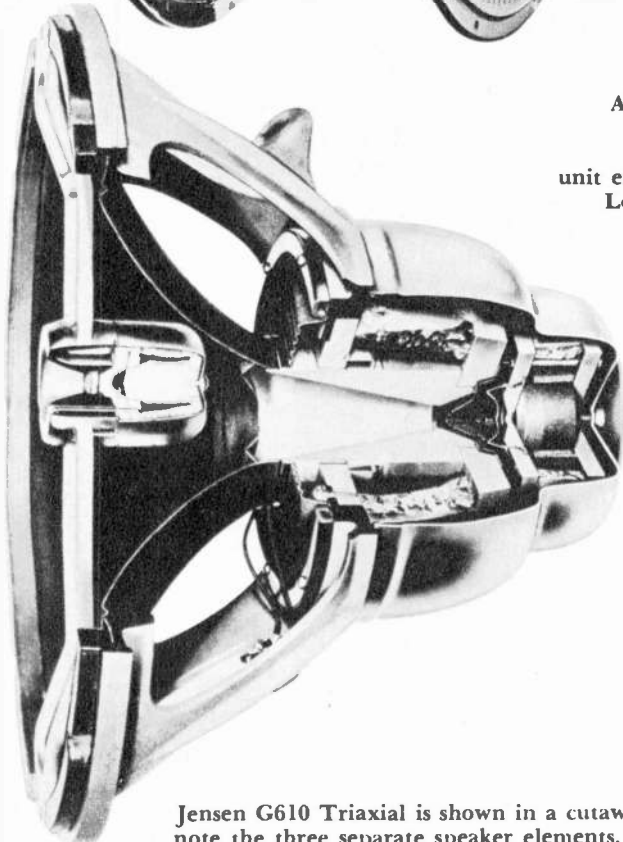




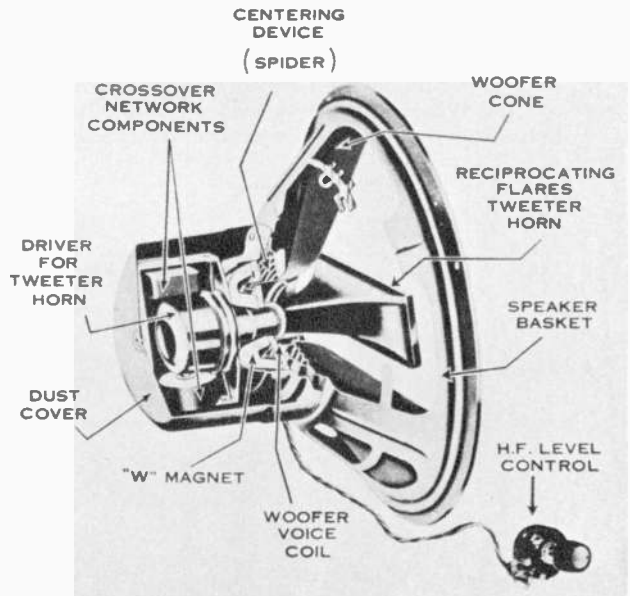
Above, a cross-section and a photograph of the Pickering Isophase electrostatic high frequency speaker, Model 581-B. This tweeter is a new concept in hi-fi speakers, sells for \$210.



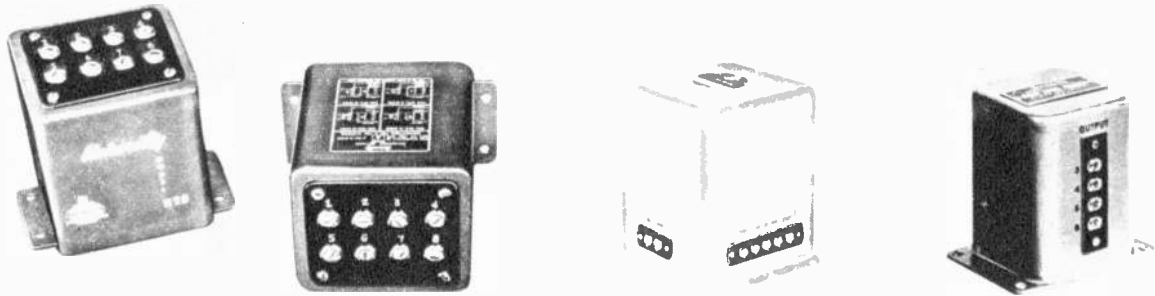
Above (l to r), the Jensen G610 Triaxial (\$252) employs three voice coil and magnet assemblies, is 15"; GE A1-401 (\$44) uses single cone tweeter, is a 2-way or coaxial speaker, as is Altec 604C 15" unit employing horn type tweeter units with compression drivers (\$165). Lorenz LP-312-2 12" employs dual cone tweeters mounted on special bracket and angled for wide treble dispersion, priced at \$72.



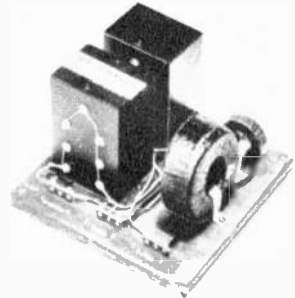
Jensen G610 Triaxial is shown in a cutaway; note the three separate speaker elements.



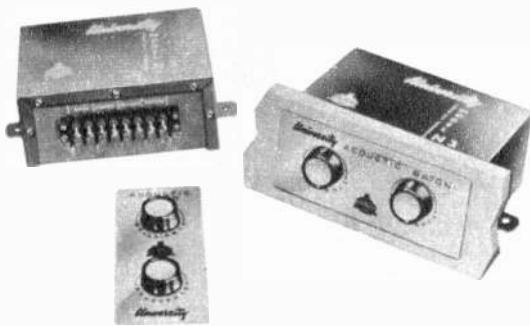
Above, a cross-section of a coaxial speaker, this one being the University 6201; note HF level control.



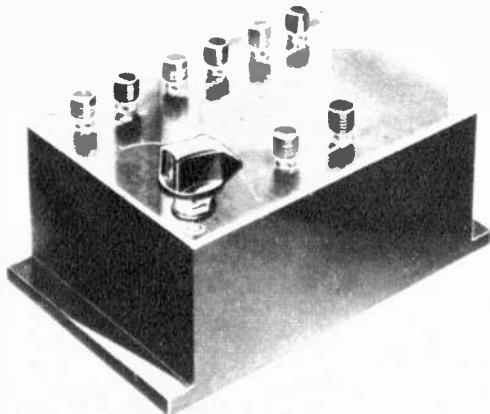
Crossover networks for multi-speaker systems include (l to r), the University N-2A (\$18) and N-2B (\$14) which provide a variety of crossover points from 350 to 50,000 cycles—they can be used individually or in combination. Others: Electro-Voice X2635 (\$74) is for a 4-way speaker system. Upper right, Jensen A-204 (\$13) is for a 2-way system, while the Bozak N-104 (\$38) is intended for use with 3-way systems.



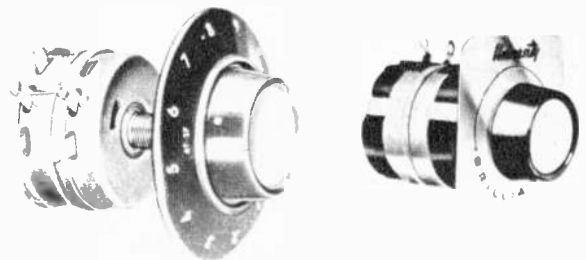
Below, crossover networks with built-in controls for adjusting to room acoustics include the University N-3 (\$28) for 3-way systems and the JBL Signature network for a 2-ways system, Model N2500 (\$15) with HF control.



Below, the Wharfedale 3-way network (\$35) with high frequency (brilliance) control mounted on box.



Level controls for multi-speaker systems may be used with crossover networks to adjust the high frequencies (brilliance) and mid-range frequencies (presence) to balance to room acoustics. Shown are: Electro-Voice Model AT-37, priced at \$4, and the University Model AP-8, also \$4.





## Crossover networks "separate" the sound into the correct speakers—

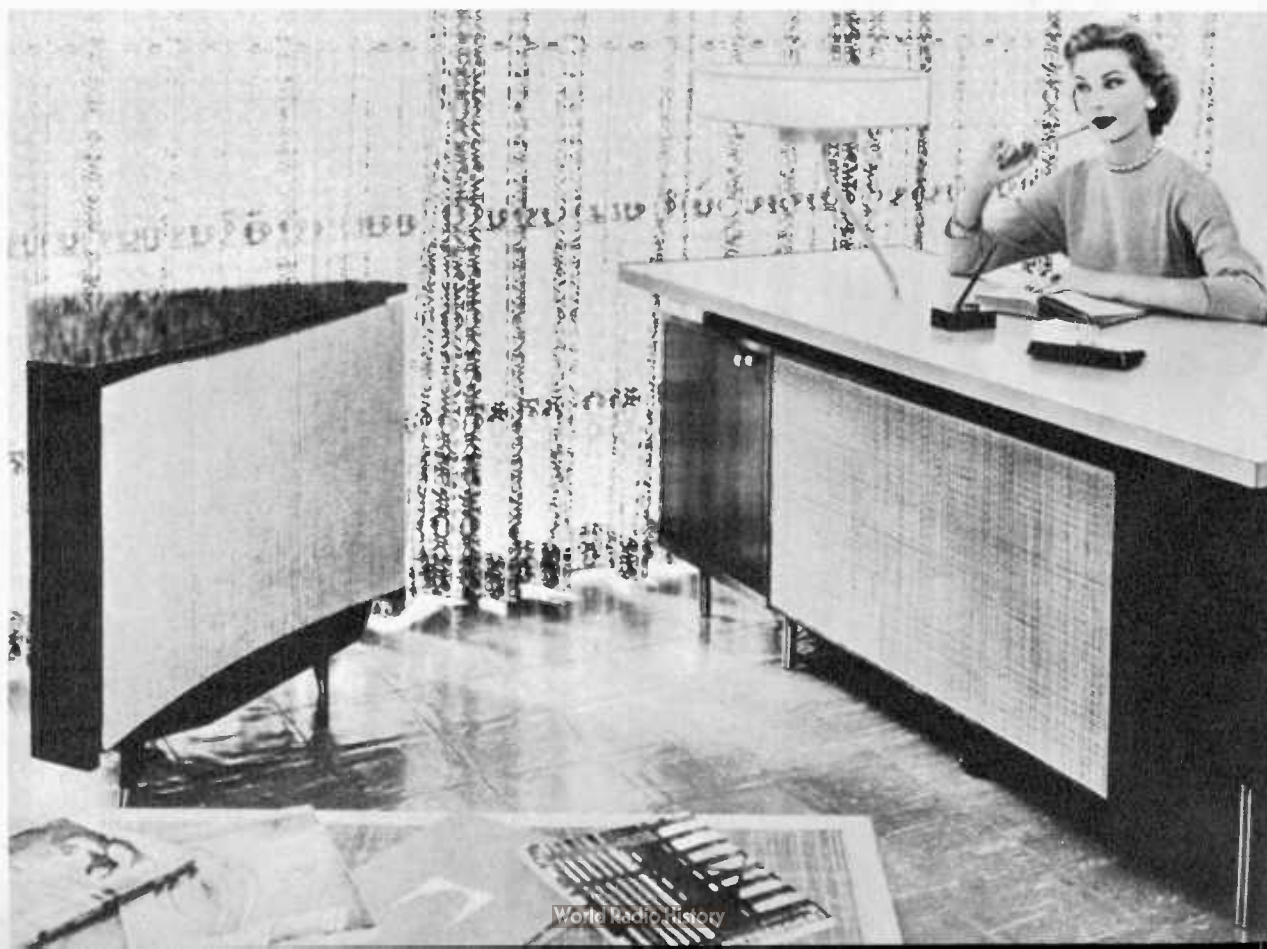
Installation of speakers into walls, closet doors, stairwells, etc. employ the infinite baffle principle. In wall installations, the rear of the speaker should face into another room, or into a closet. In closet door installations, the door should be "tight-fitting." In large boxes or enclosures, it is advisable to entirely line the inside with thick sound absorbing material. In all cases, a speaker mounted into an infinite baffle reproduces sound by front radiation without any supplementary support from its rear waves (as in other types of enclosures). Box or cabinet types of infinite baffles must be very sturdy and not vibrate as a result of the speaker's action.

**The Bass-Reflex**—In addition to preventing interaction between front and rear waves, the bass-reflex principle utilizes the rear wave to supplement the front wave response. Known by engineers as *phase-inversion* it re-directs the rear waves (changing the phase) through a port opening on the front baffle board, thus extending the bass response of the speaker. Simple to build, the bass-reflex is a favorite of home constructors. It is also helpful in the design of built-ins. Many types of built-in or bookcase high fidelity installations rarely have adequate space for an infinite baffle. By the same token, many closet and

stairwell installations face the same problem. The use of a bass-reflex design permits an efficient yet compact speaker compartment. The bass-reflex design is used extensively in complete system cabinets and it has been adapted in corner type speaker enclosures.

**Horn Type Enclosures**—In summary, Infinite Baffle and Bass-Reflex speaker enclosures are devices to couple the sound of the loudspeaker to the room. The Horn Type enclosure attempts to go them one better . . . by making the room in which it is installed a component part of the enclosure. In operation, the cone speaker becomes a *driver* which generates sound into a horn whose flared mouth couples to the room. For this reason, many types of horn loaded enclosures are not particularly suitable for the integrated multi-speaker. Others employ some degree of direct radiation and load the speaker from the rear . . . this type can be used with the integrated multi-speaker. Horns are usually *folded* (curved, bent or angled) so that the greatest possible length can be made to fit into an enclosure whose dimensions are compatible to an average living room. In essence, the horn is like a large *megaphone* and is usually designed for placement in a corner where it makes use of adjacent walls of the corner to couple the sound to the room. Many

A multiple corner reflex enclosure, the Jim Lansing Harlan C39 (\$132) is available with a choice of two styles of baffle boards for progressive building of a multi-speaker system. The Harlan departs from traditional "box" design.



Enclosures of space-saving designs are available for bookcase or closet



Electro-Voice Patrician 4-way speaker system (\$847) is in basic utility horn enclosure designed for built-in use. Woofer is below, others above.

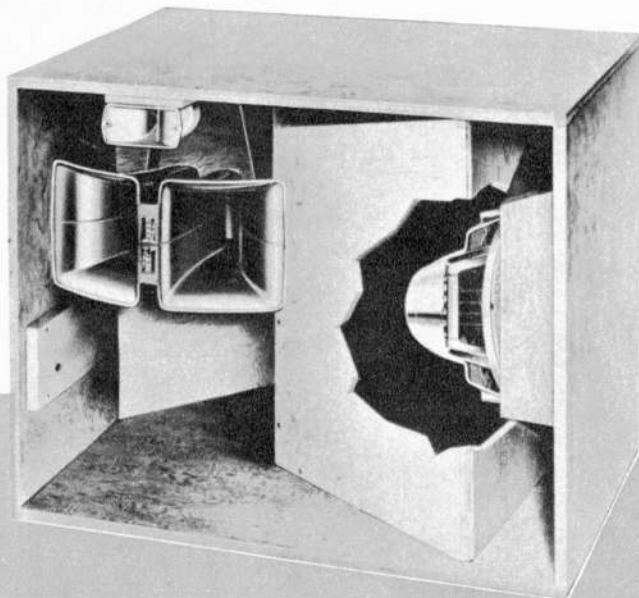
designs are self-contained, *with built-in corners*, and are physically designed to be used in a corner or against a flat wall. They are referred to as "cornerless-corner enclosures."

#### Other Types of Enclosures

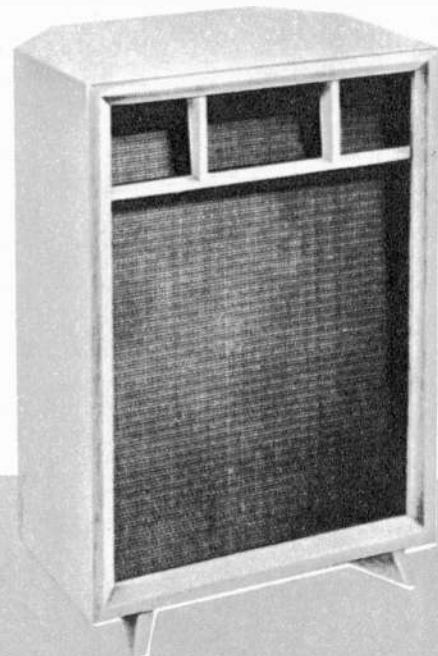
Many designs of "space-saver" enclosures have been put on the market. They are practical in installations where space is at a minimum, and for use as remote speakers in other rooms of the house. The more popular types are designed to conform to standard bookcase shelf dimensions, although they will also fit into other units of furniture. The diminutive type of enclosure is made in a number of acoustic design principles. Most prominent is the R-J which employs the Helmholtz resonator principle. Others use the simple bass-reflex design or some form of back-loaded horn principle. Because of its limited size, the bookcase type of enclosure is the least desirable for use as the main speaker in a high fidelity system. However, it will provide immediate listening satisfaction when building a system with a limited budget. In time, as a larger speaker system is acquired, the small unit can be used as a remote speaker in the den or playroom.

#### Do-It-Yourself Enclosures

Most of the commercial enclosures marketed by speaker manufacturers have been designed for specific



A 3-way multi-speaker system installed into a horn type enclosure (University) shown in cutaway.



University Model KEN-12 KwiKit has folded horn enclosure; design permits building in multi-speakers.

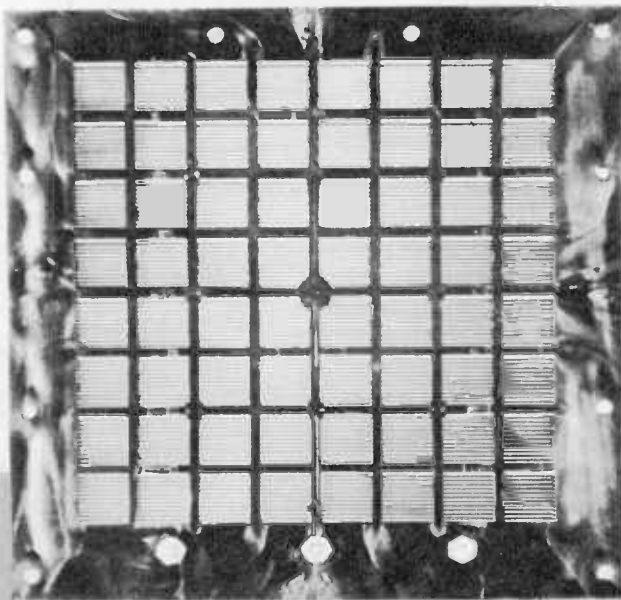
use; suprisingly they sacrifice little to sound quality

multi-speaker systems, or single speaker units. No doubt, there are an untold number of hobbyists and home craftsmen who would rather build their own enclosure. For them, a majority of speaker manufacturers have made plans available for building the speaker enclosure in the home workshop. Many are sent free, or they may be included with a loudspeaker component. Others, are made available for a nominal charge, and are usually more detailed and elaborate plans. A list of where to write for such plans will be found in the last part of the book "A Potpourri Of Hi-Fi Sources."

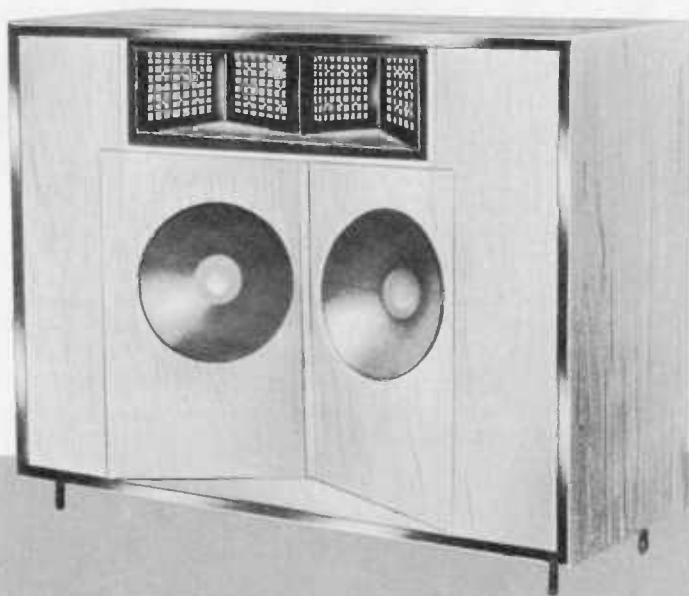
Some of the speaker manufacturers have enclosure kits which are exact counterparts of their standard line of enclosures. Unlike the kits of the earlier days in hi-fi . . . modern kits are pre-machined requiring no cutting of lumber. All parts fit together and can be assembled with a jar or tube of glue and a few hand tools such as a screwdriver, hammer and awl. A sequence illustrating the simplicity of assembling a kit for a cornerless-corner enclosure is shown.

[Continued on page 79]

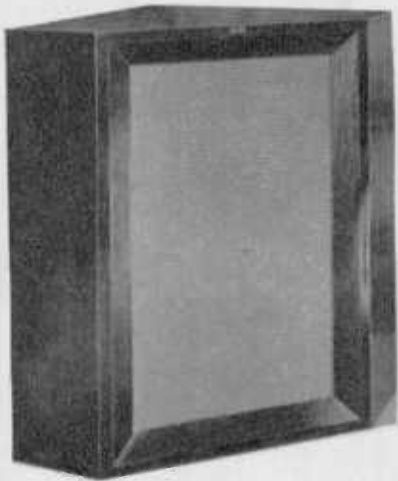
**Heathkit Legato** is available in African mahogany or imported white birch, can be had in kit form with dual woofer multi-speaker system. \$325.



Push-pull electrostatic elements: cutaway view of Pickering 581 shows fixed electrodes JansZen electrostatic element is sealed plastic unit.



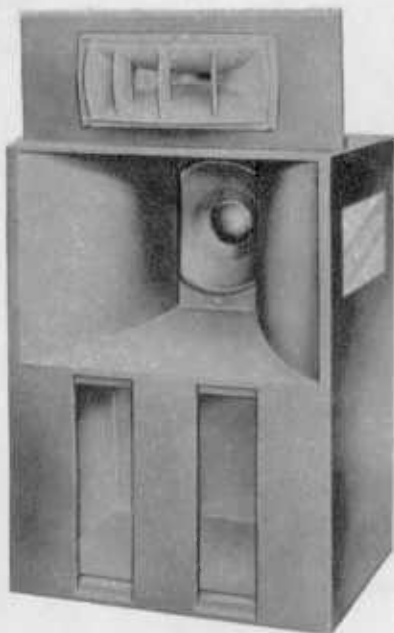
JansZen 30-30 (\$500) uses four tweeter elements in infinite baffle enclosure with dual woofers.



Above, two views of the Altec Lansing 606 corner bass reflex enclosure (\$156). Note in cutaway the relationship of the speaker opening to the reflex port below it. Cabinet can be used as multi-speaker setup.

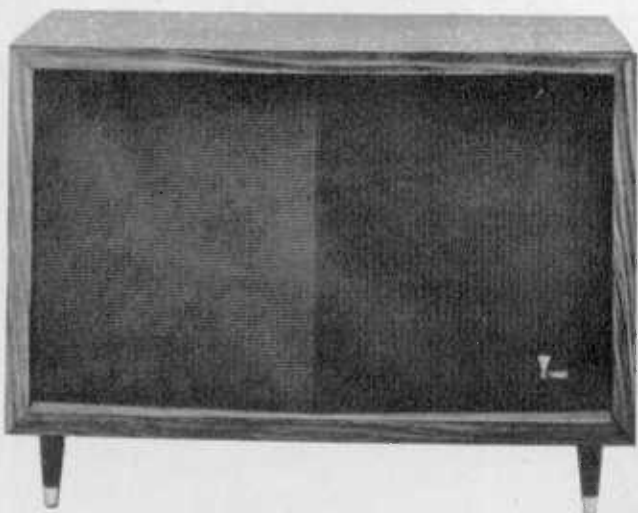
University Model EN-15 cornerless-corner folded horn enclosure, above.

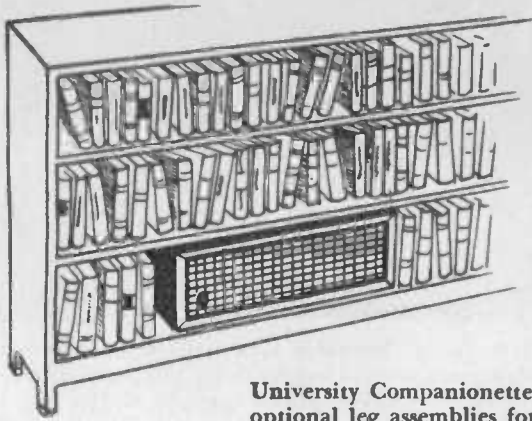
The two speaker units on the left, below, are intended for building in to walls, closets, etc. First is the Altec Lansing A-7 (\$282) 2-way speaker system, second the Lansing 550 (\$492), third the Jensen PR-100 Imperial, for use in a corner or against a wall (\$570)



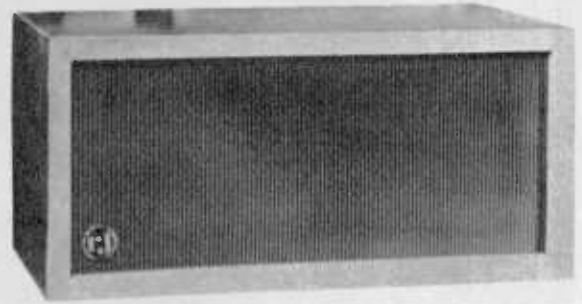
University 3-way console speaker system, Model S8 (\$450) can be used as lowboy; design is front-loaded, folded exponential horn.

Below, the Lansing Harkness Model C40 (\$365) is lowboy using a rear loading horn; dimensions—38x20x28".

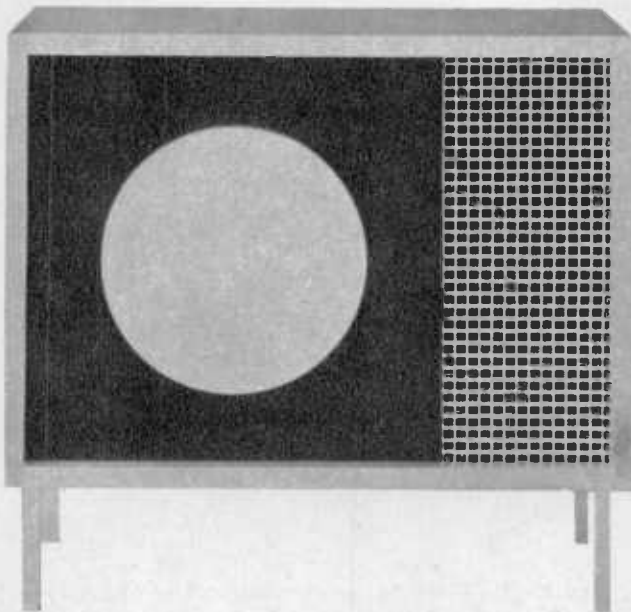




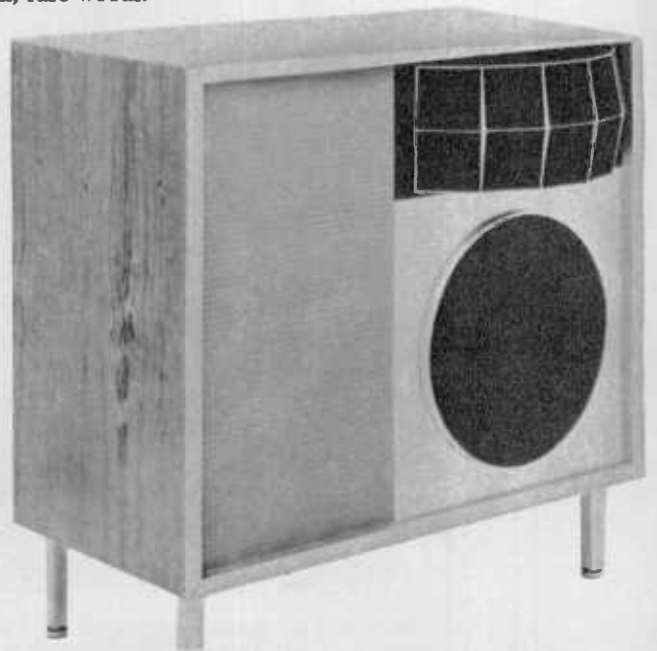
University Companionette employs an 8" woofer and HF tweeter and provides for optional leg assemblies for possible floor placement. The R-J Wharfedale bookshelf enclosure (\$60) uses the Helmholtz principle to achieve good low frequency performance.



Below, Stephens Trusonic multi-speaker systems in enclosures designed by Charles Eames feature Micarta and aluminum trim, rare woods.



1: The availability of easy to assemble speaker kits affords the music lover a great deal of economy. Here, buyer prepares to assemble Heathkit SS1.



2: Here, a speaker system that would normally sell for approximately \$400 is realized for less than \$150 in kit. Assembly takes one full week end (*cont'd next page*).





3: Heathkit SS1 is assembled with new fast-drying glue; it is designed to match Model SS1B Range Extender Kit, making 4-way system.



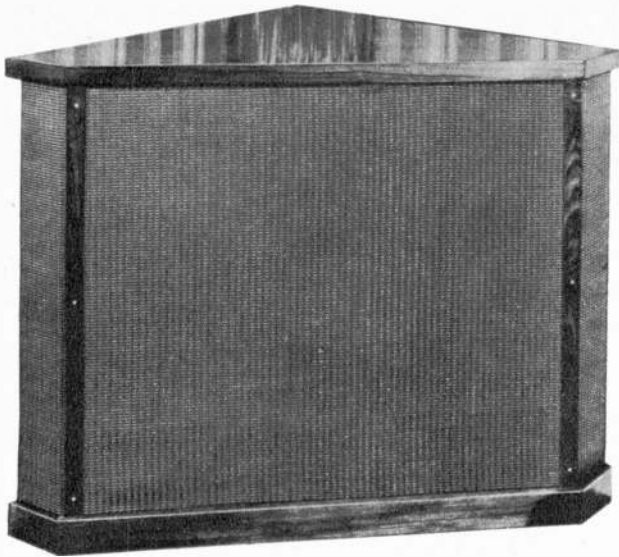
4: Heathkit enclosures can be easily finished with one of many easy to use finishing kits available at local paint stores, priced from \$2 to \$6.



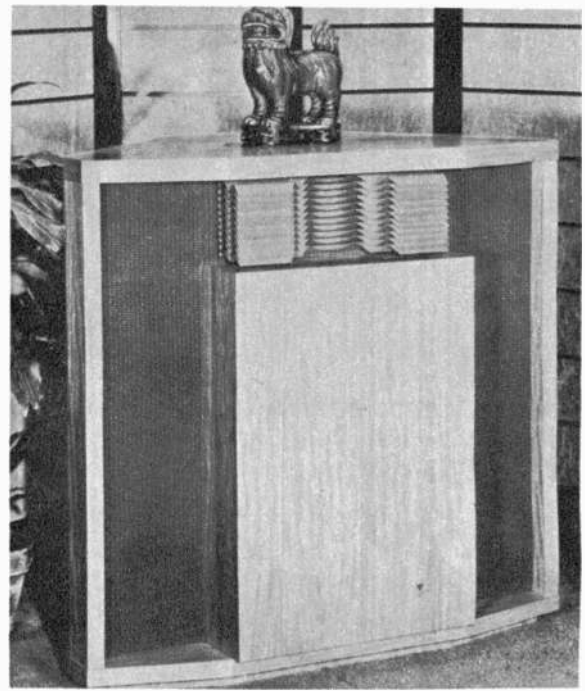
Speaker enclosures can be assembled from easy to put together kits. Electro-Voice has seven models; kits include trim. Cabinart division of G&H Wood Products features Klipsch licensed kits. See section in this book on "do it yourself."



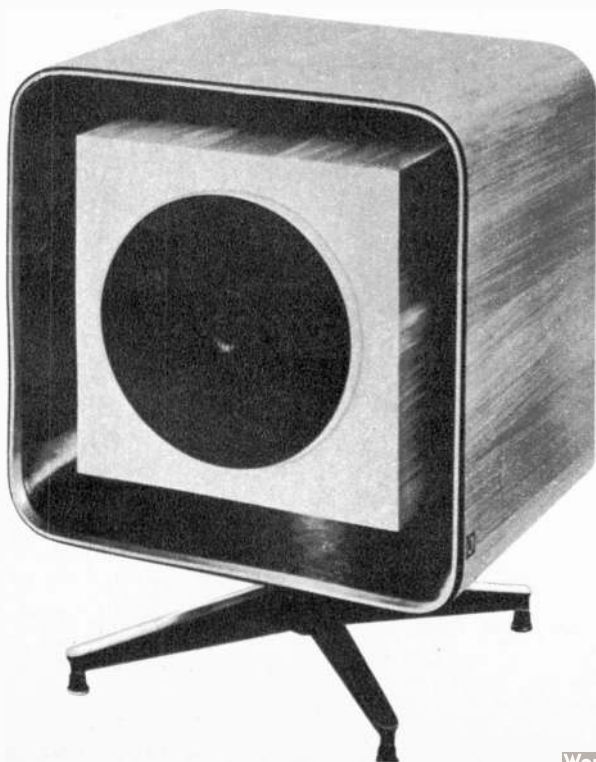
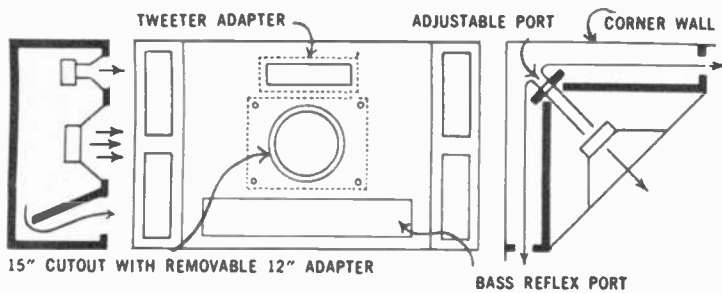
University KwiKit Model KEN-15 (\$50, left) can be assembled in four hours; glue is quick drying and permits working on sections once they have been "clamped." Right, Electro-Voice Patrician (\$847) employs folded horn for a 4-way system.



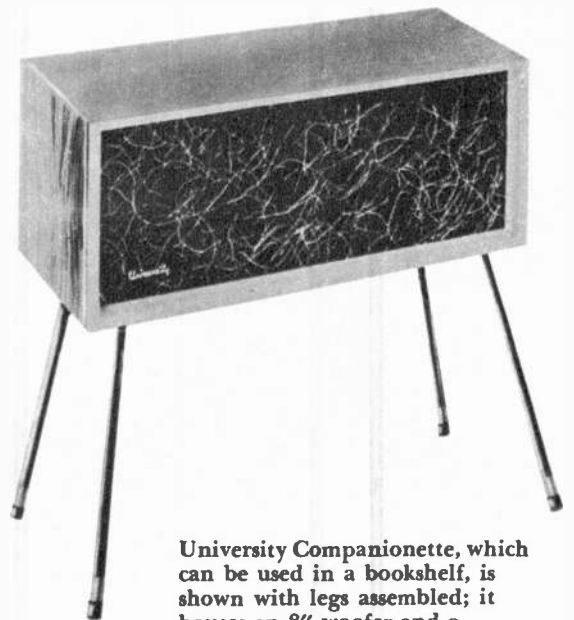
River-Edge 450 (\$90), a folded horn enclosure for corner placement, employs additional bass reflex and rear horn loading action. Adjustable rear port (see inset) for matching speaker resonance is a feature. It's for multi-speaker systems or single 12" or 15" speakers.



Jim Lansing Hartsfield C30B (\$732) is the acme of the JBL line; it employs a folded corner horn which fully loads the front of the woofer, has built-in Serpentine tweeter lens; speaker components are those of the 085 theater system.



Stephens Trusonic enclosure, left, is Model E-4S (\$278), intended for 12" integrated coaxial speaker. It uses a backloaded coupling design, swivel base.



University Companionette, which can be used in a bookshelf, is shown with legs assembled; it houses an 8" woofer and a high frequency tweeter.



—Herman Miller

*Planning Hi-Fi!  
for your Home*



Nowadays you can have the wonders of high fidelity in your home without the slightest sacrifice of decor

**T**HE EXCITING possibilities now open to you for superb musical sound, in your own home, without the slightest sacrifice of the decor your tastes demand are boundless. The most wonderful aspect of hi-fi is its infinite flexibility in terms of decoration. You are not limited by the stock cabinets that go with "commercial" radio-phonographs. With hi-fi, you can let your imagination run loose and build the type of system you want to listen to into the type of furniture or enclosure you want to live with. You are limited only by your own ingenuity.

Before selecting the type and quality of hi-fi equipment, *decide* into what and where you will put the system. If you live in an apartment, planning is almost certainly limited to the living room. If you have your own home, with somewhat more freedom of choice, you can decide more easily between the den or playroom and the living room. Selection should be based on whether or not your entire family is eager for music. Whichever room you decide on, the installation can be made into one of three types of enclosures:

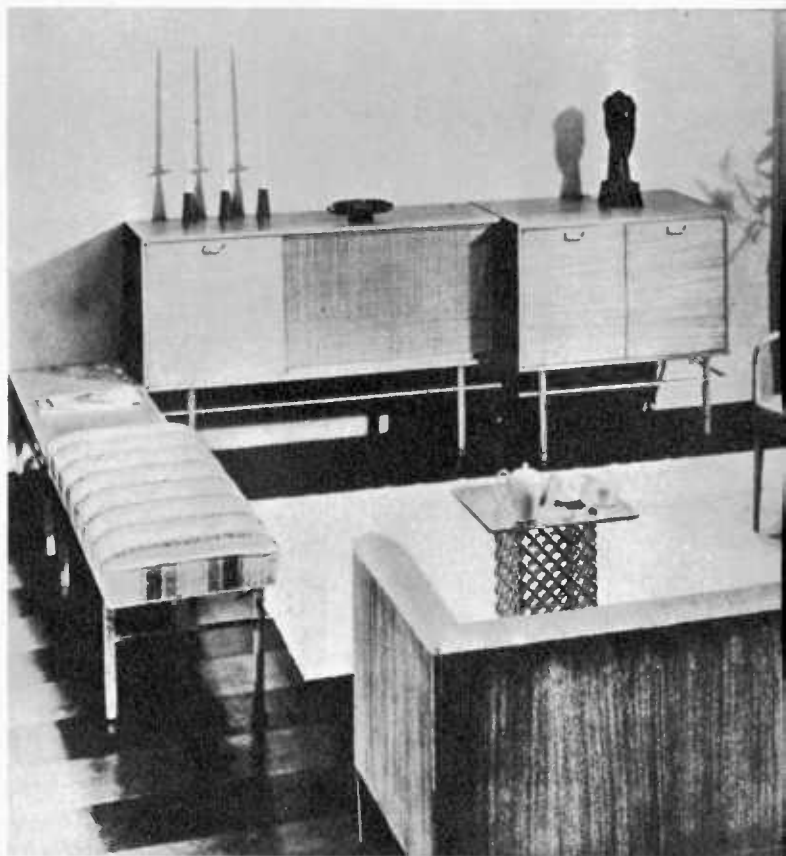
- (1) *You can purchase a console cabinet.*
- (2) *You can modify existing furniture.*
- (3) *You can use a built-in wall unit.*

#### Console Cabinets

There is a fairly large selection of stock and custom-made console cabinets designed specifically for high fidelity applications. Many of the finer designers and makers of quality furniture have special models just for this purpose. A few of the more prominent furniture craftsmen are Herman Miller, Harvey Prober, and Jens Risom. With minor exception, modern styling is predominant in ready made high fidelity cabinets. Obtaining a traditional or period (Regency, Provincial, etc.) cabinet is a problematical experience. For example, River-Edge Industries, one of the two largest manufacturers of hi-fi cabinets, has one Traditional and one Provincial model in their line. Cabintart, the other large maker of cabinets, features only modern styling.

One source for Traditional cabinets is the custom furniture builder who can make a console to your specifications. This is often more expensive, running into \$300 or more. However, there is a practical and often less costly cabinet available from almost any large furniture dealer. It is known in the furniture

Another beautiful high fidelity cabinet is shown in the photograph to the right. Many of the finer designers now make units especially designed for hi-fi adaptation.



—Harvey Prober

There is a fairly large selection of stock and custom-made console cabinets designed specifically for high fidelity application, such as the unit shown above.



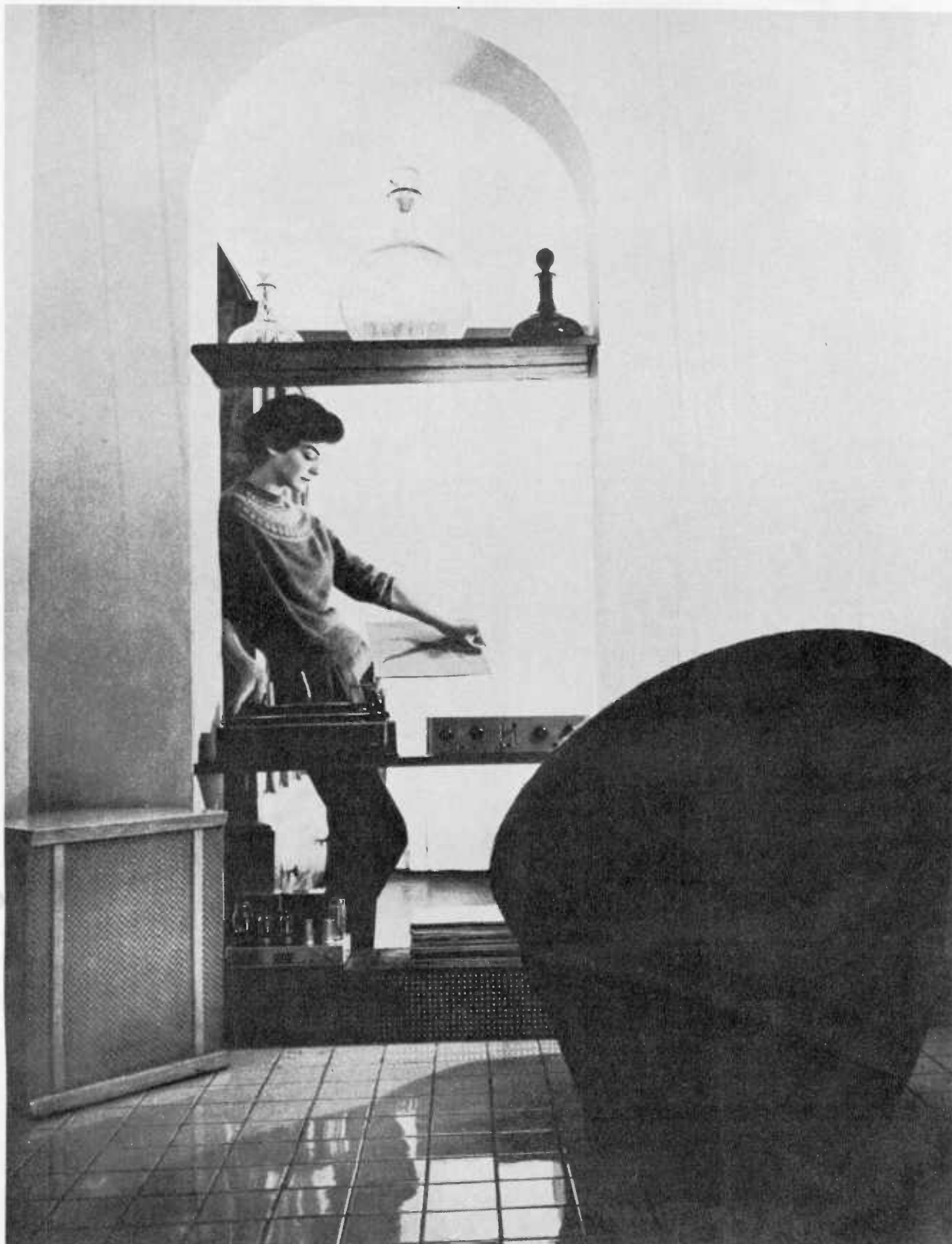


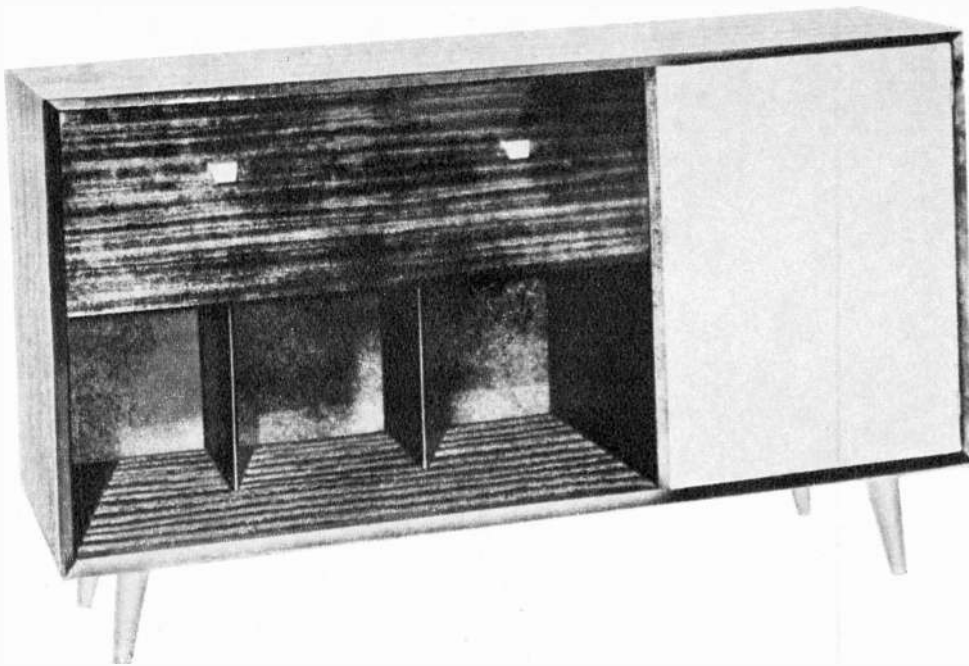
Traditional cabinets can be made over into hi-fi units by a custom furniture builder or carpenter, as photo across page shows. Conversion is usually expensive, however.

—Hollywood Electronics

Doorway is converted into hi-fi cabinet simply by placing boards across the area, then fitting the hi-fi units onto the boards. Result is a smart and attractive arrangement.

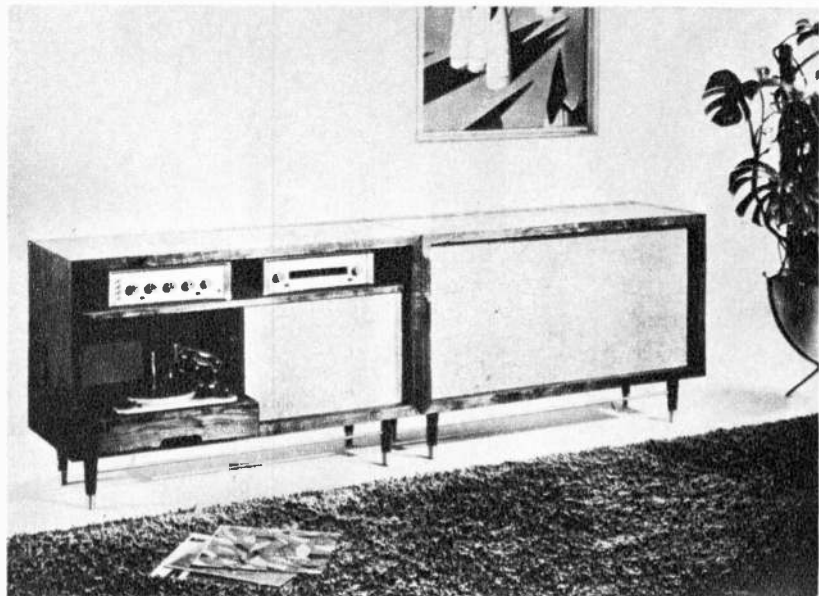
—Cabinart





Cabinet made by Cabinart (above) is representative of case goods, cabinets which have compartments or doors, are extremely flexible, adaptable.

Hi-fi unit in the photograph to the right was made by the Sherwood Electronic Laboratories of Chicago, is example of luxurious, modern hi-fi.

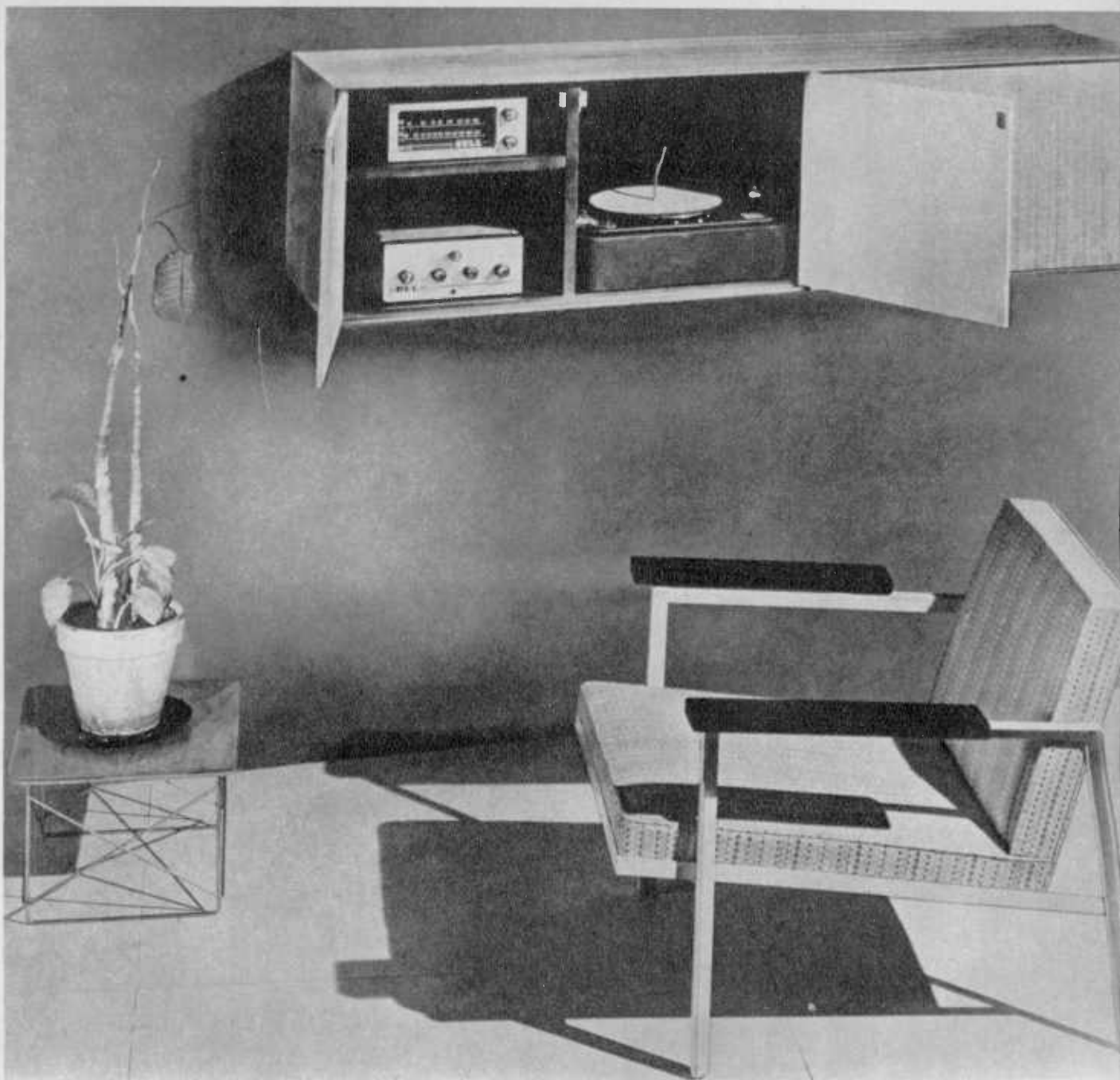


River-Edge Industries makes traditional or period cabinets for hi-fi units. Such cabinets as this fit in beautifully with room decor of same style.



industry as *case goods*. Briefly, *case goods* are cabinets which have compartments or doors. They are "box" units of furniture which offer great flexibility since they can be adapted for various purposes. The basic "case" or "shell" can be used as the lower section of a cupboard . . . or, a drop leaf desk. Most furniture dealers will modify or alter *case goods* for hi-fi applications. Some of the more familiar pieces which can readily be used are: breakfronts or credenzas; The Dutch, Provincial or Early American cupboard or hutch; Dutch or Early American dry-sink or commode.

Modern Style *case goods* are also ideal for hi-fi use. In addition to the regular hi-fi cabinets offered by such firms as Harvey Prober and Herman Miller, many of their *case goods* can be altered or modified for in-



stalling hi-fi equipment. An excellent example of hi-fi console development is the Herman Miller Wall Hung Hi-Fi. Until now this popular means of setting a hi-fi cabinet off the floor was exclusively custom-built.

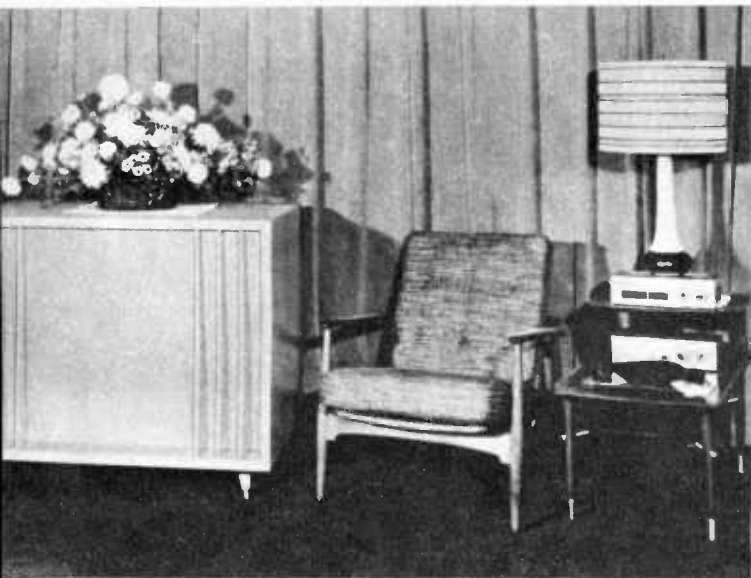
#### Existing Furniture

There is nothing more difficult than to try to *squeeze* an additional piece of furniture into what can be considered a decoratively balanced room. Even the addition of a small table or magazine rack in such a room can create a "too-busy" feeling. Where it may be possible to fit a corner speaker into an otherwise unused corner . . . there may not be enough room for the equipment enclosure. On the other hand, it may be a case of pure and simple economy—the budget just

For the ultra-modern home, wall-hung hi-fi cabinets are in keeping with motif. These cabinets are beautiful, easily mounted, have sufficient space to accommodate all parts.

doesn't stretch far enough to include a cabinet and yet provide the quality of components desired. A sure way to solve such problems is to make use of existing furniture to house just the component parts. Although, in some cases there may even be room for a speaker system too.

The simplest means of using existing furniture is to place components in their own enclosures or cabinets into compartment or shelves in the units of furniture. Step type or end tables are ideal for placing the tuner, amplifier, and record player. A shift of



The simplest means of using existing furniture is to place hi-fi components in their own enclosures or use compartments and shelves in various units of furniture.

family heirlooms to the attic or another unit of furniture frees the living room Breakfront so that the hi-fi components can be installed. The home handyman can alter the family Sideboard with a few dollars worth of material and a few hand tools and install the whole works from record player to loudspeaker system. Frankly, the most valuable tool required for such a project is the extent of your own imagination.

#### Built-Ins

The built-in has become a standard unit in today's modern living. No longer confined to private home owners, built-ins of many shapes, sizes, and applications are used in small apartments. A great advantage of the built-in is the consolidation of its contents. Bookcases blend with bars, writing desks, television, high fidelity, active and inactive storage, trophy and stamp collections, and the family heirlooms.

Probably the most attractive part of the basic built-in is the low cost and minimal amount of work it requires for a simple series of shelves. Adjustable shelf hardware easily installed, support ordinary lengths (planks) of wood which can be purchased precut at local lumber dealers. The finish can be simple (paint) or as elaborate (furniture finish) as the individual desires. The painted built-in requires less expensive lumber and permits a more economical means of construction. Shelf depths can be made to vary, offering interesting arrangements which can be set into a style pattern. This type of built-in can be planned to support the tuner, amplifier and record player.

On the other hand, built-ins can be made in more expensive and elaborate designs. Despite higher cost, they are still practical and can be planned to fit with



Any kind of furniture with shelves or compartments can be altered to hold hi-fi units. The most valuable tool required for such a project is your own imagination.

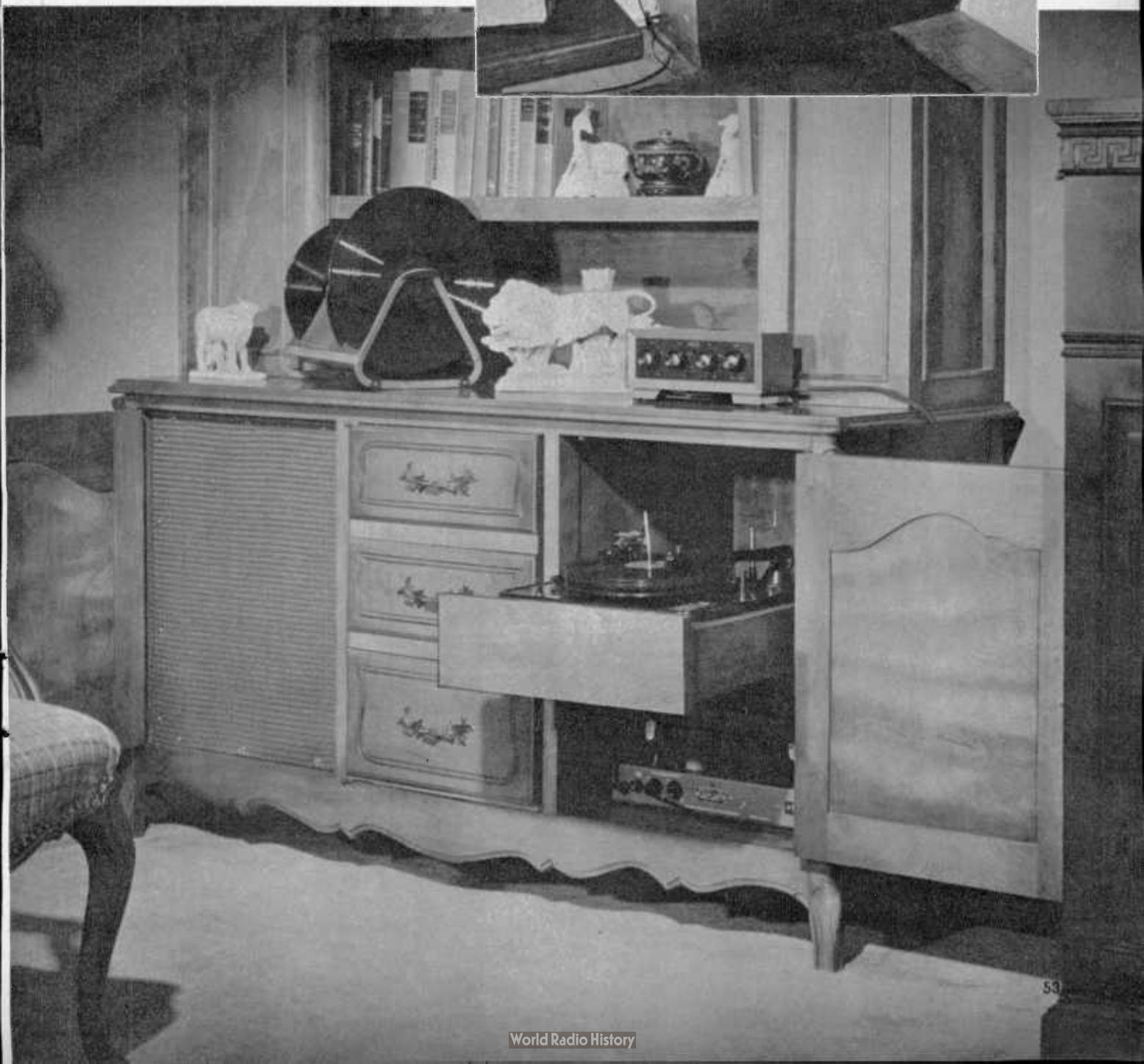
A basic built-in requires minimum work, cost. Shown here is a series of shelves fitted onto adjustable shelf hardware, which is very easily installed on the wall.

—Asco Sound, Inc.



—Bell Sound

Another example of using furniture already in the house and converting it to hi-fi is shown below. Here an old cabinet has been altered slightly, outfitted to hold the various types of equipment.



the existing decor of the home. One important theory behind the built-in is the space-saving factor, the idea to consolidate many functions into one integrated unit. Built-ins have saved the day for people who have cumbersome and unwieldy "L" shaped or long rectangular rooms, by serving as a room divider. Such an arrangement breaks up a long monotonous stretch of space and adds an interesting note to the room. It also provides an element of privacy for the music listener, permitting the other part of the room to be used for dining or entertaining guests.

Unused alcoves, foyers or small halls can be utilized for built-ins. In some of the older houses or apartments, the large living room is often accessible through more than one door. The second door may lead to a small alcove, hall, or an adjacent room. A novel means of utilizing the "second entrance" is shown. Note what three pieces of lumber and a small sheet of perforated hardboard can do . . . and, it is really economical. The closet is another excellent means of housing the components . . . building the speaker into a wall or using it in a recommended enclosure. Look for an unused corner, which is ideal for placing a speaker

enclosure. In the installation shown an entire system including television was incorporated in otherwise wasted space. Note that even the presence of a radiator did not discourage the imagination of this music lover. Existing bookcase units can afford a great savings in the hi-fi budget. In the installation shown, a sheet of perforated hardboard (for ventilation) fitted into one of the sections conceals the tuner and amplifier. Re-arrangement of the two lower right sections provides ample height for the record player (on its own base) and the tape recorder which is kept in its portable case. Planning for this type of installation permits devoting the budget for the best possible quality in components since the cost of cabinet work is kept to a bare minimum. The built-in can be: (a) built-in on a wall, (b) built-in *into* a wall. The main reason for this distinction is the mechanics behind each and the problem of ventilation and service. The installation built *on* the wall should be designed for service from the front of the unit and provision should be made for adequate ventilation. The installation built *into* a wall usually backs into a closet, utility room, stairwell, or other passageway in the house. In some cases,

An unused corner is ideal for placing television and hi-fi components, as photo below shows. An entire system can be incorporated in what would be just wasted space.

—Casey Hi-Fi Installation

The closet is another excellent place to house hi-fi components. Here we see the various parts of the unit housed on a series of shelves which are easily installed.

—Hollywood Electronics





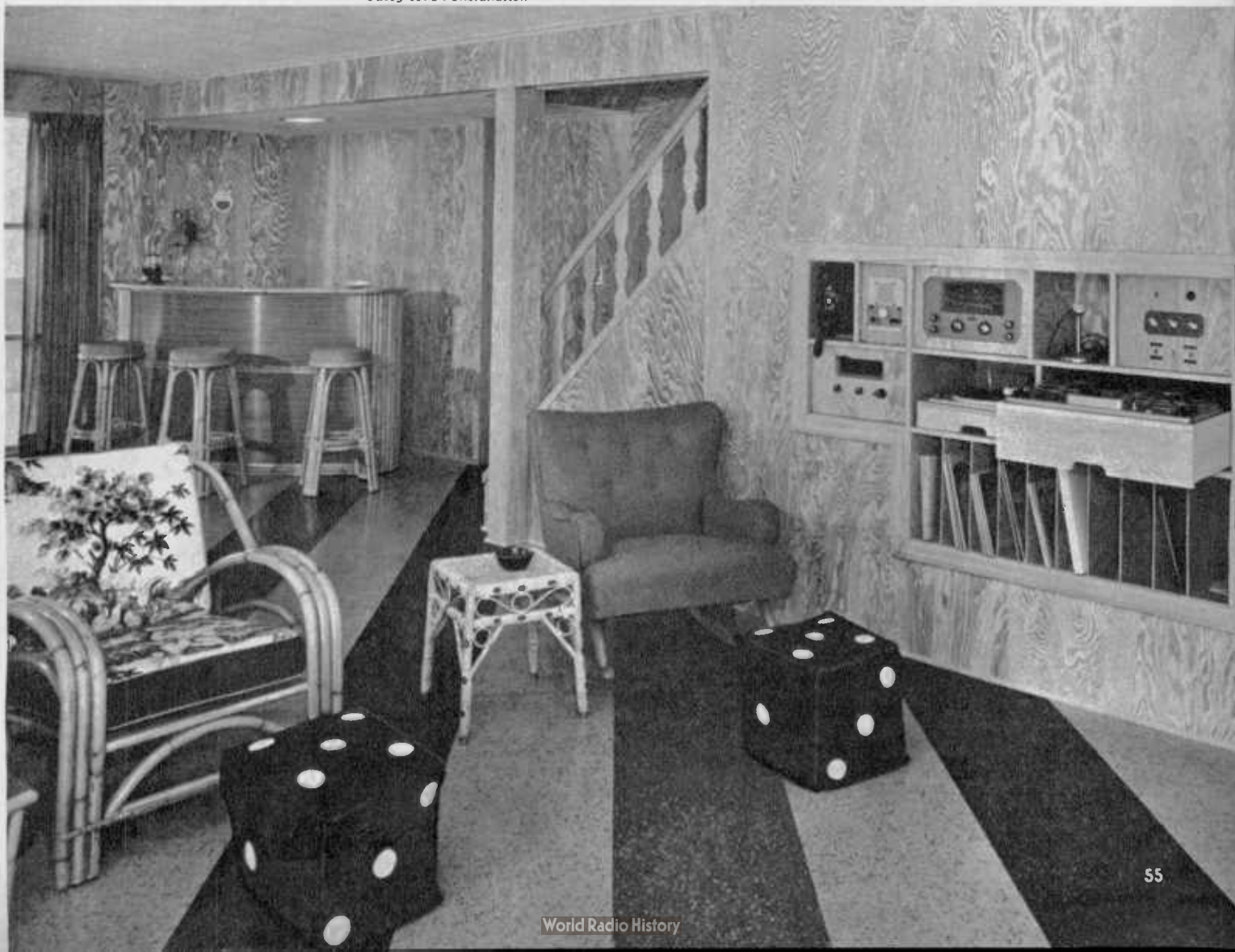


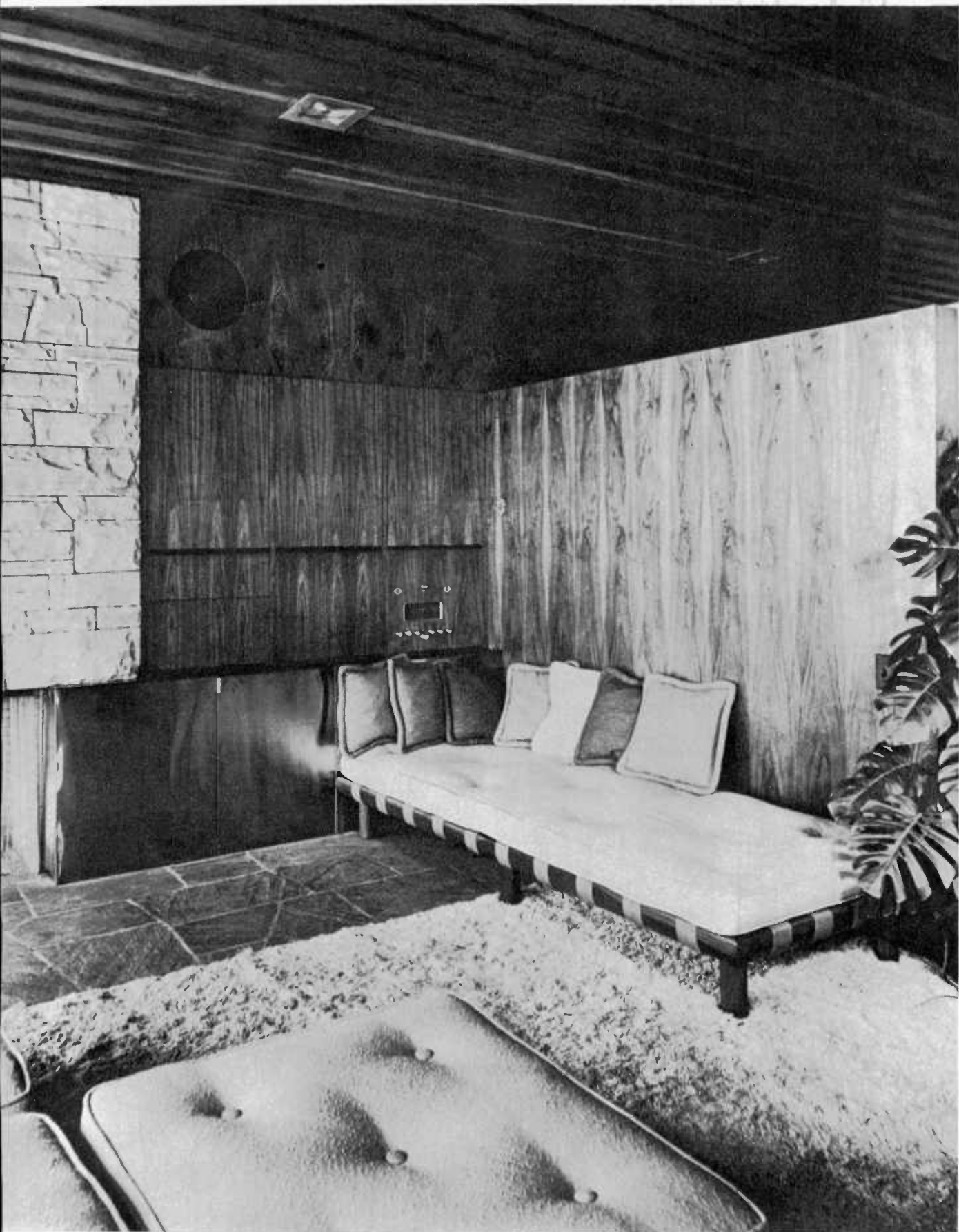
—Asco Sound, Inc.

Existing bookcase units can also be used to house hi-fi units. Here we see them placed in book shelves. Result is a highly-attractive combination of books and high fidelity set.

Photo below shows an installation made in a stairwell with the speaker and television unit in an opposite corner. Entire recreation room has been built around the high fidelity unit.

—Casey Hi-Fi Installation





Hi-fi unit as adapted to corner of ultra-modern home. Unit fits behind slide-panels, speaker is at top of unit. *—James B. Lansing Sound Co.*

this type of installation may fill an entire closet or other space which does not have an accessible means of getting to the rear. If such is the case, this installation should be regarded in the same light as the *on* the wall unit and should have provision for front of panel service and adequate ventilation from the front.

Where the built-in installation is made *into* a wall that has as accessible space behind it (such as the door to the stairwell, utility room or closet, etc.) provision for service can be made in the access area and ventilation can be provided through the access door in addition to the possibility of providing an air opening in the front of the enclosure.

In planning the built-in, whether *on* or *into* a wall, the choice of finish contributes great influence in the cost. If the finish is chosen to blend and match the painted woodwork (or walls) of the room, the cost will usually be less. To begin with, less expensive lumber can be used and the cost of painting as opposed to furniture finishing is lower. On the other hand, if a premium finished wood is selected, the cost of fine grained veneers and the labor costs of obtaining a good quality furniture finish is higher. Depending upon the installation's size and design, this cost may vary from as little as \$40 to as much as a few hundred dollars. Oddly enough, the cost of cabinet work does not differ very much when choosing a painted finish versus a furniture finish. As a rule, good cabinetmakers (like wallpaper hangers) do tend to charge a little more when working with better woods and finishes because of the greater care required which entails more time. But, with a project as large as a built-in, the few dollars difference between the two is negligible.

#### Facts and Figures

Once you have decided on the manner in which you will house the hi-fi system, you will need some facts and figures before you can begin choosing the equipment. After all, you cannot start to build, modify or buy an enclosure until you know what is going into it. Here's what you will require:

**IF YOU USE EXISTING FURNITURE**—Measure the width, depth and height of the various compartments that will hold the tuner, amplifier, record player, tape chassis, television chassis, etc. Keep these figures in mind when you select your components. If the unit does not have compartments . . . measure the overall available area and make a simple block drawing with divisions required for the compartments to house the necessary component chassis. Take this drawing with you when you visit your hi-fi dealer, he will be very glad to help you select components which will be suitable for installation. If you shop by mail, write to your mail-order dealer and send the sketch along, asking advice and counsel from their consultants. Once you have selected the components you can then have the local cabinetmaker modify the cabinet . . . or, if you are able . . . do-it-yourself in your home workshop.

**IF YOU BUY NEW FURNITURE**—Whether you decide to adapt *case goods*, or buy a regular hi-fi cabinet . . . shop for cabinet and components at one time. It is important to remember that the cabinet and components are closely associated and they must complement each other. If your hi-fi dealer does not have the cabinet you like . . . shop elsewhere . . . but, with dimensions of all of the components you have selected, so you can be sure they can easily be installed into the cabinet. Your hi-fi dealer will cooperate with you . . . and, probably make the installation if you have the cabinet delivered to him. Do not select a cabinet which will require any sacrifice on the part of the speaker system you have selected.

**IF YOU BUILD-IN**—Make sure of one thing . . . that you have ample depth, height, and width for adequate ventilation. Decide on a basic design and with sketches showing available dimension . . . then, go out and select the components. You may find it necessary to alter some of your plans, depending upon the difference between your initial and ultimate choice of components. If you are buying a basic or starter system . . . provide ample space for ultimate expansion to a deluxe system. Solicit the help of your hi-fi dealer . . . local or mail-order. You will find them eager to help and their help invaluable. If you are going to have a simple built-in, using existing bockcases or shelves, make a sketch of the available space and take it with you when you shop for components. This will assure your getting the proper size. There is nothing as aggravating as trying to *stretch* a cabinet dimension a fraction of an inch to get a component in. Moreover,

TABLE OF MINIMUM DIMENSIONS FOR  
COMPONENT CHASSIS \* \* \*

COMPONENT	Width	Depth**	Height*
FM TUNERS	15"	11"	6"
FM-AM TUNERS	15"	11"	6"
CONTROL UNITS	15"	10"	6"
POWER AMPLIFIERS (up to 30 watts)	15"	10"	10"
POWER AMPLIFIERS (over 30 watts)	16½"	12"	10"
UNIT AMPLIFIERS (up to 20 watts)	16"	10"	8"
UNIT AMPLIFIERS (over 20 watts)	16"	12"	8"
AUTO RECORD PLAYERS	16"	14"	11"
MANUAL RECORD PLAYERS	18"	16"+	8"+
TAPE DECK ONLY (horizontal mount)	16"	13"+	8"
TAPE DECK ONLY (vertical mount)	16"	8"	13"+
TAPE RECORDER (horizontal mount)	18"	16"	8"+
PROFESSIONAL TAPE DECK (with preamplifier)	20"	17"+	10"
TV CHASSIS W/21" TUBE	24"	24"	24"
W/27" TUBE	28"+	26"+	28"+

NOTES: \*\*\* These dimensions are approximate and represent an average of components currently available.

\* This includes allowance for connecting plugs, loop-stick antenna on tuners, and for adequate ventilation.

\*\* Includes space for ventilation; height for record players or tape decks mounted horizontally on a base usually 5" high (average).

+ sign indicates possibility of more space.

you should allow at least 1 to 2 inches of clearance on each side.

The attached chart illustrates the average dimensions required for compartments in consoles or built-in units. But, do not use these figures as an actual guide. Their purpose is to help you in planning and they provide approximate dimensions to show the required differences between an automatic record player and a professional unit . . . a television chassis with a 21" tube as opposed to a 27" tube . . . etc.

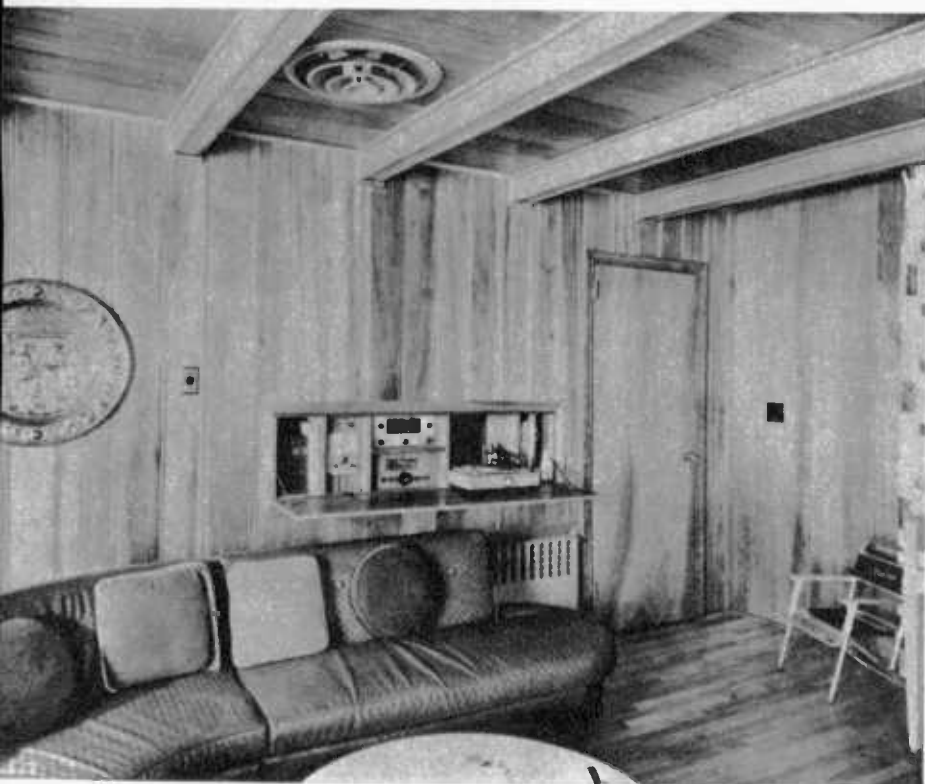
#### Speakers Through the House

In planning the hi-fi system, consideration should be given to the possibility of having remote speakers in other rooms of the house or apartment. In private homes, lines to remote speakers can be run down

through the basement or up through the attic to the other rooms. In most apartments, such lines may have to be run along the baseboard to other rooms. In all cases, if remote speakers are to be used, there are some important factors to consider.

First consideration should be given to the application of a remote speaker. It is to be used for serious listening in the comforts of the master bedroom . . . the den . . . the study . . . the children's room? Is it to be used for incidental or background music in the playroom . . . dining room . . . out of doors? The answers to such questions provide the key in selecting the proper speaker. If it is for serious listening, a good quality multi-speaker system should be used. For incidental or background music, a wide range speaker from 8 to 15 inches can be used . . . saving an ap-

Photo below shows hi-fi unit placed in compact wall cabinet in recreation room. Drop-leaf door can be closed to hide unit from view when not in use.



—Photos courtesy Casey Hi-Fi Installation



Installation right was planned to use available space in a really large room. Components were installed in an enclosure with the television screen placed in an otherwise unused space above the fireplace for wide range visibility.

preciable amount of money, with little loss of quality.

#### Remote Speaker Technicians

A speaker is rated at a given voice coil impedance; viz., 4, 8, or 16 ohms. Likewise, amplifier outputs are selectable from 4, 8 or 16 ohms. If a speaker or speaker system used with the main hi-fi installation has an impedance of 16 ohms, connections is made to the 16 ohm tap of the amplifier. But, if a remote speaker were also used, and both speakers were to operate simultaneously, a total impedance would have to be calculated to effect a proper match to the amplifier output. For example, if both speakers were 16 ohms, then the total impedance would be calculated mathematically as 8 ohms total impedance and connect to the 8 ohm tap of the amplifier. It is not the intent to

cover the full technical theory and formulae of impedance matching here. More so, the idea is to explain the requisites for correct impedance match at the amplifier when more than one speaker is used. Therefore, a brief summary is given to enable you to determine how many speakers you would want to use, and what method of connection to the amplifier would be most practical.

If all speakers are of like impedance, the total impedance can be calculated by dividing the impedance by the number of speakers. For instance if three speakers each having an impedance of 16 ohms were used, then the total impedance would be  $16 \div 3 = 5.3$  ohms. To calculate the impedance of two speakers of *unlike* impedance we use the formula  $Z_1 \times Z_2 \div (Z_1 + Z_2) = Z_t$ ; where  $Z_1$  is the impedance of the first



speaker,  $Z_2$ , is the impedance of the second speaker, and  $Z_T$  is the total impedance. For instance: If the speakers had impedances of 8 and 16 ohms respectively, the total impedance would be calculated as follows:

$$8 \times 16 = 128 \dots \text{and, } 8 + 16 = 24 \dots \text{and, } 128 \div 24 = 5.3 \text{ ohms.}$$

If there were three speakers, two with an impedance of 8 ohms and one with an impedance of 16 ohms, the total impedance could easily be found by employing the formula for speakers of *like* impedance for the two 8 ohm speakers and then use the formula for two speakers of *unlike* impedance. Here's how it's done: The total impedance of two 8 ohms speakers is 4 ohms. Then  $4 \times 16 = 64 \dots$  and,  $4 + 16 = 20$ . The total impedance is then determined by  $64 \div 20 = 3.2$  ohms. One good point to remember is that the total impedance will always be less than the lowest impedance of any speaker. In other words, if the speaker with the lowest impedance was 4 ohms, then the total impedance of all speakers would be less than 4 ohms.

We now understand how to calculate the total impedance of two or three speakers. The use of more than three speakers connected to the voice coil tap (4, 8, or 16 ohms) of an amplifier is not recommended since the total impedance can be considerably below 3 ohms. The result would be poor quality because of impedance mis-matches. But, there is a way to use as many as six or eight speakers, and it will be discussed a bit later.

More important are the other considerations associated with remote speaker connections made to the voice coil tap of the amplifier. The first is *conductor resistance*, which causes losses in power levels fed to the speaker. The second is *shunt capacity*, which affects the high frequencies. These two factors need not become a problem if the distance of any one speaker does not exceed the safe limits and if the proper gauge (thickness) of wire is used. The handy chart shown below should be used as a guide.

Total Impedance	A.W.G. Wire Size	Safe Maximum Dist.
3 to 4 Ohms	No. 14	50 Feet
6 to 8 Ohms	No. 14	75 Feet
6 to 8 Ohms	No. 16	50 Feet
10 to 16 Ohms	No. 14	100 Feet
10 to 16 Ohms	No. 16	75 Feet
10 to 16 Ohms	No. 18	50 Feet

Note: A.W.G. stands for American Wire Gauge and the number 14, 16 and 18 is the size. When buying wire, specify the A.W.G. number. The smaller number is the thicker wire (lower conductor resistance and shunt capacity). It is recommended that you discuss your problem of remote speakers with your dealer who will be glad to assist and advise you in detail. Armed with this little bit of technican, you will find it much easier to discuss this problem and arrive at a satisfactory solution.

If you intend to use more than three speakers in the system (one main and two remote speakers), then you should consider selecting an amplifier with provision for a 500 Ohm or 70 Volt line in the output circuit. And, for each loudspeaker located remotely (in addition to the main speaker) you will require a good quality *matching* transformer. A 500 Ohm or 50 Volt line will be found in some basic power amplifiers with a rated power of 30 watts or more. This higher power is required since each speaker will be fed a specific portion of the amplifier power at any level. For example, if five speakers were used with a 30 watt amplifier, the main speaker could be wired for 60% of the amplifier power and the other four 10% each. Thus, at maximum output of 30 watts (only on crescendos and peaks would this occur) the main speaker would produce the acoustic output resulting from 18 watts and each of the remote speakers from 3 watts each.

The 500 Ohm speaker line system is not new and has been in P. A. (Public Address equipment) use for many years. Selection of a transformer requires some calculations which your dealer can easily provide to suit your individual needs. The 70 Volt system is known as CVO or Constant Voltage Output, and is relatively new, especially in hi-fi. With this system, speakers are as easy to add to a hi-fi system as an electric light bulb is to a table lamp in the home. The 70 Volt line transformers are made with taps for specific power ratings in watts, and all you do is connect the wire to the desired power tap. With any transformer, there is no problem of calculating voice coil impedances. The secondary or voice coil winding of the transformer is selectable from 4 to 16 ohms, just like the amplifier output taps.

There is however one important fact to consider, and that is the quality of the matching transformers. Like amplifiers (which have output transformers), the matching transformer is rated by its frequency response and power handling capacity. When selecting a transformer, provide for ample power and make sure that the frequency response is good enough so as not to limit the performance of the remote speaker.

#### Planning the Purchase

Once the plans for the enclosure and installation have been concluded and set down on paper, you are ready to select the high fidelity components. By this time, having determined what portion of the budget will go into the enclosure, you have a pretty good idea of your ceiling for the hi-fi system. The first thing for you to do now is set a standard of quality, based upon your ceiling and use that as a guide. Regardless of your budget and tastes in buying (you may be a Ford or Cadillac customer) it is most practical to plan to get the best possible quality. Some may have to settle for modestly priced components, while others may be able to obtain the most expensive components at the start. Yet, price itself is not the criteria of ultimate performance. The best device with which you can measure quality is your own ears.

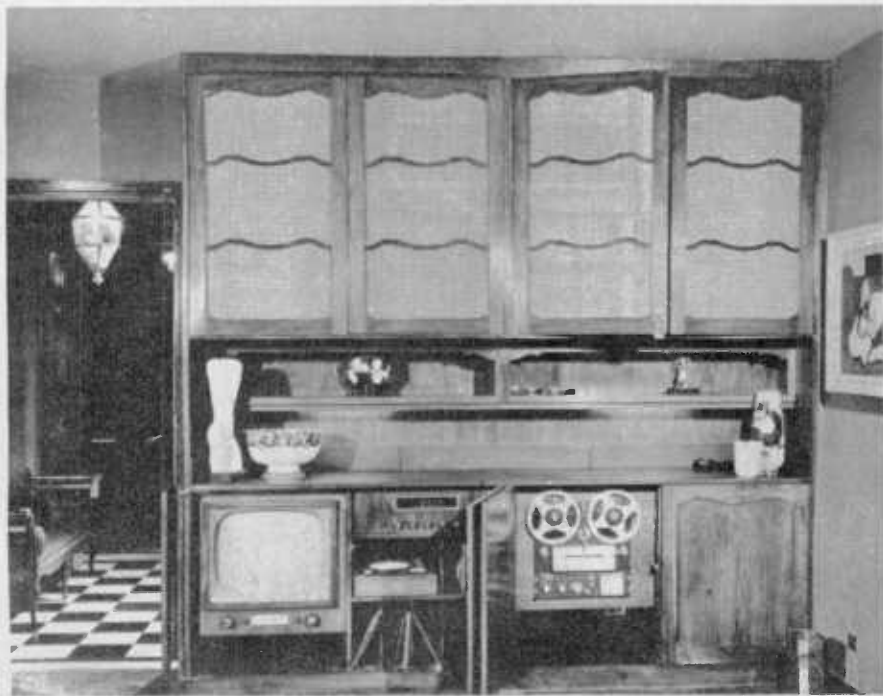
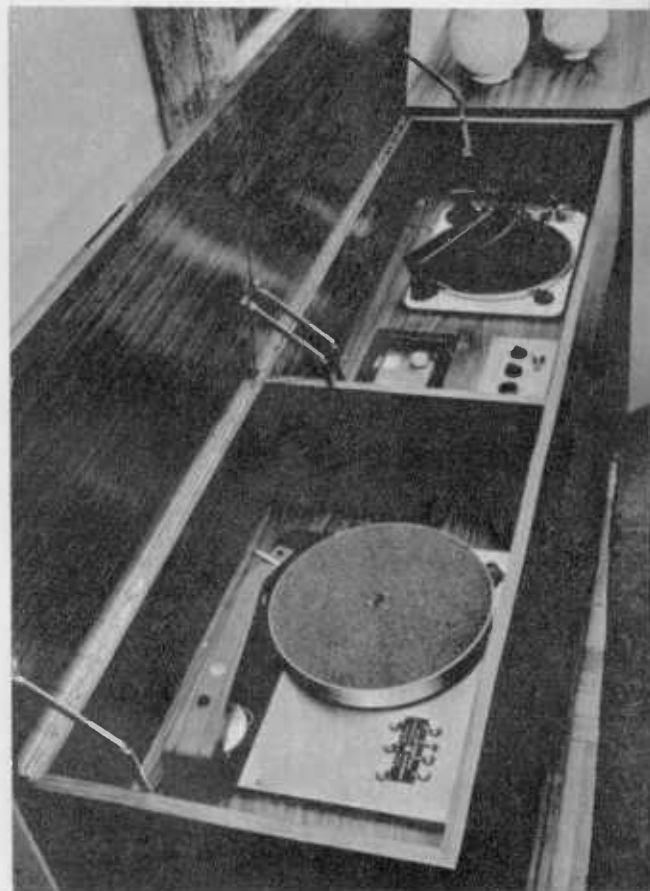


—David Bogen

Hi-fi unit above has been specially fitted into a specially-built cabinet which houses all the components, plus the record collection and a small library of music books.

—Asco Sound Corp.

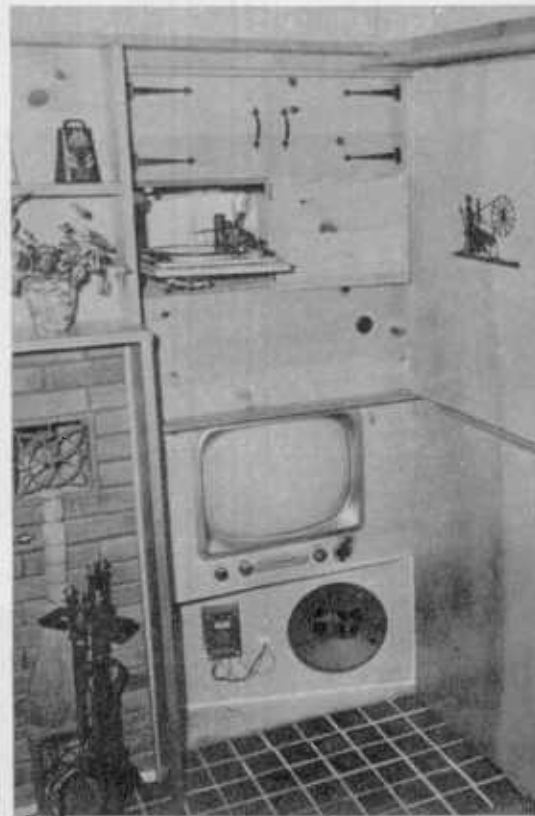
Photo right shows a sectional cabinet. These can be grouped to fill one or two walls. Unit shown here has a lift top, making it very convenient to use equipment.



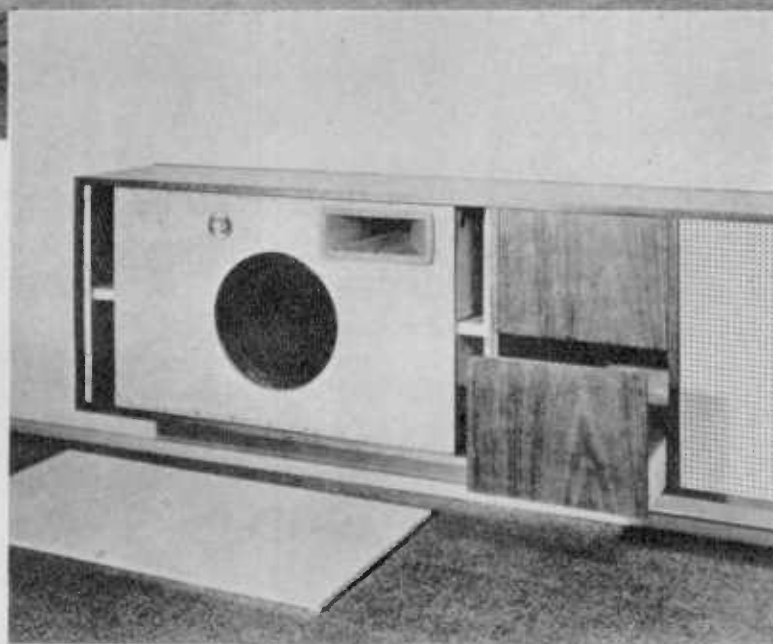
—Casey Hi-Fi Installation

Hi-fi units can be arranged so that they do double-duty; in this case, the entire hi-fi cabinet also serves as a side-board room divider, makes attractive addition to room.

TV and hi-fi at right installed in area originally intended for wood storage. Unit uses tuner, speaker and amplifier by Altec Lansing, a 21-inch Fleetwood TV receiver.



—Altec Lansing



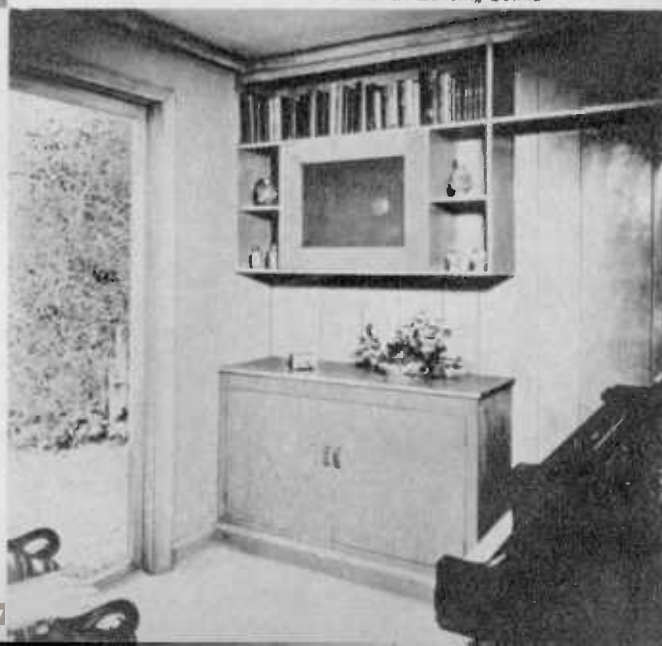
This model is by Jensen Manufacturing Company, is shown in two stages: partially completed and finished. Perforated hardboard sliding door on right covers record storage area. Note arrangement of three-way speaker in the smaller photo.

—James B. Lansing Sound

A two-way multi-speaker system is installed into a modified wall bookcase unit. This speaker system is used in a room designed especially for high fidelity music listening.

Wall-hung installation dominates the entire room and provides excellent coverage of all listening and viewing areas. Sliding doors below provide record storage.

Where it is feasible to add a speaker enclosure, deluxe multi-speaker systems can be placed in the main living room to provide excellent reproduction of your records.





Begin to get acquainted with hi-fi in the flesh. Visit friends who have systems in their home. If possible, try to make the rounds of homes that have different systems. At this time you can probably get a better picture of what your system will look and sound like if you visit with a neighbor who has a similar home or apartment and was faced with the very same decisions you have to make. Ask lots of questions and play lots of records. Listen to FM (especially if you have never owned an FM receiver) and compare it with AM. Many of the hi-fi shops have excellent demonstration or listening rooms; however, the intimate association in a friend's home can rarely be equalled in a commercial establishment.

Much information is available from manufacturers and dealers for the cost of a postage stamp or postcard. You can write for plans to build your own speaker enclosure . . . bass reflex . . . corner horn . . . from a small 8" enclosure to a deluxe 4-way system. Many of the plans are free, others require a nominal charge for mailing and handling. If you will require odds and ends . . . hardware and other incidentals for planning or building your own installation, you will find them listed also. Refer to "A Potpourri of Hi-Fi Sources" in the back of the book.

Once you have surveyed your neighbors and friends, visit or write to your hi-fi dealer. Ask for catalogs and printed information describing the various products. Write to manufacturers, ask for literature, get to understand the various features so you can intelligently compare one product against another in the dealers listening room. Buying hi-fi can be a wonderful and educational adventure . . . its more than buying a new car . . . and, almost as much fun as buying a new house. You will find yourself learning a new language of unique terms found in the description and specifications of high fidelity products. It isn't hard to understand their meaning (See Glossary of Hi-Fi Terms).

#### Binaural or Stereophonic?

Binaural or stereophonic reproduction of sound (for

practical purposes, they are synonymous) is a *luxury* limited to those who are content to go to the added expense of two amplifiers, two speakers and a stereo tape player. At the present time, tape playback is the most practical medium for reproducing stereophonic sound in the home. Some of the larger "fine music" stations transmit stereo broadcasts over FM and AM simultaneously. To receive these broadcasts you require an FM-AM tuner with separate output channels for FM and AM . . . or, a separate FM and AM tuner. However, these programs are often limited to about one hour and broadcast once during the day. Depending upon the station, there may be from three to five programs a week. Some FM tuners (and FM circuits in FM-AM tuners) have a provision to connect a multi-plex adaptor. Plans are to broadcast stereo programs in the future over FM by means of multi-plex, which is the transmission of two signals using a common (single) carrier wave. Just how far the work in providing this type of transmission has progressed is not exactly known. Rumor has it that it may be used on a small scale some time in 1958 . . . others say it will not be before 1959.

When multi-plex is in regular operation, you can easily convert your monaural (single channel) system to a stereo or binaural (dual channel) system by adding the multi-plex adaptor, and an additional amplifier and speaker. Whether or not you wish to plan for this type of reproduction for the future is a decision you will have to make. You can decide on a location for the future speaker, or you can include it in the present system, using two speakers for single channel operation. If you decide on the latter, the only added component you will need aside from the multi-plex adaptor is a second amplifier, to which the second speaker would be connected. If you should decide on planning your system with provision for stereo reproduction at the present, here is what you should know.

(1) At the present time binaural or stereophonic reproduction from phonograph records is impractical

—David Boger



—Electro-Voice



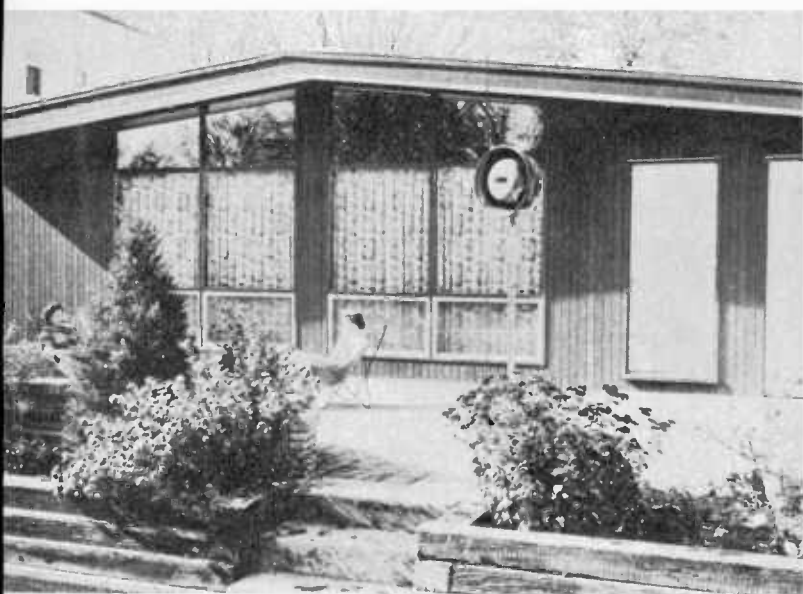


A good quality speaker can be used with the television set in the playroom, and it can also double as a remote speaker from the family hi-fi system.

—Casey Hi-Fi Installation

The Jensen HF-100 and University BLC are weather-proof outdoor speakers containing a two-way speaker in horn-loaded housing for permanent installation.

The outdoor speaker can be mounted on a pole so it can swivel in any direction, or it can be mounted on a nearby tree trunk, as it has been done in photo below.



both from a cost and mechanical point of view. It requires a special arm, professional turntable and two preamplifier equalizers with two pickup cartridges. This in addition to the extra amplifier and speaker. At one time, there were quite a large number of binaural records available. At present the supply is small. Mechanically, there is the problem of adjusting both pickup cartridges to track properly in the two sets of grooves on the record surface. Also, because one program has to be recorded on two parts of the same side of a record, the playing time is just about one half of a regular 33 rpm LP record.

(2) Binaural reproduction of sound from tape is practical and is in fairly wide use. The cost of stereo pre-recorded tapes is higher than monaural tapes, and the repertoire is not as large. You will require, in addition to the extra amplifier and speaker, a tape deck which can be obtained in a variety of combinations. You can get a unit which will play back only, from both monaural and stereo tapes; or, you can get one which has a record and erase head for monaural recording. If you are musical and wish to record stereophonically, you can obtain a unit which will record both monaural and stereo as well as play back.

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—Asco Sound

Another lavish-hi-fi setup is shown in photo above. Lush cabinet houses various parts, record collection, books.



Here we see Presto turntable with binaural pickup arm and two cartridges. Unit makes listening a pleasure.



Unit shown in photo above is a binaural amplifier made by the Bell Sound Systems. It is compact and reliable.



And here we have a binaural FM-AM Tuner made by H. H. Scott. Unit is available at most major hi-fi stores.

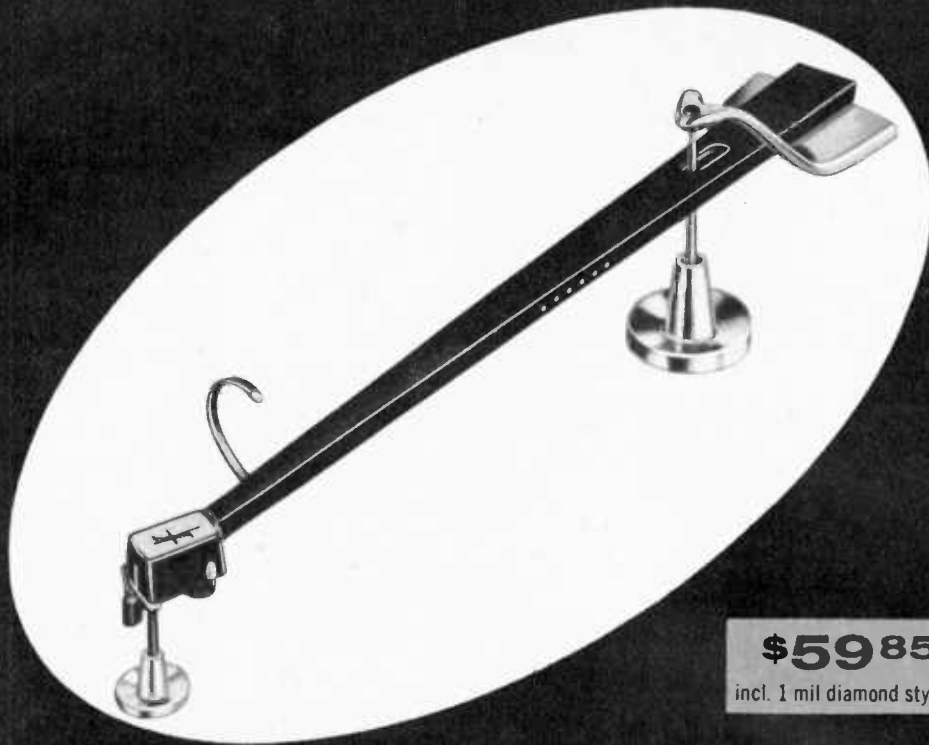
This requires two microphones and critical placement. Stereo broadcasts can also be recorded using FM for one channel and AM for the other. Tape is a convenient means of stereo sound reproduction.

(3) Receiving stereophonic broadcasts at present is a thrilling experience and will provide much pleasure. But, stereo broadcasting is limited to a few hours a week (if a local station makes it available), and must be received over FM and AM simultaneously. With this in mind, if you include stereo in your plans, you must select a radio tuner with separate output channels for FM and AM. Not all

FM-AM tuners have this facility; be sure to check with the manufacturers specifications and your dealer.

In summing it up, you must consider the immediate extra cost of including stereo and the benefits you will realize to justify this cost. Weigh the possibility of available stereo broadcasts and the selections available on pre-recorded tape. Decide whether you will provide for the additional amplifier and speaker for future installation; or, include the extra speaker for dual speaker monaural reproduction (adding the amplifier in the future); or, plan for binaural or stereo at the start. •

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# How to Buy Hi-Fi

A number of ways to purchase a high fidelity system are discussed in this chapter aimed at procuring the very best quality for your money—



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**T**HERE are two maxims for which I have a great deal of respect; and, they derive from sources far removed from one another. The first is an old Latin proverb: "*Caveat Emptor . . . let the buyer beware.*" The second, of more recent vintage, was first uttered by a colorful carnival pitchman: "*You pays your money and you takes your choice.*" Like buying anything else of major scope, high fidelity systems must be carefully selected to assure continued satisfaction and pleasure. Changes in mid-stream can be costly, and aside from the trouble of carting a unit back to the store, there is always the possibility of added cabi-network when installing another unit.

A high fidelity system may be purchased complete at one time; or progressively, buying a basic starter group and adding the remainder of the components at a later date. The latter method of procurement offers a wide latitude for obtaining the best possible quality you can afford. Of course, the degree of quality you choose will depend more upon your individual tastes and financial limitations; however, progressive buying will always permit you to reach for a higher level of quality than you would normally be able to afford if you were to buy the entire system at one time.

PAYMENT PLAN



Sun Radio and Electronics Co., Inc., N. Y. C.

Trust your hi-fi dealer to be up on the latest equipment on the market, and then listen carefully yourself to compare several models before choosing your unit.

**Progressive Buying**

Depending upon whether you want the basic system to reproduce records or receive FM broadcasts you can initially purchase a signal source, an amplifier, and a loudspeaker. The enclosure should be planned to house all of the components which will ultimately be used in the system. Here are some hypothetical examples to better understand how you can benefit by spreading your purchases over a period of time, building the system in progressive stages.

*Example A:* Your initial budget is \$250.00; and, you will put the system into an existing unit of furniture, except for the speaker. If you were to buy the entire set-up at once, you could find a good quality system with

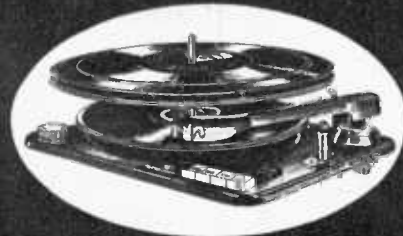
FM radio and record player. Itemized with approximate prices, the components are:

FM Tuner .....	\$80.00
10 Watt Amplifier .....	55.00
Automatic Record Changer with magnetic cartridge and dual sapphire stylus ....	50.00
Base for changer .....	5.00
12" Wide-Range Speaker .....	30.00
Unfinished kit for speaker enclosure .....	40.00
	-----
	\$260.00

The total cost for such a system is only \$10 over the budget, which is within reason. But, the question is whether or not you have obtained the

World's Most Distinguished High-Fidelity Family

MATCHLESS!



**MIRACORD XA-100**

**2-in-1 Pushbutton Record Changer and Manual Player with Exclusive "Magic Wand and Spindle"—New: 4 Speeds**

5 pushbuttons provide complete control at the touch of a fingertip. Instantly converts to an automatic Manual Player by inserting short spindle. Famous "Magic Wand" spindle intermixes 10" and 12" records, protects your finest recordings.

Complete with plugs and leads attached. \$67.50 less cartridge

MARVELOUS!



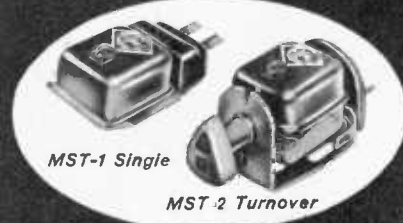
**MIRAPHON XM-110A**

**Transcription Quality Manual Player—New: 4 Speeds**

The perfect performer! Embraces true High Fidelity construction features usually found only in very expensive units.

Complete with plugs and leads attached. \$37.50 less cartridge

MAGNIFICENT!



**MIRATWIN Cartridges**

**Brings Out The Best In ANY Hi-Fi System**

An extremely wide range magnetic cartridge that recreates all the brilliance and realism of the original sound. Fits all Standard Tone Arms. Instant Fingertip Stylus Replacement. Stylus replacements available from stock.

**NEW LOW PRICES**

- MST-1D—Single Diamond . . . \$26.50
- MST-1S—Single Sapphire . . . \$10.00
- MST-2D—Dual-1 Sapph., 1 Dia. \$31.50
- MST-2A—Dual Sapphire . . . \$15.00

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At all Hi-Fi Dealers  Write for Complete Brochure

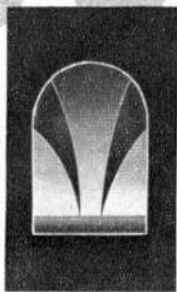
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"Feather-Ray" Tuning Eye

**Sherwood**  
TUNERS

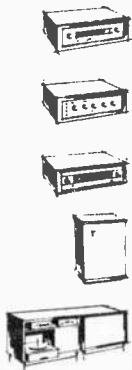
Indeed the Ultimate! Under one micro-volt sensitivity for 20 db FM quieting increases station range to *over* 100 miles with the newly engineered Sherwood tuners. Other important features include the new "Feather-Ray" tuning eye, a local-distance switch to suppress cross-modulation images, AFC switch, fly-wheel tuning.

MODEL S-2000 FM-AM Tuner... \$139.50 net  
MODEL S-3000 FM only Tuner... \$99.50 net

Write for literature—Dept. HP-8

**Sherwood**  
Electronic Laboratories, Inc.

2802 West Cullom Avenue, Chicago 18, Illinois



The "complete high fidelity home music center."



quality you would like; or whether you have made any sacrifices because of budget limitations. For one thing, you do not have a diamond stylus for LP records. This is an important feature since records are costly and the sapphire will not last too long before record wear begins. Already exceeding the budget by \$10, it may be difficult to stretch it another \$15 to get the diamond. On the other hand, is the 10 watt amplifier the model you really would like? It is entirely possible that in order to stay within your budget, you have made a sacrifice and settled for less than you would have wanted. Does the record changer have all of the features you want? Perhaps you settled for a slightly cheaper model to satisfy the budget ceiling. You could have obtained better quality at the start and eventually built up to a deluxe system, which you could easily afford, if you spread your purchase over a period of time. Here's how a progressively purchased system would be planned:

20 Watt Amplifier .....	\$95.00
Deluxe Automatic Record Changer .....	55.00
Base for changer .....	5.00
Magnetic Cartridge with diamond/sapphire .....	22.00
12" Wide-Range Speaker (better quality) .....	33.00
Unfinished kit for speaker enclosure .....	40.00

Exact amount of budget—\$250.00

Here is a better quality record playing system with twice the amplifier power, a better record changer, a diamond stylus, and a better speaker. Over a period of time, you could add components and build the speaker you started with to a deluxe 3-way multi-speaker system, later add a better quality FM tuner. Here's what the add-on units would cost, and you could make the addition in your own time, when you feel you can afford it.

ADDITION 1—A high frequency tweeter, converting the wide-range speaker into a 2-way multi-speaker system. A high frequency tweeter kit includes the network, Brilliance Control and cables; cost is about \$35.00. The enclosure kit planned for this system has pre-cut openings for tweeter and mid-range, so there is no need for cabinetwork, and only a screwdriver is needed to make the addition.

ADDITION 2—At this point you can complete the 3-way speaker system by adding a mid-range speaker; or, you can add the FM tuner. If you add the mid-range speaker, the expenditure would be about \$80.00 for speaker, net-work, Presence Control and cables. Like the tweeter unit, installation requires a screwdriver and about 30 minutes of your time.

ADDITION 3—Now the system can be completed by adding a top quality FM tuner, cost is about \$100 for any one of a half dozen good quality makes.

Although it took a little more time, building the system in stages has also provided you with a greater sense of value since you were able to recognize and appreciate the difference in quality each time you added a component. It certainly was apparent when the speaker system was built-up to a 3-way system. No sacrifices were made since a better and more powerful amplifier was used, and a diamond stylus further contributed to savings by avoiding wear on records.

*Example B:* Going to another extreme, let's examine another hypothetical case of building a system in stages. Here, the initial budget is \$550.00 and the system is to be installed into a custom console cabinet. To obtain the entire system at once could require a choice of components which admittedly substitutes an automatic record changer (deluxe model with diamond stylus for LP records) for a manual record player; and, a coaxial speaker which is second choice to a 2-way multi-speaker system. The itemized list is as follows:

FM-AM Receiver with 20 watt amplifier (Tuner, control, 20 watt amplifier on one chassis) .....	\$175.00
Automatic Record Changer with diamond/sapphire ....	75.00
15" Coaxial Speaker .....	90.00
Custom Console Cabinet .....	210.00
	-----
	\$550.00

The custom console cabinet is selected to fit into existing room decor and is not a variable. It has a compartment for installing an existing tape recorder to bring the overall cost down with a minimum of sacrifice. Records are considered most important, but to stay within the



budget, a good quality record changer was selected. The speaker is second choice, but was also chosen on the basis of budget. These are common sacrifices made in an untold number of cases, where almost half of the budget is used for an enclosure. Spreading the purchases over a period of time would create no immediate sacrifice, except to omit radio; but, since records are of prime importance this is a minor matter. Here's how a modified purchase would look.

Custom Console Cabinet .....	\$210.00
Turntable and Motor .....	50.00
Pick-up Arm and Cartridge with diamond stylus .....	60.00
40 Watt Amplifier .....	125.00
15" Wide-Range Speaker .....	75.00
	-----
	\$520.00

Here is the nucleus of a truly deluxe system for much less than the budget ceiling. The pickup arm, cartridge, turntable, and amplifier are the original preferred choice. The wide-range speaker represents one half of the preferred multi-speaker system. The existing tape recorder

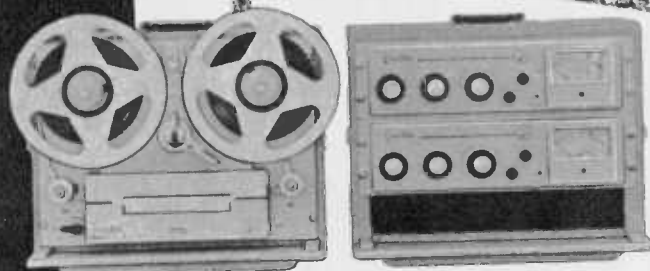


*Sun Radio and Electronics Co., Inc., N. Y. C.*

Should you choose a unit beyond your immediate budget, you can achieve that fine quality by buying progressively; adding to your original scope at a later time.

## CONCERTONE

... professional  
quality  
designed for  
home  
enjoyment



Until you've heard the starting perfection of stereophonic sound on a Concertone Tape Recorder, you haven't heard Hi-Fi at its best. The Concertone is a magnificent instrument that permits you to record stereo with professional fidelity and on the same instrument play back your own stereo recordings or full or half track pre-recorded hi-fi tapes with lifelike reproduction.

Professional features include 3 separate motors for the utmost accuracy and fidelity, automatic cut-off, erase safety, straight line threading and use of 10½" reels.

Write for Bulletin No. 5001.1

Audio Division

AMERICAN ELECTRONICS, INC.

655 West Washington Boulevard  
Los Angeles 15, California

# FAIRCHILD

... When only the  
*BEST* will do

The renowned FAIRCHILD "Micradjust" Cartridge brings remarkable realism to any high fidelity system. Its sparkling clarity and sheer beauty of sound lifts the full dynamic range from modern recordings. This is the same cartridge used by recording studios and broadcasting stations whenever perfection is required. Fits all changers and tone arms. Complete with precision ground diamond stylus.

**\$37.50**



Designed for true professional performance, yet modest in price, the FAIRCHILD Model 280A Plug-In Transcription Arm is the housing best designed for the FAIRCHILD Cartridge. The first choice of the audio fraternity, it's rated "tops" by leading consumer testing organizations.



Tracks perfectly, no groove jumping, has built in arm rest, easily interchanged cartridge slides. Beautifully styled, simple to mount. **\$37.50**

Want new authoritative booklet on arm design? Send 10¢ for "How Good Is Your Arm" and complete technical data on all FAIRCHILD products to:

Fairchild Recording Equipment Co.  
10-40 45th Ave., L. I. C. 1, N. Y.

Name \_\_\_\_\_

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can still be adapted to the system. In time, additions can be made to build the system up to the full standards of the purchaser's requirements. With the single exception of radio, this system is superior in every way to the complete system selected because of budget. In this case, if radio reception were secondary in importance, the first step in building would be to add a radio tuner. An excellent FM-AM unit could be obtained for about \$140, and an FM tuner for about \$100. In time, the speaker could be built up to a 2-way system by adding a companion tweeter with network and Brilliance Control for about \$55.

### Going Out to Buy

Armed with facts and figures of

the contemplated installation and budget, you are now ready to go out and make a purchase. But, where do you go? Do you live in a large city where it is easy to visit the demonstration room of a hi-fi dealer? Do you live in the country or suburbs, and know of a hi-fi custom builder who made an installation for a friend or neighbor? Do you live in the backwoods where hi-fi shops and custom builders don't exist . . . and have to buy by mail? Are you the type who was raised with a workshop in the basement and like to do-things-yourself?

There are three main sources from which you can purchase high fidelity equipment.

## The Hi-Fi Dealer

He also acts as consultant, decorator, technician

High fidelity dealers will appear in various cities as different types of establishments. It may be a division or department of the radio parts distributor who will not sell retail across the radio parts counter, but has opened a hi-fi department to sell direct to the music lover and hobbyist. The radio parts distributor is the original source of hi-fi equipment; but, more and more, the hi-fi specialty shop is making its appearance. This is a store devoted only to sound equipment . . . some have only hi-fi, others have a commercial department doing custom public address work. The hi-fi shop usually is better equipped to make installations and service you in the home, although the parts distributor in larger cities maintains a service and installation department. Another source is the music shop who has added a hi-fi department to satisfy the demands of his record buying customers. Almost all have trained and well informed personnel who are able to assist you with your installation problems and answer technical questions. A reputable and efficient hi-fi dealer should have a demonstration or listening room where you can listen to equipment and make rapid comparisons. Beware of the nondescript shop which claims to be able to supply anything you need, yet has practically no facilities (except for a

little display) to demonstrate or compare components. In many cases such an establishment is not a franchised dealer and does business with a dealer out of the city who sells him equipment. He can probably supply brand new items . . . but may not be in a good position to service you when trouble comes.

One of the most valued assets of the hi-fi shop is the accumulation of experience and know-how by their technical staff. Dispensing hundreds of hi-fi systems and talking or writing to hundreds of people, they become intimately familiar with the many problems faced by the music lover. They are well versed in the trials and tribulations of decorating and furniture. In large urban areas, where the majority of hi-fi dealers do business, most of the installations are made into apartments of all sizes. Even in nearby suburbia, small, modern ranch homes present some space problems; and, building-in is not always feasible. Thus, the hi-fi dealer's biggest stock in trade is an active selection of ready-made or custom enclosures as well as an affiliation with cabinet-makers whose capabilities range from a simple modern enclosure to the restoration of a precious antique. Since the early days of high fidelity the hi-fi dealer has most certainly enlarged his scope of operation!

# The Custom Builder

## An experienced designer

Many people feel that the custom builder is a luxury they cannot afford. Truthfully, the title and appearance are somewhat deceiving. The custom builder does have facilities for making truly elegant installations and is equipped to design and custom build the most expensive of cabinetry. On the other hand, they depend upon average income business for their bread and butter. In doing research for this book, I called on Jack Casey of Casey Hi-Fi Corp. in Teaneck, N. J. to observe the activity in a "Custom Hi-Fi Shop." During my stay, I watched him take an order for \$325 for a system that was to be built-in. When I questioned him about average cost, he stated that he did many installations running as low as \$200 although he did have jobs running to \$1500, and up to \$4000 for a most elaborate and involved installation in a fabulous \$200,000 mansion.

If you are not the type who likes to putter and fool with mechanical gadgets and cannot measure the distance across a room accurately, the custom builder can be of great help. Many times, his fee for know-how and design is more than amortized by the money he can save you with practical ideas which eliminate expensive cabinetry and save space affording greater convenience. Often this type of service cannot be measured in dollars and cents. The custom builder is also a specialist, with many years in the field of high fidelity. His establishment usually contains a listening or demonstration room where you can listen to and compare components. In addition, he has a service department

and will include a period of service as part of the installation he sells you.

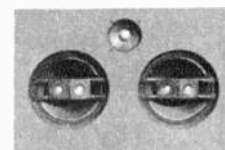
An installation by a custom builder may only cost a few dollars more than buying by mail order or from a local dealer. Of greater importance is the help in planning which, in one instance, cleverly eliminated the speaker enclosure since it presented a space problem; and, the cost of the speaker cabinet covered the charges for service and installation. Not having the time or inclination to tackle

the project himself, this customer discussed his budget and requirements with the custom builder and arranged for a visit to the demonstration room. Once components were decided upon, arrangements were made for a survey in the home. With a location selected for the equipment enclosure and a place to install the speaker, work was begun to complete the installation. In two weeks, from the first meeting to final connection, the job was completed.

## If you are planning a Music System...

PLAN FOR  
**SUSTAINED MUSICAL SATISFACTION**  
through SYSTEMATIC GROWTH with  
**BOZAK**  
*Quality Loudspeakers*

The Bozaks are building-block units —  
*one line of one quality* —  
three inherently-matched direct-radiators,  
designed to work together and with the  
N-10102 Convertible Crossover Network  
for clean, realistic sound and easy  
Systematic Growth.

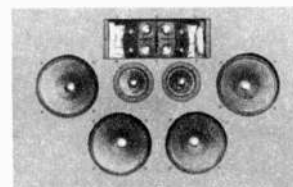


Start with the wide-range two-way B-207A in an infinite baffle — the *easiest* enclosure to build, the *only* enclosure for a fine woofer . . .

Add a B-209 and N-10102 for crystal-clear middles . . .

Grow by easy stages — adding compatible Bozaks and modifying the Network — into the magnificent B-310 or B-400, for the finest sound you can hear!

In short — if your interest is in *music* rather than gadgetry, you will Build with Bozaks for



### *The Very Best in Sound*

Plans for all Bozak infinite-baffle enclosures are available on request.

Write for the 8-page Bozak Catalog or see your nearest Franchised Bozak Dealer.

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Tool Catalog

TOOL CATALOG



YOUR NAME

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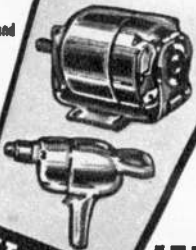
The opportunity now awaits you to own and operate your own business on a part time or full time basis in the lucrative field of HARDWARE, HAND TOOLS, FANS, POWER TOOLS, MOTORS, PAINTS, etc., or BUY TOOLS FOR YOUR INDUSTRIAL OR INSTITUTIONAL USES.



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# MAIL TODAY!



Casey Hi-Fi Corp. N. J.

Having discussed the design and style requirements of his client, the custom builder lays out the plans for the console cabinet to fit that particular home.

## Buying by Mail

Choose a reputable firm, have fun and save money

Study the catalogue carefully; write for all the information you will need.



Allied Radio, Chicago, Ill.

Looking at the massive catalogs from Sears, Roebuck and Montgomery Ward, I am more and more convinced that there is nothing wrong with buying by mail. The only important requisite is that you do business with an established, reputable organization . . . buying direct from their catalog or advertisement. Most of the larger hi-fi shops have a mail-order department and a consultation service to help you with your technical and installation problems. Any reputable firm will welcome correspondence and will reply promptly with helpful information and literature. Since they receive many letters a day, do not expect a reply overnight. If there will be any serious delay for some reason, you will probably receive an acknowledgement advising you when to expect an answer to your query. When buying by mail order you will receive the same type of service offered by the local dealer. Component chassis are checked out and coded for simple interconnection. In the case of a complete system with console, many mail-order firms will ship a unit ready to plug into the wall outlet as soon as it is unpacked.

Compared to a short five years ago, today there are an enormous amount of do-it-yourself kits for assembling high fidelity components. You can buy a kit to assemble a professional pickup arm, or build a series of enclosure cabinets to house the entire hi-fi system from record player to multi-speaker system. And, building from kits can really effect a large savings in the budget. For example, you can obtain kits for good quality components including an FM tuner, 25 Watt Amplifier, and a 2-way speaker system in an enclosure for about \$225 including the cost of shipping. Comparable ready built units could run about \$400 or more. While the savings is large, about 1/3 or more, the kit builder can look forward to about three week ends of interesting work . . . even with help from the family. But, with time to spend, and the fun of putting things together, you can save money by helping yourself. •

## Glossary of Hi-Fi Terms

**A-B TEST**—A comparison test of Product A versus Product B. Briefly, it is a test to determine the better sounding product.

**ACOUSTIC FEEDBACK**—Mechanical vibrations which emanate from the loudspeaker and are picked up again by the sensitive phono cartridge. Usually this is caused by poor cabinet design, especially in the shock mounting of the record player base.

**ATTENUATE**—To reduce in loudness level. An Attenuator is a control which reduces loudness. Often referred to as a level control in a multi-speaker system.

**AUDIO FREQUENCY**—Abbreviated AF: Sound vibrations which can be perceived by the human ear, ranging from about 15 to 20,000 cycles per second.

**AURAL COMPENSATOR**—Also known as a Loudness Control, Loudness Contour Control, Compensated Volume Control: This is a secondary volume control or a circuit which can be switched into the volume control circuit. It provides a proper balance between treble and bass with respect to mid-range at low volume. This is to compensate for the characteristic falling off of hearing sensitivity of the treble and bass frequencies at low loudness levels.

**AUTOMATIC FREQUENCY CONTROL**—AFC: A circuit in an FM or FM-AM radio tuner which prevents drift by holding the local oscillator at its correct frequency after the station has been tuned in. This feature also makes tuning stations much easier as it locks the station in when the dial pointer reaches the center of the FM channel.

**BAFFLE**—A partition or enclosure used to extend the path of the sound emanating from the front of the speaker cone and to prevent the rear waves from canceling sound waves from the front. It increases the acoustic loading of the speaker cone (diaphragm).

**BASS-REFLEX**—A type of speaker enclosure which employs phase inversion and loads the speaker cone for maximum bass performance. Port or vent in the enclosure permits back waves of speaker to emerge in phase and reinforce the bass notes.

Contemporary American Furniture, Inc.

# american loudspeaker



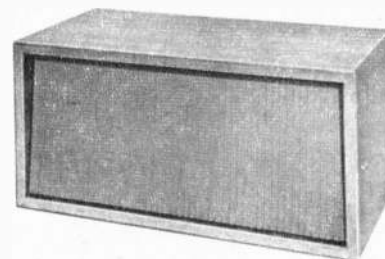
The Mark 100 is an interesting and handsome piece of furniture designed to house a complete audio system except speakers. Changer cut-out is furnished at no extra cost and the cabinet back is pre-drilled for easy installation. The changer drawer is mounted on quality ball bearing slides for smooth operation. Record storage is provided beside the changer in separate compartment. Three fine finishes are available.

27" high 16" deep 36" wide  
Mahogany \$97.50 Sandalwood or Walnut \$105.00  
The Mark 100 K (kit) Birch only \$69.50



The Mark 12 speaker system is a two-way system using a 12" base driver and a 5" cone tweeter. The cavity is coupled through a slotted grid to a flared duct which is the cabinet base. This complex assures unusually good performance in the lower base range. Isolated by a solid back, the tweeter is not modulated by the base driver. Essentially flat from 50 cps to 15000 cps. 25 watts. 8 ohms impedance. Clean and restrained in styling the Mark 12 depends on careful use of fine materials for visual appeal.

23" high 14" deep 27" wide Mahogany \$97.50  
Sandalwood or Walnut \$105.00  
Mark 12 LS cabinet only Mahogany \$74.50  
Sandalwood or Walnut \$79.95



The Mark 8 speaker system. This fine minimum size enclosure employs an 8" base driver and a matching 3½" tweeter. The cavity is ported through a resistive grid formed by 12 slots in the mounting panel. Sharp peaking is eliminated but base reinforcement is maintained by this carefully designed loading device. Essentially flat from 60 cps to 12000 cps. 20 watts. 8 ohms. This enclosure is at its best as a quality extension system and is especially desirable in Stereo application where cost and or space is a factor.

10" high 12" deep 24" wide Mahogany \$49.50  
Sandalwood or Walnut \$52.50  
Mark 8 LS cabinet only Mahogany \$29.95  
Sandalwood or Walnut \$32.95

american loudspeaker 1821 W. BERTEAU AVE. • CHICAGO ILLINOIS DEPT. X-1

Division of Contemporary American Furniture, Inc.

# t-m KITS

- Advanced designs for the best in high fidelity reproduction
- Build and save do-it-yourself
- See them at your local radio parts distributor



## New 60 WATT HIGH FIDELITY AMPLIFIER- PREAMP KIT

An integrated high power amplifier package for the audio perfectionist — complete with versatile pre-amplifier in one compact high styled unit — at a budget price. Undistorted power output is guaranteed to be 60 watts from 20 to 20,000 cps. Intermodulation is 1% at 60 watts and below 0.25% at ordinary listening levels.

Model 19K ..... \$79.95  
Cabinet ..... 7.50



## New 25 WATT HIGH FIDELITY AMPLIFIER- PREAMP KIT

Top quality integrated amplifier preamplifier system on a single chassis at exceptionally low price. Performance equals or exceeds any available amplifier up to rated power of 25 watts.

Model 21K ..... \$59.95  
Cabinet ..... 7.50

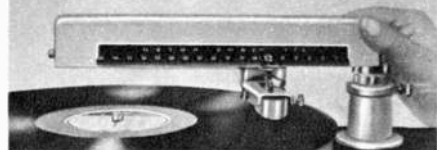
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KITS

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### Ortho-sonic 1/4

TRACKS COURSE OF ORIGINAL RECORDING STYLUS



## VITAL ENGINEERING PRINCIPLE SOLVED!

### Tracking Error Eliminated

**FLAWLESS REPRODUCTION ATTAINED.**  
Stylus moves in straight line from edge to center as originally recorded.

**INSPIRED DESIGN:** Increases record life  
... fits smallest cabinets ... plays all  
size records ... no scratching possible  
... all popular cartridges

**NEVER BEFORE** in the history of Hi-Fi development has the introduction of a single component created such wide interest, laboratory and editorial endorsement. Get ORTHO-SONIC 1/4 with its 10 incomparable features.

Model #100, only 35.95

If Your Hi-Fi Dealer Cannot Supply You  
Order Direct From

**ORTHO-SONIC INSTRUMENTS, Inc.**

66K Mechanic Street, New Rochelle, N. Y.

**BINAURAL**—A dual channel sound system using two signal sources, two amplifiers and two speaker systems. Provides a feeling of "depth" since one channel reproduces sound picked up by one microphone, and the second channel reproduces sound from a second microphone. Also referred to as stereophonic sound.

**BOOST**—Increase of sound level. Usually designates the increase of a given range of frequencies; i.e.: "bass boost" or "treble boost."

**CATHODE FOLLOWER**—A vacuum tube transformer. An effective means of coupling the output of a signal source chassis (radio tuner, control unit) over long distances without any loss of high frequencies or pickup of hum.

**COMPENSATION**—Also known as *Equalization*. A process of compensating or equalizing the signal to restore proper tonal balance to music from phonograph records, magnetic tape and radio broadcasts. Various adjustments must be made at the broadcast or recording studio when transmitting or recording a musical program. These adjustments are compensated for or equalized in playback of a broadcast or recorded program. See *Recording Characteristic; De-emphasis; Pre-emphasis*.

**CONTROL UNIT**—Also known as a "Front End"; Preamplifier-Equalizer Control Unit; Audio Control Unit. It contains the preamplifier, compensator or equalizer, tone controls, input circuits, etc. and serves as a "center" where all of the signal sources are connected and selected for coupling to the power amplifier. All adjustments for equalizing, tone, and volume are made at the Control Unit.

**CONVERSION EFFICIENCY**—Also known as *Speaker Efficiency*. The ratio of the acoustic output power to the electrical power delivered by the amplifier. A speaker is said to have high efficiency when the acoustic output is high in proportion to the electrical input at the voice coil. A speaker producing 1/4 acoustic watt when fed 5 electrical watts from the amplifier is said to have a conversion efficiency of 5%.

**COUPLING**—A transfer of power or energy from one stage to another. Effective couplers are transformers, which transfer the energy from the amplifier output tubes to the loudspeaker.

**CORNER HORN**—A loudspeaker enclosure for a woofer (low fre-

quency speaker). It is exponential in shape, and utilizes the adjacent walls and floor of the corner as an extension of the horn mouth increasing its effective size, and augmenting its low frequency performance.

**CPS**—Abbreviation for *cycles per second*. A range in the audio spectrum is measured in vibrations or cycles per second and is stated as "... from 15 to 20,000 cps."

**CROSSOVER NETWORK**—Also known as a *Dividing Network*. A device employing circuits containing inductors (coils) and capacitors (condensers) which effect a separation of frequencies at a given crossover or dividing point. Low frequencies are fed to the bass speaker (woofer), middle frequencies to the mid-range speaker, and high frequencies to the treble speaker (tweeter). In a 2-way system the network feeds only to the bass and treble speaker. It is an essential component part of a multi-speaker system.

**CUT**—Decrease of sound level. Usually designates the decrease of a given range of frequencies; i.e.: "Bass Cut" or "Treble Cut."

**CYCLE**—A unit of frequency which designates one complete excursion of an alternating current. A frequency of 10 cycles reverses itself 10 times during a period of one second.

**DAMPING**—A means of attenuating or limiting extraneous vibrations or resonances in a pickup arm and cartridge, or a loudspeaker and enclosure. A well designed pickup arm is either well damped (using some form of friction) or it has no natural resonances in the audible range. In a pickup cartridge, the stylus or needle (which is the vibrating element) is mechanically damped. The loudspeaker is made with built-in damping (braking action) so it moves only with the electrical signal and will not continue to vibrate after the signal has stopped (creating a condition shown as hangover). Loudspeaker enclosures are lined with an acoustic damping material to absorb standing waves behind the speaker cone.

**DAMPING FACTOR**—Pertains to the ratio of the nominal impedance of the amplifier (at the speaker tap) and the internal or source impedance which is the *actual* impedance. The output transformer tap on an amplifier is designed to *match* a speaker voice coil, but its actual source impedance may be lower. Damping factor is shown as a single number or as

a ratio; i.e.: if the source impedance at the 16 ohm tap measures 2 ohm, the damping factor is 8:1 or 8. The higher the damping factor, the better it will electrically augment the built-in damping characteristics of a speaker.

**DECIBEL**—Usually shown as “db.” A measurement of sound intensity which corresponds to the characteristics of human hearing. A db difference of 3 db corresponds to a ratio of 2:1, 6 db is 4:1 etc. Each increment of 3db doubles the ratio, thus increasing the volume setting by 3 db produces twice the loudness.

**DE-EMPHASIS**—Attenuation of certain audio frequencies. In FM Broadcasting, and in recording, high frequencies are emphasized (accentuated), to reduce the scratch level of records and noise level of FM transmission. FM tuners have a *fixed* de-emphasis network, while record compensators have a variable de-emphasis or treble roll-off control.

**DIFFRACTION**—The bending of sound waves around the edges of obstacles. A principle used in tweeter horn designs to produce a wide dispersion of high frequency sound.

**DIFFUSE SOUND**—Dispersion of sound so that it has a uniform intensity in any part of a given area. High frequencies are directional and tweeter horns are designed to diffuse the high frequencies so that they can be received in a wide area. Manufacturers use various methods of diffusing the high frequencies in their tweeter units, a few are: Koustical Lens, Reciprocating Flare, Multi-Cellular Horn, Diffraction Horn.

**DISTORTION**—A component in the reproduced sound which was not in the original program. It is any form of sound that colors or alters the original sound affecting the fidelity. Distortion may be one of two types: *Harmonic Distortion*, which is the generation of spurious harmonic frequencies of the original sound. *Intermodulation Distortion*, which is produced by a non-harmonic tone as a result of interaction of two or more simultaneous tones.

**ELECTROSTATIC SPEAKER**—A speaker consisting of a movable electrode (diaphragm) suspended between two fixed electrodes. It operates on the principle of attraction and repulsion. Because of its limited response below 800 to 1000 cycles, its application is mainly used as a tweeter or high frequency reproducer.



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**EQUALIZER**—See *Compensation*. A control, or set of controls for equalizing the sound signal for proper balance in playback. Also known as a *Compensator*.

**FILTER**—An electrical network which will eliminate (or reduce) all frequencies except those it is designed to pass. A *high-pass* filter passes high frequencies; a *band-pass* filter passes middle frequencies; a *low-pass* filter passes low frequencies.

**FLUTTER**—Caused by short, periodic variations in speed which in turn causes similar variations in the sound volume and pitch at mid-frequencies. It is associated with the phonograph or tape recorder and is a result of a mechanical defect in the assembly.

**FOLDED HORN**—A horn loaded speaker enclosure with the *horn* folded to conserve space.

**FREQUENCY RESPONSE**—The ability of a high fidelity component to maintain a *flat* or non-discriminating response of the entire frequency range it is designed to reproduce. A component is said to be *flat* within 1 db when it is responsive to all frequencies *without* accentuating or attenuating any frequency more than 1/2 db. This is often specified in description and specifications as: *Frequency Response: 20 to 30,000 cycles -0.5 db at 30 watts output.*

**GAP**—That portion of the magnetic circuit of a transducer which contains the energy. The voice coil in a speaker moves within a gap in the speaker magnet. The phono stylus moves within a magnetic gap. The tape moves over a gap in the record or playback head to receive or deliver intelligence (signal).

**GRAM**—A unit of weight for stylus force pressure. About 28 grams equal one ounce. Average stylus force pressure for automatic record players is from 6 to 10 grams. Manual record players can use a force pressure as low as 2 grams.

**HALF TRACK**—Also known as *Twin* or *Dual Track*. A method of recording on tape which uses one half the width of the tape. This affords twice the recording time. Binaural or stereo recording uses dual track, but both tracks are recorded simultaneously, providing the same playing time as single or full track.

**HANGOVER**—Poorly damped bass reproduction which manifests itself as a blurring sustained sound. Also can be the result of a poorly designed enclosure.

**HUM**—A form of distortion, usually

60 or 120 cycles. May be heard in the background of a high fidelity system. Usually stems from poor shielding, bad ground connection, or faulty hookup in the system.

**INFINITE BAFFLE**—For mounting loudspeakers. Separates all of the rear wave motion from the front of the speaker. Usually built into a wall, closet door, or room partition. There are box type infinite baffle enclosures, these have a cubic volume of 10 cubic feet or more.

**IPS**—Abbreviation for *Inches Per Second*; pertaining to the speed of a tape recorder. Standard tape speeds are: 1 7/8, 3 3/4, 7 1/2, and 15 ips.

**LOADING**—Pertains to loudspeaker performance. To *load* a loudspeaker is to take power from it. In this case, it is acoustic power. A loudspeaker may be front loaded, back or rear loaded, or both. In a tweeter, the horn loads the diaphragm of the compression driver. In a woofer, the cabinet (or horn in the cabinet) loads the speaker cone which actually is the driving element in the system.

**PHASING**—Connecting more than one speaker so that the diaphragm of each speaker moves in unison . . . that is, they move *out* and *in* together or *in phase*. Components in a multi-speaker system should be phased to provide optimum performance. Connecting speakers out of phase will result in poor frequency response and distortion, especially at high levels.

**PRE-EMPHASIS**—Accentuation of certain audio frequencies. See *De-emphasis*.

**RUMBLE**—A low frequency noise resulting from poor shock mounting of a motor in an automatic or manual record player. Sometimes rumble is caused by defective linkage between motor and turntable, or because the turntable base is not properly constructed.

**RUMBLE FILTER**—Attenuates surface noise from a record by filtering action at a given high frequency.

**SELECTIVITY**—The ability of a radio tuner to choose between *wanted* and *unwanted* signals on adjacent channels.

**SENSITIVITY**—The ability of a radio tuner to receive distant broadcasts.

**TWEETER**—A speaker designed to reproduce the treble frequencies.

**WOOFER**—A speaker designed to reproduce the bass frequencies.

**WOW**—Periodic variations in speed which affects the bass frequencies. See *Flutter*. •



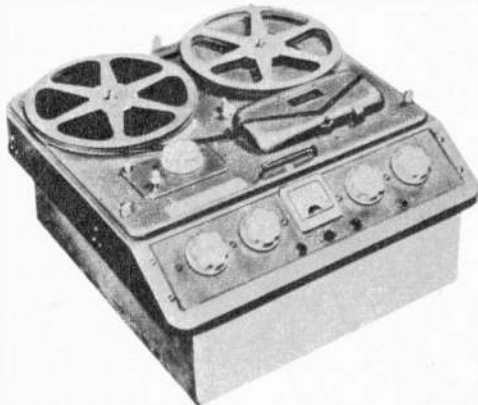
# The cost of a tape recorder is no longer a prohibitive buying factor

[Continued from page 41]

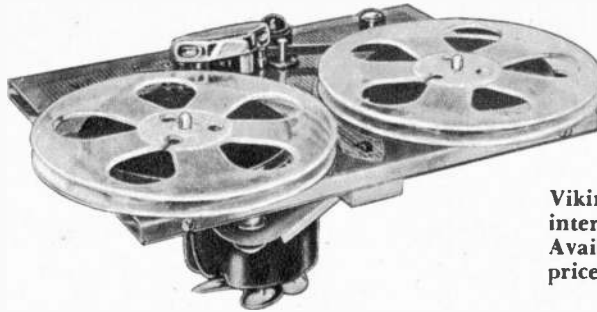
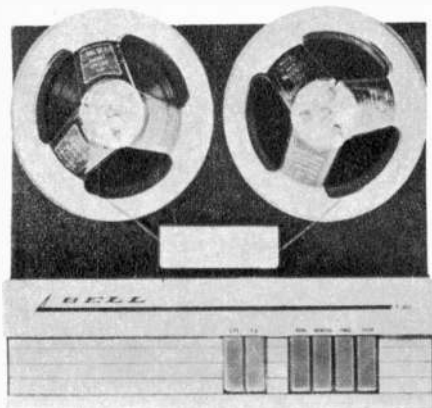
## Magnetic Tape Recorders

It was about ten years ago that magnetic recording began to attract the interest of the high fidelity hobbyist and music lover. Since that time, magnetic recording has come a long way. Wire has become obsolete and tape has been accepted as the superior medium. Much has been accomplished in research and development—most of it has benefited *quality*. Thinner tape has made possible *long-playing* tape recordings. New techniques in tape transport construction have provided models which are almost foolproof and are no longer troublesome. A few years ago, the cost and size of a tape transport mechanism (as opposed to a portable recorder) for a custom high fidelity installation was out of the reach of many. It was too expensive for the average music lover—and it was too cumbersome to fit into available space in the average installation. Today,

**Series 3A Ferrograph**  
hi fi tape recorder deck for custom installation features 3 motors, sells from \$195 up.

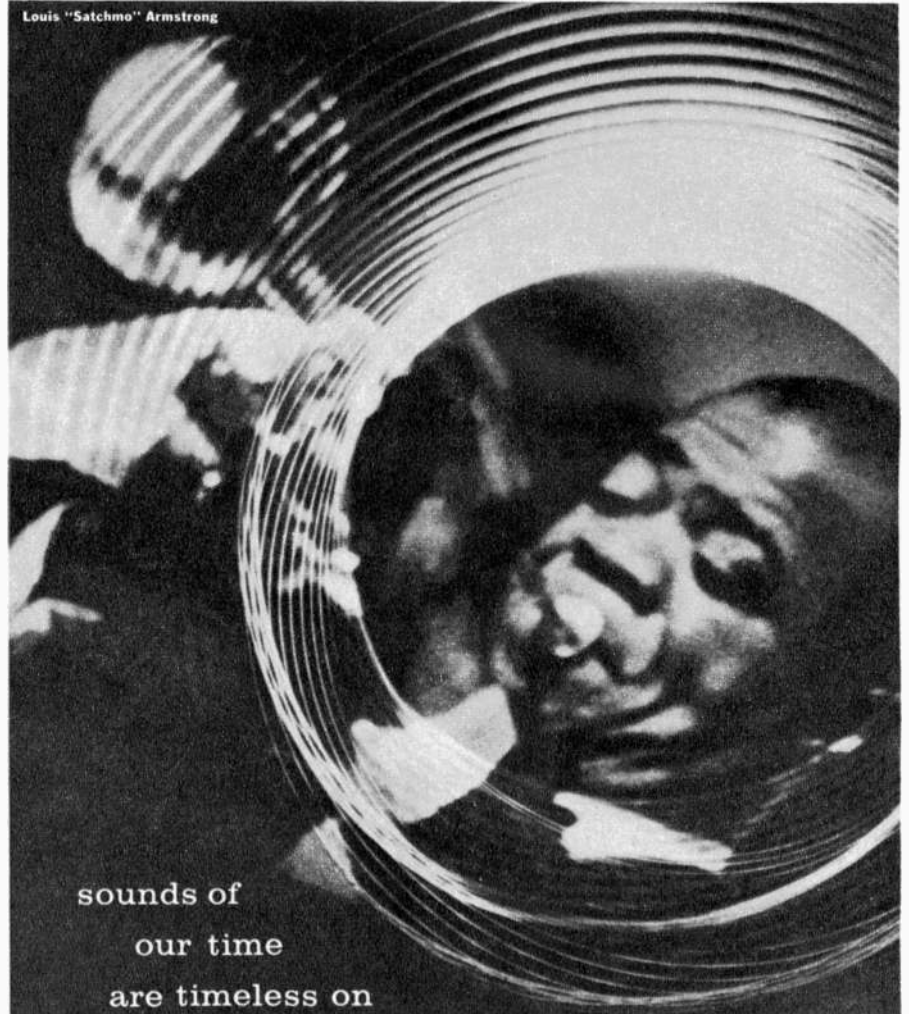


**Bell T-202** tape deck (\$100) features push-button operation, may be installed in any angle.



**Viking Series FF75** tape deck has interchangeable tape-head design. Available in 8 different models, priced from \$66 to top of \$113.

Louis "Satchmo" Armstrong



sounds of  
our time  
are timeless on

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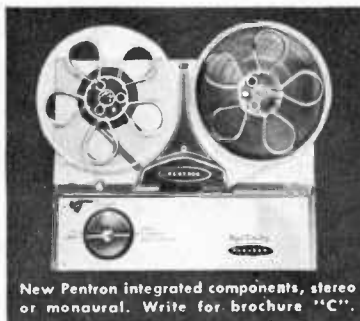
PENTRON, hi-fi tape recorder pioneer and leader, presents its completely new superbly designed recording instruments. Available monaurally or stereophonically (stacked, *in-line* heads) . . . and at down-to-earth prices. See and hear Pentron—dollar for dollar your best tape recorder buy!

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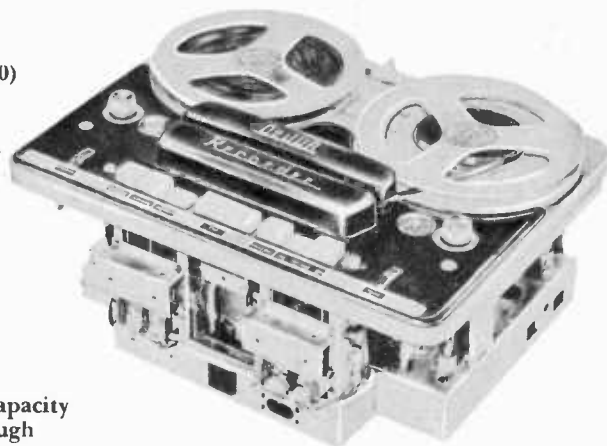
there are a number of tape transport mechanisms with matching preamplifier control units for recording and play-back that are reasonably priced, and they are of a physical size which conforms to almost any type and size of custom or cabinet installation.

The tape recorder chassis is very flexible. A unit may be obtained for playback of pre-recorded tapes only,

or provision can be made for recording as well. Presently, there is a large repertoire of pre-recorded tapes which includes "pop" and classical.

Almost all portable tape recorders are designed for connection to a radio or a high fidelity system. Modern amplifiers provide a special *output* socket for recording purposes and an *input* socket for tape playback. •

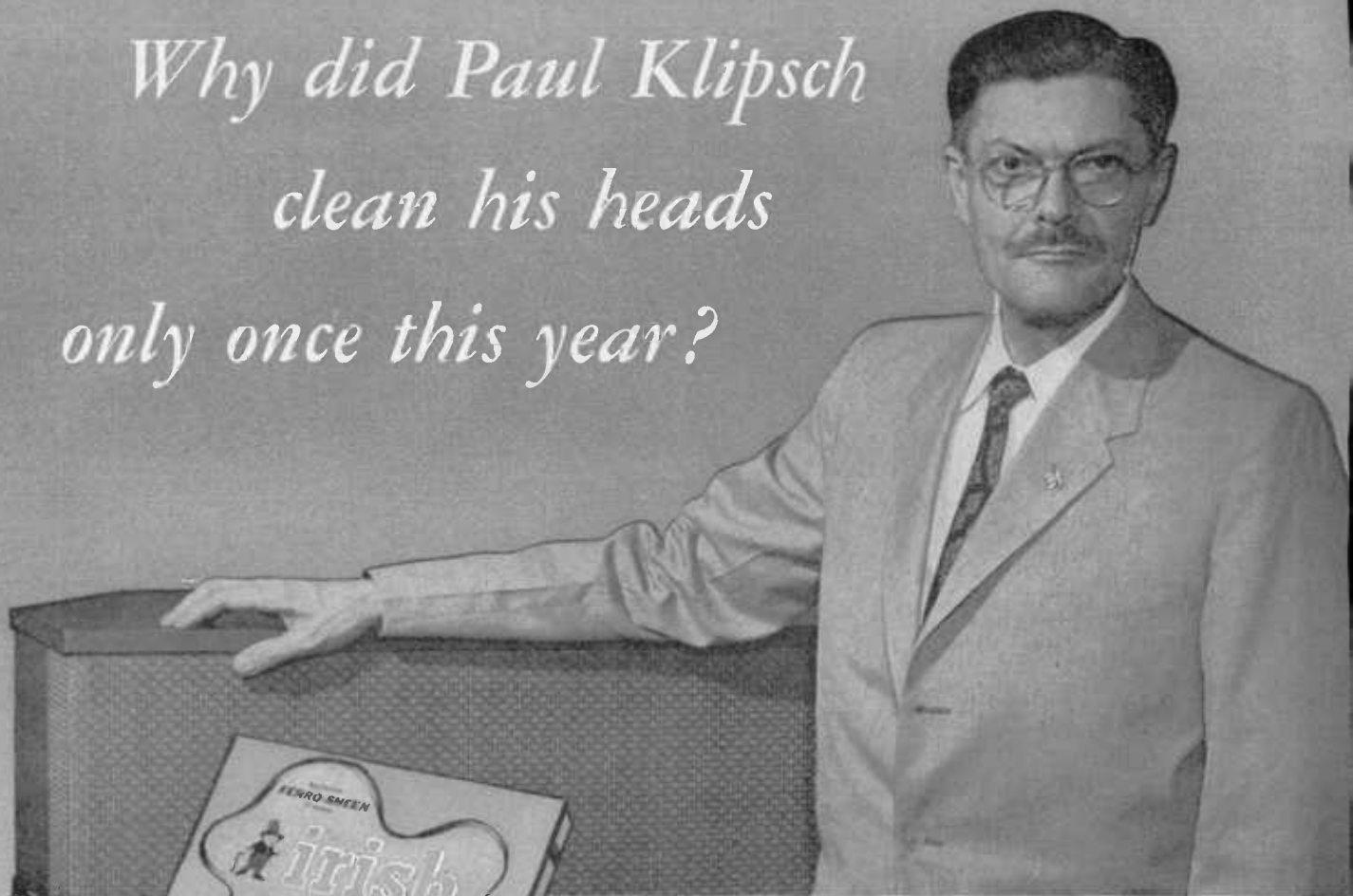
DeJur TMB-820 tape deck (\$330) has push-button operation, is for monaural record playback only, is only 16x13".



Ampex stereophonic system complete with AM-FM radio, phono and tape plays the capacity to play back from tape through two amplifiers and speakers.



*Why did Paul Klipsch  
clean his heads  
only once this year?*



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### **FERRO-SHEEN TAPE**

for every recording requirement . . .

**GREEN BAND** on 1.5-mil acetate base

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**DOUBLE PLAY** on 0.5-mil Mylar base

**SOUND PLATE** on 1.5-mil Mylar base



*Because* he uses **irish FERRO-SHEEN** recording tape, naturally. . . Says Mr. Klipsch, famed inventor of the Klipschorn® and tape recording perfectionist extraordinary: "With **irish FERRO-SHEEN** tape, the nuisance of shedding oxide powder is minimized to a degree I have never encountered with other brands. As a result, the magnetic heads of the tape recorder are saved from abrasion and last a lot longer, and there is no loss of high-frequency response due to an intervening layer of loose oxide between the heads and the tape. That's even more important than being spared the chore of cleaning the heads every few hours — not that I don't enjoy leaving the cleaning swabs at home when I go to a recording session. As a matter of fact, I have had to clean my heads only once this year!"

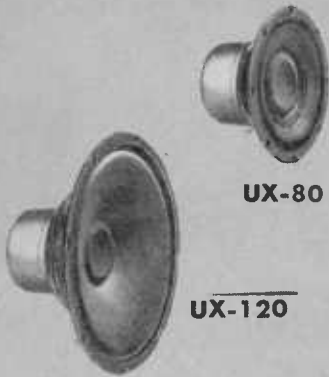
**ORRADIO INDUSTRIES, Inc., Opelika, Alabama**

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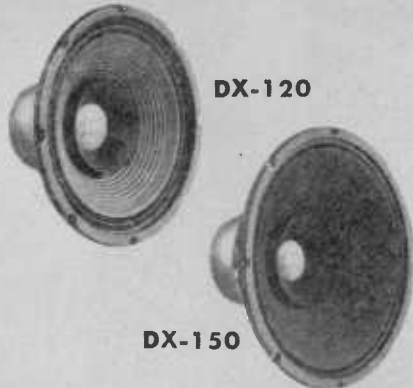
# The World's Most Extensive

Now you can select your Jensen loudspeaker



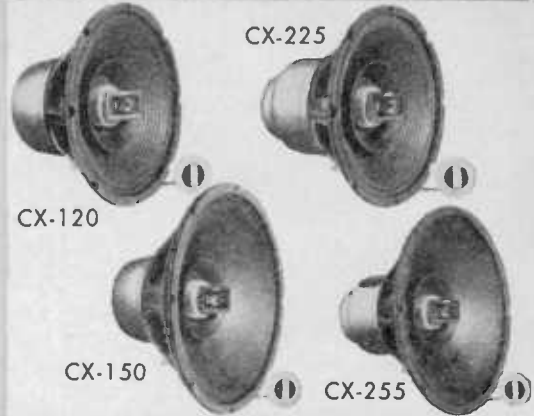
UX-80

UX-120



DX-120

DX-150



CX-225

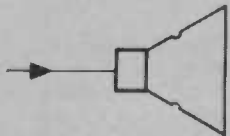
CX-120

CX-150

CX-255

## New Performance Levels in New Price Ranges

### UNAX\* SINGLE ELEMENT



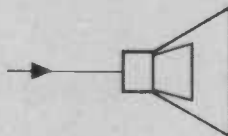
The new Jensen UX Series provides a new high in single-cone single voice coil loudspeakers at unusually low cost, actually outperforming comparable (and even more complex) units selling for much more. A listening test will convince you that this is a maximum value buy in hi-fi listening pleasure.

Of course, there are special design elements that enable us to give so much for so little. The cone is artfully dual acting, the center sector operating effectively for unusually extended highs, while the whole moves to reproduce the lows.

Withal, there is superb balance and cleanliness. And, if you choose, you can step up performance later with the inexpensive KTX-2 Step-Up Kit which substitutes a compression driver tweeter for the top.

**UX-80.** 8-in. Speaker. Net \$14.50  
**UX-120.** 12-in. Speaker. Net \$19.50

### DUAX\* 2-ELEMENT SYSTEMS

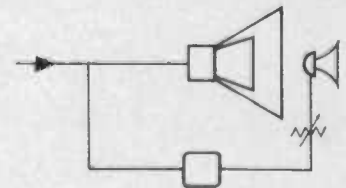


A step-up in the reproduction scale is the DX Series in which two carefully coordinated cones are driven by one voice coil. (Some call these "coaxials," but we reserve the name for still more elaborate systems and higher performance.)

The separate auxiliary radiator gives the designer a chance to attain a wider frequency range than with a single cone (albeit dual acting as in UX Series). The result is, with low cost, additional performance and added listening pleasure. We know of no similar speakers with equal sound, none with as high efficiency or as low distortion at anywhere near DX Series cost. Again you can step-up performance easily at anytime with KTX-2 Kit to substitute high-order compression driver tweeter operation at the high end.

**DX-120.** 12"; 1-lb. mag. Net \$25.50  
**DX-150.** 15"; 1-lb. mag. Net \$35.50

### COAXIAL 3-ELEMENT SYSTEMS



Still better than the "all paper" system with single voice coil is the use of a compression driver tweeter for the highs. The least expensive way to do this is to nestle a supertweeter coaxially inside the cone; it must cross over high in the frequency scale at 3500 to 4000 cycles. The third element is the diffusion radiator which shapes and disperses middle-high response. (Some call such speakers "Triaxial," though Jensen alone is entitled to use this registered name, applied by us to true 3-way speakers only.) Again, we guarantee more and better sound, cleaner hi-fi at lower cost, than all comparable speakers. And you can step up performance correctly and impressively with a real C.D. horn 600-4000 cps mid-channel (KTX-3 Kit) that leaves you with a *real* 3-way system.

**12" Models.** CX-120\* . . . . \$49.50  
CX-225 . . . . \$59.50  
**15" Models.** CX-150\* . . . . \$66.50  
CX-255 . . . . \$76.50

\*Denotes 1-lb. magnet; others 1 3/4 lbs.

### SELECTING A HI-FI SPEAKER? YOU'LL WANT THESE HELPFUL, INFORMATIVE BOOKS

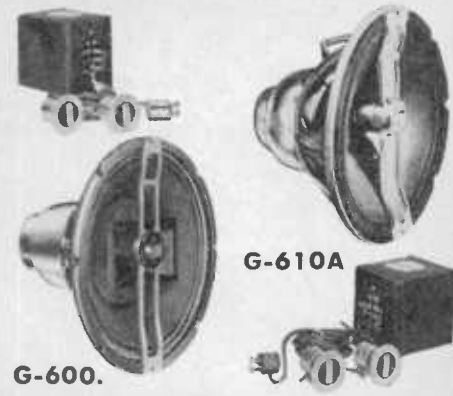
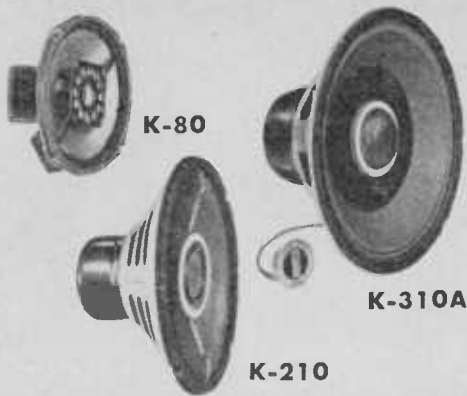
"How to Select a High Fidelity Loudspeaker." A comprehensive, authoritative manual covering all types of high fidelity loudspeakers and systems, their operating principles, performance and relative advantages. 24 pages, profusely illustrated. Write for Manual 1061. Price 25¢.

"Guide to Jensen High Fidelity Loudspeakers." Complete specifications and detailed descriptive information on all Jensen high fidelity loudspeakers and accessories. 24 pages. Send for Brochure 1021. Price 25¢.



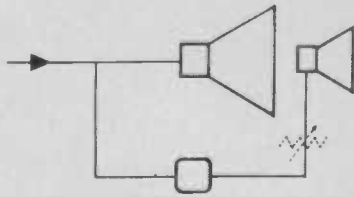
# High Fidelity Loudspeaker Line

*from this new complete range of types and sizes.*



... All with Traditional Jensen Quality

## COAXIAL 2-WAY SYSTEMS



By using two completely independent (but carefully coordinated) speakers, each with its own magnetic system, voice coil and cone, the true two-way system spans the frequency range to obvious advantage in smoothness and extent, cleanness, low distortion and uniformity of angular dispersion.

Coaxial mounting makes them a convenient unitary package. Please note that we at Jensen use the term "coaxial" only in referring to a speaker with two completely independent systems.

Lowest in cost in the Jensen coaxial family is this fine group of speakers employing "cone" type direct radiator units for both tweeter and woofer. Available in 8, 12 and 15-inch models, they provide a maximum of value in true two-way system speakers.

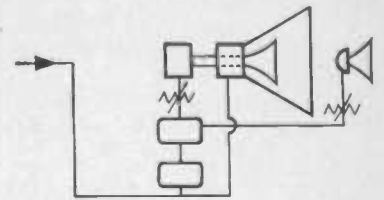
**K-80.** Coaxial, 8-in. Net \$16.75  
**K-210.** Coaxial, 12-in. Net \$27.50  
**K-310A.** Coaxial, 15-in. Net \$39.75

The highest type of performance in the coaxial two-way loudspeaker is attained by the use of a compression-driver horn-loaded tweeter for the high end. When properly designed, there results an outstanding clarity, realism and instrumental separation not achieved by lesser designs. By adopting the expensive "thru bore" construction, the tweeter horn can be made long enough to operate at the lowest practicable crossover frequency, a very desirable feature for the very best sound.

In this manner, the very popular Jensen H-222 and H-520 give you the "tops" in fine coaxial performance. Crossover is at 2000 cycles. Though many will see no need to, you can step-up performance to full three-way with KTX-1 Range-Extender Supertweeter Kit.

**H-222.** Coaxial, 12-in. Net \$62.50  
**H-520.** Coaxial, 15-in. Net \$79.50

## TRIAxIAL\* & TRIAX\* 3-WAY SYSTEMS



The true three-way speaker system divides the range in three parts with three electrically and acoustically distinct and independent elements, each designed to perform near-ideally in its portion of the range.

The famous G-610A TRIAXIAL was the first (and until our new G-600), the only speaker made in accordance with this concept! It employs a heavy woofer and two compression driver horn-loaded elements for m-f, and h-f channels. (The woofer cone acts as the final section of the m-f horn.) Its performance is so outstanding that it easily rates as the world's most wanted hi-fi speaker.

Now, for those who would like a G-610A, but are dissuaded by the price tag, Jensen announces the new lighter, less expensive G-600 TRIAX with similarly outstanding features and performance.

**G-610A.** Triaxial, 15". Net \$252.75  
**G-600.** Triax, 15". Net \$129.50

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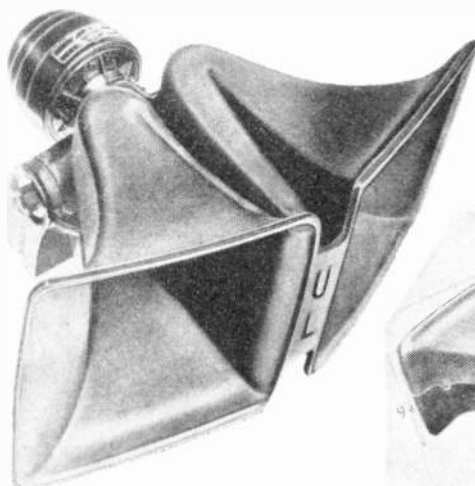
ELECTRO-VOICE, INC.  
Dept. 7, Buchanan, Michigan

## Which is the best speaker? Judge by *listening*—

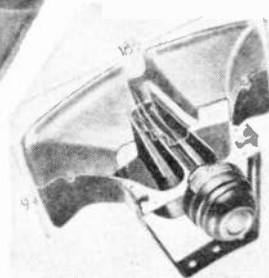
### The Different Loudspeakers

The diameter of a cone speaker determines its bass response. Wide-range and low frequency (woofer) speakers are available in 8", 12", and 15" diameters. Logically, the 15" speaker would appear capable of producing the best bass response. However, there is the matter of quality to consider. A good quality 12" speaker can very well provide superior bass reproduction compared to a mediocre 15" speaker. You can see then, that size is not the only yardstick in se-

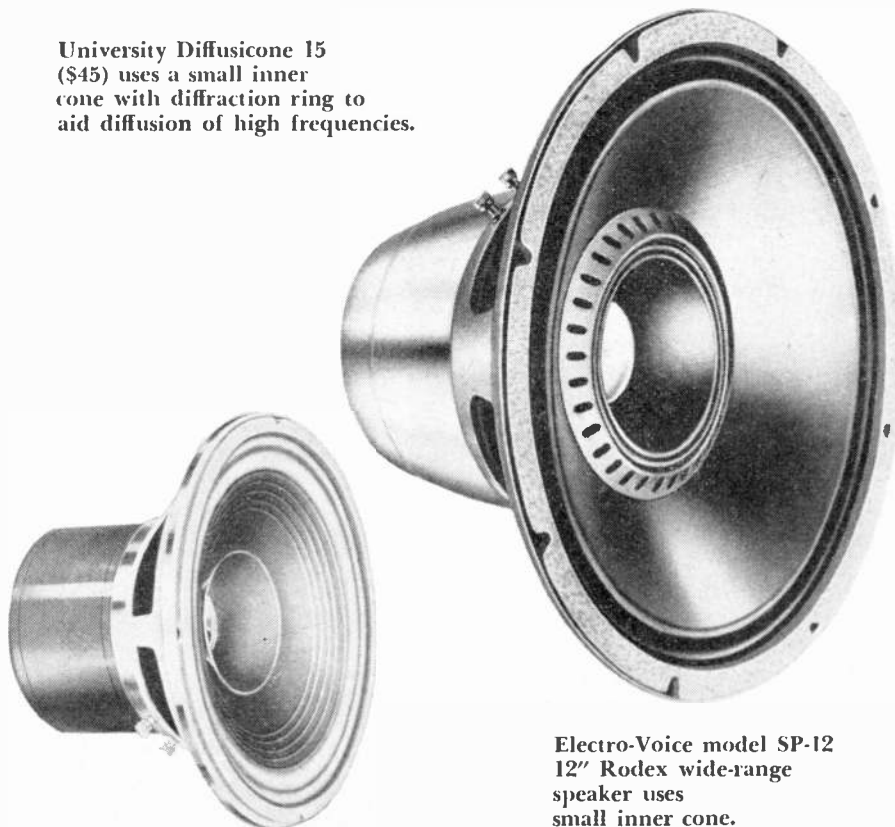
lecting a loudspeaker. What then is the criteria? The answer is quite simple . . . *listening* . . . to the various types, designs, and sizes. Important differences are determined by natural balance . . . mellowness of tone . . . the brightness and *live* feeling of presence. You may read the specifications of one make of speaker that measure up in every way to a superior reproducer. Yet, in a listening test, its actual performance leaves much to be desired. On the other hand . . . you may find another make fully satisfies your listening requirements . . .



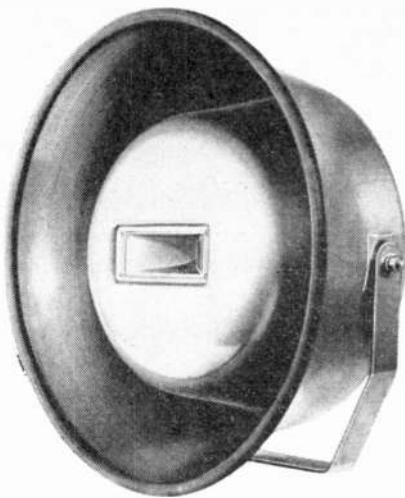
University Cobreflex-2 (\$43) uses a twin-horn assembly, cuts off at 250 cycles; note cutaway view.



University Diffusicone 15 (\$45) uses a small inner cone with diffraction ring to aid diffusion of high frequencies.



Electro-Voice model SP-12 12" Rodex wide-range speaker uses small inner cone.

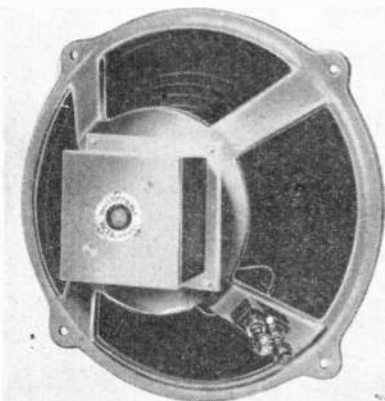


Jensen HF-100 (\$80) is weatherproof outdoor coaxial speaker, ideal for remote listening out of doors.



Electro-Voice 15W 15" unit (\$84) is top-grade woofer.

Wharfedale W15/CS 15" unit sells for \$76, is woofer ideal for 3-way systems.



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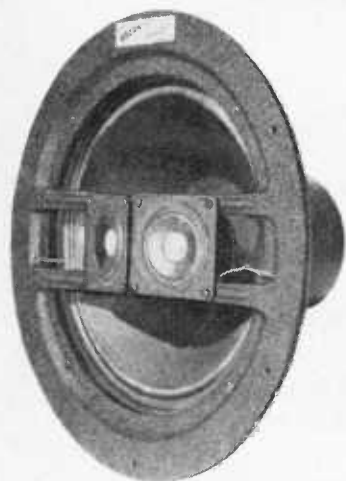
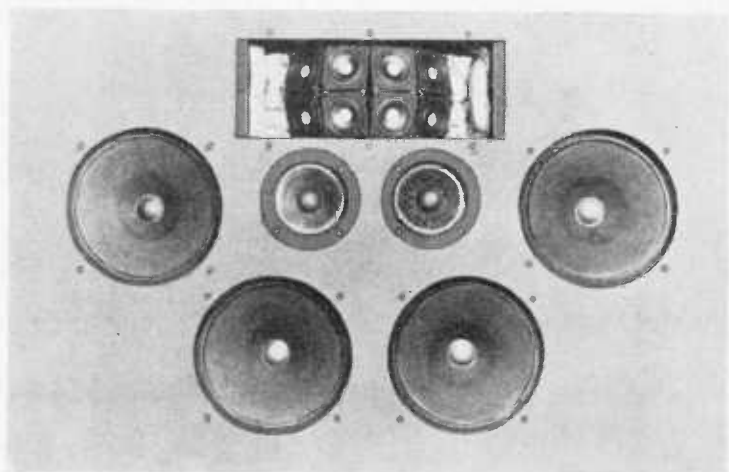
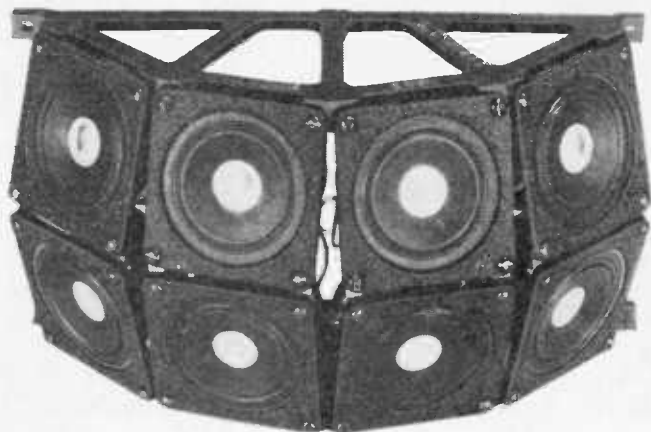
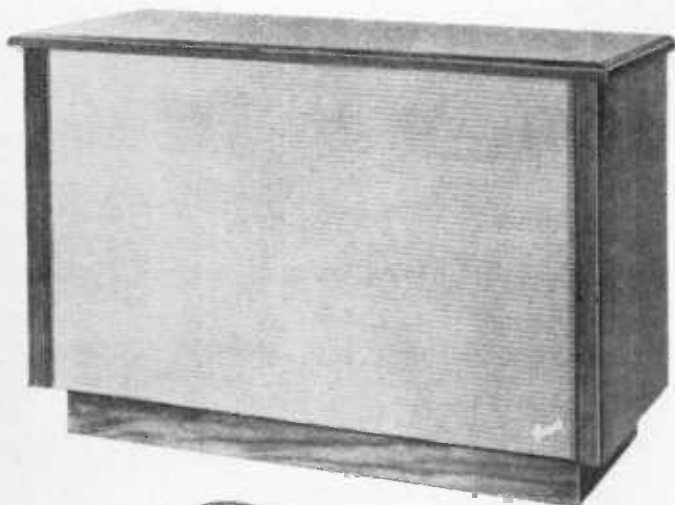
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even though it is less costly and the specifications are less impressive. Loudspeakers are just that way. No one manufacturer can satisfy the esthetic requirements of all music lovers. We all hear with two ears, but we each interpret what we hear differently. The one important yardstick to use is *quality* . . . the final choice should be made on the basis of what you hear. To recognize quality, you must first understand the mechanics of the loudspeaker.

Bozak multi-tweeter array model B200XA, \$125, employs 8 cone tweeters on a single frame assembly for 180° horizontal coverage; it's used in 50-watt multi-speaker systems. Beneath it is an infinite baffle console enclosure, the Bozak B-400 (\$798), which houses a 3-way system consisting of an 8 tweeter bank HF unit, four 12" woofers. Internal volume: 10 cubic feet. Left of the exposed system is its enclosure, an infinite baffle console.



Left, the Model B207A Bozak speaker has twin tweeters across speaker "bridge."

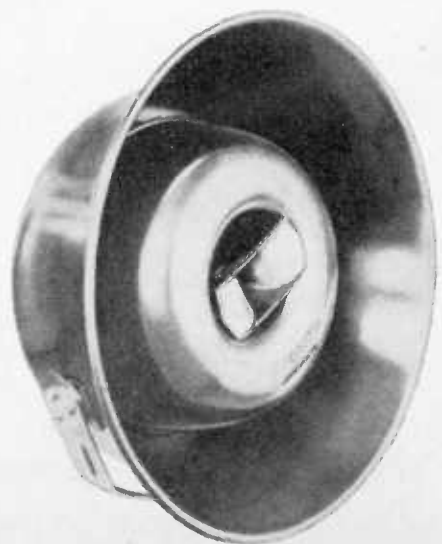


Left, the Wharfedale Super 3 is a direct radiator (cone) high frequency tweeter, priced at \$21.



Left, the Jensen H-222 Coaxial (\$59) is a 12" unit, is an integrated 2-way speaker, has HF balance control.

Right, University full range weatherproof coaxial speaker system, Model BLC has power of 25 watts, a response of 70-15,000 cps.







# When you build your High Fidelity sound system, use **THE VERY BEST** LOUDSPEAKERS YOU CAN GET

You are planning to build, or improve, your high fidelity sound system. Unstintingly, you will pour out your enthusiasm, time, and energy to get the finest music reproduction you can bring into your home. Get a loudspeaker that will do full credit to your handiwork... Install a JBL Signature Extended Range Loudspeaker, or two-way speaker system, in your enclosure.

JBL Signature Loudspeakers are made with the same careful craftsmanship, the same precision forming and fitting that you yourself would use if you set out to make the finest loudspeaker the world had ever heard. JBL Signature precision speakers are the most efficient loudspeakers made.

With a JBL Signature Loudspeaker in your high fidelity system, you can exhibit your components with pride, confident that those you have made yourself are being demonstrated in the most effective way possible.



**MODEL D130—15" extended range loudspeaker** The only 15" extended range speaker made with a 4" voice coil is the world-famous JBL Signature D130. The large voice coil stiffens the cone for crisp, clean bass; smooth, extended highs. Your basic speaker, the D130 works alone at first, later becomes a low frequency driver when you add a JBL Signature high frequency unit and dividing network to achieve the ultimate excellence of a JBL Signature two-way system.



**MODEL D208—8" extended range loudspeaker** A precision transducer in every sense of the word, the famed JBL Signature 8" D208 is made with the same care and precision as the larger units in the James B. Lansing Sound, Inc., line. If space and cost are major considerations, the D208, properly enclosed, provides the most lastingly satisfactory sound you can get. It is widely used in top quality systems where extension speakers are desired for areas other than the main listening room.



**MODEL D123—12" extended range loudspeaker** With outstanding "presence" and clean response throughout the entire audio spectrum, the D123 features an unusual shallow construction. Only 3 3/8" deep, it is designed to mount flush with the wall, between studding, in any standard wall or partition. Frequently, the D123 is used in multiples in "infinite baffle" wall installations. In this case the JBL Signature 075 is a logical high frequency unit to add when you advance to a two-way system.



**MODEL 175DLH high frequency assembly** The acoustical lens is only available on JBL Signature high frequency units. The 14 element lens on the 175DLH disperses sound within the listening area over a 90° solid angle, smoothly, with equal intensity regardless of frequency. The acoustical lens is the greatest contribution to lifelike high frequency reproduction in 20 years, and it was developed for use with high fidelity equipment by James B. Lansing Sound, Inc. In addition to the lens, the 175DLH consists of a high precision driver with complex phasing plug and a machined aluminum exponential horn. Designed for crossover at 1200 cycles with the JBL Signature N1200 Network.



**MODEL 075 high frequency unit** Another exclusive for James B. Lansing Sound, Inc. is the ring radiator in the JBL Signature 075 high frequency unit. A ring, rather than a diaphragm, radiates into the annular throat of an exponential horn. The result is high frequency reproduction of unmatched smoothness and clarity, absolutely free of resonances and strident peaks. The horn is beautifully machined from aluminum, the entire unit a gratifying, solid piece of fine craftsmanship. Designed for crossover at 2500 cycles with the JBL Signature N2500 Network.

## JBL Signature two-way systems are available as kits



**086 KIT** This two-way system is made up of units which have been acclaimed by impartial authorities as the finest available anywhere today. Included in the kit are the 150-4C Low Frequency Driver, N500H Network, 375 High Frequency Driver, 537-509 Horn-Lens Assembly. These are the same units—including the serpentine acoustical lens—which are used in The Hartsfield... units designed originally for installation in the most modern theaters in the world.



**002 KIT** Including some of the newest speakers made, the JBL Signature 002 Kit includes a D123 for low frequency reproduction, N2500 Network, 075 High Frequency Unit. The 002 Kit is moderately priced, yet gives the user all the advantages of a two-way system made with independent drivers.



**001 KIT** Probably the most popular high quality two-way system on the market, the JBL Signature 001 system consists of a 130A Low Frequency Driver, N1200 Network, 175DLH High Frequency Assembly. The D130 may be substituted for the 130A without disturbing the balance or coverage of the system.

There are many more kits and loudspeakers in the JBL Signature line. Whatever your needs, you will find exactly the right unit or system in the complete JBL Signature catalog. Send for your free copy. A limited number of technical bulletins are also available. Please ask only for those in which you are vitally interested.

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# Do-It-Yourself Hi-Fi

These projects are designed to improve the performance or add greater scope to your present high fidelity system.

**U**P to now we have discussed planning *for* high fidelity. At this point let's look into the aspect of planning *with* high fidelity. Many who *now* have hi-fi systems may have purchased this book to learn what more was offered in the way of information; or, it could be that their hi-fi system is ready for new additions or modifications. This part of the book is written for them, and for the person who is now getting his first hi-fi system; but, who will want to consider planning for probable additions of a TV chassis or tape recorder deck at some future date.

What follows are *projects* presented with words and pictures to illustrate the many possibilities of adding to or improving your system. You can determine where to spend . . . or, where to save; turn something old into something new. It may be that you wish to add a tape recorder deck . . . but, do not have room in the present hi-fi console. Or, you may wish to expand your wide-range speaker up to a 2-way multi-speaker system.

Projects are lots of fun, they take you on a new and exciting adventure, providing a pleasurable feeling derived from creative activity. You can save money too . . . by doing things yourself . . . stretching your budget to add the best you can afford. Doing is learning; and, aside from improving the performance and scope of your system, you will gain a more intimate knowledge of how high fidelity works.

## A 15 Minute Assembly

All you need are a few simple tools and a little time.

**H**IGH fidelity component manufacturers provide the simplest means of assembly. Even the *lady-of-the-house* can, in a short quarter hour assemble a top quality professional manual record player. The base for the Metzner "Starlight" turn-

table was pre-cut and drilled, and the Pickering 194D "Unipoise" Arm and Cartridge was pre-wired to a phono socket. Requiring only a screwdriver, pliers and 15 minutes, the record player was ready to play a half hour after the two parcels were delivered.

Base plate fits easily over the opening in wood base. Hold with four screws and nuts.

Arm is secured with wing nuts; signal cable and socket assembly fit when nut is tightened.



With arm fully installed, the turntable is fitted onto motor assembly.



"T" stylus assembly is inserted into Fluxvalve cartridge built into arm.



Project is now completed. Stylus box which adheres to base holds spare stylus.



Metzner Engineering Co. and Pickering & Co.

## Where your problem is a **SPEAKER...**

it's wise to select one from the  
**STROMBERG-CARLSON** components  
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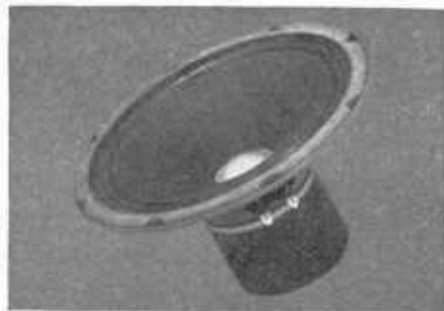
### 3 POPULAR MODELS

Planning to build your Hi-Fi to an eventual perfection? You'll be smart to standardize on the "Custom Four Hundred"® speaker and component line. We're confident each component from speaker to preamplifier will come out ahead in any comparison of performance and price. All are designed in the same laboratory, made under the same quality-control standards, styled in the same modern manner, matched to perform together perfectly!

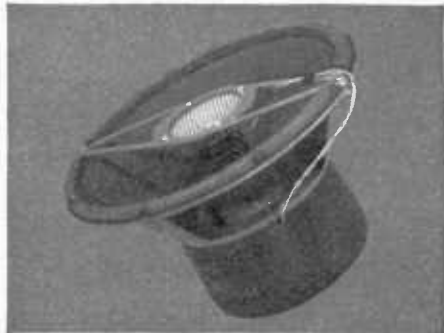
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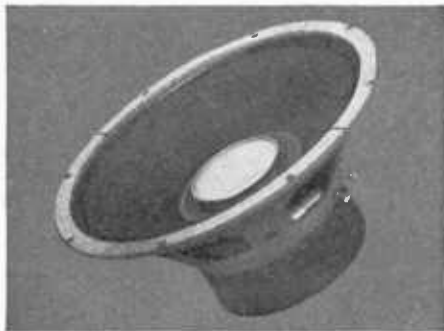
... or write for your nearest dealer's name and free literature.



8" RF-460 . . . \$20.00 • Frequency response 45 to 14,000 cps. Power-handling capacity, 12 watts program material. Curvilinear shape, molded cone with hard center for improved treble response and wide-angle coverage. Heavy Alnico V magnet provides higher flux density in gap.



12" RF-471 . . . \$49.95 • Coaxial mounting of tweeter and woofer. Frequency response 30 to 14,000 cps. Power-handling capacity, 32 watts program material. Better than 100 degrees angle of coverage. Aluminum spider and Carpinchoe leather suspension. 20 ounce Alnico V low-frequency and 2.15 ounce Alnico V high-frequency unit magnets.



15" RF-465 . . . \$89.95 • Features the unique "Omega M-Voice Ring" horn-loaded 2½" tweeter and separate 15" low-frequency woofer. Frequency response 30 to 20,000 cps. Power-handling capacity 35 watts program material. Total magnetic flux at voice-coils is 20,000 gauss.

*Prices stated slightly higher in the West.*



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# Installing a Remote TV Chassis

A remote control TV tuner can prove a useful device and an interesting project

**T**HE present TV chassis was showing signs of old age . . . not that it was operating poorly . . . in more than six years it performed with great efficiency and quality, progressing from the original 10" tube to the present 16". For want of a larger screen and the newer and more sensitive circuits, it was decided that the time had come for a change. The idea of remote control was most intriguing, and a Fleetwood 800 chassis with

remote tuner was chosen. The next step was to determine what size picture tube could be used in the area of the TV compartment in the hi-fi console. Requirements for the 800 chassis with a 21" tube is: 21 1/4" depth, 22" height and 22 1/16" width. The TV compartment measured 25" wide by 25" high and 23 1/2" deep, permitting ease and adequate room to install the newer chassis.

An early American "dough table"

which was being used as an end table had an internal area of 18" wide by 9" high and 11" deep which was more than adequate for housing the remote tuner. Precut cleats to support the remote was obtained at the local lumber yard with a 1/4" sheet of knotty pine plywood for a panel. Using a few tools, some glue for the cleats and some do-it-yourself ingenuity . . . the project was started and completed within a few hours.



The mounting brackets and hardware for supporting the picture tube was attached to the chassis. Set in the picture tube, taking great care that the surface is not scratched or damaged in any way.

The safety glass, mask and front panel assembly is mounted onto the chassis and secured in place. The chassis is then set into the console. You are now ready to prepare for the installation of the tuner.

Using a full sized template, the cutout opening for the tuner dial face is scored on the plywood panel. After cutting panel, the interconnecting cable is fastened along the wall and over the doorway.



The end table is fitted with cleats on the inside and the bottom panel is cut out to provide ventilation and access for cable. The tuner, which contains power switch, is now fitted into the end table.

The job is now completed and ready to be used. All that remains is to connect the antenna leads and to plug the interconnecting cable which reaches from the chassis to the tuner. This is seen below.



The end table remains functional as a support for the lamp, and also houses the remote television tuner.



Closeup of the remote tuner in end table. At arm's length to the sofa it is convenient for all operations.



TV chassis in console. Relay circuit installed in the high fidelity system controls McIntosh power amplifier.



Photos courtesy Courac, Inc., makers of Fleetwood TV chassis.

## Need a better AMPLIFIER?

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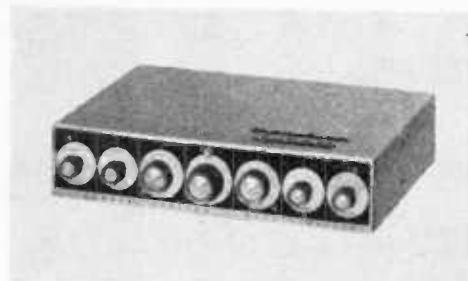
The "Custom Four Hundred"<sup>®</sup> line of audio components is equally attractive to the audiophile who sets up a complete system in one operation, and the man who builds to eventual perfection over the years.

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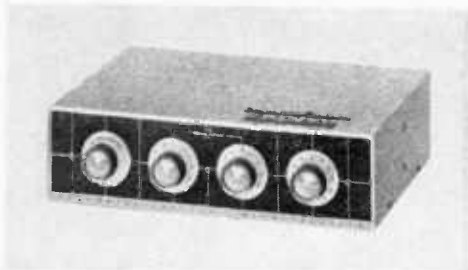
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**AE-426 PREAMPLIFIER** • Highest quality, self-powered audio control center. Continuously variable record equalization, loudness compensation, rumble suppression, tonal balance. Frequency response 10 to 100,000 cps.  $\pm 1$  db. Tape output and input jacks. AC operated with DC on tube filaments. 3" x 14" x 8". ..... \$95.00



**AP-428 POWER AMPLIFIER** • Includes famous Stromberg-Carlson Duo-Power circuit. Peak power-handling capacity, 50 watts. Frequency response, 10 to 32,000 cps. Noise level better than 80 db. below rated output. Distortion, well under 1% at 25 watts. 4, 8, 16, 150 and 600 ohms and 8 VU output taps for tape recorder. 8 1/4" x 16" x 7". \$95.00



**AR-411 AMPLIFIER** • A budget-priced gem—probably the best first step in converting from ordinary record-playing to Hi-Fi. 12 watts at less than 1% total harmonic distortion; peak, to 15 watts. Frequency response, 15 to 25,000 cps. Magnetic phono, radio tuner, tape and auxiliary inputs. 3 1/2" x 13" x 7". ..... \$65.00

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## Adding a Tape Recorder

The first operational step is simply to find a suitable enclosure—



This antique chest, once used for magazines, now houses the tape recorder. When not in use, it is placed beside rocker.

**O**FTEN, the hi-fi console does not have room for a tape recorder; unless, the compartment for record storage is used and another location set up for records. Since the record player is used more often than the tape unit, it was decided that record storage was more important as an integral part of the console. And we proceeded to look to another piece of existing furniture to house the tape unit. It was decided that a *movable* unit would be best.

An antique oak chest used for magazines was considered. It was 18½" wide, 12" deep and had a bottom to top clearance of 11½". Finding a quality tape deck and amplifier to fit was little trouble since the Viking was listed in most catalogs put out by hi-fi dealers. The FF75R-LP measured 12⅛" wide by 8⅝" deep and required 4⅝" under the deck. The RP-61 amplifier chassis required panel space of only 2" high by 12⅛" wide. Since there was 18½" of panel width, ventilating ports and all connecting jacks were located to the left of the tape deck and amplifier. The RP-61 is a record/playback preamplifier and is connected to the hi-fi system with two shielded cables. When the tape unit is not in use, the chest cover can be closed concealing the unit, permitting it to be placed by the rocker and lamp near the bookcase. When it is to be used, the chest is placed near the hi-fi console and connected.

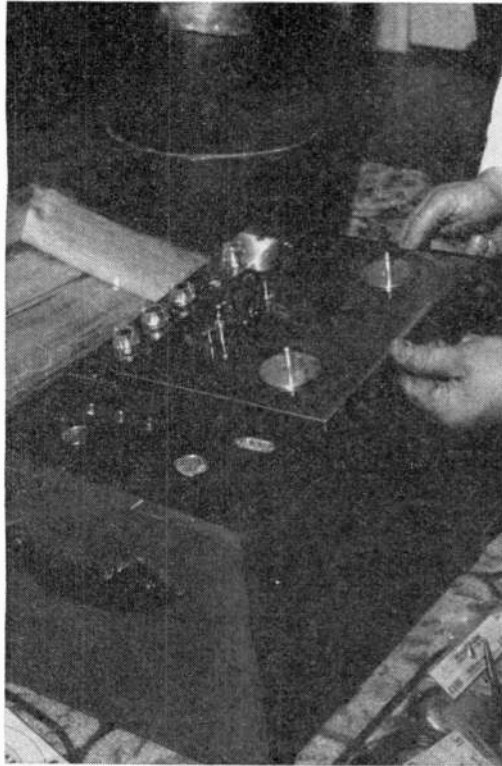
With the tape deck, jacks, socket and ventilation ports set in, the preamplifier is then screwed into its proper place.

Shielded cables are used to connect the input and output jacks on the Viking RP-61 to the jacks on the tape panel.

With the tape unit ready to install into the chest, the cleats are then glued and secured in place with wood screws.



Ventilation is provided by two ports to the left of the unit, and from beneath the chest which is set on rubber feet.



Closeup of tape unit. When in use, cover must be up, since the tape reels overhang front of the chest as can be seen, below.



Photos courtesy Viking of Minneapolis

## Superb performance, based on laboratory engineering... Stromberg-Carlson High Fidelity **TUNERS and RECEIVERS**

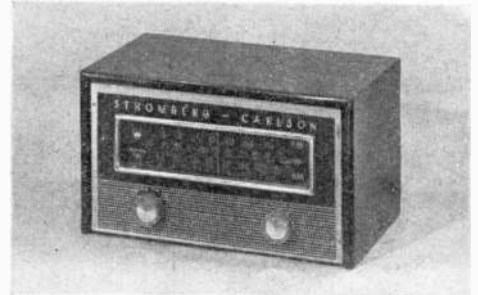
Need a better tuner or receiver? You're probably concerned about frequency response, sensitivity, undistorted output, drift-free operation, new improved circuits, ample but simplified controls, and above all manufacturing *quality*. You want laboratory precision results—not just fancy claims! Choose any of six Stromberg-Carlson models with confidence that you'll have the ultimate in high fidelity performance coupled with traditional quality—backed by 60 years' experience in making the finest in radio and audio equipment.

And Stromberg-Carlson is a pioneer in producing perfectly *balanced* complete systems. Every component of these factory-engineered systems is matched and tuned to perform to perfection with every other. Result—the most faithful reproduction possible! Start any one of several systems that will please your purse, your home, your audio preference.

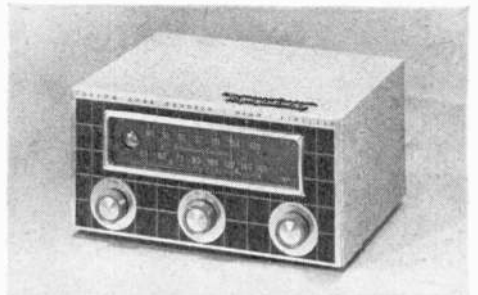
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**SR-403 FM-AM Radio Tuner**.....\$105.00  
Frequency response: 30 to 15,000 cps. Sensitivity 3 microvolts for 20 db quieting. Harmonic distortion less than 1%. Temperature-compensated oscillator circuits prevent drift. Amplifier and phono connectors. U.L. approved. Meets FCC requirements for spurious radiation. 7"x12"x7½".



**SR-402 FM-AM Radio Tuner**.....\$159.50  
Frequency response: 20 to 20,000 cps. Less than 1% harmonic distortion. Sensitivity 1.5 microvolts for 20 db quieting. AFC. 2-position selectivity control on AM. Tuning, Band Selector and Volume Controls. Temperature-compensated oscillator circuits prevent drift. Meets FCC requirements for spurious radiation. U.L. approved. 5¾"x12½"x9¾".



**SR-406 Radio Receivers**.....\$249.95  
A combination AM-FM Radio, pre-amplifier, and 20 watt amplifier. Peak power output 32 watts, 20 watts at 1% total harmonic distortion. Sensitivity 5 microvolts for 30 db quieting. Microphone, crystal phono, magnetic phono, auxiliary inputs, 30 to 20,000 cps. Tape recorder output jack. Output taps for 4, 8, 16 ohms. Bass control—15 db boost, 10 db droop at 50 cps. Treble control—10 db boost, 15 db cut at 10,000 cps. U.L. approved. 8"x15½"x11½".

Prices stated slightly higher in the West.



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## Putting Together a Pickup Arm Kit

This high quality kit comes complete with easy-to-follow instructions

**T**HE newest "kit" to appear is the Audak KT-12 Tone Arm Kit, which saves the purchaser almost half the price of a factory assembled model. There is now mounting acceptance of kits in high fidelity by the do-it-yourself music lover.

First fit the cable into the inner channel of the arm. Secure finger grip in place. Run cable through the tone-arm support, and position the arm in place onto the compass-pivoted base. The next step is to mount the arm and cartridge on the Components turntable base. When arm is mounted and in place, you are then ready to play records as soon as you connect assembly to a hi-fi amplifier and speaker. Total time for assembly, 15 min.



## Building up to a 2-way Speaker System

The flexibility of a hi-fi system allows easy conversion to two speakers

**O**NE of the most practical methods of buying hi-fi components is to progressively build up to the ultimate requirements for the system. In the initial hi-fi system, the Electro-Voice SP-15 wide-range speaker was used. Now, after a period of time, it was decided to add a high frequency speaker, converting the wide-range speaker into a deluxe, 2-way multi-speaker system. In accord with Electro-Voice's "building-block" plan, the added component required was the BB-2 tweeter kit which contained the T-35 high frequency tweeter, AT-37 Brilliance Control, and X-36 Crossover.

Back is removed to provide access to mounting board. Opening is cut out for tweeter, held with two screws.

Cable harness is wired into terminals of the speakers and network. AT-37 brilliance control is located on the rear panel.





# IMPORTANT HI-FI NEWS!

We are proud to announce the merger of the **AUDAX COMPANY** pioneer in audio-electronics with the

## REK-O-KUT CO. INC.

The reputation of both companies for producing quality products is known to all in the growing high fidelity industry. The combined resources and specialized experience of both organizations are now at work on the completion of the

### "DISCRIMINATOR"

a new phono cartridge which will represent one of the most important contributions to high fidelity reproduction.

#### WATCH FOR THE ANNOUNCEMENT

## the MOST WANTED TONE-ARM . . .

**New Audax in Kit Form—at HALF price!**  
**accommodates ANY MAKE cartridge**  
**including the famous AUDAX Hi-Q7**

**AUDAX KT-12: KIT, \$14.55 NET**

*Factory-assembled, \$24.00 NET*

**AUDAX KT-16: KIT, \$17.55 NET**

*Factory-assembled, \$30.00 NET*



The new KT models exactly duplicate the Audax "Compass-Pivoted" transcription arm long recognized as top "blue chip." These new arms are the crowning achievement of a quarter-century of constant refinement and re-engineering of the very first commercial electronic pickup arm (Audax 1928) . . . to the fewest possible parts. It is this very *nth* degree engineered simplicity that makes the new KT arms possible.

Anyone can assemble a KT arm in about 10 minutes—and save 50%! The "Selector-Index" permits instant adjustment for any stylus-pressure. The newly-designed cartridge-housing enables checking of the all-important stylus-to-groove alignment at a glance.

You do-it-yourself with no tools other than a nail-file or small screwdriver.

" . . . The most original of the late developments. . ." Harvey Radio, N. Y.

" . . . What amazed me most, however, is the highest grade workmanship at such a low price. . ." From a letter

" . . . The big news in tone-arms! . . ." Practical Electronics

" . . . a very fine unit. . ." Audio Engineering

" . . . exactly duplicates the famous Audax transcription arm, long recognized as a leading design. . ." Popular Electronics

# Audax

the Standard by which others  
are judged and valued

division of **REK-O-KUT Co. Inc.**

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Audax Company, Division of REK-O-KUT Co. Inc., Dept. HF-1  
38-19 108th Street, Corona 68, New York

Please send me your FREE Illustrated Brochure on your new "Discriminator" cartridge

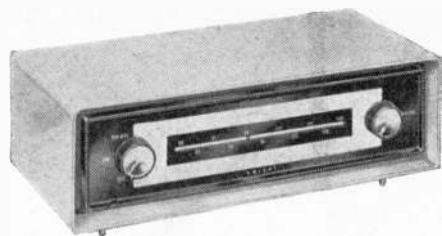
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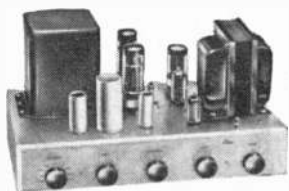
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# Roundup of Do-It-Yourself Kits

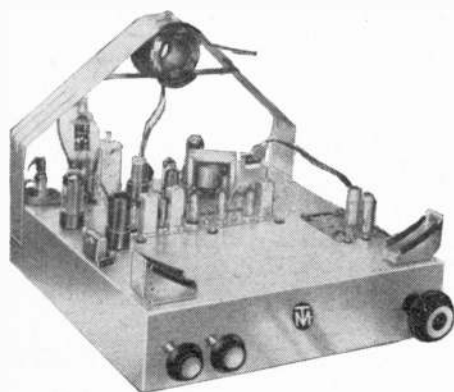
The home builder can enjoy the creative feeling of assembling almost everything in hi-fi equipment with the exception of the cartridge, record player, loudspeaker and tape recorder. Here is a compilation of kits you can get.



**Tuners**



**Amplifiers**



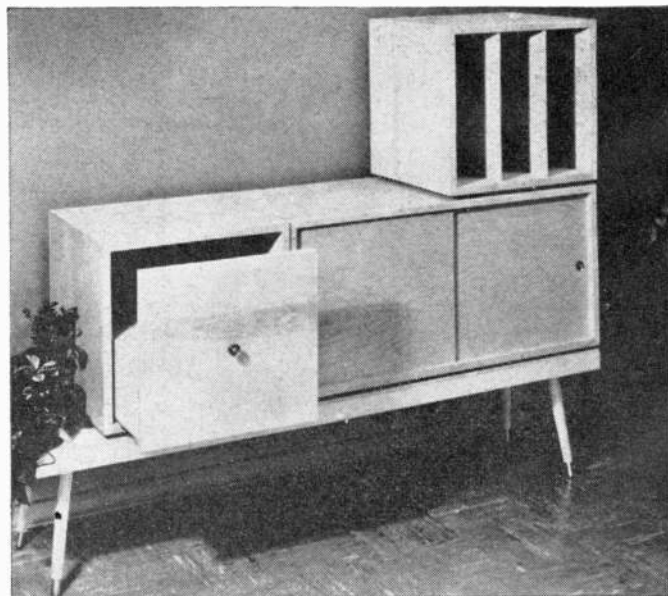
**TV Sets**

MANUFACTURER	TYPE OF KITS
Approved Electronics, N. Y. C.	Amplifier
Argos Products Co., Genoa, Ill.	Speaker Enclosure
Arkay, Radio Kits, Inc., N. Y. C.	Tuners, Amplifiers
Audak Company, N. Y. C.	Pickup Arms
David Bogen Co., Paramus, N. J.	Amplifiers
Bozak Sales Co., Darien, Conn.	Speaker Enclosure
Conrac, Inc., Glendora, Cal.	TV Cabinet
Cabinart, Brooklyn, N. Y.	Equipment and Speaker Enclosure
Dynakit, Dyna Co., Philadelphia, Pa.	Amplifier
Eico, Brooklyn, N. Y.	Amplifier
Electro-Voice, Buchanan, Mich.	Speaker Enclosure
Elmat, Electromatic Mfg. Co., N. Y.	Amplifier
Grommes, Precision Electronics, Inc., Franklin Park, Ill.	Amplifier
Heathkit, Heath Co., Benton Harbor, Mich.	Tuners, Amplifiers, Speaker Systems (Order direct)
Karlson Associates, Brooklyn, N. Y.	Speaker Enclosure
Klipsch & Associates, Hope, Ark.	Speaker Enclosure
Knit, Allied Radio, 100 N. Western Ave., Chicago, Ill.	Tuners, Amplifiers, Speaker Enclosures (Order direct)
Lafayette Radio, 165-08 Liberty Ave., Jamaica, N. Y.	Tuners, Amplifiers (Order direct)
Peri, Printed Electronic Research, Inc., North Hollywood, Cal.	Amplifier
Precise Dev. Corp., Oceanside, N. Y.	Amplifier
Qual-Kit, Quality Electronics, Inc., N. Y. C.	Tuner, Amplifier
Regency, Idea, Inc., Indianapolis, Ind.	Amplifier
River-Edge Industries, Fort Washington, N. Y.	Equipment and Speaker Enclosure
Stephens Trusonic, Inc., Culver City, Cal.	Speaker Enclosure
Tech-Master Corp., Brooklyn, N. Y.	Tuner, Amplifier, TV
University Loudspeakers, Inc., White Plains, N. Y.	Speaker Enclosure

## Speakers and Enclosures



## Cabinets



*"You'll Have The Best  
in Hi-Fi Sound with  
a Jensen Speaker System!"*



## ADD YOUR OWN TOUCH TO HI-FI...and SAVE!

You'll enjoy hi-fi music doubly when you put together your own easy-to-assemble Jensen speaker kit . . . and you don't need a work shop. The acoustically correct Jensen-designed Cabinart enclosure kit and the famous Jensen loudspeaker kit can be assembled right in your living room without any messy woodworking or wood finishing. Everything is accurately pre-cut and *pre-finished* with a professional furniture finish in your choice of mahogany, walnut or blonde mahogany. You'll have the same fine matched speaker components used in Jensen's factory assembled complete high fidelity reproducers—and at far less cost, too!

Send 50¢ for your copy of Manual 1060 for full information about selecting and building Jensen speaker systems.

System Type	"Woofer" Size	Equivalent Jensen Reproducer	Jensen Speaker Kit		Type	Cabinart Cabinet Kits			
			Model	Price		Basic Cabinet Kit	Price	Dress Kit†	Price
3-Way	15"	Imperial	KT-31	\$184.50	Corner* Horn	K-101	\$89.00	P-201	\$54.00
3-Way	15"	Triplex	KT-32	169.50	Corner* Bass-Ultraflex	K-103	48.00	P-203	39.00
3-Way	15"	Triplex	KT-32	169.50	Low Boy Bass-Ultraflex	K-105	48.00	P-205	39.00
2-Way†	15"	—	KT-21	99.50	Corner* Bass-Ultraflex	K-103	48.00	P-203	39.00
2-Way†	15"	—	KT-21	99.50	Low Boy Bass-Ultraflex	K-105	48.00	P-205	39.00
2-Way†	12"	Concerto	KT-22	73.00	Corner* Bass-Ultraflex	K-107	39.00	P-207	36.00
2-Way†	12"	Concerto	KT-22	73.00	Low Boy Bass-Ultraflex	K-109	39.00	P-209	36.00
2-Way†	8"	Contemporary	KDU-10	24.75	Corner* Bass-Ultraflex	K-111	23.00	P-211	25.00
2-Way	8"	Duette Treasure Chest	KDU-10	24.75	Duette	K-113	18.00	P-213	21.00

\* Gives excellent results against sidewall. Bass-Ultraflex is a Jensen trademark.  
† Cabinet provides for expansion to 3-way system at any time with Jensen KTX-1 Range Extender Supertweeter Kit, price \$43.75.  
‡ Available in Mahogany or Korina Blonde.

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JENSEN LOUDSPEAKERS . . . WORLD'S QUALITY STANDARD FOR MORE THAN A QUARTER CENTURY

# A Basic Collection of Music

A well planned record library should have variety and depth, as reflected in the following selections

By Shelley Brussel

**T**HIS list attempts at a broad survey of the important, the popular and the interesting in recorded music. Individual performers have been omitted both in consideration of space and individual tastes, except on jazz listings. With this serving as an outline, and using your own judgment and inclinations, you should be able to develop a satisfying music library.

## SYMPHONIES

- Beethoven—Symphonies Nos. 1-9  
Berlioz—Symphonic Fantastique  
Brahms—Symphony No. 1 in C minor  
Dvorak—Symphony No. 5 in E minor  
Franck—Symphony in D minor  
Haydn—  
Symphony No. 88 in G major  
Symphony No. 104 in D major  
Hindemith—Mathis der Maler  
Mahler—Symphony No. 1 in D major  
Mendelssohn—  
Symphony No. 4 in A major  
Mozart—  
Symphony No. 29 in A major  
Symphony No. 40  
Prokofiev—Classical Symphony in D major  
Schubert—  
Symphony No. 4 in C minor  
Symphony No. 7 in C major  
Schumann—Symphony No. 3 in E flat major  
Shostakovich—Symphony No. 1 in F major  
Tchaikovsky—Symphony No. 6

## CONCERTI

- Bach—  
Brandenburg Concerti Nos. 1-6  
Concerto No. 2 in E major for violin  
Italian concerto for harpsichord  
Bartók—  
Concerto No. 3 for piano  
Beethoven—  
Concerti for piano Nos. 1-5  
Concerto in D major for violin  
Boccherini—Concerto in B flat major for 'cello and orchestra  
Brahms—  
Concerto in D major for violin  
Concerto in A minor for violin and 'cello  
Dvorak—Concerto in B minor for 'cello  
Gluck—Concerto in G major for flute  
Grieg—Concerto in A minor for piano  
Handel—Concerti Grossi—Nos. 1-12  
Haydn—Concerto in E flat major for trumpet  
Mendelssohn—Concerto in E minor for violin  
Mozart—  
Concerto in A major for clarinet  
Concerto No. 1 in G major for flute  
Concerto No. 12 in A major for piano  
Concerto No. 4 in D major for violin  
Concerto No. 5 in A major for violin  
Concerto No. 3 in E flat major for horn  
Prokofiev—  
Concerto No. 3 in C major for piano  
Concerto No. 1 in D major for violin  
Ravel—Concerto for the Left Hand (piano)  
Schumann—Concerto in A minor for piano and orchestra  
Shostakovich—Concerto for piano and orchestra  
Sibelius—Concerto in D minor for violin  
Tchaikovsky—Concerto No. 1 in B flat major for piano and orchestra  
Telemann—Concerto in G major for viola  
Vivaldi—Concerti for flute and orchestra

## ORCHESTRAL WORKS

- Bartók—  
Concerto for orchestra  
Music for strings, percussion, celesta  
Berlioz—Harold in Italy  
Romeo and Juliet  
Bizet—L'Arlesienne Suites  
Britten—Young Person's Guide to the Orchestra  
Copland—  
Appalachian Spring  
Billy the Kid  
Debussy—  
Prelude a l'apres-midi d'un faune  
La Mer  
Gershwin—American in Paris  
Mozart—  
"Eine Kleine Nachtmusik"  
Sinfonia Concertante in E flat major  
Mussorgsky—Pictures at an Exhibition  
Piston—The Incredible Flutist  
Prokofiev—Love for Three Oranges  
Lieutenant Kijé Suite  
Ravel—  
Daphnis et Chloé  
Saint Saëns—Carnival of Animals  
Schönberg—  
Verklarte Nacht  
Five Pieces for Orchestra  
Sibelius—Finlandia  
Strauss—  
Death and Transfiguration  
Til Eulenspiegel  
Stravinsky—  
Firebird Suite  
L'Histoire du Soldat  
Petronchka  
Sacre du Printemps  
Tchaikovsky—  
Romeo and Juliet  
Swan Lake  
Sleeping Beauty  
Vaughn Williams—English Folk Song Suite  
Vivaldi—The Four Seasons  
Walton—Facade  
von Weber—Invitation to the Dance

## CHAMBER MUSIC

- Bach—  
Art of the Fugue  
Suite No. 2 in B minor for flute and strings  
Well-Tempered Clavier  
Bartók—Quartet No. 5  
Beethoven—  
Quartet No. 6 in B flat major  
Quartet No. 12 in E flat  
Quartet No. 14 in C sharp minor  
Quartet No. 15 in A minor  
Sonata No. 8 in C minor for piano  
Sonata No. 9 in A major for violin  
Trio No. 7 in B flat  
Brahms—Quintet for clarinet and strings  
Chopin—  
Sonata No. 2 in B flat minor  
Preludes  
Corelli—La Follia  
Couperin—Harpsichord Music  
Debussy—Quartet in G minor  
Handel—Sonatas for Flute and Harpsichord  
Haydn—  
Quartet in D major, Op. 61 No. 5  
Quartet in B flat major, Op. 76 No. 4  
Hindemith—  
Sonata for Bassoon and piano  
Kleine Kammermusik  
Mozart—  
Quintet in A major (clarinet)  
Quartet No. 17 in B flat major  
Purcell—Suites Nos. 1-8 for harpsichord  
Rameau—Harpsichord Works  
Ravel—Quartet in F major  
Scarlatti—  
Sonatas for Harpsichord  
Sonatas for piano  
Shubert—  
Quartet No. 14 in D minor  
Quintet in A major  
Telemann—Suite for flute and strings in A minor

## CHORAL WORKS

- Bach—  
Mass in B minor  
Cantata No. 78—"Jesu der du meine Seele"  
Cantata No. 106—"Gottes Zeit"  
Cantata No. 140—"Wachet auf"  
Magnificat in D major  
Brahms—Lieder  
Britten—  
Ceremony of Carols  
Peter Grimes: 4 Sea Interludes  
Gluck—Orfeo ed Euridice  
Handel—Messiah  
Mahler—Kindertotenlieder  
Monteverdi—Madrigals  
Mozart—Requiem Mass in A minor  
Ravel—L'Enfant et les Sortilèges  
Shubert—  
Songs  
Die Schöne Müllerin  
Verdi—Requiem  
Vivaldi—Gloria Mass in D major

## OPERA

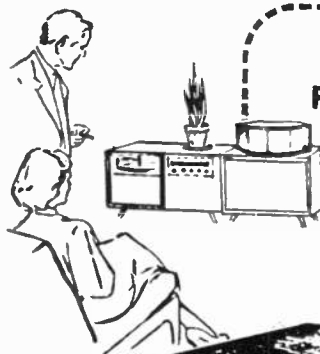
Bizet—Carmen  
 Borodin—Prince Igor  
 Debussy—Pélécas et Mélisande  
 Gershwin—Porgy and Bess  
 Humperdinck—Hansel and Gretel  
 Menotti—Saint of Bleecker Street  
 Mozart—Don Giovanni  
     The Magic Flute  
 Mussorgsky—Boris Gudunov  
 Puccini—La Boheme  
     Madame Butterfly  
 Offenbach—Tales of Hoffmann  
 Rossini—The Barber of Seville  
 Smetna—Bartered Bride  
 Strauss—Die Fledermaus  
 Verdi—Aida  
     La Traviata  
 Wagner—  
     Ring des Nibelungen  
     Die Meistersinger  
     Tristan and Isolde  
 Weill—Three Penny Opera

## JAZZ RECORDS

Louis Armstrong—  
     Plays the Blues  
     Plays W. C. Handy  
     With King Oliver  
 Mildred Bailey—Rockin' Chair Lady  
 Pearl Bailey—Birth of the Blues  
 Charlie Barnet—Town Hall Jazz Concert  
 Count Basie—  
     Jumpin' at the Woodside  
     Lester Leaps In  
 Sidney Bechet—Creole Reeds  
     With Buck Johnson, DeParis  
 Beiderbecke—Story  
 Bunny Berigan—Take It, Bunny  
 Chu Berry—Memorial  
 Will Bradley—Boogie-Woogie  
 Les Brown—Cool Classics  
 Dave Brubeck—College of the Pacific  
 Hoagy Carmichael—Stardust Road  
 Maurice Chevalier—Paris, Je t'Aime  
 Charley Christian—Jazz Immortal  
 Buck Clayton—All the Cats Join In  
 Nat "King" Cole—Ballads of the Day  
 Eddie Condon—Dixieland  
 Miles Davis—  
     Birth of the Cool  
     With Sonny Rollins  
 "Wild" Bill Davis—At Birdland  
 Wild Bill Davison—Jazz at Storyville  
 Marlene Dietrich—Souvenir Album  
 Baby Dodds—Band & Solos  
 Jimmy Dorsey—Dixie by Dorsey  
 Tommy Dorsey—Ecstasy  
 Billy Eckstine—Great "Mr. B."  
 Roy Eldridge—Rockin' Chair  
 Ellington—Blue Light  
 Ella Fitzgerald—Lullabies of Birdland  
 Dizzy Gillespie—  
     With Charlie Christian  
     Horn of Plenty  
 Benny Goodman—  
     Chicago Jazz Classics  
     Henderson Arrangements  
     Mostly Sextets  
 Johnnie Guarnieri—Modern Piano  
     Rhythms  
 Al Haig—Trio  
 Lionel Hampton—Just Jazz  
 George Handy—Handyland, U. S. A.

W. C. Handy—Blues Revisited  
 Coleman Hawkins—Accent on Tenor  
 Erskine Hawkins—After Hours  
 Fletcher Henderson—Birth of Big Band  
     Jazz  
 Woody Herman—At Carnegie Hall, 1946  
 Earl Hines—Oh, Father!  
 Art Hodes—Chicago Rhythm Kings  
 Johnny Hedges—Blues  
 Billie Holiday—Lover Man  
 Pee Wee Hunt—Dixielanders  
 Bunk Johnson—New Orleans Jazz Band  
 James P. Johnson—Early Harlem Piano  
 Jay Jay Johnson—Jai & Kai  
 Pete Johnson—Boogie Woogie  
 Al Jolson—Souvenir  
 Mezz Mezzrow—With Collins & Singleton  
 Thelonious Monk—Brilliant Corners

Moondog—and his Friends  
 Jelly Roll Morton—Rediscovered Solos  
 King Oliver—Plays the Blues  
 Kid Ory—Creole Jazz Band  
 Charlie Parker—Be Bop  
 Oscar Pettiford—Sextet  
 Edith Piaf—Chansons  
 Django Reinhardt—Le Jazz Hot  
 Muggsy Spanier—Ragtimers  
 Art Tatum—Piano Solos  
 Jack Teagarden—Meet Me Where They  
     Play the Blues  
 Sophie Tucker—Latest and Greatest  
     Spicy Songs  
 Fats Waller—The Amazing  
 Ben Webster—Sophisticated Lady  
 Teddy Wilson—All Star Sextet  
 Lester Young—Pres

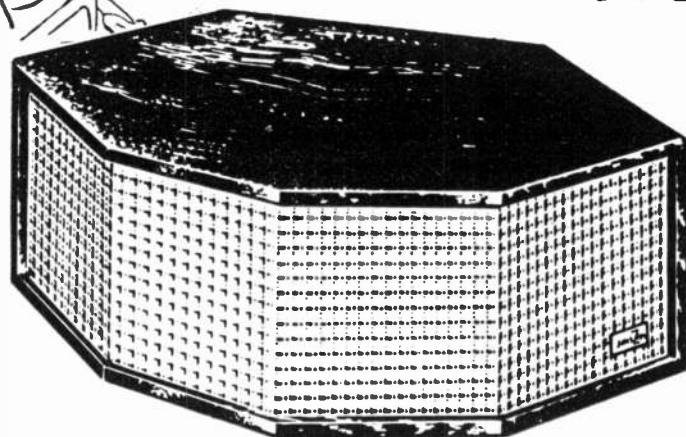


PUT A **JansZen**

*Electrostatic*

IN YOUR

**HI-FI SYSTEM**



Your hi-fi system will be only as good as the speaker. Make it superb with a JansZen electrostatic. This best of loudspeakers will provide the smoothest, most extended frequency response with absolutely no trace of any inherent noise.

### Here's what the critics say about the JANSZEN electrostatic:

*"With the JansZen speaker the entire apparent sound source broadened out . . . sparkingly different from other tweeters. Instrumental combinations which had been submerged on other speakers emerged with startling clarity."*

The Audio League Report

*"It is easily the smoothest-sounding tweeter I have heard to date . . . its crispness and definition are amazing."*

Hi-Fidelity Magazine

*"What strikes me is the clearness of the sound, its freedom from impurities."*

B. H. Hoggins, The Nation

You'll be just as enthusiastic about your JansZen electrostatic speaker. It is easy to install and blends with any decor. Loudspeaker, power supply and crossover network are housed in one small cabinet.

Send for literature and the name of your nearest dealer.

**JansZen** *Electrostatic*

PRODUCT OF NESHAMINY ELECTRONIC CORP., NESHAMINY, PA.

Dept. HS

Export Division: 25 Warren St., New York 7, N.Y. Cable: Simantrice, N.Y.

# Hi-Fi Sources

Where to write for free information

## For the Phonograph

Duotone Company Inc. has a leaflet "Play it Safe"—*Here's How to Buy and Replace Phonograph Needles*. Write to Duotone Company Inc., Keyport, New Jersey—Ask for Form T1.256.

Electro-Sonic Laboratories Inc. offers three technical bulletins on the phonograph cartridge. Bulletin No. 1: *Design Principles of a High Fidelity Phonograph Reproducer*. Bulletin No. 2: *High Frequency Distortion In Record Reproduction*. Bulletin No. 3: *True Bass Response*. Write to: Electro-Sonic Laboratories Inc., Technical Information Service, 35-54 36th Street, Long Island City, New York.

Fairchild Recording has two booklets available. Both have been written in non-technical text: "In the Groove" discusses *The How and Why of Phonograph Cartridges*. "How Good Is Your Arm" discusses the basic design considerations of the professional quality pickup arm. Write to: Fairchild Recording Equipment Co., 10-40 45th Avenue, Long Island City, New York.

"Record Care—The Modern Way." An interesting leaflet which discusses the elimination of *static charges* on LP records. A helpful and informative leaflet for all record enthusiasts. Write to: Mercury Scientific Products Corp., 1725 W. 7 Street, Los Angeles 17, California.

"The Starlight Story"—a leaflet dis-

**Deluxe AM-FM radio tuner model SR-402 has improved quieting circuits with simplified controls. List price is \$160.**

*Stromberg-Carlson*



cussing a new type of phonograph turntable. Write to: Starlight, Metzner Engineering Corporation, 1041 E. Sycamore Avenue, Hollywood 38, California.

Pickering & Co., Inc. has three exciting and interesting leaflets discussing phonograph cartridges and arms. Bulletin No. 194: *The Stanton Unipoise Pickup Arm*. Bulletin No. 350: *The Stanton Fluxvalve Reproducer*. Bulletin No. 260: *Miniature Phonograph Cartridges*. Write to: Pickering & Co., Dept. WOS, Ocean-side, L. I., New York.

"Skitch, on Pitch"—Skitch Henderson discusses a turntable. Write to: Presto Recording Corp. Box 500, Paramus, New Jersey.

"Turntable or Record Changer— which shall I buy."—A frank and intelligent discussion of the relative merits of a turntable vs. an automatic record changer. Illustrated and written in easy-to-understand text. Write to: Rek-O-Kut Co., Inc., 38-01 Queens Blvd., Long Island City 1, New York.

Strobe disc for checking turntable speed of a transcription turntable or record changer. Card contains two discs for checking speeds at 33, 45 and 78 rpm. Ask for "Rek-O-Kut Strobe Disc." Write to: Rek-O-Kut Co., Inc., 38-01 Queens Blvd., Long Island City 1, New York.

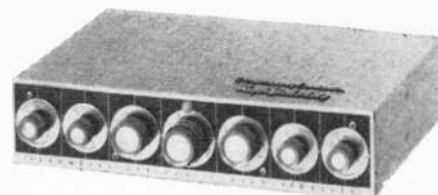
"Phonograph Modernization Manual"—Discusses the ceramic phonograph cartridge and its applications in high fidelity. 12 pages, illustrated, written in simple terms. Write to: Electronics Application Division, Sonotone Corp., Elmsford, New York. Price 10¢.

"The Music Lovers Cartridge"—An 8 page booklet discussing barium-titanate ceramic phonograph cartridges. Write to: Shure Brothers, Inc., 225 W. Huron St., Chicago 10, Illinois.

"Why You Must Replace Your Phonograph Needle"—An illustrated chart showing phono stylus (needle) wear, indicating the "danger" points of wear and how to recognize them. Write to: Tetrad Co., Inc., 62 St. Mary Street, Yonkers 2, New York.

"Hi-Fi and your budget" an interesting text on the high fidelity system discussing the questions asked by people who want to buy and have a limited budget. Write to: Thorens Co., New Hyde Park, New York.

Paul Weathers answers questions about the FM pickup in his new leaflet: "You Were Asking..." Write



*Stromberg-Carlson*

**A high quality audio control center, designed for maximum audio fidelity is preamplifier model AE-426. \$100.**

to: Weathers Industries, Inc. 66 E. Gloucester Pike, Barrington, New Jersey.

## General Miscellany

"Planning Built-In High Fidelity Systems For the Home"—A 16 page booklet dealing with built-in high fidelity systems. Illustrated, the book is simply written and includes a typical built-in project. Contains useful data on wiring, remote speakers, electrical layout, etc. Ask for 39 K 012. Write to: Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois. Price 10¢.

"This Is High Fidelity"—A guide to the easy understanding of high fidelity. Clearly written and illustrated. Many useful and practical ideas helpful in planning for hi-fi. Ask for 39 K 000. Write to: Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois. Price 10¢.

"High Fidelity Home Music Systems." the Altec Lansing plan book. Available from east and west coast addresses. Write to: Altec Lansing Corporation, 161 Sixth Ave., New York 13, New York, or 9356 Santa Monica Blvd., Beverly Hills, California.

"BIC High Fidelity Plan Book"—published by British Industries. Clearly written, the book is an aid in planning the high fidelity system. Illustrated. Write to: British Industries Corp., 80 Shore Road, Port Washington, New York.

Bogen "High Fidelity Plan Book" and "Bogen Amplifier Kit Brochure." Available from: David Bogen Co., Inc. Box 500, Paramus, New Jersey.

"Understanding High Fidelity" by Louis Biancolli and Lester H. Bogen: *A Guide to Hi-Fi Home Music Systems*. 56 pages of clearly written, easy to understand text. Illustrated, this book covers everything from the phonograph to the speaker system and enclosure. Now in its third edition, revised. Available from high fidelity dealers or write to: David

Bogen Co., Inc. Box 500, Paramus, New Jersey. Price 25¢.

"Cabinart '57"—A plan book for selecting enclosures for equipment and loudspeakers. Illustrated, includes ready built enclosures and kits for the do-it-yourself enthusiast. Write to G & H Wood Products, 99 North 11 Street, Brooklyn, New York.

"Installation Ideas"—An interesting 8 page booklet brim full of ideas for installation of a high fidelity system complete with high quality TV. Non-technical, illustrated and written in simple terms. Write to: Conrac Inc., Glendora, California.

Harmon-Kardon has a new catalog and guide on how to buy high fidelity. Illustrated, 11 pages. Discusses the operating and circuit features of tuners and amplifiers. Interesting and helpful. Write to: Harmon-Kardon Inc., 520 Main Street, Westbury, L. I., New York.

"High Fidelity . . . Especially For You"—24 pages, illustrated and written in simple, easy to understand text. Includes many suggested systems for all budgets and applications. Write to: Heath Co., Benton Harbor, Michigan.

"Heathkits For 1957"—A complete catalog and plan book for the do-it-yourself enthusiast who wants to assemble all of the components from radio tuner to speaker enclosure from kits. 12 pages of high fidelity kits. Many more pages of test equipment and amateur equipment kits. Illustrated and plainly written. Write to: Heath Company, Benton Harbor, Michigan.

Hudson Radio 1957 High Fidelity Catalog includes interesting commentary and recommendations regarding the planning of a hi-fi system. In its 64 pages, all major manufacturers are listed. Write to: Hudson Radio and Television Corp., 48 West 48th Street, New York 36, New York.

A new catalog for 1957 contains an interesting commentary on high fidelity which uses the sport of "fishing" to analogize the basic concepts of hi-fi. 30 pages, includes a catalog listing of high fidelity components. Write to: House of Hi-Fi, 3415 W. Broadway, Council Bluffs, Iowa.

New giant 164 page catalog featuring high fidelity system components, accessories and kits. Buying guide also lists many hundreds of items for the enthusiast and hobbyist. Write to: Lafayette Radio, 165-08 Liberty

Avenue, Jamaica 33, New York.

"Lost Instruments"—*The Picture Story of High Fidelity Sound*. A 16 page profusely illustrated booklet written in the basic terms of everyday conversation. Makes the understanding of an amplifier and the other high fidelity components clear and simple. Write to: McIntosh Laboratories, 4 Chambers Street, Binghamton, New York.

A 52 page high fidelity buying guide has been announced by MusiCraft of Chicago. Fully illustrated, includes all components and kits for the music lover, enthusiast and hobbyist. Write to: MusiCraft, 48 East Oak Street, Chicago 11, Illinois.

"Music in your Home"—*The Radio Shack Story of High Fidelity*. A 34 page booklet containing an illustrated, easy to understand text on high fidelity. Listing of hi-fi components, enclosures, kits and accessories. Write to: Radio Shack Corporation, 167 Washington Street, Boston 8, Massachusetts.

"Customized Cabinet Guide"—A guide to high fidelity cabinets—ready built or in do-it-yourself kits. Includes separate cabinets for hi-fi components and loudspeaker enclosures. Illustrated, shows many arrangements of cabinets. Design of book makes it easy to use as a master planning guide. Write to: River Edge Sales Corporation, 80 Shore Road, Port Washington, New York.

*Questions and Answers on High Fidelity*. In this Hi-Fi Guide and Catalog, H. H. Scott answers important questions on high fidelity. New 1957 edition, the 16 page booklet is fully illustrated and written in plain text. Covers radio tuners, amplifiers and the turntable. Write to: H. H. Scott, Inc., 385 Putnam Avenue, Cambridge, Massachusetts.



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## For the Tape Recorder

“The Audio Record”—Published by Audio Devices Inc. in the interests of better sound recording. Available without cost to recording enthusiasts throughout the United States and Canada. Write to: The Audio Record, Audio Devices Inc., 444 Madison Ave., New York 22, New York.

1957 *Tape Recorder Directory*—A complete directory of magnetic tape recorders. Actually, this is the September/October 1956 issue of the Audio Record, Volume 12, Number 3. Write to: Audio Devices Inc., 444 Madison Avenue, New York 22, New York.

“7 Old Fashioned Villains”—A novel 32 page vest pocket booklet. Illustrated with caricatures and easy to understand text. Discusses the characteristics of recording tape and the effects such characteristics have on the tape recorder. Includes a playing time chart for all thicknesses of tape at all speeds on dual and single track recorders. Write to: ORRadio Industries, Inc., 120 Marvyn Road, Opelika, Alabama.

“How Magnetic Tape Is Made”—An interesting picture story illustrates the manner in which magnetic recording tape is manufactured. Tape Recorder enthusiasts will find this booklet interesting. Write to: Dept. F, ORRadio Industries Inc., 120 Marvyn Road, Opelika, Alabama.

“Tape Playing Time Chart”—Shows tape playing time for all reel sizes of magnetic tape of all thicknesses. Lists all speeds from 17/8 ips to 15 ips, single or dual track. May easily be attached inside the lid of the portable tape recorder. Write to: ORRadio Industries Inc., 120 Marvyn Road, Opelika, Alabama.

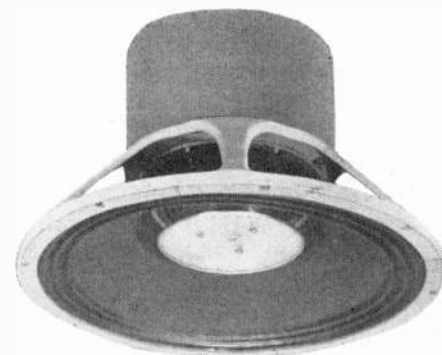
*Tape Comparator Card*—This card has strips of magnetic tape which can easily be compared under a simple light source indicating the difference in surfaces. Write to: ORRadio Industries Inc., 120 Marvyn Road, Opelika, Alabama.

“You Don’t Have To Be A Recording Expert,” a basic booklet on the subject of tape recording. Includes valuable information for the tape recording enthusiast. Write to Minnesota Mining and Manufacturing Co., Dept. A7-117, 900 Bush St., St. Paul 6, Minnesota.

“A Glossary Of Tape Recording Terms For The Amateur Recording Fan.” A compendium of definitions and explanations of the terms used in tape recording. Write to Minnesota

Mining and Manufacturing Co., Dept. A7-117, 900 Bush St., St. Paul 6, Minnesota.

“How to Use Leader and Timing Tape,” a discussion outlining the practical application of leader and timing tape for the tape recorder enthusiast. Explains how to make splices between programs and for identification without weakening the tape and introducing breaks. Write to Minnesota Mining and Manufacturing Co., Dept. A7-117, 900 Bush St., St. Paul 6, Minnesota.



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## For the Loudspeaker

“The Very Best In Sound”—Well illustrated, this book conveys basic principles of the loudspeaker in simple terms as outlined by Mr. R. T. Bozak. Write to: The R. T. Bozak Sales Co., Box 966, Darien, Conn.

“A Resume Of Loudspeaker Enclosures”—Written by Alexis Badmaieff, one of the foremost acoustic designers. Although written in quasi-technical terms . . . the booklet is illustrated with charts and drawings and is easily understood by the enthusiast or hobbyist. Write to: Altec Lansing Corporation, 161 Sixth Avenue, New York 13, New York.

*Adding A High Fidelity Loudspeaker To An Existing Radio-Phonograph or TV Set.* A single sheet brim full of information on how to add a hi-fi speaker to your present radio-phono or television receiver. Write to: Electro-Voice Inc., Buchanan, Michigan.

“Do-It-Yourself Enclosure Kits”—A four page illustrated guide to the selection of knocked-down loudspeaker enclosure kits. Ask for Bulletin 211-1. Write to: Electro-Voice Inc., Buchanan, Michigan.

“A Guide To High Fidelity Loudspeaker Systems and Components”—A useful plan book for selecting the



right speaker system. Discusses the decorative aspect of loudspeaker cabinetry, the loudspeaker system, and how they work together. Ask for Book No. 129-1. Write to: Electro-Voice Inc., Buchanan, Michigan.

"Jensen Pre-Finished Dress Kits"—A new concept in loudspeaker enclosure kits. Designed by Jensen for Jensen hi-fi loudspeaker kits and manufactured by Cabinart. Two booklets, describing the basic "shell" units and pre-finished dress kits. Ask for planning chart and Pre-Finished Dress Kit Booklet. Write to Jensen or Cabinart: Cabinart, Division of G & H Wood Products, 99 N. 11 St., Brooklyn 11, New York. Jensen Manufacturing Company, 6601 South Laramie, Chicago 38, Illinois.

James B. Lansing Sound, Inc. has two new booklets. The first, Form SL-603, tells the story of the JBL Harlan C39, a fresh approach to loudspeaker enclosure and system design. Modern in concept, the Harlan will accommodate any one of six speaker systems. The second booklet, Form SC-502 is a guide to JBL multi-speaker systems. Write to: James B. Lansing Sound Inc., 2439 Fletcher Drive, Los Angeles 39, California.

"Speaking About Loudspeakers"—An amusing sketchbook that does a serious job of explaining the science of loudspeakers. Illustrated, this book has been very basically written so that the neophyte can understand it and the engineer can appreciate it. Covers the basic cone speaker, mid-range and high frequency (tweeter) speakers, networks, enclosures, etc. Write to: L. J. Epstein, University Loudspeakers Inc., 80 S. Kensico Ave., White Plains, New York. Price 10¢.

"The PSE Story"—Illustrated, this plan for Progressive Speaker Expansion is complete with charts to show the practical step-by-step of building a deluxe speaker system, starting with a single speaker. Written in easy-to-understand language. Write to: L. J. Epstein, University Loudspeakers Inc., 80 S. Kensico Avenue, White Plains, New York.

"A Revolution In Acoustics"—A four page brochure discussing the Acoustic Suspension Principle. Write to: Acoustic Research, Inc., 25 Thorn-dike Street, Cambridge 41, Massachusetts.

Quam-Nicholas Company has announced two pamphlets. The first is "High Fidelity Speakers," and the

second is Bulletin No. 69. Bulletin No. 69 includes information and dimensions for recommended speaker enclosures. Write to: Quam-Nicholas Company, Marquette Road and Prairie Avenue, Chicago 37, Illinois.

"Electronic Phono Facts"—Written by Maximilian Weil in non-technical terms for the beginner or engineer. Published at \$1.00, this booklet is available for the cost of handling and mailing. Write to: Audak Company, 500 Fifth Avenue, New York 36, New York. Price 25¢.

"Theory and Operation of the Ultra-Linear Circuit"—A semi-technical story of the operation of the Ultra-Linear amplifier circuit. 22 pages with charts and diagrams. For the serious hobbyist and audio enthusiast. Write to: Keroes Enterprises, 369 Shurs Lane, Philadelphia, Pennsylvania. Price 25¢.

"This Is Your Hi-Fi Life"—An illustrated guide to the selection of a record player and cartridge. Write to Audiogersh Corporation, 514 Broadway, New York 12, New York.

"Authentic High Fidelity Speakers"—A data sheet. Bulletin 165A, illustrates the complete Jensen line of high fidelity speakers, kits, and en-

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losures. A concise guide for selecting the loudspeaker system. Write to: Jensen Manufacturing Company, 6601 So. Laramie, Chicago 38, Illinois.

The Allied guide to an easy understanding of high fidelity is a two part booklet, 98 pages big with a generous portion allotted to the explanation of high fidelity and many helpful hints on how to plan for high fidelity. Illustrated, contains a large listing of high fidelity components, kits, enclosures, etc. Ask for 151. Write to: Allied Radio Corporation, 100 N. Western Avenue, Chicago 80, Illinois.



#### Cabinets and Enclosures

"Construction Plans For Bass Reflex Speaker Cabinets"—Ask for book 39 K 013. A 12 page book with diagrams, drawings and charts for building a bass reflex enclosure to house 8" to 15" speakers. Write to: Allied Radio Corporation, 100 N. Western Avenue, Chicago 80, Illinois. Price 10¢.

Altec Lansing will send construction plans for building their regular line of speaker enclosures. A total of eight plans are available. Request the plan or plans by the model number of the cabinet in which you are interested. Plans are available for Models: 606; 607A; 608A; 609B; 821C; 825 Horn; 827A. Write to Altec Lansing Corporation, 161 Sixth Avenue, New York 13, New York.

Plans for constructing Bozak speaker enclosures. Information includes all plan drawings, bill of materials for wood and hardware, speaker hookup data and circuit drawing. Write to Rudy Bozak, The R. T. Bozak Company, P. O. Box 966, Darien, Connecticut.

Electro-Voice Inc. has published seven construction books for building their enclosures from regular lumber and plywood stock. Each book is

fully illustrated with construction drawings and pictures showing the actual assembly of each cabinet. Included in easy to understand text is a plan for laying out of stock wood and an accurate list of other parts and tools required. The reader will also find the explanation of room acoustics and the loudspeaker system concise and helpful. Order the books by number.

1B1-1 Patrician Construction Book . . . \$1.50.

1B2-1 Georgian Construction Book . . . \$1.50.

1B3-1 Centurion Construction Book . . . \$1.00.

1B4-1 Regency Construction Book . . . \$1.00.

1B5-1 Empire Construction Book . . . \$1.00.

1B6-1 Aristocrat Construction Book . . . \$1.00.

1B7-1 Baronet Construction Book . . . 75¢

Order From Electro-Voice Inc., Buchanan, Michigan.

"Authentic High Fidelity Do-It-Yourself Designs"—A 36 page book containing 18 simplified plans for building Jensen designed speaker enclosures. Complete with construction drawings and all information regarding installation of the speaker system into the enclosure. Easy-to-understand text covers selection, planning, construction theory, dressing up the enclosure, etc. Ask for Technical Manual 1060. Write to: Technical Service Department, Jensen Manufacturing Company, 6601 So. Laramie, Chicago 38, Illinois. Price 50¢.

James B. Lansing Inc., will send construction data sheets on all of their cabinet models to the home constructor. Ask for the construction folder by number:

Construction Folder CF-700—For Enclosure Model 31.

Construction Folder CF-701—For Enclosure Model 34.

Construction Folder CF-702—For Models: 35, 36, 37, 38, 39.

The construction folders will be sent free upon request. The home constructor who wishes to work from a detailed construction drawing may order a copy for any model at \$1.00 per unit. Specify Model of cabinet when ordering the free construction folders or the detailed set of drawings at \$1.00. Order from James B. Lansing Sound Inc., 2439 Fletcher Drive, Los Angeles 39, California.

Malarky Plywood has many helpful plan booklets for the home con-



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structor which can be adapted for planning an enclosure or structure to house the hi-fi system.

"A Play Area"—12 exciting plan ideas for playrooms, covers built-ins too.

"Rendezvous Room"—10 plans for built-ins in casual rooms, includes plans for enclosures easily adapted to hi-fi.

"Family Room"—18 ideas for converting spare space into a family room . . . include TV and hi-fi.

Each booklet sent for 10¢ to cover cost of handling. Write to M & M Wood Working Company, Portland, Oregon.

University Loudspeakers Inc. has published Technigrams containing construction plans for their loudspeaker enclosures. The Technigrams are designed for the home constructor to build a loudspeaker enclosure from stock lumber or plywood. Detailed drawings and explanatory text show the construction of each cabinet. Request the Technigrams you require by number.

Technigram 10 — Plans to build the EN-15 Enclosure.

Technigram 13 — Plans to build the EN-12 Enclosure.

Technigram 12 — Plans to build an 8" speaker enclosure.

Write to: L. J. Epstein, University Loudspeakers Inc., 80 S. Kensico Avenue, White Plains, New York.

United States Plywood has many helpful plans and do-it-yourself booklets which contain specific plans for hi-fi built-ins and enclosures as well as other projects easily adapted to hi-fi use.

"Do-It-Yourself With Weldwood"—sent for 25¢. Contains 40 pages of data for the home craftsman. Information includes discussion of tools and materials, methods in wood-working, finishing, etc.

"Storage Wall," designed by George Nelson.

Plans for construction of a storage wall unit including a hi-fi system and storage area for other incidental storage. Sent for 25¢.

U. S. Plywood is continuously adding to their list of plans made available to the home craftsman. When writing, inquire for latest list of booklets and plans available. Write to U. S. Plywood Corp., 55 W. 44th Street, New York 36, New York.

Douglas Fir Plywood Association has a number of plans available for


10¢ to cover the cost of handling.

Plan 1—Flexible Storage Wall. Ideal for use in a hi-fi built-in. Includes bill of material, finishing suggestions and how to buy plywood. 10¢.

Plan 2—Under Eave Storage. Ideal for those who have an area in an attic or top level of a sloping roof home. Can easily be used as a storage unit or as a center of entertainment, modifying its compartments for hi-fi components and TV. 10¢.

Plan 8—Demountable Music Wall.

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Inquire for complete list of current available plans. Write to: Douglas Fir Plywood Association, Tacoma 2, Washington.

## Knicks and Knacks

Years ago when assembling a high fidelity system we had to improvise for every gimmick and gadget. For instance, we scrounged all of the machinists supply houses to get a spirit level small enough to install on a precision turntable base . . . and we paid heavily to obtain a set of four custom made leveling devices for the base. On another occasion, we improvised a precision postage scale, converting it to grams in order to measure stylus force pressure.

Today, there is little need to scrounge any further than this chapter and the catalog pages of the larger high fidelity dealers. Many of the knicks and knacks . . . gimmicks and gadgets have been made available especially for high fidelity purposes . . . and, of those that have not . . . the author has made a survey and lists them here for your convenience. In all cases, if you are not sure of all of the virtues of a product, drop the manufacturer or supplier a post card asking for more specific information before you buy. Items listed here are described from information supplied by the manufacturer or supplier. A listing in this chapter must not be construed as a recommendation of the product or the product's merit by the author.

## High Fidelity Furniture

Despite the rather large selection of high fidelity equipment cabinets available in the high fidelity market, many music lovers find it necessary to search for a custom cabinet-maker to satisfy the decorative and dimensional requirements of their homes.

Listed below are sources in the regular furniture market which are able to supply cabinets designed to house high fidelity components, and companies which custom build cabinets, wall bookcases, built-ins, etc.

Lopipero Inc. of 788 Third Avenue, New York City. Features furniture pieces in Early American (maple, pine, cherry). Usually has large selection of stock pieces easily adapted for hi-fi installation. Will custom make units of special dimension and style.

F. B. Arthur Interiors, 149 East

57th Street, New York 22, N. Y. Features modern interior styling. Stock units adaptable for high fidelity. Serves metropolitan New York areas.

Mills-Denmark, 1141 Second Avenue, New York City. Features modern styling from Denmark. Custom or stock units adaptable for hi-fi. This company announced a design especially made for hi-fi, available in teak, walnut or palisander . . . adaptable to any grouping of components. Any dimension of cabinet may be ordered custom-made in Denmark especially for your needs.

The Herman Miller Company, Zeeland, Michigan. Dealers and showrooms in many major cities in U. S. and Canada. Features George Nelson designs . . . modern 80" units in Rosewood. Stock units designed for hi-fi and TV. Newest model is designed for wall hanging, complete with hardware. Write for brochure and name of nearest dealer or showroom.

Country Workshop, 95 Rome Street, Newark 5, New Jersey. Mail-order house for unpainted low cost units. Has special designs for hi-fi as well as other units adaptable for hi-fi. Source for lathe turned wood leg assemblies in all sizes. Write for brochure, shows complete line.

H. L. Hubbel Manufacturing Company, Zeeland Michigan. Mail-order house, sells direct. Stock sectional cabinets for hi-fi and loudspeakers. Also features record storage units to match sectionals or as independent units. In moderate cost bracket, offers choice of many woods and finishes. Write for descriptive brochure.

Contemporary American Furniture Co., 725 S. La Salle Street, Chicago, Illinois. Custom built cabinets for high fidelity systems. Write for information.

Show-Off Inc., Jamestown, New York. A source of supply for case goods, in kit form. All parts pre-cut and easy to assemble. Write for catalog to above address, enclose 10¢ for handling.

Harvey Prober features a hi-fi set of cabinets which can be used individually and as a wall section. Has many items of case goods which easily adapt to hi-fi. Write for name and address of nearest dealer. Brochure sent upon request. Harvey Prober, 41 E. 57 Street, New York City.

## Hardware and Miscellaneous for Hi-Fi Cabinets

WoodZan, a transparent wood finish in many colors. Easy to do, color

sealer and final coat is all that is required. Applied with ordinary soft-hair brush. For brochure and name of local dealer write to: WoodZan, Inc., South Hackensack, New Jersey.

*Pen-chrome Wood Finishes*, available in six colors. Easy two-step process with ordinary brush, no rubbing. For brochure and name of local dealer write to: The O'Brien Corp., South Bend 21, Indiana.

*Finishing Kits* are made available in many sizes and varieties. Write for catalog to: Albert Constantine & Sons, Inc., 2054 Eastchester Road, New York 61, New York. Price 25¢.

*Woodlac Finish*, fast drying. For natural grain finishing. Catalog and wood finishing pamphlet on request. Write to: Linseed Oil Products Corp., 1102 S. Fremont Ave., Alhambra, California.

"How To Remove and Restore All Finishes"—A book helpful to the home craftsman rebuilding an existing piece of furniture for hi-fi purposes. Write to: Savogran, 25 Huntington Avenue, Boston, Massachusetts. Price 25¢.

An interesting book of facts on the subject of furniture refinishing may be obtained for the small cost of handling and mailing. Write to: Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland 1, Ohio. Price 25¢.

"The Hang Of Things"—A valuable 20 page booklet for the home constructor who wants to hang anything on a wall, inside or outside the house. Illustrated, it explains in simple terms the safest and best means of hanging cabinets, bookcases, etc., on all types of walls. Write to: Star Expansion, 142 Liberty Street, New York 6, New York.

An adjustable countersink drill fills many drilling jobs in constructing cabinets, enclosures and built-ins. Available in many sizes from 98¢ and up. Indispensable for drilling speaker mounting boards, cabinet backs, shelf cleats, etc. Write for information to: Durabilt Metal Products Co., 709 Zip Street, Union City, New Jersey.

A useful tool guide may be obtained for 25¢ by writing to: Stanley Tools, 394 Elm Street, New Britain, Connecticut.

*Craftsman's Catalog*, 1957 Edition has 132 pages of interesting material for the home wood craftsman. Includes fancy and imported plywoods and veneers, adhesives, patterns, ornaments, hardware, tools, etc. Write to: Craftsmen Service Co., 2727 St.

Mary Street, Chicago 8, Illinois. Price 25¢.

*Constantine's Catalog* for home wood craftsmen contains over 2000 unusual items including woods, finishing kits, ornaments, hardware, tools, etc. 126 pages. Write to: Albert Constantine, and Sons, Inc. 2054 Eastchester Rd., New York 61, New York. Price 25¢.

*Woodworkers Catalog*, contains 100 pages of plans, hardwood and plywood, finishing material, cabinet hardware, furniture trim, etc. Write to: Minnesota Woodworkers Supply

Co., 1713 Olson Highway, Minneapolis 5, Minnesota. Price 25¢.

*Tool Catalog*, illustrates the many tools and attachments that make woodworking projects easier. Write to: Millers Falls Company, Greenfield, Massachusetts.

*Screw Selector Chart* gives helpful information about measuring length and diameter of wood and sheet metal screws. Lists important data regarding correct hole and drill sizes, etc. Ask for TC-4. Write to: Southern Screw Company, Box 1360, Statesville, North Carolina.



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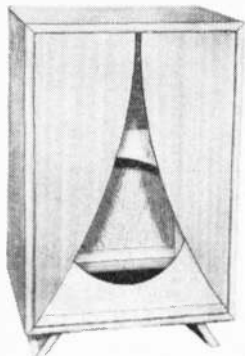
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## Miscellaneous Accessories

Baffles for speakers built-in to a wall, ceiling, closet door or other flat surface. Complete catalog illustrates the various baffles, enclosures, grilles and accessories for mounting speakers into flush surfaces. Write to Lowell Manufacturing Company, 3030-F Laclede Station Road, St. Louis 17, Missouri.

Cables and interconnecting devices for hi-fi systems, prefabricated and in various lengths can be purchased at local hi-fi dealers. Write for name and address of nearest dealer and descriptive brochures to Lab-Tronics, Inc., 3656 N. Lincoln Ave., Chicago 13, Illinois.

Selector switches and volume controls for remote speakers are available on wall plates, pre-wired with terminals for simple hookup. Write to Lab-Tronics, Inc., 3656 N. Lincoln Avenue, Chicago 13, Illinois.

Mechanical Remote Control for TV chassis. Alliance "TT" priced at only \$19.95 permits remote control of tuning and fine tuning of TV tuner or chassis. Adaptable to most makes of TV chassis. Available at most dealers. Write to Alliance Mfg. Co., Inc., Alliance, Ohio for name and address of nearest dealer and brochure.

## Phonograph Accessories

**RECORD PLAYER COVERS**—A heavy gauge plastic cover for open (table top and shelf mounted) record players. Three sizes to fit record changers and manual record players. Available from most high fidelity shops. Robin Industries, Bayside 61, New York.

**PHONO BASE LEVELER KIT**—Consists of a precision circular level with four adjustable legs. Easily mounted to all turntable bases and record changer bases not installed on slides. Permits leveling turntable or changer for optimum operation. Model ACC-3, Price \$2.10. Order from high fidelity dealer. Free literature. G & H Wood Products, 99 N. 11 Street, Brooklyn 11, New York.

**PHONO-STYLUS BRUSH**—*Klee-Needle* mounts to turntable or changer base by means of pressure sensitive backing. Adjustable for most arms. Safe, easy means of cleaning dust from stylus tip, each time a new record is played. Price 98¢. Order from most high fidelity shops. Free literature. Robins Industries, Bayside 61, New York.

**PHONO DRAWER SLIDES**—Available in many sizes and types. Order from most high fidelity shops. Write for literature. Grant Pulley and Hardware Corp., 31-85 Whitestone Parkway, Flushing, New York.

**RECORD STORAGE**—A record storage bin which can be integrated with most high fidelity groupings. Available in many furniture finishes. Cabinart Model ACC-22, Price \$18.00. Order from most high fidelity shops. Write to manufacturers for literature: G & H Wood Products, 99 N. 11 Street, Brooklyn, New York.

**RECORD STORAGE**—A record storage unit available in kit form (knocked down) or assembled but unfinished. Units are of Birch Hardwood and may easily be finished to match existing decor. Model 120K Kit, Price \$21.50; Model 120 Assembled, Price \$31.50. Available from most high fidelity shops. Write for literature: Riveredge Sales Corporation, 80 Shore Road, Port Washington, New York.

**RECORD STORAGE**—Aud-O-File, a new concept in record storage. Made of wrought iron with sliding compartments, which are made of heavy gauge plastic. Model AF-50, Price \$23.99. Available from most high fidelity shops. Write for literature: Robins Industries, Bayside 61, New York.

**RECORD CLEANER**—*Dual Micro-Pianissimo* record cleaner, consists of two plastic arms hinged at one end. Other ends fit into the record hole permitting the record to be quickly rotated to clean the surface with a slightly moistened plastic foam. Price \$2.95. Order from most high fidelity shops. Free literature. United Audio Products, 202 E. 19 St., New York 3, New York.

Static Master accessories for eliminating annoying crackles and pops caused by static charges on the vinyl record. *Record Brush* is of soft Jaguar bristles carefully set in rubber. Built-in polonium strip showers groove with alpha particles neutralizes the static charge and the brush wipes away freed dust and grit. The *Ionizing Unit* is a radio-active cartridge mounted on a flexible arm which is positioned over the record surface. This provides a constant force to de-staticize the stylus friction while the record is being played. Eliminates all traces of dust and static. Available from hi-fi dealers. *Record Brush* is \$14.95, *Ionizing Unit* is \$19.75. Write

to Nuclear Products Co., 10173 East Rush St., El Monte, California for descriptive brochure and name of dealer in your city.

### Stylus Pressure Gauges

Many companies produce a device for measuring the vertical force pressure of the phonograph stylus. The gauges may be purchased from most high fidelity shops. Manufacturers will mail literature upon request.

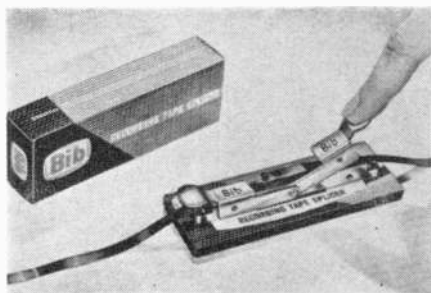
*British Industries*, 80 Shore Road, Port Washington, New York. *Garrard Stylus Pressure Gauge*, Price \$2.50.

*Pacific Transducer Corp.*—11836 W. Pico Blvd., Los Angeles 64, California. *Clarkston Stylus Pressure Gauge*, Price \$1.50.

*Audak Company*—500 Fifth Avenue, New York 36, New York. *Audax Stylus Balance*, A balance scale with graduated weights. Price \$4.80.

*Pickering & Company, Inc.*, Ocean-side, New York. A stylus force gauge that measures force pressure by means of simple balance. Lever-type. Price 15¢.

*Weathers Industries*, 66 E. Gloucester Pike, Barrington, New Jersey. A scale type gauge that measures force pressure. Price \$2.00.



The tape splicer is specifically devised for repair of broken tapes and for editing.

### Tape Accessories

*Audio Tape Head Demagnetizer*—A useful means of removing permanent magnetism from magnetic sound recording heads. Easy to use by even the non-technical music lover. Reduces noise level and maintains highest fidelity of recording. Price \$6.00. Order from high fidelity shops. Free literature. *Audio Devices*, 444 Madison Ave., New York City.

*Gibson Girl Tape Splicer*—A device for rapid repair of broken tapes or for use in editing tapes. Available in 4 models from \$2.62 to \$8.63. Complete with built-in cutting blades, requires no scissors or razor blade. Free literature. *Robins Industries*, Bayside

61, New York.

*Jiffy Tape Splicer*. A compact tape splicer. Price \$1.50. Free literature. *Ranson Mfg. Co.*, 3050 W. 21 Street, Brooklyn, New York.

*Cousino Tape Splicer*. Compact. Made of moulded plastic. Price \$1.50 for complete kit including blade and splicing tape strips. Free literature. *Cousino Inc.*, 2107 Ashland Ave., Toledo 1, Ohio.

*Robins Tape Threader*—Simplifies starting tape on take-up reel. Available from high fidelity shops. Price 79¢. Free literature. *Robins Industries*, Bayside 61, New York.

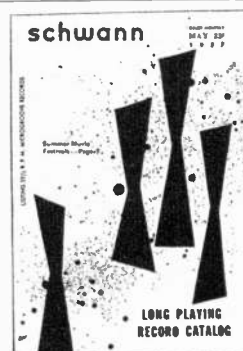
*Audio Alignment Tape*—Permits easy alignment of magnetic recording head to assure best frequency response. Recorded at 15 ips, but may be used with recorders having a 7½ ips speed. Available from high fidelity dealers. Price \$6.00. Free literature. *Audio Devices, Inc.*, 444 Madison Ave., New York City.

*Jockey Cloth* for magnetic recording tape. Cleans and lubricates recording tape. Price 60¢. Available in high fidelity shops. Free literature from *Robins Industries*, Bayside 61, New York.

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11. Turntable Covers	CC-3	2.50
12. Disclosures	EIO, 12 (pkg)	1.20
13. Jockey Cloth for Records	JC-1	1.00
14. KleeNeeDLE	NB-1	1.50
15. Phono-Cushion, 10", 12"	PC-10, 12	1.50
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### Helpful Records

The high fidelity enthusiast, hobbyist and technically untutored music lover can choose from a selection of recordings designed to instruct and help him in maintaining and using his equipment. Some are recorded to help him understand his equipment better . . . and some to instruct him in the proper use of the equipment.

**HOW TO USE YOUR TAPE RECORDER**—a 12" microgroove recording with a talk on the use of the tape recorder. Includes some examples of magnetic tape recordings to illustrate the effects of microphone placement, tape speeds, etc. Price \$4.98. Available from high fidelity shops or from manufacturer, Crest Records, Inc., 220 Broadway, Huntington Station 25, New York.

**ALL ABOUT TAPE ON TAPE**—A talk (recorded on tape) on how the tape recorder works, operation, adjustment, etc. Recorded at two speeds,  $3\frac{3}{4}$  and  $7\frac{1}{2}$  ips. The *Tape-book* is supplied with a 28 page booklet, illustrated and written for the layman. Shows flutter, wow, distortion, etc. Prices:  $3\frac{3}{4}$  ips on a 5" reel, \$5.95;  $7\frac{1}{2}$  ips on a 7" reel, \$6.95. Order from high fidelity shops or direct from HI-FI Tape Recording, Severna Park, Maryland.

*Components Corporation* have made available six 7" LP records to help analyze a hi-fi system. Each record is priced at 89¢ and may be obtained from high fidelity shops or direct from *Components Corp.*, 106 Main Street, Denville, New Jersey. Free literature on request. The six records are:

"Quiet Please"—To check rumble.

"What! No Hum!"—To measure hum.

"How's Your Stylus?"—A stylus wear test.

"Tracking Special"—Measures fundamental resonance, discusses damping problems.

"Vertical/Lateral Response"—Measures ratio of vertical to lateral response.

"Wow! & Flutter Too!"—Checks wow and flutter.

**CHROMATIC SCALE TEST RECORD**—With 8 page instruction booklet. A test record which employs true musical pitches based on chromatic intervals of the tempered scale. Can be used to detect deficiencies in response of speakers, cartridges, etc. Record has tone bursts to detect cone breakup in speakers and cabinet res-

onances. Strobe on label. 12" LP. Price \$4.98. Order from high fidelity shops or direct from Cook Labs, 101 Second Street, Stamford, Connecticut.

### Specialty Records

A company specializing in high-fidelity records recorded for hi-fi enthusiasts is *Audio Fidelity Records*. Repertoire includes many famous collectors items and compositions. Write for complete listing to *Audio Fidelity Records*, Dauntless International, 750 Tenth Ave., New York 19, New York.

### Bibliography for the Music Lover

James Boswell in his biography of the *Life of Dr. Samuel Johnson* wrote . . . "Knowledge is of two kinds; we know a subject ourselves, or we know where we can find information upon it."

With these words in mind, a bibliography of publications and helpful books on the subject of high fidelity has been compiled for the reader.

### Publications

*Audio*, published monthly by Radio Magazines, Inc., P. O. Box 629, Mineola, New York. Single copy available from high fidelity shops and newsstands; 50¢ per copy. Subscription \$4.00 for one year.

*AUDIOCRAFT*, published monthly by Audiocom, Inc., Great Barrington, Massachusetts. Single copy available from high fidelity shops and newsstands; 35¢ per copy. Subscription \$4.00 for one year.

*BETTER LISTENING*, published monthly as a house organ for high fidelity shops who subscribe to this service. Copies are free from subscriber dealers in their shops or by mail. Write to publisher for name and address of subscriber dealer in your city. *Better Listening*, 7 West 44th Street, New York 36, New York.

*HIGH FIDELITY MAGAZINE*, published monthly by Audiocom, Inc., Great Barrington, Massachusetts. Single copy available from high fidelity shops and newsstands; 60¢ per copy. Subscription \$6.00 for one year.

*HI-FI Music At Home*, published bi-monthly by Sleeper Publications Inc., 105 E. 35th St., New York City. Single copy available from high fidelity shops and newsstands; 50¢ per copy. Subscription \$3.00 for one year.

*HI-FI TAPE RECORDING*, published monthly by Mooney-Rowan Publications, Severna Park, Mary-



land. Single copy available from high fidelity shops; 35¢ per copy. Subscription \$3.75 for one year.

**LONG PLAYER**, published monthly by Long Player Publications Inc., P. O. Box 346, New York 19, New York. A complete catalog of long playing records, classical, popular and jazz. Contains the newest listings each month. Single copy 35¢ at high fidelity shops, record and music stores. By subscription: \$4.00 for one year.

### Books

These books are available in most high fidelity shops, as well as in book stores and book sections of department stores. Copies may also be obtained direct from the publisher. In most cases, the books may be reviewed by visiting a public library to ascertain whether they will serve your purposes.

**Basic Audio Course:** Donald C. Hoefler. Published by Gernback Library, New York City. Hard Cover; \$2.75.

**Building Your Record Library:** Roy Hoopes. Published by McGraw-Hill, New York. Hard Cover; \$3.95.

**High Fidelity, A Practical Guide:** Charles Fowler. Published by McGraw-Hill, New York. Hard Cover; \$4.95.

**Hi-Fi Loudspeakers and Enclosures:** Abraham B. Cohen. Published by John F. Rider, New York. Marco Cover; \$4.60. Hard Cover; \$5.50.

**Hi-Fi Manual:** Donald C. Hoefler. Fawcett Books, Greenwich, Connecticut. Soft Cover; 75¢.

**High Fidelity Reader:** Edited by Roy Hoopes. Published by Hanover House, Garden City, New York. Hard Cover; \$3.50.

**High Fidelity—The Why and How for Amateurs:** G. A. Briggs. Published by Wharfedale Wireless Works, Bradford, England. U. S. A. British Industries, Port Washington, New York. Hard Cover; \$2.95.

**How to Select And Use Your Tape Recorder:** David Mark. Published by John F. Rider, New York. Soft Cover; \$2.95.

**How To Make Good Tape Recording:** C. J. LeBel. Published by Audio Devices, 444 Madison Ave., New York City. Soft Cover; \$1.50. Hard Cover; \$2.50.

**Low Cost Hi-Fi:** Donald C. Hoefler. Published by Fawcett Books, Greenwich, Conn. Soft Cover; 75¢.

**Mechanix Illustrated Hi-Fi Guide:**

Donald C. Hoefler. Published by Fawcett, Books, Greenwich, Conn.; 75¢.

**New High Fidelity Handbook:** Irving Greene and James R. Radcliffe. Crown Publishers, New York. Hard Cover; \$2.75.

**Tape Recorders & Tape Recording:** Harold D. Weiler. Published by Radio Magazines, Mincola. New York. Hard Cover; \$3.95.

**Note: All catalogs, plans, etc., free unless otherwise noted.**

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## High Fidelity is for your home



The Ballad



The Trend



The Theme

Because of its early cultist trappings, high fidelity remains a mystery to many people. Some see it as complex, cumbersome machinery; some think a knowledge of higher electronics is required to operate it; and some believe a large and somehow special room is needed for it to perform as it should. These are all fables.

Today's high fidelity by Harman-Kardon is uniquely good looking. The operating controls are so wisely organized that each instrument performs at its maximum in the hands of an intelligent layman. The very essence of their value is that they reproduce music IN YOUR HOME — large or small — the way the composer wanted you to hear it.

Don't consider high fidelity a substitute for the concert hall and its very special aura: the orchestra filing onstage, the burst of applause as the conductor appears, the solemn hush as he raises his baton and the presence of many sharing the experience with you.

High fidelity, in its proper setting — the home — has its own special and exciting values. The music you listen to this new way is created from perfect program material, broadcast or recorded under ideal conditions, and then retold with flawless authenticity. Where many seats in a concert hall provide a compromised performance, high fidelity in your home can be perfect every time.

Genuine high fidelity can be purchased in two basic forms: component high fidelity and integrated high fidelity.

**Component High Fidelity:** This form presents a system including (a) a *record player*, (b) a *tuner* for picking up AM and FM radio programs, (c) an *amplifier* to enlarge these sources of sound sufficiently to excite (d) the *speaker*.

Because Harman-Kardon component high fidelity is strikingly attractive, because it is as simple to connect as a lamp, because it is all performance with nothing spent on non-performing cabinetry, it is your best high fidelity buy.

**Integrated High Fidelity Consoles:** Until recently this form was only obtainable from a limited number of high fidelity specialists on a "built-to-order" basis. Today, Harman-Kardon high fidelity systems are available, fully integrated and factory assembled in fine furniture cabinets. These are not mass-produced products. They are the custom-built product of years of research by Harman-Kardon engineers.

When you buy custom console high fidelity you are buying three things: performance, furniture and the cost of assembly. In our models, as in anyone's, you pay for all three. The same number of dollars spent on components would buy more performance; but for those who desire the extra convenience of a fine system in a fine furniture cabinet, Harman-Kardon consoles are unexcelled.

### Illustrated Harman-Kardon High Fidelity Models:

The Trend amplifier (Model A-1040) easily delivers 40 watts of hum-free, distortion-free power from the new "Controlled H" circuit and generates less heat than a conventional 20 watt instrument. A speaker selector switch permits you to add an additional speaker system elsewhere in the house. It also features: three position rumble filter; six position loudness contour selector to provide precise balance for your own hearing characteristics; Variable Speaker Damping to insure ideal matching of the amplifier and speaker; separate record and tape equalization and enormously effective bass and treble controls to adjust for the acoustics of your room. The Trend is enclosed in a brushed copper cage only 13 $\frac{3}{4}$ " wide x 9 $\frac{1}{4}$ " deep x 4-1/16" high.

**The Trend price is \$125.00**

The Theme tuner (Model T-1040) is the ideal companion for the Trend amplifier. It features: FM with sensitivity at the theoretical maximum; Variable Interstation Noise Gate to eliminate noise between stations; illuminated tuning meter; FM Rumble Filter; dual cathode follower outputs with adjustable level controls. Finish and dimensions are the same as the Trend.

**The Theme price is \$140.00**

The Harman-Kardon Ballad console provides truly remarkable performance in a compact, functional design which is equally at home in a modern or traditional setting. The cabinet is constructed of five ply, bonded, fine hardwoods and is available in mahogany, walnut or blonde finish. It incorporates a 12 watt amplifier (18 watt peak), sensitive AM-FM with Automatic Frequency Control; Garrard record changer with GE reluctance cartridge and diamond needle; ported triple speaker system with horn loaded dual tweeters; selector switch for extra speaker; record equalization; loudness contour selector; bass and treble tone controls and rumble filter.

**The Ballad price is \$400.00**

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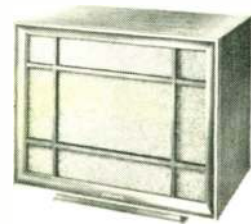
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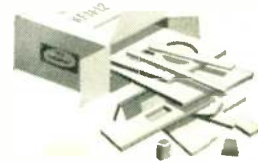
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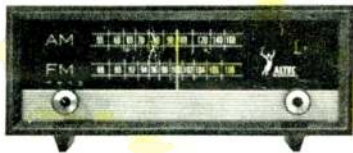
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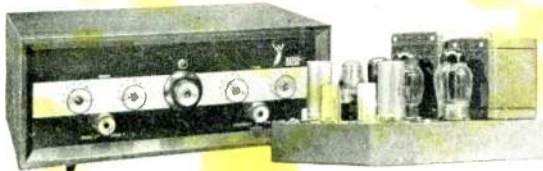


Discriminating high fidelity fans know that there is no substitute for a home music system which is "customized" to their individual needs. This personalization is the difference between an ordinary installation and a "designer-matched" system which utilizes professional quality Altec Lansing high fidelity components to achieve outstanding performance.

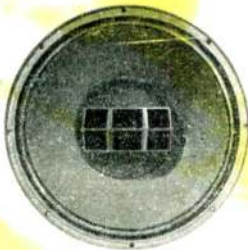
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