

High-Fidelity

WINTER ISSUE
VOL. 1 NO. 3

Published by Milton B. Sleeper

Price \$1.00



Devoted to the Interests of Audio-philes

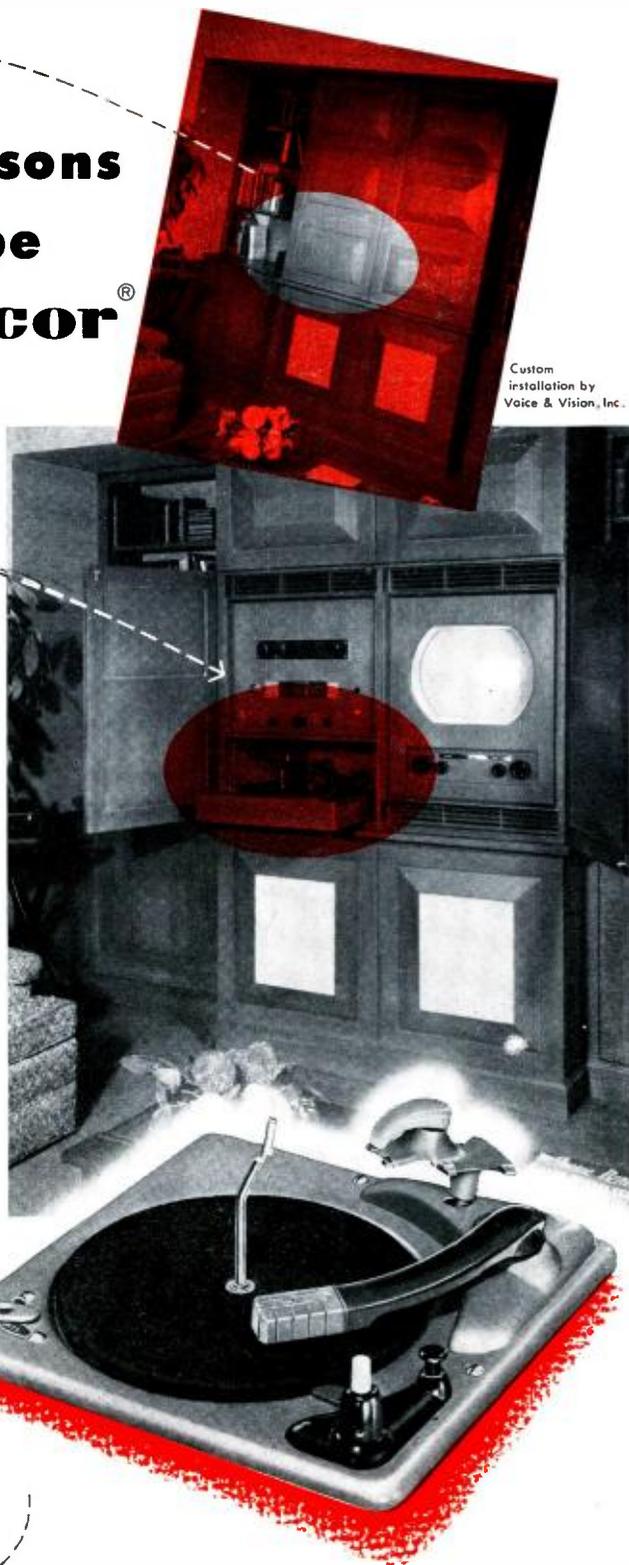
Only TWO reasons why it should be the new Webcor[®]

Your hi-fidelity installation deserves those components that provide the "extras" which, when combined add up to 1 pride of ownership and 2 truly fine high fidelity reproduction. The new Webcor 106-27 HF Diskchanger gives you both. The features your installation *must* have to perform at its best are those that are found exclusively in a Diskchanger made by Webster-Chicago.

- Plays all three speeds, all three sizes automatically.
- Absolute minimum rumble.
- Extra-balanced weight turntable for "fly-wheel" action and speed constancy.
- Retractable idler wheel eliminates flat spots on drive surfaces.
- Plug-in head takes popular magnetic cartridges.
- Automatic muting switch between records.
- Super electrostatic flock turntable.
- Easiest changer to install.

*If it's made by Webster-Chicago,
it's **Webcor***

*... and if it's Webcor
it is the finest*

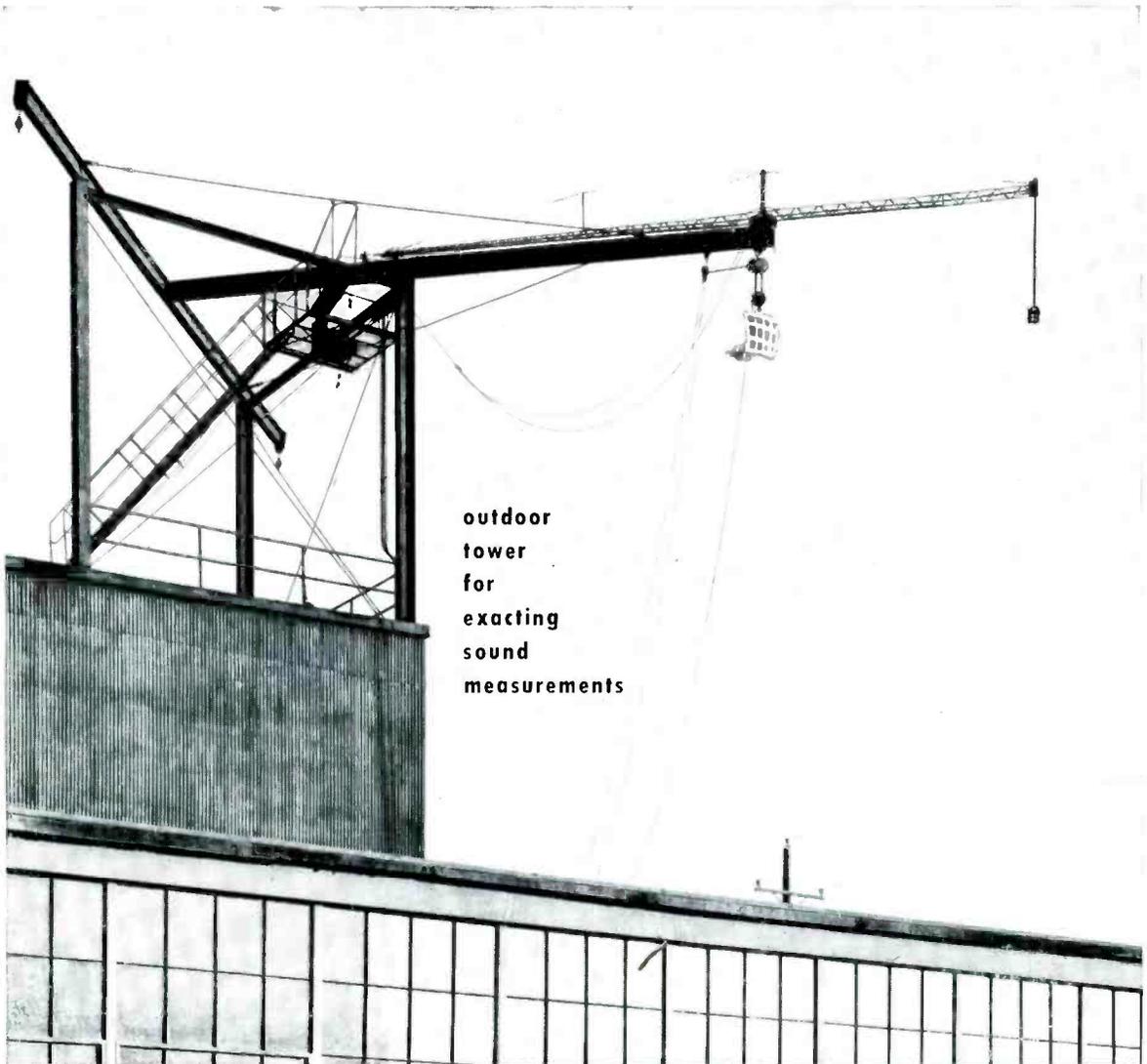


Custom
installation by
Voice & Vision, Inc.

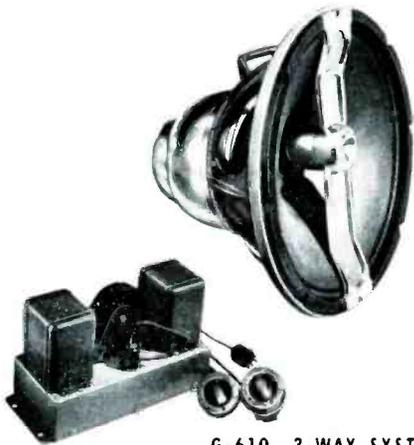
*Webcor is a registered trade name for products manufactured by

WEBSTER-CHICAGO





outdoor
tower
for
exacting
sound
measurements



G-610 3-WAY SYSTEM
World's Finest Loudspeaker

Jensen

*... foremost
in advanced-design loudspeakers*

Jensen's history is the history of the sound reproduction art itself. Dedicated to the purpose of making fine loudspeakers, Jensen engineering has led in the introduction of new basic developments, types and models . . . has been first most often throughout almost 23 years of progress in sound.

Typical of the engineering tools brought to bear on loudspeaker research, is Jensen's outdoor tower . . . high in the air, away from reflecting surfaces . . . used for precise measurements of acoustic performance.

JENSEN MANUFACTURING COMPANY • 6601 S. LARAMIE, CHICAGO 38
Division of the Muter Company • Export Department at the Factory

BURTON BROWNE ADVERTISING

Audax
POLYPHASE
reproducers

bring to an end at last . . .

75 years of destruction

and

Thousands of Audax users are acclaiming POLYPHASE REPRODUCERS as "indispensable for superb quality from disc-recorded music." Not since the advent of the Electronic pickup itself, (built by Audax back in 1926) has there been anything like it . . . Never before such EAR-QUALITY, such FAITHFUL REPRODUCTION . . . This remarkable achievement is now crowned by the further development of the New CHROMATIC stylus system, which, for the first time in 75 years, totally eliminates the ugly factors that have caused untold record destruction and distortion. — BECAUSE . . . you and ONLY YOU can decide what sounds best and most pleasing to you . . . see it, HEAR it, compare it with any reproducer at any price and . . . you be the judge. Yet POLYPHASE costs no more than ordinary pickups.



3 Compass-Picoted Arms Available, 116 Shown Above
POLYPHASE Models for Record changes

Write for editorial reprint on POLYPHASE principles

AUDAX COMPANY

500 Fifth Avenue — New York 18

Creators of Fine Electro-Acoustical Apparata
for Over 25 Years

distortion

AUTHORitatively Speaking

On the cover this month is an outstanding (no pun intended) example of the originality of the custom installation work being done by Voice & Vision in Chicago. Photographs of other installations by this organization appear on pages 49 to 55.

There was an item in one of the magazines a while ago about the consternation created in its editorial offices when the publisher appeared and announced that he wished to write a piece for the magazine. Publishers, they felt, were a strange breed for whom the "no loitering" sign in the editor's office was specifically prepared.

If this story is typical, then HIGH-FIDELITY can consider itself a magazine indeed out of the ordinary, because its publisher is distinctly literate and always a welcome contributor. When readers have finished the article by Milton Sleeper, which begins on page 13, we are sure they will agree.

Discussion among audio hobbyists as to which piece of equipment is the most important in a high fidelity installation usually goes on into the wee hours of the morning. With characteristic originality, G. A. Briggs approaches his subject of sound reproduction in the home with the conviction that the most important aspect of hi-fi is the one which is least often discussed: the human ear. Thus the first in his series of articles for HIGH-FIDELITY begins with *The Loudspeaker and the Ear*, on page 17. His thesis is that since the whole purpose of realistic audio reproduction is to please the ear, we had better start any discussion of the subject by understanding exactly what this thing is which we are trying to please. A thesis which, for us, seems wise indeed.

We do not understand at all why we were so rash as to undertake to experiment on the Air-Coupler, to edit and publish this magazine, and to prepare a considerable amount of equipment for the Audio Fair in New York — all simultaneously! Our foolishness has practically wrecked our health and has made us late getting this issue of HIGH-FIDELITY off the presses. Nevertheless, excellent progress was made with the new design of the Air-Coupler, the magazine is finally in print, and the Audio Fair was an overwhelming success. We admit that our sense of humor wore a little thin at times during the long hours spent working with the Air-Coupler, and we got very tired of trips to the hardware store to buy more 1/4 by 10 flat-head screws . . . but in the

Continued on page 79

Published by: AUDIOCOM, INC. at 264 Main Street, Great Barrington, Mass. Tel. Great Barrington 500.

HIGH-FIDELITY is issued quarterly in April, September, November and February. Single copies \$1.00—Subscription rate: \$6.00 for three years. \$3.00 for one year in the U.S.A.—Canada, add 50¢ per year postage—foreign, add \$1.00 per year postage.

Editorial contributions will be welcomed by the Editor. Payment for articles accepted will be arranged prior to publication. Contributions will be neither acknowledged nor returned unless accompanied by adequate postage, packing, and directions, nor will HIGH-FIDELITY Magazine be responsible for their safe handling in its office or in transit.

The cover design and contents of HIGH-FIDELITY magazine are fully protected by U.S. copyrights, and must not be reproduced in any manner or in any form without written permission.

High-Fidelity

THE MAGAZINE FOR AUDIO-PHILES

Volume 1 Number 3 Winter 1951

CHARLES FOWLER, Editor

CONTENTS

As the Editor Sees It	4
Noted With Interest	7
Readers' Forum	9
15,000-Cycle FM Broadcasting, by Milton B. Sleeper	13
An experiment on WABF that answers some questions about high fidelity programs, and indicates potential sources of fine music for FM.	
The Loudspeaker and the Ear, by G. A. Briggs	17
This noted authority on sound reproduction begins a series of articles with a non-technical discussion of the most important factor of high fidelity sound reproduction: the human ear.	
Prescription for Better Bass: the Air-Coupler, by Charles Fowler	22
A detailed discussion of experimental work which led to the development of an improved Air-Coupler. Photographs and drawings show how to install the unit for best results.	
List of FM Stations in the United States	29
A new compilation, prepared from latest FCC records.	
Record Compensators and Preamplifiers, by Victor Brociner	31
Correct use of this type of equipment is essential to achieving best sound reproduction from phonograph records. The author provides complete data on turnover frequencies, treble preemphasis, and compensation requirements.	
RECORDS AND MUSIC SECTION	33-48
Opera Buffa on Records, by C. G. Burke	33
The author continues his informative discussions with a review of what is currently one of the most popular forms of opera on records.	
Record Critic's Home Listening Equipment	38
Records of the Great	39
Complete Information about LP Record Manufacturers	41
Records in Review, by J. F. Indcox and C. G. Burke	42
Home Installations Which Make You Stop, Look, and Listen	49
A portfolio of the latest custom designs, devoted to the proposition that a hi-fi installation should be as handsome in appearance as it is fine in performance.	
Tape Recording, Part II, by Alan C. Macy	56
Continuing the detailed discussion of tape recording for the home enthusiast.	
How Transcription Pressings are Made	61
A picture story showing each step in the processing of these records.	
Equipment Reports:	
Brociner Preamplifier and Record Compensator	80
Fairchild Transcription Arm and Cartridges	82
Exhibitors at the Audio Fair in New York	84
Traders' Marketplace	85

MILTON B. SLEEPER, Publisher

Copyright 1951 by Audiocom, Inc.

Entered as second-class matter April 27, 1951 at the Post Office, Great Barrington, Mass., under the Act of March 3, 1879. Additional entry at the Post Office, Pittsfield, Mass. Printed in the U. S. A.

AS THE EDITOR SEES IT

A DOZEN times a day, by phone and by mail, we are asked the simple question, "Which piece of audio equipment is best?"

The fact that such a question arises so often for everyone, from audio hobbyist to casual music listener, seems significant because, in audio, we are dealing with equipment which is rated by a number of technical standards; we are presumably dealing with a *science*. But are we? Is sound reproduction a science?

Before we consider that question, let's go back to the original one. How far can we go toward deciding which piece of equipment is best?

In our opinion, there is no *conclusive* answer. Certainly, a piece of equipment can be put through its electrical paces. A transformer rated at 50 watts can be tested to determine at what point it will collapse from overload. Intermodulation distortion in an amplifier can be measured with a high degree of accuracy. These determinations of quality mean much — but not everything. They must not be underestimated, nor taken as the *final* answer.

For one thing, although the question may be *stated* as: "Which amplifier is best?", the question is, in *fact*: "Which amplifier, when used in conjunction with the other pieces of equipment which I have in my system, and operated at the particular volume level which I enjoy in my living room, will sound best to my ears at my age and at the time of day when I usually listen, which is when I am moderately tired after a day's work in a noisy office?"

Even though many factors are incorporated into the statement of that question, there are still more. Yet, altering any one of those factors *may* affect the decision as to which piece of equipment is best for the system under consideration. It is, of course, the old story of the chain and all its links.

It is also much more. For in sound reproduction, factors enter in which, so far, no one has been able to analyze and correlate with finality. Some of these factors vary so widely that they are too complex for convenient analysis. Others are as yet undetermined.

For example: even though every link from studio microphone to living room loudspeaker were perfect, there would still be the extremely complex problem of room acoustics. And then — the final link in the chain — there is the almost complete unknown: the human being.

Thus, satisfactory and pleasing sound reproduction is not only a matter of highly complex engineering but also of physiology and psychology.

We harp once again on this subject because its importance was brought home to us very forcefully at the Audio Fair in New York and because we may need to reexamine our perspective.

We hesitate to estimate how many hundreds of audio-philes came to our exhibit room — a sort of last port of call — dazed, bewildered, and probably slightly deaf! One after another said, "Well, I've heard umpteen amplifiers. They may all be flat from 10 to 100,000 cycles. *But they don't sound alike at all!*"

Not so common was the person who had heard them all, and arrived at a decision as to which he liked the best. But then, so often that it ceased to be amusing, would come the conflict: one person would announce his decision and a second, overhearing it, would come in with a "You thought that was best? Why, I thought such and such was much better!"

This is the quandary of the audio-phile. For the advanced hobbyist, it is half the fun of the hobby, changing and experimenting, to determine what improvement he can make in the final result: his listening pleasure. For the person just becoming acquainted with the possibilities of high fidelity reproduction of sound, the problem is baffling and sometimes discouraging. He has been led to believe, perhaps, that by a judicious selection of components, each rated by engineering measurements, he can achieve a degree of perfection limited only by his pocketbook.

How is it there can be such confusion in a *science*?

PERHAPS the time has come for a long look at the development of the audio art. And perhaps the last word in that sentence is the key to the present problem: sound reproduction is not only a science; it must also be recognized as an art.

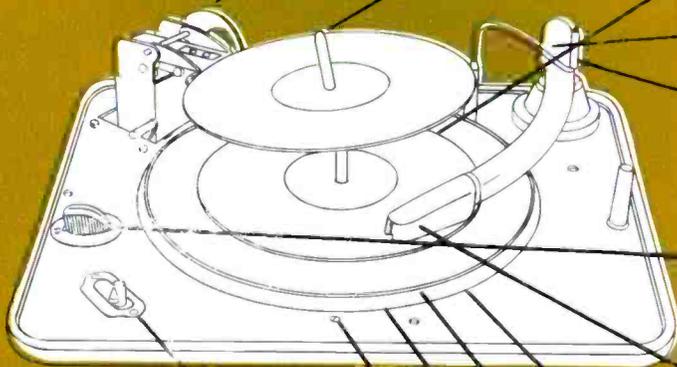
Not long ago, an improvement in the technical rating of an amplifier indicated an improvement in sound reproduction which was clearly audible. Today, the engineers have developed amplifiers to a point where there is little audible difference between any in a given price class. There may be an indefinable and subtle difference which is audible, but it does not seem to correlate with differences in engineering specifications.

Should we therefore stop talking and writing about audio systems, with the idea that they are something scientific which we know all about and can discuss in clean-cut scientific terms? Should we face the fact that audio reproduction has outgrown science and entered the realm of art? Has the turning point arrived? Are we beginning to deal with a musical instrument? Shall we look forward to the day when a phonograph player is chosen by ear alone, as musical instruments are selected?

The scientist can analyze the sound and construction of a violin and he can reproduce the instrument, but the chances are indeed slim that the facsimile will sound exactly like the original. There will be something missing — and that something is the contribution of the violin-maker's art.

So too with audio. We are tremendously indebted to the scientist and the engineer; they have made possible the achievement of the present, and they have much still to accomplish. But should we not acknowledge the broadening of our horizon and consider music listening systems no longer a matter solely of audio engineering but also of musical art? To put the audio science in this perspective will restore the balance of importance between the ear and the engineer.

Model RC-80
GARRARD "Triumph"
 THE WORLD'S FINEST RECORD CHANGER



PLAYS ALL 3 SPEEDS
 —fully automatic with
 automatic stop.

*A triumph of engineering,
 with every feature tested
 for finest performance.*

GARRARD SALES CORP. Dept. F-11 164 Duane St., New York 13

Gentlemen:
 I am interested in learning more
 about the Garrard "Triumph"
 3-speed record changer. Please
 tell me, with no obligation, where
 I can see and hear it in my area.

NAME

ADDRESS

CITY ZONE STATE

Minimum cabinet space required is 15 1/2" long x 13 1/4" wide with 5 3/4" clearance above and 3 1/2" clearance below top of motor board.

PUSHER TYPE PLATFORM:

Adjusts simply to 7"-10"-12" records regardless of diameter or size of spindle hole.
 No record changing mechanism has been developed to equal the performance of the precision pusher platform. For records with standard center holes, the pusher platform is the only method that gives positive gentle record operation.



TWO INTERCHANGEABLE SPINDLES:

Easily inserted, the two Garrard spindles accommodate all records as they were made to be played. (If user prefers one spindle can be used throughout simply by plugging center hole of 45 rpm records.)

- a) Typical Garrard spindle for standard center holes.
- b) Easily inserted wide spindle, for 45 rpm records, remains stationary when record is played. Only a small collar revolves, assuring longer center hole and record wear.



HEAVY DRIVE SHAFT:

A unique feature! Exclusive with Garrard!
 Drive shaft for 33 1/3 rpm and 45 rpm is heavy, thus obtaining more consistent quality at critical low speeds. Wows and wavers eliminated.



BALANCED TONE ARM:

Parallel lift tone arm construction guarantees true tangent tracking. Disturbing resonance eliminated.



AUTOMATIC STOP:

Insures positive and unfailing action at end of any type of record and returns tone arm to rest position.



TRIPLE SPEED SWITCH:

Speed changes are clearly marked, easily made. The RC-80 plays 33 1/3, 45 and 78 rpm. Records are placed on the player and simple settings made. Action is then completely automatic, including automatic shut-off after last record of any size.



INTERCHANGEABLE PLUG-IN HEADS:

Carefully engineered to accommodate user's choice of crystal, magnetic or variable reluctance cartridges for standard and microgroove reproduction, such as Astatic, Audak, G.E. Variable Reluctance, Pickering, Garrard Magnetic, etc.



HEAVY DUTY SILENT MOTOR WITH ABSOLUTELY NO RUMBLE:

Speed maintained throughout a wide variation in line voltage. There is no appreciable speed variation operating unit "cold" with a full load, or "hot" with one record, regardless of weight, thickness or diameter of records.



WEIGHTED TURNTABLE:

RC-80 turntable is heavily weighted to give flywheel action. No turntable rumble. No "wows", no wavering reproduction.



MUTING SWITCH:

No sound while changer operates on run-in or run-off grooves. Continuity of music undisturbed by noises.



SIMPLE INSTALLATION:

Mounting holes are identical with former Garrard models, so that replacement is very simple. Unique spring suspension.



CONVENIENT START-STOP-REJECT LEVER:

Start, stop and reject lever are combined and located conveniently away from tone arm.



Changer operates on 100/130 and/or 200/250 volts, 60 cycles, A.C. (50 cycle bushing available.) D.C. model also now available.

FOR THE WORLD OF MUSIC

-- At its Finest!



Zenith Quality

**Radios and Radio-Phonographs Alone
Bring You Super-Sensitive FM**

No finer music outside the concert hall itself—the clear, uninterrupted, static-free music you enjoy on Zenith FM. And now, with Zenith's amazing new Super-Sensitive circuits, your enjoyment of music soars to even greater heights!

Reaching far beyond the usual FM range, powerful Zenith Super-Sensitive FM brings in more stations, more programs. And, with Zenith's larger, finer speaker design brings you a revelation in full, rich glorious tone. New, superior Zenith tuning circuits prevent station drifting or fading. Tune easier . . . and *stay tuned*. No antenna is needed in primary signal areas.

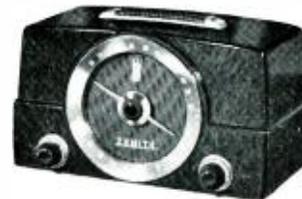
Only in Zenith table radios and striking radio-phonograph combinations can you

enjoy *all* the features of this better FM, plus famous Zenith Long-Distance AM reception, too. See them now at your Zenith Radio and Television dealer's.

World's Finest Record Playing, Too!

New Zenith "Cobra-Matic" . . . first and only record player that lets you play every record — all records — at the exact speed at which they were recorded . . . enables you to adjust for perfect pitch, tempo and tone quality. Lets you play not only 33½, 45 and 78 R.P.M. but all intermediate speeds between 10 and 85, including the coming new 16 R.P.M. Your insurance for the future of record playing. Yours *only* in Zenith radio-phonographs!

Above, New Zenith "Tudor" with exclusive Cobra-Matic® record-player, Super-Sensitive FM, Long-Distance AM radio, Radiorgan® Tone Control. Beautiful period cabinet, rich Mahogany veneers.



New Zenith "Super-Symphony." Super-Sensitive FM, Long-Distance® AM. Most sensational tone and reception ever in a Zenith table radio. New-type Broad Range Tone Control. Walnut plastic cabinet.



Zenith Radio Corporation, Chicago 39, Illinois • Over 30 Years of "Know-How" in Radionics® Exclusively
Also Makers of Fine Hearing Aids

Noted with Interest:

Highlights of the Audio Fair

The audio orgy of the year is over, done with, and pur to bed. At least 8,000 audio-philosophers are recuperating from bad aural hangovers and, without doubt, a goodly proportion have become temporary audio-phobes. Both the hangovers and the audio-phobia will pass; enthusiasm will return, and— heaven help us! — New York's Audio Fair next year will be bigger and better than ever!

We have not yet assembled our thoughts into coherence; the percussion of Varèse's *Ionization* on EMS label is not yet stilled. But perhaps random impressions will be in order, for the benefit of those unable to attend . . .

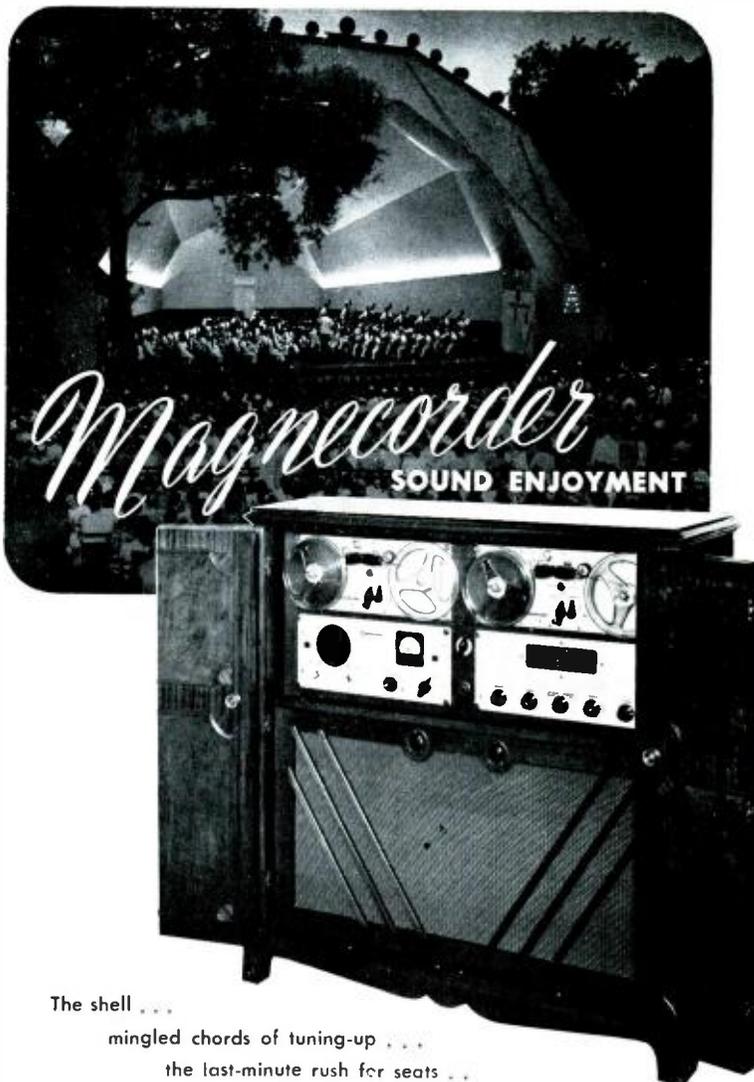
Strongest impression: the battle of the Midgets and the Giants. Electro-Voice produced the biggest giant, the Patrician, and also the smallest midget, the Baronet. The latter is a corner enclosure about 18 ins. high and occupying barely a square foot of floor space! It housed an 8-in. loudspeaker, radiating direct from the front, horn loaded *a la* Klipsch at the rear. For an 8-in. unit, astonishingly good reproduction, probably the best balanced of any of the midgets.

Other midgets were the R-J and the Hartley. The R-J was demonstrated with ear-shattering volume (by no means the only unit guilty of such conduct!) which certainly dug deep but stirred up a little mud in the extreme low-frequency region. Future development of the R-J is well worth watching carefully, as is the entire trend toward disproving the axiom that good bass reproduction requires giant size. The Hartley was extremely clean from middle C on up. Both the R-J and the Hartley bring to mind the days in the mid-thirties when it was fashionable to house an 8-in. Western Electric speaker in a tightly closed box, 1 cubic foot or less in size, using anything in sight to fill the back of the box to deaden back radiation from the speaker.

Giants included the Electro-Voice Patrician, grandest and most impressive sonically of the lot; the Altec 820, clean and bright, whether operated *pianissimo* or *super-fortissimo*; the Jim Lansing, attractive in design and exquisite in sound— particularly when demonstrating the Magnecord bin-aural system; the Brociner corner design, which sounded wonderfully restful to the ears (partly due, no doubt, to the fact that the exhibitor's door was kept closed and volume level kept blessedly low, and— brand new— the McIntosh sawed-off corner enclosure. Its *square* footage of space occupied was high, but its *cubic* footage low: it stood only waist-high. Bass was full and good; an efficient tweeter would have improved it for us. Another colossus: the Jensen back-loaded horn.

A prize of a large bunch of wilted carnations goes to the well-known manufacturer of a certain 12-in. speaker, which was housed in one of the largest enclosures in captivity, and which produced the loudest and most persistent one-note bass at the Fair. We refrain from mentioning the name, because we know the unit was not being operated properly. In fact, reports had it that, at one time, it continued to produce

Continued on page 8



The shell . . .
mingled chords of tuning-up . . .
the last-minute rush for seats . . .

— then the thrill of great music borne out upon the night. This moment is relived each time Magnecord Tape Recorders bring the "living sound" of musical artistry into your home. "Presence" and full-range reproduction make Magnecorder the leading tape recorder among sound connoisseurs. Easily mounted in your custom-built cabinet or installation*, Magnecorder places at your fingertips an unlimited repertory of fine tape recordings . . . See and hear for yourself the features, flexibility and fidelity of Magnecorder at your electronic distributor's today!



* Cabinet pictured above not sold by Magnecord

WRITE FOR NEW CATALOG

Name.....

Address.....

City..... Zone..... State.....

Magnecord, INC.
Professional Tape Recorders

360 NORTH MICHIGAN AVENUE
CHICAGO 1, ILL. • DEPT. HF-11

A Message TO THE Musically SENSITIVE LISTENER

It is possible to reproduce faithfully your great favorites ---- classics or popular ---- in your own home, reflecting original concert-hall performance.

ASSEMBLE YOUR HIGH-QUALITY MUSIC SYSTEM AROUND

THE
BROOK

ALL TRIODE HIGH QUALITY AUDIO AMPLIFIER



Detailed information and free booklet, "Better Listening", available on request. Dept. FM-1

BROOK ELECTRONICS, INC.
34 DeHART PLACE, ELIZABETH 2, N.J.

Noted with Interest

Continued from page 7

its one-note beer barrel boom even after the record had finished. Engineers had to scramble under tables to disconnect wires before the booming stopped!

At the high-frequency end of the spectrum, the Jim Lansing acoustical lens deserves special attention. A report will be forthcoming in HIGH-FIDELITY.

Practically all of the jobber-dealers managed to cram an unbelievable quantity and variety of equipment into relatively cramped quarters, thus impressing us, at least, with the seriousness of the problem of the audiophile who must select from this overabundance. At least one exhibitor in this category kept most of the people outside his demonstration room by stationing a particularly lush blonde in the hallway with a supply of lapel tags . . . Island Radio of Hempstead, Long Island, cleverly personified "service" by garbing its attendants in neat work clothes, clearly signifying a readiness to climb the roof to fix the FM antenna, or crawl into the closet to reestablish a cooperative spirit between amplifier and speaker. Congratulations to them for a smart idea, and for recognition of a pressing need on the part of many audiophiles.

As Victor Brociner points out elsewhere in this issue of HIGH-FIDELITY, time was when only a few hard-bitten audio hobbyists knew the function of record compensators and preamplifiers. This year's Fair ended that era for good: everyone in sight had a pre-amp-compensator unit. Noteworthy new editions were announced by Pickering, Radio Craftsmen, H. H. Scott, and Altec-Lansing. What to do with Messrs. Fletcher and Munson with their curves of hearing characteristics, troubled some in this group of manufacturers. A few progressives bluntly admitted the existence of Fletcher-Munson curves, and used a loudness control on their preamps. Others, such as Waveforms and Radio Craftsmen, adopted a take-it-or-leave-it attitude and incorporated a switch to throw the loudness control feature in or out.

Oddments: a pick-up operating with only one gram pressure, instead of the customary 6 to 8 grams, exhibited by Weathers Industries . . . Some ultra-smart custom installations by Electronic Workshop of New York . . . the Acoustical Corner Ribbon speaker, an English product which gave sound reproduction an Oxford accent . . . Rek-O-Kut's excellent and complete line of turntables . . . the Magnecord binaural demonstration, adding startling dimension and definition to individual sound sources . . . Concerrone's new professional Network model tape recorder . . . Browning Labs, continuing to present its consistently fine line of FM and FM-AM tuners . . . Cook Labs, normally best-known for its test records, disrupted the show by releasing a record called *Rail Dynamics*. It was not long after opening time the first day before the first copy of this record put in an appearance at our demonstration room. From then on, *Rail Dynamics* was brought in by one person after another. It's an exciting, superbly recorded sound-effects record!

Continued on page 72

Readers' Forum

SIR:

I have now read and enjoyed two issues of HIGH-FIDELITY, but have bought only one piece of equipment: an amplifier. I cannot follow your advice to buy on the basis of listening tests because there are no demonstration rooms within hundreds of miles. After reading letters from your subscribers, it appears that I am not the only one willing — nay, anxious — to have your magazine do some of the listening and testing for us. I believe most of your readers would like detailed information such as that given in the Fall issue on amplifiers, but even more important, accurate data on performance. This information should not, and need not, be highly technical. However, articles such as Alan Macy's on Tape Recording are educating your subscribers to the point where some technical information is meaningful and highly desirable.

Concerning the discussion about reviews of popular music and the Music Between, I cannot complain of the lack of opportunity of making listening tests on popular records, what with the omnipresent radio and juke box. An expansion into the field of Music Between sounds interesting, especially if it could include music from all times and places, the unusual, and even, occasionally, the bizarre. All this, of course, provided it entails no restriction of the present classical reviews.

G. M. Connally

Floresville, Texas

How do readers feel about the Equipment Reports on pages 80-83? — *Editor*

SIR:

I took your suggestion made in the first issue and wrote letters to the FM stations to which I listen. Most of them answered and seemed to be very glad I had written. It might not be a bad idea to repeat your suggestion in the next issue. For those of us with FM sets, three cents and a little time is a small amount to pay to help protect an investment of usually more than one hundred dollars.

A. E. Foster

Tyndall Air Force Base, Fla.

SIR:

It would be interesting to hear from readers using Magnecord Tape Recorders and McIntosh Amplifiers, if they have considered the advantage of a plug-in pre-amplifier for their McIntosh. This pre-amplifier might use a 12AX7 with bass equalization rising slowly from 1,000 cycles to a maximum of 20 db. boost at 20 cycles, to correct deficiencies in the tape. In this manner, instead of feeding the McIntosh from the 16 ohm output of the tape recorder, a low-level signal can be amplified out of the bridge-in jack following the first 12SJ7 stage in the Magnecord.

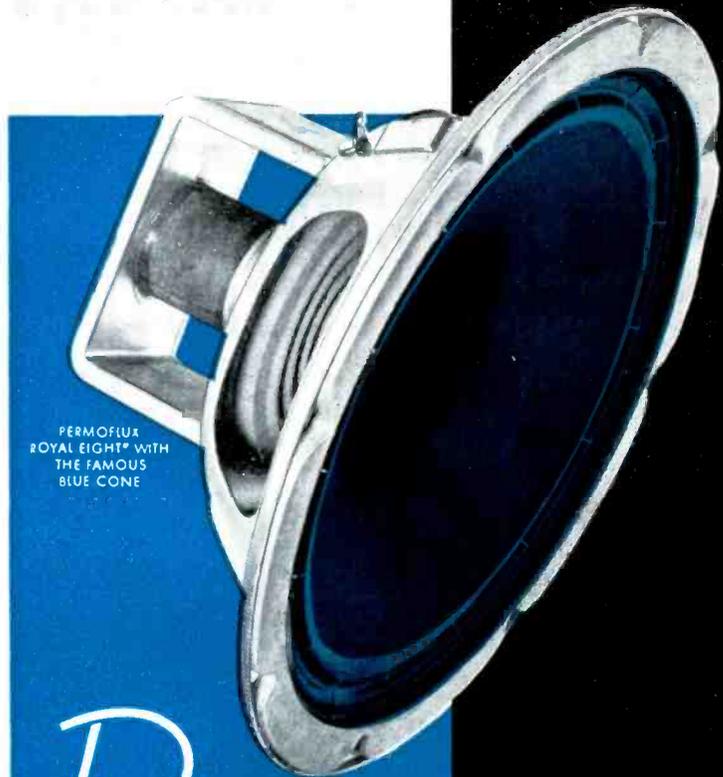
Granted that a Magnecord using live-

Continued on page 11



Balanced tone

...from the flashing sunlight
of Mozart to the storm of
Shostakovich



PERMOFLUX
ROYAL EIGHT™ WITH
THE FAMOUS
BLUE CONE

PermoFlux ROYAL EIGHT™

AUDIOPHILES the country over acclaim the clean, brilliant, life-like musical reproduction of the PermoFlux Royal Eight™...the 8" Speaker comparable to any 12"! Combined with the new PermoFlux Corner Baffle, Model CB-8-M, the Royal Eight™ re-creates original programs with even superior sensitivity and fidelity—every instrument in full-range tonal balance. Here's Big Speaker Performance in a small, easy-to-install frame at a sensible price. (\$22.50 List, less Baffle).

See your Radio Paris Distributor or write to PermoFlux today for full information about the complete Royal Blue Line of 6" to 15" Speakers and Baffle Combinations. Ask for PermoFlux Catalog J-203.

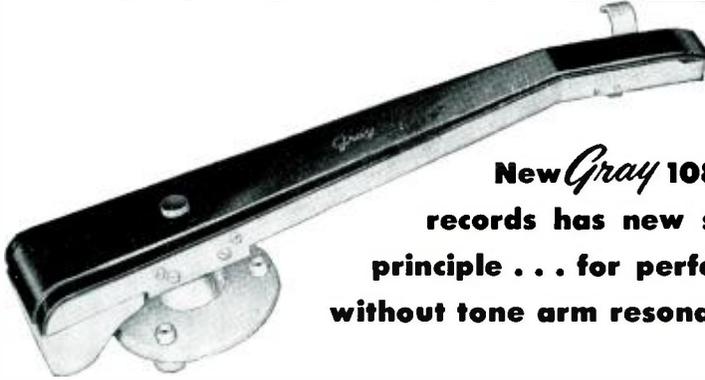
"Sound in Design!... Sound in Price!"

PERMOFLUX CORPORATION

4916-K W. GRAND AVE., CHICAGO 39, ILL.
236 S. VERDUGO RD., GLENDALE 5, CALIF.

Canadian Licensee—Campbell Mfg. Company, Toronto, Canada

VERSATILITY!



New *Gray* 108-B Arm for all records has new suspension principle . . . for perfect tracking without tone arm resonances

Perfect tracking of records and virtual elimination of tone arm resonances are only two advantages of this versatile, specially-designed arm — the finest yet developed! It satisfies every requirement of LP reproduction, permits instant changing from 78 r.p.m. to LP (micro-groove) or

45 r.p.m., and *assures correct stylus pressure automatically*. GE or Pickering magnetic pickup cartridges are interchangeable and slip into place quickly and easily. Maintains perfect contact with bad records, accommodates records up to 16" in diameter.



106-SP Transcription Arm —

Assures fidelity of tone for every speed record. Three cartridge slides furnished enable GE 1-mil, 2½ or 3-mil, or Pickering cartridges to be slipped into position instantly, with no tools or solder. Low vertical inertia, precisely adjustable stylus pressure.



Gray Equalizers —

Used as standard professional equipment by leading broadcast stations, these specially-designed equalizers assure highest tonal quality . . . new record reproduction from old records . . . constant velocity frequency response for conventional or LP records. Uses GE or Pickering cartridges.

Please write for bulletins describing the above equipment.

GRAY RESEARCH

and Development Co., Inc., 16 Arbor St., Hartford 1, Conn.

Division of The GRAY MANUFACTURING COMPANY—Originators of the Gray Telephone Pay Station and the Gray Audograph



Arthur E. Ostman
President

Readers' Forum

Continued from page 9

pickup orchestral tape sounds excellent when played into a 2 or 3-way Lansing or Air-Coupler system, it is immediately evident that additional realism has been added when the tape recorder is run at idling level with the recorder gain at 9 o'clock, letting the McIntosh handle the dynamic range from thundering bass to shimmering cymbals. By using a plug-in preamplifier as suggested, we would be by-passing the unnecessary 6SN7 and 6V6 stages in the recorder with its feedback loop.

F. W. Anderson

Waterfall, Alaska

SIR:

So far the only comments I have to make about the magazine are as follows:

Drop the hyphen in HIGH-FIDELITY, and in audio-ophile.

With respect to record reviews, I would suggest that you expand them considerably, that is, cover more records per issue; minimize comment and annotation of the work itself, information on which is elsewhere available; concentrate on performance and recording quality.

William W. Hartney

Bridgeton, N. J.

SIR:

One of the reasons why I am so interested in your magazine is that I have heard that there are a large number of new record companies in the U. S. which specialize in LP records. Would you have a list of such companies, or can you tell me how to obtain catalogues of their releases?

(Mrs.) Peggy Boyesen

London, England

See listing on page 41 of this issue — *Editor*.

SIR:

I do have one problem and I would appreciate it very much if you could give me some help. I have purchased and have been using in a temporary arrangement the various components commonly employed. However, I would now like to have a cabinet or group of cabinets to house the equipment and to provide for future expansion. Having just moved to Princeton, N. J. from Boston, Mass., I find that I am in a quandary as to where to find a reputable cabinet maker who has had previous experience along these lines either in the N. J. area or in New York City. I would appreciate very much if you know of any such cabinet makers, if you would give me their addresses.

Dr. Leon Lapidus

Princeton, N. J.

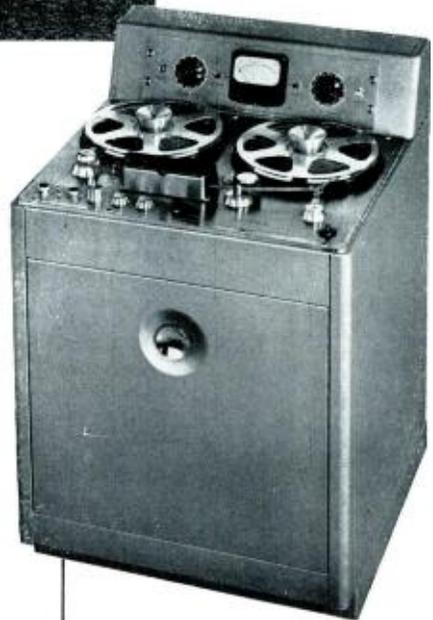
See "Noted With Interest" in this issue. — *Editor*.



For those who
insist on the

*Highest
Fidelity*

Ample proof of the surpassing performance and fidelity of Ampex is evident throughout the world of professional programming. Ampex records with such faithful fidelity and sureness that it has supplanted most other methods for recording broadcast material and for making original masters from which disc records are made. Complete information on request.



*Precision
Performance*

AMPEX *Magnetic Tape Recorders*

STANDARD OF THE GREAT RADIO SHOWS

Ampex Electric Corporation • Redwood City, California



VARIABLE RELUCTANCE CARTRIDGE

**"OUTSELLS ALL OTHER
MAKES COMBINED!"**

Reports **ARNOLD DEUTSCHMANN**
Vice President, **RADIO SHACK Corporation**
Boston, Mass.



MORE customers ask us for G-E than for all other cartridge brands combined. In our business that's an important tip-off because people who come to us usually know exactly what they want in audio performance. They demand that we stock the best. We handle every commercial cartridge—and G-E Variable Reluctance units outsell them all by at least 4 to 1!"

Famous the world over as a "quality" store for audio accessories, Radio Shack on Boston's Washington Street, is typical of finer dealers everywhere in its

support of General Electric parts and components.

Every stylus in every G-E cartridge is double-damped to absorb virtually all mechanical noise. Diamond or synthetic sapphire tips are available for standard or microgroove records.

A Sales Point to Remember—Replace with a G-E stylus and you get the equivalent of a whole new pickup! Here's why:—General Electric's single-package stylus assembly contains stylus, cantilever, and damping blocks—the only parts of your pickup that are affected by time and use. No other cartridge gives you this advantage.



SPEAKER PERFORMANCE THAT SELLS—

and stays sold! Lew Kornfeld and Arnold Deutschmann, Radio Shack experts, agree that G.E.'s 27 sizes of speakers bring quality sound within the range of every taste and budget.

**SEND FOR THIS
NEW BOOKLET!**



General Electric Company, Section 54111
Electronics Park, Syracuse, New York

Yes—send me new booklet with complete information on General Electric diamond styli.

NAME
ADDRESS
CITY STATE

You can put your confidence in—

GENERAL  ELECTRIC

15,000-Cycle FM Broadcasting

Is it true that listeners don't want 15,000-cycle tone quality on FM? Here are some significant facts that many people don't know about, and others have forgotten, together with a report on listeners' opinions of a musical program using original, full-range tape recordings.

BY MILTON B. SLEEPER

TO UNDERSTAND the present status of FM broadcasting, and the possibilities of future improvement, it is necessary, and very interesting, to turn back to 1940, the year the FCC formally recognized FM.

The invention of FM by Major Edwin H. Armstrong was the result of his search for a method of eliminating static. Important as that was, FM listeners back in 1940 were more impressed by its startling quality and realism.

In those days, there was much more live-talent broadcasting than there is now. You may remember that NBC had a strict rule, in those days, against the use of phonograph records. And all the early demonstrations of FM were made with live talent.

Actually, FM provided the first source of high-fidelity music. One of the most impressive programs on the air was the broadcast of the New York Philharmonic concerts on Sunday over Major Armstrong's FM station at Alpine, N. J. They were fed to Alpine over a special telephone line by CBS.

An account of one incident will point out the exceptional quality of those broadcasts. I had tuned in the Philharmonic Orchestra for some friends who had come to visit me. They brought their daughter, age four, to whom radio was nothing more than voices and music made by people who were somewhere else because they were nowhere in sight. When I first turned on my FM receiver, Deems Taylor was speaking. After a moment, the little girl turned to her mother and said: "Mommie, it sounds as if the man is right inside that box!"

That comment, coming from a child, was the most impressive testimonial I have ever heard as to the realism that can be provided by FM. I never did find out why, but not long after that incident, CBS stopped furnishing the Philharmonic concerts to Alpine.

Probably the first formal presentation of FM to a large group of advertising managers and executives occurred at Boston, in October, 1940, when the late John Shepard III and Paul deMars put on a demonstration from Pax-

ton for the local Advertising Club at the Hotel Statler.¹ Today, we hear that advertisers are indifferent to the use of FM broadcasting, but I recall, because I was there, that the members of the Boston Advertising Club applauded the artists who performed for them by FM with more spontaneous enthusiasm that I ever knew such a group to show before or since that occasion.

They didn't identify what they heard as the beginning of high-fidelity reproduction, but that is what it was. They only knew that this was totally different and superior to any radio reception they had ever heard before. In the discussion that followed, there were various comments to the effect that FM had ushered in a new era in broadcasting, when sponsors would increase the effectiveness of their programs and multiply their audiences, because such startling realism opened up new horizons of radio entertainment that would attract a still larger number of listeners.

THAT WAS the status of FM on Dec. 7, 1941, when, without warning, scheduled programs were suddenly interrupted and cancelled so that radio stations could carry the news of the attack on Pearl Harbor, and the rapid succession of events that followed. By April, 1942, manufacture of all home radio sets was stopped by Government order. FM audiences were growing at a furious pace at that time, but they were still numerically small, compared to AM listeners, when the supply of receivers was cut off. So, of necessity, the broadcast stations put aside their plans for the expansion of FM service.

But why didn't the progress of FM pick up at the point where it had been stopped, as soon as the production of radio receivers was resumed? What happened to those

¹Details of this event were published in FM Magazine for December, 1940. Among those who displayed particular enthusiasm over the demonstration were Craig Smith of Gillette, George Chatfield of Lever Bros., E. C. Favorite of Atlantic Refining, Arthur Rogrow of Sears Roebuck, Philip McAtear, vice-president of the Advertising Federation of America, Herbert Claridge of Salada Tea and Ray Ilg, of the National Showmen Bank.



WABF announcer Bob Bigbam, left, has done an excellent job of the commercials for High-Fidelity. He has an effective, low-key style, well suited to FM.

magnificent live-talent programs? How about the 15,000-cycle networks that AT & T said they could furnish? Is it true that, as broadcasters and set manufacturers widely assert, the public today doesn't want high-fidelity reception? Or if people do want the kind of audio quality that characterized FM before the war, why aren't they getting it?

Well, in the years following the war, many things happened to bring about a decided deterioration of audio quality on AM, and to reduce FM to the same low level. In fact, FM was affected so adversely that only during the past two years has it shown definite signs of progress toward recovering its position of preeminence as a high-fidelity service.

In the perspective of time, it now seems clear that, among the many contributing factors, FM was hurt most by 1) the antagonistic attitude of the Federation of Musicians, 2) the CBS report on listener preferences, and 3) the advent of television. That FM has survived these adverse influences is the most definite assurance as to its future progress.

By the way of keeping the record straight, as Major Armstrong would say, it's worth while to look back on the three factors just cited to see just what effect they had on the audio quality of FM broadcasting.

First came the refusal of the musicians' union to participate in programs transmitted on both FM and AM unless they received additional pay. Since, economically, that was out of the question, FM stations were forced to limit their musical programs to the use of records and transcriptions. Later, the union withdrew that refusal but, in the meantime, they had increased their scale of wages by such an amount that many musical shows on the networks were dropped, and in their place came soap operas, disc-jockey shows, crime stories, and mystery dramas. As for the independent stations, both AM and FM, they had to depend on recorded music.

Then came the CBS report that, as determined by exhaustive engineering research, listeners did not want high-fidelity music.² This conclusion was completely contrary

²"Tonal-Range and Sound-Intensity Preferences of Broadcast listeners" by H. A. Chinn and P. Eisenberg, Proc. of the I.R.E., Sept. 1945. This was followed by a further report: "Influence of Reproducing System on Tonal-Range Preferences" by H. A. Chinn and P. Eisenberg, Proc. of the I.R.E., May 1948.

to the reactions of people listening to live-talent FM programs under normal home circumstances. However, the results of the tests were publicized widely. Broadcasters quoted the report to explain their abandonment of good musical programs, and as a reason for not making available the full capabilities of FM.

With nearly three times as many AM stations on the air as before the war, set manufacturers were forced to narrow the pass band of their IF amplifiers, reducing upper-frequency response to as low as 3,500 cycles, in order to limit whistles caused by interstation interference. Under such circumstances, there was no justification for making expensive AM sets, since the difference in audio performance would not justify higher prices. So they were pleased to accept and pass on the word about the public rejection of high-fidelity.

Just when it began to seem that the set manufacturing business would be limited to the production of cheap table models, television got under way. Sets priced up to \$1,000 or more began to sell faster than the factories could turn them out. In time, as competition brought the prices down, the demand increased. FM receivers were forgotten in the stampede to produce TV sets.

Furthermore, the advertising agencies saw a golden opportunity in television. Their revenue is a percentage of what they spend for their clients. If an audio program costs \$5,000 and a television show costs \$20,000, it's easy to see why the agencies are inclined to be so enthusiastic about TV, and indifferent toward attempting to develop the art of audio programming.

SO MUCH for the adverse influences that brought about the deterioration of audio quality on AM broadcasting, and that so severely limited FM. It was an unfortunate situation, but all the cards were not stacked against FM and high-fidelity programs. Far from it!

Actually, many influences were at work to stimulate interest in high-fidelity, and to draw new devotees into this group of enthusiasts. To recall a few: There was Jerry Minter's paper on intermodulation, delivered before the Radio Club of America back in 1945.³ Lincoln Walsh stirred up wide interest in the possibilities of better audio quality by bringing out the Brook amplifier. Then, from England, came the London FFR Records, followed by Columbia's development and promotion of LP recordings. Norman Pickering contributed a pickup that took more from records than had been heard before. Paul Klipsch, answering the criticism that extended treble response alone sounded too shrill, provided an extension of musical bass response. Further audio developments followed fast and furiously.

Meanwhile, parallel progress was being made in another direction. When most of the larger set producers dropped FM to devote their efforts to television, Zenith Radio went into TV, too, but Commander Eugene McDonald took this opportunity to move in as the No. 1 manufacturer of FM receivers. And Zenith's Chicago station WEFM is one of the oldest in the Country.

Back in 1940, Browning Laboratories came out with

what was then a new idea. Instead of making complete receivers, they produced FM tuners to which individual purchasers could add whatever audio amplifiers they preferred. Immediately after the war, Browning added FM-AM tuner designs, promoting their sale aggressively and successfully. Meissner, Radio Craftsmen, and Espy followed suit. Terminals and switches were provided for connecting phonographs.

Interest in high-fidelity reproduction spread most rapidly in areas where there was good FM broadcast service. Naturally, the hi-fi enthusiasts built FM tuners into their systems so that, at least, they could have interference-free reception, and once in a while a live-talent program. In addition, although the AM broadcasters don't seem to know it yet, there are many sections of the Country where there is no primary AM coverage, but an excellent choice of FM programs.

THAT WAS the situation a year ago, when we were making final plans to bring out HIGH-FIDELITY Magazine. Since then, despite the tremendous and fast-spreading interest in hi-fi reproduction that made this publication an immediate success, a great many well-informed individuals in the industry have held forth at great length, in person and by letter, concerning the public rejection of full-range audio quality, as evidenced by the fact that many FM stations are being programmed mostly with well-worn records, and the best are carrying 5,000-cycle network shows.

There was no doubting their sincerity, and I had no evidence to prove they were wrong. Still, looking back over the events of the past two years, it seemed to me that circumstances, rather than the preference of the listeners, were responsible for the present low standards of audio broadcast quality. This subject came up during a staff discussion at a time when it was proposed that we use some spot announcements on a recorded program over WABF New York, as a means of acquainting their audience with HIGH-FIDELITY Magazine. That idea was dropped, however, because our staff was unanimously opposed to program quality inconsistent with the name of the Magazine!

Soon after that decision had been reached, I mentioned it in the course of a discussion with Leon Wortman, of A-V Tape Libraries. He said: "How would you like to put on a show with 15,000-cycle tape, using an Ampex machine and original Mercury tape recordings?" As a result of his suggestion, an arrangement was worked out with David Hall for the use of the tapes, and to have Mr. Hall handle the show on two half-hour periods each week. The Ampex machine was duly installed at WABF, and the program started at the end of September. This, as far as I know, was the first radio show to offer orchestral masterworks of 15,000-cycle tape quality.

Here was our chance to find out whether or not listeners would notice any difference in audio quality and, if they did, whether they would like it or not. For the first month,

we made no point of the high-fidelity feature, except to explain that we were using original 15,000-cycle Mercury tapes. Then our announcements were changed to ask the listeners if they noticed any difference in the quality of this musical series and that of other programs with which they were familiar. The replies expressed a degree of enthusiasm beyond anything we expected. For example:

Robert W. Cushman, Newtown, Pa. — Were I in the movie business, my comment on the broadcast from tape of the Bartok work would be "stupendous". One feature I have noticed in this and in the previous programs involving passages for strings is the fact that I heard the "shimmer" of the strings as bowed in a way I haven't heard since I used to listen to the studio programs from W65H [now WDRC-FM in Hartford, Conn.] in the early forties.

H. L. Hawthorne, Suffern, N. Y. — I wish to congratulate you on the performance last Sunday night of the master tape recording by the Chicago Symphony Orchestra of the *Block Concerto Grosso*. This was indeed a thrilling experience, and I hope there are many more to come.

Charles L. Mudge, Crawford, N. J. — My father and I would like to express our appreciation for the splendid work you are doing in broadcasting 15,000-cycle tape recordings. Please give us all you possibly can of it.

Rebecca A. Merrill, Westport, Conn. — I heard your tape-recorded program last Thursday. There was a striking difference between it and the conventional recorded programs. Will it ever come to pass that there will be more programs like that?

Albert Taxson, Long Island City, N. Y. — If I had not known that it was a tape recording, I would have been positive that I was listening to a live program.

Eric C. Lambert, Jr., no address given — The composi-

The Ampex tape machine used for our WABF shows is as easy to handle as a turntable. David Hall's program notes are also recorded, and added to the Mercury tapes.



⁴This paper, entitled "Audio Distortion in Radio Reception" was reprinted from the Radio Club Proceedings in the March, 1946 issue of FM and TELEVISION.

tion to which I have been listening is not my favorite piece, by far, but I have been listening to the most realistic, most beautiful musical reproduction I have ever heard!

Ben Resnick, New York City — I have never heard anything like it on radio before. Let's have more of it.

Edgar C. Leaycraft, Jr., New York City — Your Mercury master tapes on WABF are spectacular. On my FM set there is no comparison with standard programs.

Martin Heinemann, M.D., New Haven, Conn. — Compared to your programs, the conventional presentation is no more than an unreasonable facsimile. Thanks. Let's have many more of these gems.

Richard Stewart, Larchmont, N. Y. — It truly was a revelation to hear your high-fidelity recording of Bartok's work, even on my Zenith table model receiver.

Hubert Prince, New York City — The hi-fi recordings make all the difference in the world. That music popped right into my living room as if by magic. I guess it is magic — wonderfully alive and vibrant.

P. Hafstein, New York City — The medium of full-fidelity tape is a decided improvement over the generally badly-worn recordings that serve as the core of too many otherwise well-planned programs.

We have reams of similar letters and postcards, and they are still coming in. But these typical quotations confirm my long-standing conviction that the interest in and appreciation of full-range program quality is actually far greater today than it was in 1940. What is lacking now is program material of such quality as to evoke the enthusiastic response represented by those letters. Broadcasters, not listeners, have rejected high-fidelity.

Of course, we have only used the formal music for our WABF programs as has been available through the generous cooperation of Mercury Records. It might be said that full-range quality would not be a factor in plays, where music is incidental. That was not the case in the early days of FM, when I heard several live-talent shows of that kind. Mr. G. A. Briggs, in his article in this issue of HIGH-FIDELITY points out that lack of realism is more noticeable in sound effects than in music. I recall hearing a play on FM in which there was some shooting. The sound of the shots and the reverberation fairly took me off my chair. But with 5,000-cycle quality, a revolver makes a noise like a cap-pistol.

Today, tape offers the simple answer to better quality.

All programs not related to time can be recorded well in advance of the actual date of transmission. That is being done now, in many cases, but the tape shows are being put over 5,000-cycle lines. In point of expense, it would be cheaper to make tape copies and to distribute them by mail, even to a large number of stations. It is not necessary to use telephone lines for distributing such programs. And all the larger stations have tape equipment now.

That would not improve AM, but it would make it possible for all FM stations to furnish the full-range quality that has so impressed the audience on our WABF shows. Even the soap operas and the mystery plays would be made more interesting by the live quality of the voices, and the realism of the sound effects.

More important to many listeners is the improvement possible in musical programs. The relatively few shows that employ live talent could be taped, of course. Think what it would mean, for example, if FM stations could get 15,000-cycle tapes of the current NBC Symphony programs, with Toscanini conducting. Such music could be repeated several times a year. Instead, it is available only once, and then over 5,000-cycle lines!

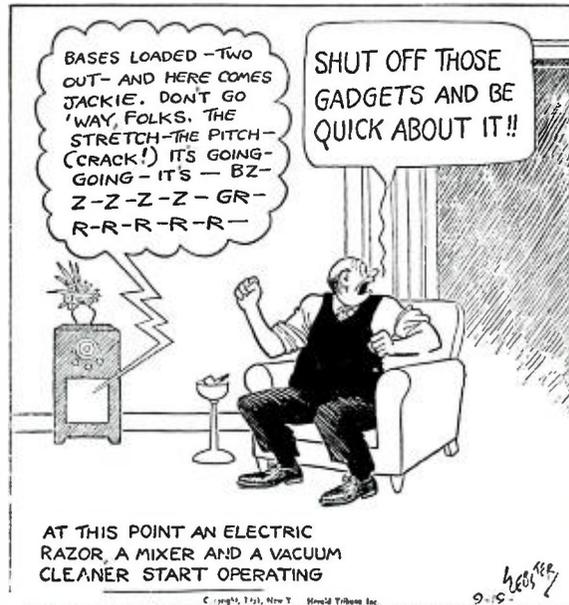
On the other hand, efforts to improve audio quality do not rule out transcriptions and some records. The serious trouble with such music is that the discs are used too many times. Here, again, tape offers a solution, be-

cause it can be run repeatedly without evidencing audible signs of wear. Thus, if a record or transcription is run just once to make a tape, the original quality can be preserved. A few stations are doing that now, but most use their discs until needle scratch competes with the music.

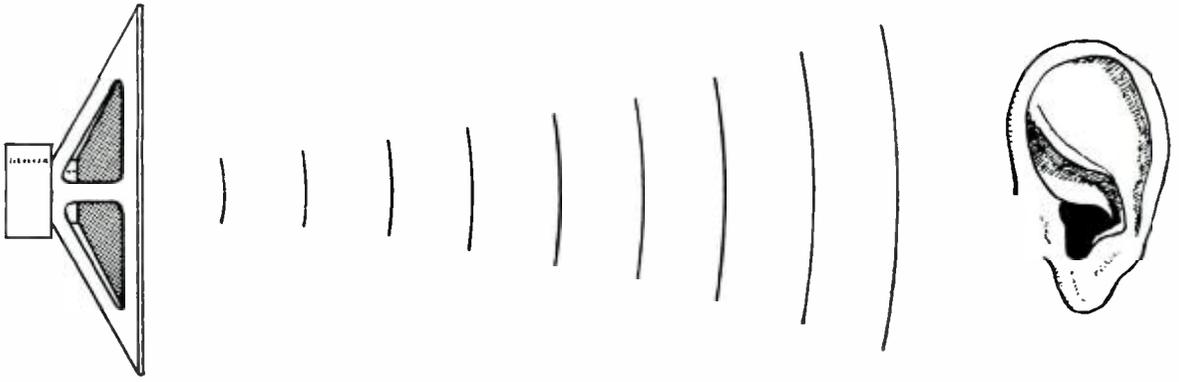
In short, broadcasters have at their command right now the means for furnishing programs of 10,000 to 15,000-cycle quality for immediate use on FM stations affiliated with the networks. Similarly, the independents can improve their audio quality to a considerable degree, and at a small, extra expense that would be covered quickly by attracting added sponsors.

Well, there you have the picture of audio program quality as it was, as it is, and as it can become. But if listeners want full-range programs, they must take a personal interest in the operation of their local stations. They must make their desires known. Broadcasting will only improve to the extent that listeners demand it.

The Unseen Audience : : : : : By WEBSTER



There are times, of course, when freedom from static is more important than tone quality, as indicated in this cartoon published recently in the New York Herald Tribune.



the LOUDSPEAKER and the EAR

by G. A. BRIGGS

This is the first of a series of four articles by the noted authority on loudspeakers and acoustics, G. A. Briggs. Subsequent articles will discuss Room Acoustics, the Loudspeaker, and Loudspeaker Mounting.

I SHOULD like to begin by saying that I was extremely pleased to receive an invitation from the Editor of this journal to make a contribution to its pages, for two main reasons: 1) In the present disturbed and uncertain state of the world, any move, however small and however remote from politics, which tends to bring our two countries into closer contact, is to be warmly welcomed. 2) As a result of the American demand for my books, "Loudspeakers" and "Sound Reproduction", I have received many friendly letters bearing U. S. postmarks, and I appreciate this opportunity to write more directly for American readers.

There is one more personal point that I should like to raise. I am actually a maker of loudspeakers. My activities in this field provide facilities for making tests and experiments which help me in writing on kindred topics; but it will be my endeavor to preserve an impartial attitude toward all types and all makes, so that the principles and ideas which are considered can be applied

to as broad a range of loudspeakers as possible. To that end, the relevant characteristics, such as flux density, cone resonance, and diameter of the units used in the tests will be stated. This neutral line is fairly easy to follow in my case, because my factory is small and is usually fully loaded with orders. And, being on the wrong side of 60, I am not interested in enlarging the works and turning my few remaining hairs even grayer than they are.

The general position in relation to sound reproduction was neatly summed up in the Editorial of the July 1951 issue of *Wireless World* in the following words: "Among the many branches of electricity, electro-acoustics is unique in that it has attracted a large band of fervent devotees. The reasons for this are not far to seek: the quest for perfect reproduction amounts to chasing the unattainable, and so offers a constant stimulus to human instincts. Again, art enters into it quite as much as science. Interest in the subject was never at a higher pitch than at the present time; according to correspondents in the U.S.A., the same applies in that country, where hi-fi tends almost to displace television."

I think that America, Canada, and Great Britain are the countries which show the keenest interest in this question, followed by certain South American countries, South Africa, Australia, and New Zealand. I am not in a position to speak about conditions in Germany, but

other European countries still show a good deal of apathy. During a recent visit to Holland and Belgium I was surprised at the generally low standard of sound reproduction which is still accepted.

NOW it seems to me that there are four variable and uncertain elements in the domestic reproduction of sound. These are:

1. The human ear
2. The listening room
3. The loudspeaker
4. The method of mounting the loudspeaker, for coupling elements 2 and 3 together, to give maximum satisfaction to number 1.

To expect all listeners to agree about items 3 and 4 would be equivalent to converting all the Conservatives and Socialists in this country to Liberalism. (Even this miracle would leave a smattering of Communists). For, although differences of opinion on quality of reproduction are often looked upon as questions of taste, they may be due in fact to differences in what is heard, depending on the personal characteristics of the ears of the individuals concerned. This involves the faculty of tonal discrimination, which is probably most highly developed in recording engineers, who must constantly exercise this faculty by comparing reproduced music with the original.

Strangely enough, musically gifted people do not necessarily shine in the tonal department; I have often noticed that a fine musician may be a poor judge of loudspeaker performance, and I am astonished at the low standard of reproducing equipment which is tolerated in the homes of many famous pianists and other artists. The musician is impelled by instinct and habit to concentrate on the music, and on its interpretation by the performers, whereas these vital qualities must be totally ignored if concentration on quality of reproduction is to be ensured.

The B.B.C. recently ran a series of programmes on "Records I Like", by famous musicians, which confirmed this view. Of those I heard, only one musician made any reference to quality of recording. This was none other than the great Sir Thomas Beecham himself, who played a pre-electric recording of a song and came out with the amazing remark that very little progress had been made in recording the human voice during the last 40 years. Sir Thomas is never dull — he is always lively and entertaining when he speaks — but he surely never said anything funnier than this! The record in question sounded exactly as though the singer was bellowing into a horn, which of course he was. One can only conclude that the pronounced recording resonances in the middle register did not worry Sir Thomas Beecham's ear; his musical genius must be a talent quite distinct from this problem of tonal judgment.

Comparison Of Speakers

When comparing the performance of a variety of loudspeakers, it often happens that different listeners select different types as the best, particularly on music. There

is less confusion when speech and noise effects are reproduced. I have an excellent "bathroom" recording (free from the commercial curse of preemphasis at high frequencies), made by Cecil Watts of Sunbury-on-Thames, giving life-like reproduction of the sound of water running into a wash basin. I generally fall back on this record — figuratively speaking — when I want to convince a visitor that a certain loudspeaker is better than its fellows.

There are two main reasons for the success of such a noise test. The first is that many changes to the harmonic structure and resonance of music are possible without destroying its appeal, whereas similar mutilation of noises often destroys the natural quality, due mainly to the enormous frequency content of the noise. The second is that the distraction of music and its dynamic and aesthetic appeal are removed.

I have more than once been asked why a visitor's opinion as to which is the best reproduction of music should not be as good as mine. How do I know that my tonal judgment is so wonderful? And so on. One reply is that if I really set about¹ a visitor and apply the heat for half an hour and draw attention to such factors as obvious resonances, I can usually bring him round to my way of thinking. But the best reply is that my judgment, while not infallible, is constantly being checked by tests of response range, frequency and intensity of resonances, performance of units under transient impulses, purity of output at low frequencies, and intermodulation products. If, after these tests, my choice of what sounds best did not in a general way agree with what *should* be best, I should naturally have to revise my ideas and suspect my judgment.

How The Human Ear Hears

A brief study of the ear from the physiological aspect would not be out of place here. The best summary I have come across is in the interesting book "Wave Motion and Sound" by R.W.B. Stephens and A. E. Bate,² from which three diagrams have been taken.

The human ear is made up of three compartments, shown diagrammatically in Fig. 1. Sound vibrations pass through the air of the outer ear, through the solid bone of the middle ear, and then through the liquid of the inner ear. The transfer of sound energy, from the ear drum to the oval window through the middle ear, is performed by the lever action of the small bones called *ossicles*, depicted in Fig. 2. The area of the oval window is much smaller than the ear drum, and it is stated by Stephens and Bate that the middle ear acts as a step-up acoustic transformer, the pressure variations of the sound waves being stepped up by 50 or 60 times. At the same time, the low acoustic impedance of the air is matched to the high impedance of the liquid of the inner ear.

The main portion of the inner ear consists of a coiled tube or shell, known as the *cochlea*, represented uncurled and diagrammatically in Fig. 3. Pressure on the oval window passes through the liquid and is relieved by a small

¹For audiophiles who do not speak English. Mr. Briggs means "go to work on."
²Edward Arnold & Co., London, 1950.

gap, the *helicotrema*, and consequent outward pressure of the *round window*. The most interesting item of all the complicated details of the ear is the *basilar membrane*. It is calculated that this membrane contains some 30,000 fibres of varying length and tension, which transmit impulses of frequency and intensity of sound to the brain.

In order to complete this short description of the working of the ear, I must quote from "Theory of Hearing" by E. G. Wever,³ in which the *volley* theory of hearing is put forward as a combination of the *resonance* and *place* theories. According to the *volley* theory, the area of the

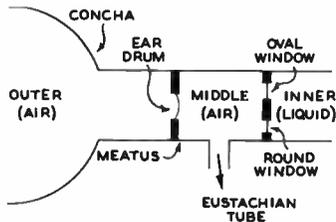


Fig. 1. A simplified sketch of the human ear, showing the three compartments: outer, middle, and inner ear.

basilar membrane and the number of fibres which are used vary according to the frequency involved, as shown in the following table:

TABLE I

FREQUENCY	SPREAD %	DENSITY cells per mm.	SCORE spread x density
30	49.0	116	5,684
100	46.0	173	7,958
200	45.0	787	35,415
500	41.5	1,150	47,725
1,000	31.5	1,225	38,587
3,000	12.0	1,140	13,880
5,000	7.0	1,025	7,175
10,000	4.3	975	4,192
20,000	3.7	179	662

It is interesting to note that the largest number of fibres or cells are brought into play at the middle frequencies where the sensitivity of hearing is well known to be highest, thus accounting for the normal threshold-of-hearing curve.

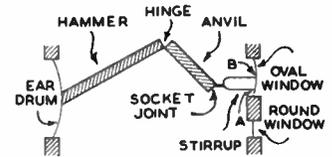
These brief details of the ear are adequate to remove any surprise at the fact that human beings vary enormously in what they actually hear under identical conditions. Indeed, it is surprising that there is so much unanimity that an outstanding voice, such as Gigli's, can achieve world-wide recognition.

Distortion

It is often stated that distortion is produced in the ear at low frequencies by the non-linear lever action of the bones of the middle ear, but I am inclined to think that this statement should be accepted with reserve. It is of course clear that distortion sets in when the intensity of sound is unduly increased; this is obvious where very loud speaker output is used to surmount a high level of background noise in a factory. The ear interprets distortion and suffers accordingly, although the amplifying equipment may be blameless. Such distortion is heaviest

³John Wiley & Sons, Inc., N. Y., 1949.

Fig. 2. Sound energy is transferred from the outer to the inner ear by means of small bones, called ossicles.



at low frequencies where the sound amplitude is greatest.

Paradoxically, it is also stated in some quarters that the ear is not worried by distortion at low frequencies at reasonable levels in reproduced sound.

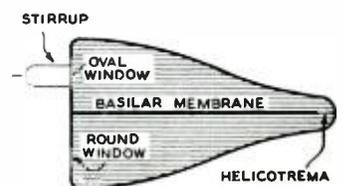
In order to test these ideas, a pure tone, set at 0.5 watt at 500 cycles, was fed into various loudspeakers at frequencies from 250 cycles down to 30 cycles, and a microphone was placed in front of the unit under test. I listened carefully to the sound emerging from the speakers, while my confederate watched the wave form on an oscilloscope, and I had no difficulty in detecting the first signs of distortion — usually frequency doubling and trebling. In other words, what I heard agreed with what the observer saw.

It is interesting to compare the results from different units and cabinets, tested in a room about 15 ft. by 14 ft., with facilities for facing any loudspeaker unit through a hole in the wall into a large, quiet field for free-field conditions. The wave-form of any note was the same whichever way the unit faced, which shows that although an enclosed space makes an enormous difference to the intensity of low notes, it does not affect the actual *quality* from a single-tone source.

It is regretted that the following diagrams, Fig. 4, are not actual photographs because the main oscillograph (with camera attached) started to go up in smoke during the course of the tests, and we were compelled to bring on its understudy (with no camera). My confederate, Mr. E. M. Price, M.Sc.Tech., a Senior Lecturer at Bradford Technical College, has approved the diagrams as presenting a reasonable picture of what happened. It is important to note that there was no trace of distortion or harmonic content in the output from the oscillator at the power and frequencies used; the input to the speakers was a pure sine wave in every case. The point of maximum interest is the frequency at which distortion commenced.

The power of the ear to recognize non-linearity at frequencies below 100 cycles, even at low volume levels, is beyond dispute. It is satisfactory to note at the same time that the loudspeakers which produce the best low-frequency wave forms also sound best when reproducing music which contains the lower frequencies.

Fig. 3. The basilar membrane, shown in the accompanying sketch of the cochlea is estimated to contain some 30,000 fibres of varying length and tension.



Masking

When two tones of different frequency are produced, increasing the power of one of the tones may, at certain frequencies, mask the other tone and render it inaudible. Such masking occurs only where the frequencies are fairly close together — say within a range of two or three octaves — and is most easily produced in the region of 500 to 8,000 cycles, where the sensitivity of hearing is greatest. The masking tone may be higher or lower in pitch than the tone under test, the effect being due to the spread of the action of the masking tone on the basilar membrane.

A test with two loudspeakers and two audio frequency oscillators gave the results shown in Table II. In each case, the speaker under test was fed with 0.5 watt from the oscillator. It was found necessary to use the full output of 6 watts from the second oscillator before any total masking effects could be produced. No attempt was made to increase the power of the masking tone above 6 watts, because we are concerned here only with what happens to the ear under normal conditions, and 6 watts with units of reasonable efficiency is too loud to be comfortable.

TABLE II: Test for Masking

SPEAKER NO. 1	10,000 cycles at 0.5 watt	masked by	SPEAKER NO. 2	3,000 cycles
5,000	" "	" "	" "	2,500
2,000	" "	" "	" "	1,100
1,000	" "	" "	" "	700
1,000	" "	" "	" "	1,200
500	" "	" "	" "	600

The masking tone was started at a remote frequency, and was made to approach the frequency under test until the latter became inaudible. It was very difficult to make reliable tests, because all sorts of beat effects, difference tones at lower frequency, and summation tones at higher frequency were produced, and these often persisted after the tone under test was actually inaudible. In such cases, it was assumed that complete masking in the ear had not been effected.

No doubt masking effects in music are of sufficient importance to account for the difference in the tone of a musical instrument played solo compared with the same instrument heard in an orchestra, but I think the effects may be safely ignored so far as domestic loudspeakers are concerned. Unfortunately, it has often been stated by people who ought to have known better — including yours truly — that high notes are masked by very low ones, thus accounting for the excess of bass and lack of "top" which is sometimes noticed when reflex loading is applied to a single loudspeaker. Any such lack of balance is not due to masking. It is, I suppose, simply due to lack of balance.

Interference

The effect of interference is rather different. According to Wever in "Theory of Hearing", it is due to electrical activity of the cochlea, rather than overlap in the basilar membrane, and produces a reduction in the magnitude of

one tone on the presentation of another. Interference occurs between any pairs of tones at any frequency, but is again most pronounced for tones to which the ear is most sensitive, so far as the frequency of the interfering tone is concerned. Very loud sounds are required to produce noticeable interference by listening tests; volume levels of 5 or 6 watts from the oscillator have no serious effect on other low-level tones.

The interference caused by background noise is of course a common experience. Percussion sounds, such as clicking or hammering, have a much stronger interference value than steady tones. Few people can listen to music with equanimity if accompanied by constant banging, even when the sound level of the noise is below the sound level of the music. On the other hand, this phenomenon accounts for the clarity of the piano against quite a large orchestral background, which in turn accounts in no small degree for the enormous popularity of the piano concerto.

Another interesting aspect of interference is that uneven frequency levels are almost as objectionable as sudden changes in intensity. Factory noise often comprises severe frequency changes as well as peaks of intensity, which make the satisfactory reproduction of speech and music much more difficult than would be the case with steadier conditions. In other words, the nature of the noise may be quite as important as the over-all volume level. To return home, the same problem applies to surface noise from records, where pronounced resonances in pickups and loudspeakers often intensify the annoyance, and the pop-gun effects of some early LP records loomed up as a serious threat to the survival of the system.

In order to check the actual masking effect of needle scratch, a test was made by playing the centre groove of a worn 78-rpm. record through a wide-range, two-speaker system. It was found necessary to increase the volume to a room level of 78 db. above the threshold of hearing, according to the noise meter used. This level cannot be guaranteed as an absolute statement of fact, but it is about equal to the volume of sound produced by playing a piano *ff*. When heard in the form of needle scratch, it is a lot of noise and, in this case, was sufficient to drive my secretary headlong out of the room, after she had withstood the pure-tone masking tests previously described. Another loudspeaker was then connected to an oscillator, and could be clearly heard at all frequencies above 60 cycles up to 10,000 cycles with an input of no more than 0.5 volt into 15 ohms (only about .02 watt). At 50 cycles, the speaker became inaudible with this input. Although rather astonishing, these results do little more than confirm that masking and interference effects at domestic power levels are of small consequence. (I would hardly advocate this amount of needle scratch as a cure for 50-cycle⁴ hum).

Surface noise is also intensified by cabinet resonance. A simple but illuminating test is easily made with the help of an ordinary electric kettle. When water reaches a temperature at which singing is heard, place the kettle first on the carpet, then directly on the floor boards, and

⁴50-cycle AC is used in England, instead of the U. S. 60-cycle standard.

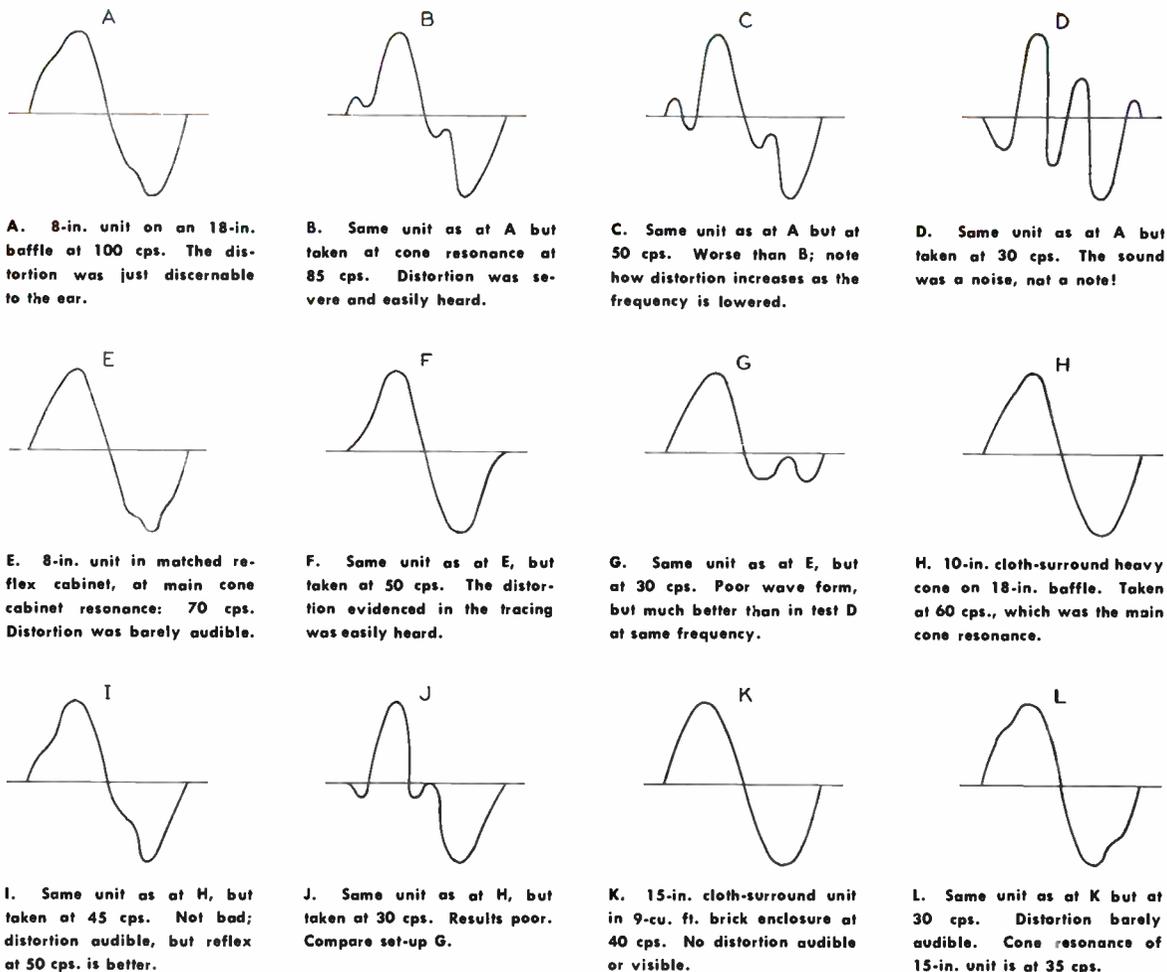


Fig. 4. Oscilloscope tracings showing output wave from various combinations of speakers and enclosures at low frequencies.

then on a hollow wooden cabinet or table, and observe how the intensity of the sound, especially at the lower frequencies, is amplified by resonance. The singing of the kettle is somewhat similar in frequency content to needle scratch, although the latter contains more of the lows. The main point is that these random noises consist of an infinite number of frequencies which are sure to find the fundamental or harmonics of the natural resonances of surfaces which they excite. The acoustic coupling is very strong in the case of the kettle, as there is actual mechanical contact, but it should be remembered that surface noise from records is only troublesome during soft passages of music, where even the slightest increase caused by resonance is objectionable. The effect of cabinet resonance on the reproduction of speech or music is of course much more pronounced.

Conclusion

The importance of the vagaries of the human ear has long been recognized in connection with high fidelity. In

fact, it is an old dodge of a certain British loudspeaker maker to condemn all his competitors as being owners of cloth or tin ears. Such descriptions of the ear get us nowhere, and I feel that the time has arrived when it should be possible to assess the value of the interpretation which the individual places on the sounds he hears, in addition to the existing tests of ear efficiency by audiometer.

I also think that regular concert-going is a necessary part of the equipment of any sound enthusiast or engineer. How else shall he know what is good? I am still regularly shocked by the difference between music at first hand and the same at one remove. Much of what we hear today from gramophone records is at two or three removes. For instance, recorded music goes from a concert stage through a microphone, through a tape recorder, to a disc, through a pickup, and finally through a loudspeaker before it can be heard in the home . . . and then it goes through the ear.

NOTE: This is the first of a series of articles by Mr. Briggs. The second, on room acoustics, will appear in the next issue of HIGH-FIDELITY.

Prescription for better bass:

THE AIR-COUPLER

By CHARLES FOWLER

IN THE first issue of HIGH-FIDELITY, the article "How To Achieve Full Bass Response" told about a method of speaker mounting which provided a remarkable improvement in the reproduction of low frequencies — simply, and at relatively low cost. The article created wide interest, and many requests for further information.

In this article, we shall provide additional details about the device used for bass reproduction: a speaker cabinet which we call an Air-Coupler. In addition, we shall report on a series of recently completed experiments which have brought about a substantial improvement in the powerful bass reproduction already made possible by the Air-Coupler. Complete *technical* details on the experiments are given in RADIO COMMUNICATION Magazine, beginning in the October 1951 issue. The articles are replete with charts, graphs, frequency response curves, and other impedimenta¹.

In HIGH-FIDELITY, we shall discuss the Air-Coupler without getting involved in technicalities which, to be entirely honest, relatively few people understand anyway! The system *works*, as a very large number of people have proven to their own entire satisfaction. Let's not, therefore, examine too closely into *why* the system works; far better technical minds than the author's have pondered the question at considerable length, only to conclude that, in theory, it cannot produce the results that are obtained in practice!

As a specific and amusing instance of such scientific confuddlement, we recall the visit to our workshop of an engineer representing a company which manufactures a particularly well-known loudspeaker, which we shall call "XY". We were using a 12-in. XY speaker in the Air-Coupler at the time, and demonstrated to our visitor the wonderful, floor-shaking response we were getting at 20 cycles. This engineer insisted that we could not be using the XY speaker, because 12-in. XY units could not reproduce 20 cycles!

What is the Air-Coupler?

As has been discussed in previous articles in HIGH-FIDELITY, one of the great problems in the reproduction of low frequency sounds — bass notes — is that of coupling a large body of air to the cone of the loudspeaker. The device under discussion performs that function in an effective if somewhat unorthodox fashion. The Air-Coupler is a low frequency reproducing unit which utilizes any good 12-in. speaker, and which can be used with any good amplifier. It improves bass reproduction greatly when added to an existing amplifier and system of speakers. It is neither complicated nor expensive.

As can be seen from Fig. 1, the Air-Coupler is a long, rectangular box whose inside dimensions are 70½ by 14½ by 4½ ins. The speaker is mounted on the back panel, and faces *into* the box. The front of the Air-Coupler is totally enclosed except for a port or opening.

¹For those to whom such things are a delight, copies are available at 35 cents each from Radiocom, Inc., Great Barrington, Mass.

The Air-Coupler is usually fabricated from $\frac{3}{4}$ -in. plywood, but it can also be made from other, thicker woods. Because the speaker tends to make the whole enclosure vibrate at low frequencies, the joints should be tightly glued and screwed together.

The Air-Coupler can be disposed of in any number of ways so long as it is heavily weighted or well anchored to the floor or wall. From the interior decorating point of view, one of its big advantages is that the small port is the only necessary opening into the room. For people who do not mind cutting a hole $14\frac{1}{2}$ by 5 ins. in the floor, preferably near a wall, the Air-Coupler can be mounted under the floor as in Fig. 2. Since floor joists are customarily spaced 16 ins. on center, a net inside space is available of 14 to $14\frac{1}{2}$ ins. This corresponds to the inside width dimension of the standard Air-Coupler. Therefore, the back panel, on which the speaker is mounted, can be cut to slip between the joists, and screwed to a 1 by 2-in. strip attached to the inside edges of each joist.

The Air-Coupler can be mounted between studs in a room wall, in a closet, or in the ceiling. In all these arrangements, the low-frequency speaker and its enclosure are completely out of sight.

If, as is often the case, structural changes to the house are not possible, the Air-Coupler can be laid on its 6-in. side so that there are 2 to 5 ins. clearance from the back of the speaker to the room wall. It can then be covered with a heavy board, and used as a magazine and book shelf, or the board can be covered with cushions and used as a bench or seat.

Further thought will suggest other ways of disposing of the Air-Coupler. The only important points are that it must be firmly anchored, and the port must face into the room, though its exact location in the room is of little importance.

From the decorating point of view, an indirect advantage of the Air-Coupler is that the remainder of the speaker system can be housed in almost any cabinet. It is customary to think that a good loudspeaker system requires a large enclosure. This is quite true — but only insofar as the reproduction of low frequencies is concerned. With an Air-Coupler, the frequencies below 350 cycles are fed into the speaker on the Air-Coupler. Only frequencies above this point are carried by the rest of the

Fig. 2. Dimensions of the Air-Coupler are such that it can be mounted between floor joists. It may be necessary to mount the cover between the beams, so as to make the inside depth of the Air-Coupler not more than $4\frac{1}{2}$ ins.

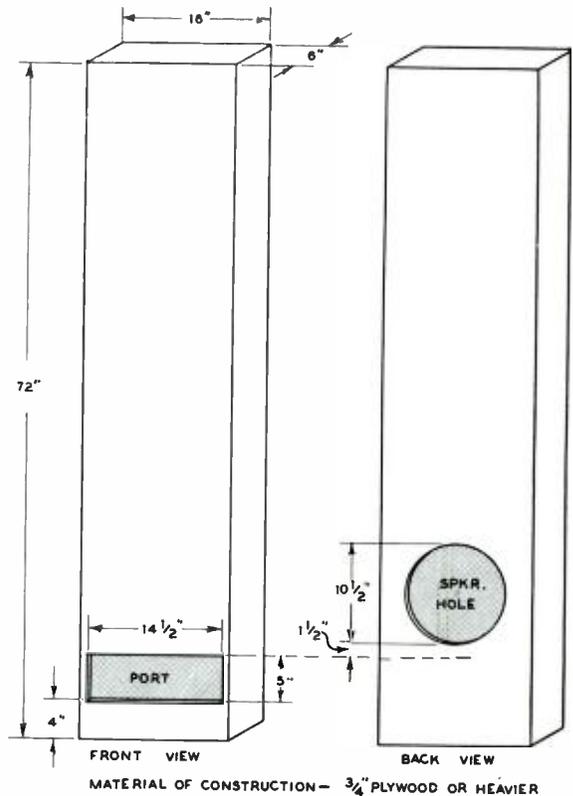
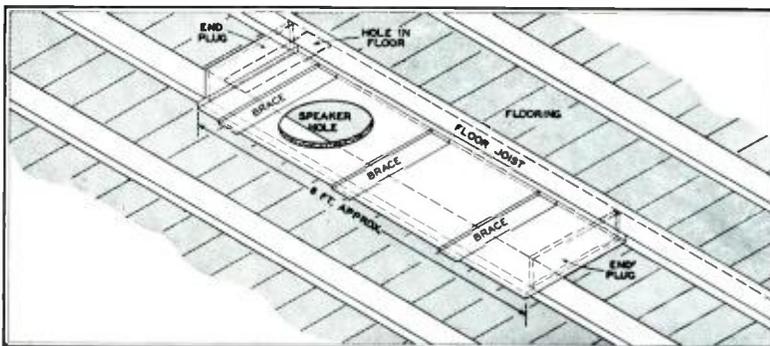


Fig. 1. The original Air-Coupler was a long, rectangular box.

speakers in the system. Since it is a general rule of thumb that baffle or enclosure size is not important above 250 cycles, even a 15-in. coaxial speaker can be tucked away in a 3-cu. ft. enclosure.

What Other Equipment Is Necessary?

It was stated above that frequencies below 350 cycles were fed to the speaker on the Air-Coupler, and that those above were handled by the other speakers in the system. To divide the frequency spectrum into these two sections, a crossover, or dividing, network must be used. This is the only equipment, other than a speaker and the wood for the Air-Coupler, required for a complete installation.

Easily assembled components for dividing networks operating at 350 cycles are available commercially, and at reasonable cost. Only two coils or inductances, and two capacitors are required. The coils can be designed and wound by the home experimenter, if desired. Complete details on their construction were given in the December

1950 issue of RADIO COMMUNICATION.²

It should be pointed out that dividing networks can be designed to operate at any desired frequency. It has been found that best results are obtained with the standard Air-Coupler if a crossover frequency of 350 cycles is used.

Experimental Work With Air-Couplers

So much for the background of the Air-Coupler design. Built exactly according to instructions, and combined with a middle-range speaker and tweeter, or with a coaxial speaker and connected to the amplifier through the proper dividing network, the Air-Coupler will provide an astonishing improvement in bass reproduction. Any professional carpenter or moderately skilled hobbyist can construct the case. The rest of the assembly is simplicity itself.

On the other hand, those who are experimentally inclined can have many hours of audio fun working with the basic Air-Coupler idea. Fundamentally, it draws upon three different principles of loudspeaker enclosure design: air column, Helmholtz resonator, and acoustic labyrinth. Each of these basic principles has been thoroughly explored from the theoretical viewpoint. But when the three are combined into a single unit, it requires an analog computer to determine in advance, what result may be expected. Hence, the practical way to make progress with the Air-Coupler is by guess and by gosh. This means that the non-technical hobbyist is just as likely to make a radical improvement as the man with fourteen academic degrees after his name.

Since the original series of articles on the Air-Coupler started in the October 1950 issue of RADIO COMMUNICATION, hundreds and hundreds of people have worked with it. Some have followed the basic design to the letter, and secured results which they usually described by "never heard anything like it". Others have gone far afield. O. C. Hoggren, in Chicago, has managed to fold the Air-Coupler so that it is more compact; he is one of the few to develop a successful folded design. L. C. Gallagher, in Dallas, has a 14-ft. Air-Coupler in his floor. And so it goes.

Our group at HIGH-FIDELITY and RADIO COMMUNICATION has continued to experiment. Milton Sleeper, our publisher, started the first wheels turning, a long time back, and then withdrew from the battle to devote his attention to other matters. Roy Allison was most instrumental in the early work, and was just about to get his slide rule going again when the Navy remembered him from days gone by. Apparently, the Navy tired of hearing about Air-Couplers, for they released him last August. Now, as Editor of RADIO COMMUNICATION, his return to the fold will be felt by all Air-Coupler enthusiasts when they begin reading the series of articles in his publication, describing the changes that have been wrought in the basic Air-Coupler construction.

During Allison's absence, the writer continued his experimental efforts, using an approach quite unorthodox from the engineering point of view. An examination of the original design reveals that the sound from the back of the speaker is "wasted". In a floor or wall installation, it is totally lost. It seemed logical to try to utilize this sound by bringing it around to the front, where it could reinforce the sound from the Air-Coupler port. A reflex coupler, Fig. 3, was designed and promptly named, because of its bulk, the "telephone booth". Results were quite astonishing; the sound certainly poured forth in a way not previously experienced. This design was described in the May 1951 issue of RADIO COMMUNICATION, as an experimental model. Allison promptly advised us that it wouldn't work, since the radiation from the back of the speaker would cancel that from the front. This may be true in theory, and it may be true at one or two specific frequencies, but the overall effect was fantastic. Pedal notes on organ records such as the Bach *Tocatta and Fugue in D Minor* shook the entire room.

The next undertaking was to reduce the telephone booth to reasonable size by designing a corner enclosure.

At that point, Alan Macy entered the picture as an enthusiastic, spare-time worker, and Allison returned from the Navy. A major redesign job was undertaken and this time, the technical approach was followed throughout. Thus Allison read the orders of the day, Macy and the writer did the carpentry and generally provided background noise.

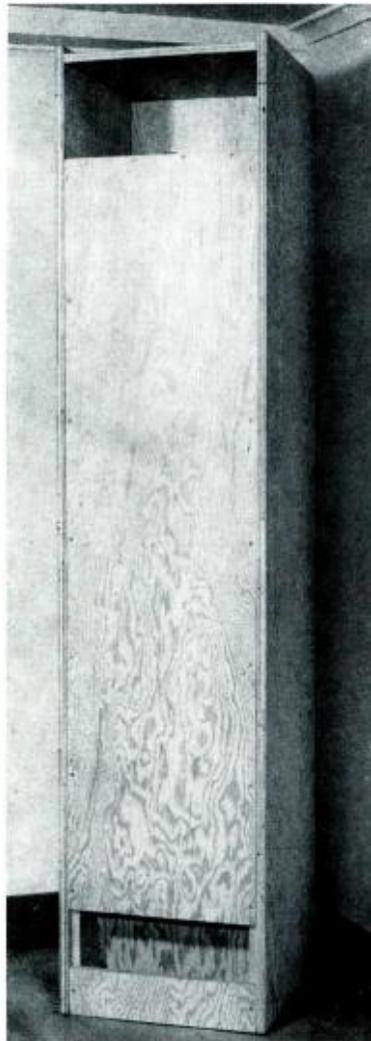


Fig. 3. A reflex enclosure for the Air-Coupler

²Reprints are available at 10 cents each.

Equipment Used for Tests

A large amount of measuring equipment was brought together for the tests. The photograph, Fig. 4, shows it assembled in one corner of our library-workshop. In essence, the test set-up was this: a Sylvania audio oscillator provided pure sound from 20 cycles on up to 20,000. This was fed into a Williamson-type amplifier, previously found to have the necessary flatness of response in the range under examination. The output of the Williamson was connected to whatever speaker was being tested.

It is quite simple to measure the impedance of a speaker voice coil over a range of frequencies, and it is often assumed that actual frequency response follows the impedance curve. However, it has been shown that there is not necessarily any continuous correlation between the impedance of the voice coil and sound power output of a speaker and its enclosure. Hence, we approximated, as closely as possible, the test set-up used by speaker manufacturers and acoustic laboratories.

The actual sound output of various experimental Air-Couplers was picked up by an Altec 21-B microphone (used because of its exceptionally flat response even at

room acoustics. For the first frequency run, we had the microphone set up 5 ft. away from the "telephone booth". At several frequencies in the 20 to 200 range, the meter indicated almost no sound. Yet, at those same frequencies, we could very definitely hear sound and lots of it! If the microphone were moved to a different position, the frequencies at which there was "no sound" would change.

This phenomenon can bring the most careful work of a design engineer to naught. Even if every link in the chain of audio reproduction could be made absolutely perfect — flat sound source, flat amplifier, and flat speaker and enclosure — still, the frequency response heard at any given spot would *not* be flat. The frequencies at which sharp peaks and valleys occur will change drastically, depending on the microphone location in the room, the shape and size of the room, the number and position of its furnishings, and the degree to which the walls are covered with drapes and other sound-deadening or deflecting materials.

This is not the time to go into a study of room acoustics. That subject will be dealt with in future issues of HIGH-FIDELITY (in the next issue, for that matter, by no less an authority than G. A. Briggs), but the point is

Fig. 4. Equipment used to test frequency response of experimental Air-Couplers included a Sylvania audio oscillator which was fed into the Williamson-type amplifier, directly above it in the illustration. Power supply for the Altec 21-B microphone is shown to the right of the Williamson. The microphone (moved near the equipment for photographic reasons) was connected to a Pickering preamplifier, which was modified to remove bass compensation circuits. This, in turn, was fed into the McIntosh 50-W-2, at right on desk. Output of the 50-W-2 was measured on the Hickok V'TVM.



very low frequencies), amplified by a McIntosh 50-watt amplifier, the output of which was read from the Hickok vacuum tube voltmeter. Frequency runs were made on each piece of equipment separately so that compensation could be made for even slight deviation from flatness.

Room Acoustics

For our first test, we set up the microphone and other equipment right in the workshop, and began taking readings over a frequency range from 20 to 200 cycles. Here we ran into a phenomenon which causes engineers who design equipment for home use to turn grey prematurely:

brought out here to emphasize once again the importance of adapting and adjusting a high fidelity system to the conditions under which it will be used.

For our tests, room acoustics forced us outdoors, to operate under "free field" conditions. Literally, we took all the equipment to a location where there were no nearby buildings or other objects which would reflect the sound from the speaker back to the microphone. Dozens of Air-Couplers were built, tested, torn down, rebuilt, and retested. Allison gave off with the theories, and the two carpenters struggled furiously to keep up. At one point, theory got so far ahead of human frailty that though the meter reading was splendid, no sound could be heard!

At another point, the carpenters got ahead of the design engineer, and Allison was hard put to it to come up with theories which would account for the various results achieved. A port size would be changed, "just to see what happens". "Such and such will happen", Allison would say. If it didn't, he would think fast and decide, "Well, that was based on the assumption that the results would follow the behavior pattern of an air column. If you had given me time to think, I would have realized it would follow a Helmholtz resonator pattern, which, of course, accounts for the results achieved". Then the carpenters would make some more background noise, and the tests would proceed.

The Final Design

One day, when rainy weather necessitated a postponement of our outdoor tests, Allison got all his theories going at once and developed the design shown in Fig. 5. The overall size of the Air-Coupler was not changed, but partitions were to be placed inside the unit in such a way as to produce two tubes or air columns, one 7 ft., the other 9 ft. long. Thus, instead of a single 6-ft. air column with a resonant peak at approximately 46 cycles, the new design called for two air columns which would resonate at 30 and at 40 cycles. The result should be smoother response at very low frequencies, and added sound power output at these frequencies.

Subsequent tests confirmed Allison's hopes in every detail. Overall response in the range from 20 to 200 cycles was considerably improved. Response was flatter and cleaner. Screwing the front and back panels to the internal partitions strengthened the Air-Coupler and reduced the possibility of panel resonance. Low frequency response between 20 and 40 cycles was improved.

Total sound power output on orchestral selections seemed to be greater, though actually it was slightly less. The apparent increase was due to the fact resonant peaks were flattened, thus producing better balance throughout the frequency range of the Air-Coupler.

The dimensions of the outside case, as given in Fig. 5, are the same as for the original design. The change lies only in the addition of the partitions which form the two air columns. Readers who have Air-Couplers can add the partitions very simply. Others are urged to follow the new design from the beginning. The Duplex Air-Coupler, as we named it, can be installed in exactly the same locations (floor, wall, ceiling, closet

door, or on its narrow side as a bench or magazine shelf) as the original design.

Corner-Mounted Air-Coupler

It still seemed logical to try to use the sound from the back of the speaker to reinforce that from the front. With the old Air-Coupler mounted in the "telephone booth", a marked improvement in total sound power output had been achieved. It was logical to hope, at least, that the same result could be secured with the Duplex. However, since we wanted also to redesign the telephone booth into a more compact corner-type enclosure, we started our experiments with this design in mind.

It is obviously more complicated to design such a structure, because cancellations can occur between the sound from the main opening and that from the reflex port. Furthermore, a whole series of new enclosure characteristics must be taken into consideration. Another air column is involved; so is another Helmholtz resonator.

Once again, the problem was approached from a try-it-and-see viewpoint. Corner-mounted Air-Couplers were built, tested, redesigned and re-tested. The design which has produced the best result so far is shown in Figs. 6, 7, and 9. The photographs in Figs. 6 and 7 are of the test model. The internal structure of the Duplex Air-Coupler is clearly visible in Fig. 6; the overall front appearance is shown in Fig. 7. The type of construction shown in these two illustrations is adequate for experimental purposes, but it should not be followed in a final set-up, because it is impossible to keep the three front panels, as shown in Fig. 7, from loosening up after a few hours of use.

Therefore, the construction method shown in Figs. 8 or 9 should be followed: a Duplex Air-Coupler should be built and then screwed and glued to a large front panel, 35 $\frac{3}{4}$ ins. wide and at least 78 ins. high. This panel can then be attached directly to the walls of a room, as in Fig. 8, or two back panels constructed and the front panel attached to them, as in Fig. 9.

All tests of this type of design indicated that total sound power output was greater than with the Duplex Air-Coupler by itself, but the frequency response curve was not as smooth. However, (and Allison was chided

about this!) efforts to achieve a smooth frequency response curve can reach a *reductio ad absurdum*: a point where frequency response is perfect, but there isn't any sound! The final design represents a compromise between flatness and sound power output.

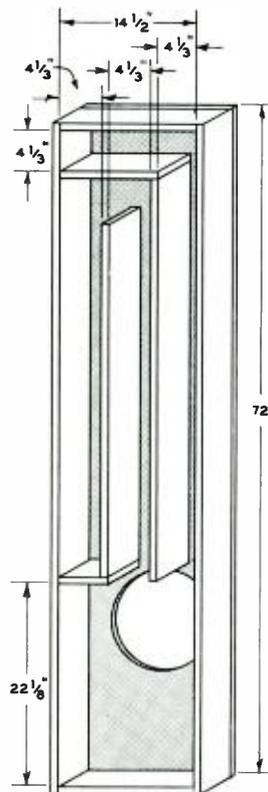


Fig. 5. The drawing shows the dimensions and arrangement of inside partitions added to the standard Air-Coupler.

Reducing the size of the reflex port to 3 ins. will improve flatness but cut down total sound level; increasing the port size to 9 ins. will improve sound power output noticeably, but exaggerate the peaks and valleys in the frequency response curve.

Construction of a Free-Standing Enclosure

The design shown in Fig. 9 should be followed if a free-standing corner enclosure is desired. The unit is completely enclosed by the two back panels, so it can be moved around and put in any convenient corner.

If a permanent installation is possible, the two back panels can be omitted. The front panel is then attached very firmly to two walls which form one corner of a room. Note that it will be necessary to notch out the lower corners of the front panel to fit snugly over the baseboards. A triangular piece of plywood or heavy board is fitted to close the top of the unit, between the front panel and the walls. The bottom of this board should be exactly 78 ins. from the floor, so that the correct reflex port size is maintained. However, the *total* height of the front panel is immaterial so long as the minimum dimension of 78 ins. is maintained. Thus, the entire corner of a room, from floor to ceiling, can be closed in, and the front panel papered or painted to match the rest of the room.

Conclusion

There are now four Air-Coupler designs: the original 6-ft. unit, the *Duplex* 6-ft. Air-Coupler, the "telephone booth", and the *Triplex* corner arrangement. A fair comparison of the four versions is difficult to make. A *visual* comparison — that of the meter and the frequency response chart — shows that the Duplex 6-ft. Air-Coupler, installed in the floor, wall, or ceiling, will produce the best balanced bass, but not the greatest volume of sound. Beyond this, no flat-footed statement can be made, because other comparisons must be made on an *aural* basis. And there may be a considerable difference between what a meter shows when a speaker-and-enclosure is tested in an open field by near-perfect equipment with pure sound — and what a *human* ear hears when the same speaker-and-enclosure is tested on symphonic music (far from *pure* sound!) reproduced from an *im*-perfect phonograph record on *average* equipment in a room which, acoustically, is probably poorly designed. In other words, *it is to be expected* that the visual and the aural comparison will correlate. But, it does not always happen that way.

The consensus of those who have heard various versions of the Air-Coupler in the author's workshop-library (a room roughly 15 by 15 ft. in size) is this:

Best all around results, and best balance between smooth

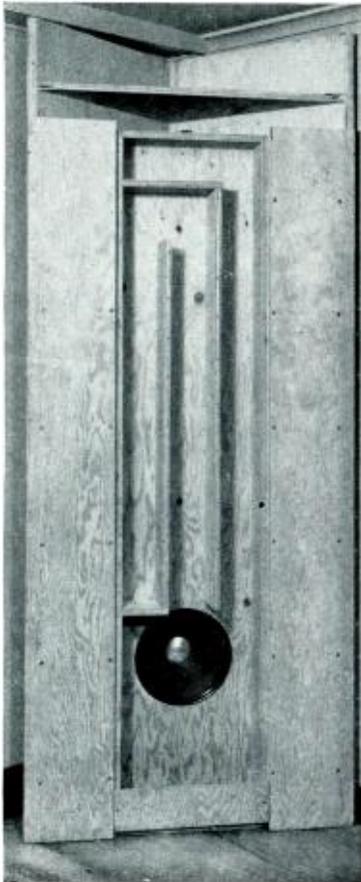


Fig. 6. Left: By mounting the new Duplex Air-Coupler in a corner enclosure, sound power output was improved considerably. For experimental purposes, two 9-in. panels were attached to each side of the Air-Coupler. In the photograph, the 16-in. front panel of the Coupler has been removed to show the internal construction.

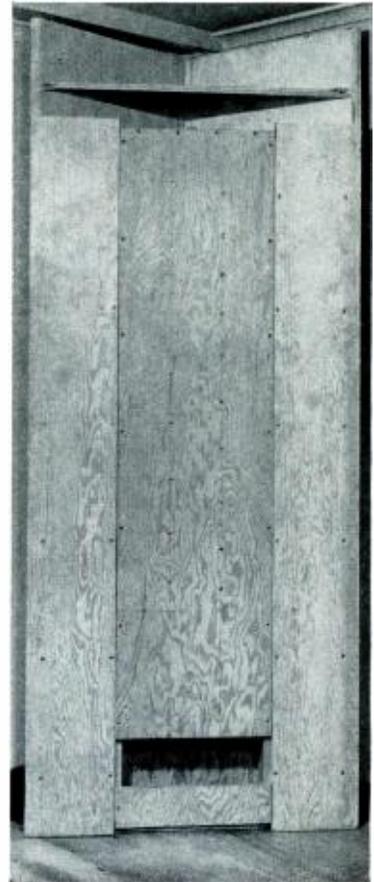


Fig. 7. Right: Experimental corner Air-Coupler with all panels in place. For final construction, a solid piece of wood should be used instead of the 3-panel construction shown here. In this way, not only neater appearance but more solid construction is achieved. In the experimental model shown here, the two back panels are 84 ins. long, to permit adjustment of reflex port size.

frequency response and sound power output, will be achieved by installing the Duplex Air-Coupler in the floor, wall, or ceiling. The original 6-ft. unit, installed in a similar location, will give greater sound power output from 40 cycles up. On an occasional orchestral selection, one with single notes at very low frequencies, the hills and valleys in its frequency response curve may be noticeable. In 98 cases out of 100, the *overall* results will be called extraordinary.

Similarly, the Duplex Air-Coupler in a corner enclosure will give greater sound power output than a floor-mounted Duplex, provided the reflex port is kept around 6 ins. in height. For optimum sound power output, still as judged by the ear and not by the meter, the telephone booth in conjunction with the original Air-Coupler is the answer. However, this design is likely to give an overpowering bass, so strong and dominant that steps must be taken to cut it down to proper balance with the rest of the frequency spectrum.

However, as was stated at the beginning of this article, the last word on Air-Coupler design is yet to be written. For the experimentally inclined, any number of modifications can be tested. It is sincerely hoped that readers working with the Air-Coupler will report their results to the author. These will be published in future issues of HIGH-FIDELITY for the benefit of all who have, or plan to have, Air-Couplers.

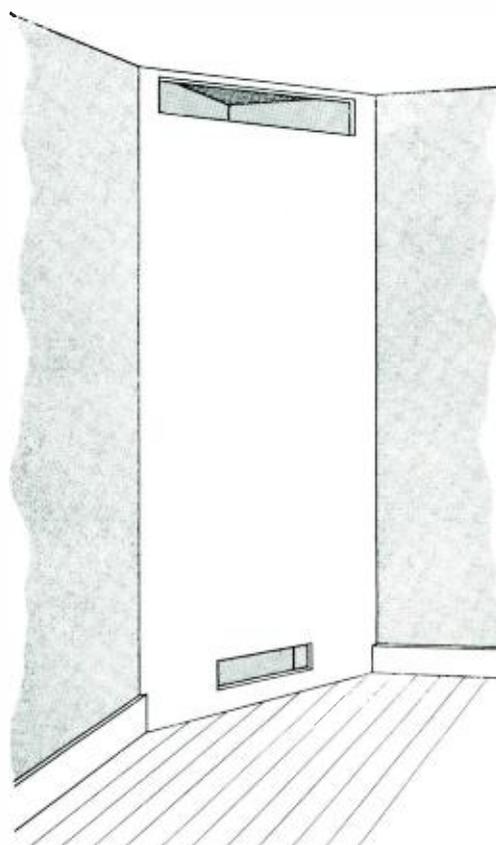


Fig. 8. Above: The front panel of the Triplex Air-Coupler can be mounted in the corner of a room. The two back panels can be omitted, as can the triangular piece which forms the bottom. The front panel can be extended to ceiling height if desired, then papered or painted to match the rest of the room.

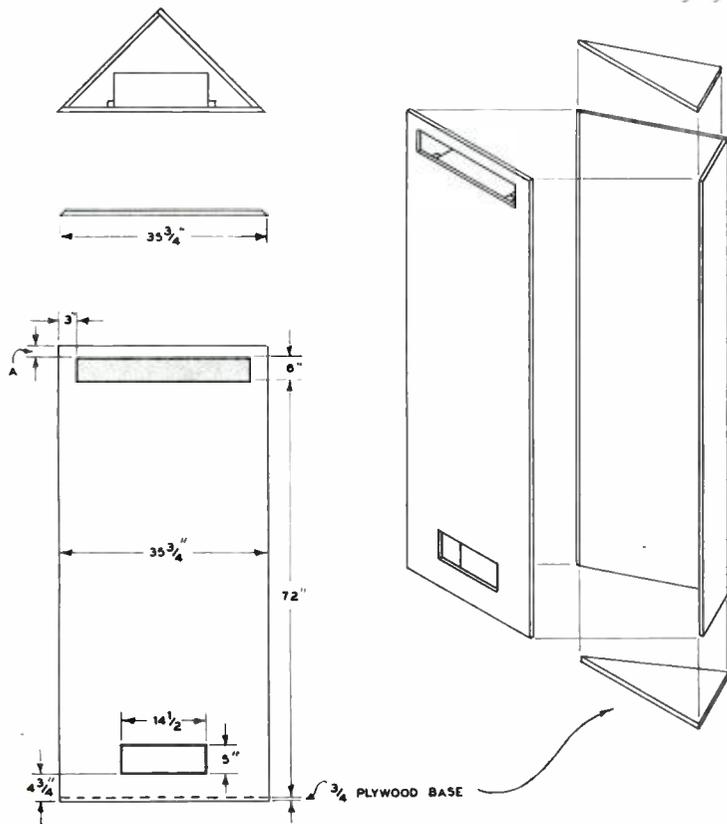


Fig. 9. Left: Complete measurements for the construction of a free-standing corner Air-Coupler. Wood at least $\frac{3}{4}$ in. thick should be used, and all joints should be securely screwed and glued together. Dimension "A" should be at least two inches, and can be made large enough so the front panel reaches to the ceiling.

FM Stations in the U.S.

This list of FM broadcast stations has been compiled from latest FCC records. We would sincerely appreciate reports from readers on those stations in their area which are programming worthwhile music hours.

Stations are listed alphabetically by cities and states.
An asterisk after name of city indicates that station is non-commercial educational.
Second column is frequency.
Third column is effective radiated power in kw.
Asterisk before call letters indicates construction permit.

ARIZONA

Phoenix* 88.5 .01* KFCA
Thatcher* 88.1 .01 KGIA

ARKANSAS

Blytheville 96.1 21 KLCN-FM
Conway 97.7 .97* KOWN
Ft Smith 94.9 14 KFPW-FM
Ft Smith 107.1 .32* KFSA-FM
Jonesboro 101.9 8 KBTA-FM
Little Rock 95.9 .39* KVLCC-FM
Silotm Spgs 105.7 2.6 KUOA-FM

CALIFORNIA

Alhambra 107.1 .37* KJSW
Bakersfield 94.1 9.8 KERN-FM
Bakersfield 92.5 4.7* KMAAR
Berkeley 104.9 1* KPFA
Berkeley 102.9 6.8 KRE-FM
Beverly Hills 106.3 1* KSRT
Chico 101.1 9.8 KVCJ
Eureka 96.3 4.6 KRED
Fresno 101.9 7.4 KARAF-FM
Fresno 97.9 7.3 KMAJ-FM
Fresno 93.7 7.0* KRFA
Glendale 101.9 9.9* KUTE
Hollywood 94.7 5.8 KFMY
Hollywood 101.1 4.8 KHJ-FM
Hollywood 97.1 5.8 KKLA
Hollywood 93.1 59* KNX-FM
Inglewood 92.7 .38* KEFM
Inglewood 105.5 .75* KHOA-FM
Long Beach 102.3 1* KFQX-FM
Long Beach* 88.1 .01 KLON
Long Beach 103.1 .32* KNOB
Los Angeles 95.5 3.8* KECA-FM
Los Angeles 104.3 8.8* KFAC-FM
Los Angeles 105.9 7.6* KFI-FM
Los Angeles 100.3 7.2* KMAU
Los Angeles 98.7 4.9* KMGM
Los Angeles 96.3 15* KRKD-FM
Los Angeles* 91.5 2.9 KUSC
Marysville 99.9 4.7 KMYC-FM
Merced 97.5 8.9 KVMG
Modesto 103.3 11* KBEE
Modesto 104.1 4.7* KTRB-FM
Oakland 101.3 2.0 KLBX-FM
Oceanside* 89.7 .01 KOEN
Ontario 93.5 .31 KEDO
Pasadena 93.3 .33 KWKW-FM
Redding 102.9 1* KVRB
Riverside 97.5 2.0* KPOR
Sacramento 96.1 11* KCRA-FM
Sacramento 96.9 5.4 KFBK-FM
Sacramento 107.9 12* KXOA-FM
Salinas 94.5 3.2 KSNJ
San Bruno 100.5 25.0* KSBR
San Diego 94.1 33* KFSD-FM
San Diego* 91.7 3.3* KSDS
San Diego 104.7 .96 KWFM
San Francisco* 91.7 1.2 KALW
San Francisco 103.7 4.4* KCBS-FM
San Francisco 106.1 5.0 KGO-FM
San Francisco 97.3 10 KGSF
San Francisco 98.9 35* KJBS-FM
San Francisco 99.7 45* KNBC-FM
San Francisco 96.5 44* KRON-FM
San Francisco 94.9 16* KSFH
San Jose 92.3 34.0* KRPO
San Jose 95.3 1* KSJO-FM
Santa Ana 96.7 1* KVOE-FM
San Monica* 89.9 .46 KCRW
Sausalito 102.1 33* KDCC
Stockton* 91.3 3.4 KCVN
Stockton 92.9 1.4* KGDH-FM

COLORADO

Denver 97.3 21* KFEL-FM
Denver 94.1 5.3 KLZ-FM
Denver 95.7 43* KOA-FM

CONNECTICUT

Greenwich 95.9 .46* WGGH
Hartford 93.7 7 WDRG-FM
Hartford 96.5 8 WVIC-FM
Meriden 95.7 7 WMMW-FM
N Britain 103.7 20 WFHA
New Haven 95.1 20* WAVZ-FM

New Haven 100.7 20* WBIB
New Haven 92.1 .87* WELI-FM
New Haven 99.1 19 WNCX-FM
Stamford 96.7 .65 WSTC-FM

DELAWARE

Georgetown 101.5 20* WJWL-FM
Wilmington 96.1 20* WAMS-FM
Wilmington 93.7 20* WDEL-FM

DISTRICT OF COLUMBIA

Washington 97.1 15* WASH
Washington 99.5 20 WCFM
Washington 107.3 20 WMAL-FM
Washington 101.1 20 WOL-FM
Washington 103.5 19* WQQW-FM
Washington 93.9 20 WRC-FM
Washington 96.3 20 WTOP-FM
Washington 98.7 20 WDDC-FM

FLORIDA

Daytona Bch 94.5 8.5 WND8-FM
Ft Lauderdale 106.5 9.2* WGOR
Gainesville 104.1 12 WRUF-FM
Jacksonville 95.1 11.5 WJAX-FM
Jacksonville 96.9 32 WJHP-FM
Jacksonville 96.1 63 WMBR-FM
Lakeland* 88.1 .01* WFSI
Miami 96.3 27* WGBS-FM
Miami 97.3 53* WODS-FM
Miami 94.9 60 WQAM-FM
Miami* 91.7 .40 WTHS
Miami 101.5 8.5 WAPB-FM
Miami Beach 93.1 28.5* WKAT-FM
Miami Beach 93.9 13 WRD
Orlando 92.3 3.4* WDBO-FM
Orlando 96.5 59 WHOQ-FM
Palm Beach 98.3 .42* WXP-FM
Palm Beach 97.9 22 WWPQ-FM
St Petersburg 97.9 16* WMLD
St Petersburg 102.5 37 WTSP-FM
Tallahassee 103.9 .71 WCPD
Tampa 105.6 26* WDAE-FM
Tampa 93.3 53 WFLA-FM

GEORGIA

Athens 99.5 4.4 WGAU-FM
Atlanta* 90.1 .40 WABE
Atlanta 103.3 5.0* WAGA-FM
Atlanta 97.5 44 WATL-FM
Atlanta 95.5 1.4* WBGJ-FM
Atlanta 94.1 34.5* WGST-FM
Atlanta 98.5 52* WSB-FM
Cedartown 96.1 5.5 WGAJ-FM
Columbus 107.9 10* WDAK-FM
Columbus 95.1 9 WGBA-FM
Columbus 93.3 46* WRBL-FM
Gainesville 103.9 .30 WDUN-FM
Lagrange 104.1 1.3* WLAG-FM
Macon 100.7 15 WMBL-FM
Macon 99.1 3* WMAZ-FM
Macon 96.9 41* WNCX-FM
Newnan 96.7 .33* WQCH-FM
Rome 106.5 1.1* WRGA-FM
Savannah 94.3 .08* WDAF-FM
Savannah 100.3 15 WSAV-FM
Savannah 97.3 43* WTOG-FM
Toccoa 106.1 10 WLET-FM
Valdosta 92.5 7 WGOV-FM

IDAHO

Meridian 101.9 2.5 KFSD-FM
Pocatello 96.5 1.8 WSEI-FM
Twin Falls 99.7 3 KTFI-FM

ILLINOIS

Alton 99.9 9.1 WOKZ-FM
Bloomington 101.5 15* WJBC-FM
Blue Island 94.3 1* WRBI
Canton 100.9 .65 WBYS-FM
Carmi 97.3 11*
Centralia 96.5 2.4 WCNT-FM
Champaign 97.5 27 WDWV-FM
Chicago 93.9 28 WAAF-FM
Chicago 97.1 13 WBBM-FM
Chicago* 91.5 15 WBEZ
Chicago 96.3 19* WBIK
Chicago 99.5 30 WEFM
Chicago 97.9 15 WEHS
Chicago 94.7 25 WENR-FM
Chicago 93.1 29 WFJL
Chicago 100.3 33 WFMF
Chicago 98.7 35 WGNB
Chicago 101.1 24 WMAQ-FM
Chicago 95.5 46 WMBI-FM
Chicago 102.7 40 WMOR
Chicago 105.9 9.3* WOAK
Chicago 101.9 30* WVRT
Chicago Hts 95.9 .25 WCHI
Decatur 102.1 31 WSOY-FM
St Louis 102.5 55 WTMV-FM

Elgin* 88.1 .01 WEPS
Elmwood Pk 107.1 .95 WLEY
Evanston* 88.5 .01* WDLJ
Evanston 105.1 36 WEAW
Evanston* 89.3 .01 WNUR
Freeport 102.5 9 WFJS
Harrisburg 99.9 4.2 WEBQ-FM
Herrin 98.5 20* WJPF-FM
Jacksonville 100.5 7.3 WLDS-FM
LaSalle-Peru 106.9 13* WFMX
Mattoon 96.9 23* WLBB-FM
Mt Vernon 94.1 15 WMBX-FM
Oak Park 102.3 1* WOPA-FM
Peoria 92.5 16 WMBD-FM
Quincy 105.1 8.9 WQDI-FM
Quincy 99.5 53 WTAD-FM
Rockford 97.5 16 WROK-FM
Rock Island 98.9 37 WBBF-FM
Springfield 102.9 25 WCVS-FM
Springfield 103.7 6.7 WTXA-FM
St Charles 106.3 .23 WEXI
Urbana* 91.7 .10 WIUC
Urbana 103.3 2.4 WKID-FM
Waukegan 106.7 12 WKRS
Woodstock 92.1 .83 WILA

INDIANA

Anderson 106.3 .35 WCBC-FM
Blmington* 90.9 33* WFUI
Columbus 93.7 71 WCSI
Connersville 100.3 9.8 WCNB-FM
Crawfordsville 102.9 13 WFAU
Elkhart 100.7 33 WTRC-FM
Evansville 104.1 19 WIKY-FM
Evansville 94.5 20 WMLL
Evansville* 91.5 1.9*
Ft Wayne 106.1 24 WKJG-FM
Ft Wayne 96.1 16.5 WWOV-FM
Greencastle* 91.7 .01 WGRE
Hammond 92.3 9.3 WJIZ
Huntington* 88.1 .01 WVSH
Indianapolis* 91.9 .82* WAJZ
Lafayette 95.1 12 WFAM
Marion 106.9 34 WMRI
Michigan City 93.5 1 WIMS-FM
Muncie 104.1 7.4 WMUN
Muncie* 91.5 .01* WWHI
N Albany* 88.1 .01 WNAS
New Castle 102.5 4 WCTW
Shelbyville 101.3 4.7 WSRK
Terre Haute 101.1 20 WBOV-FM
Terre Haute 99.9 7.4 WTHI-FM
Warsaw 107.3 34 WRSW
Washington 106.5 14 WFML

IOWA

Ames 95.5 4.3* KASI-FM
Ames* 90.1 15.5 WOI-FM
Boone 99.3 .31* KFGQ-FM
Burlington 92.9 52 KBUR-FM
Cdr Rapids 96.9 50 KCRK
Clinton 96.1 13 KROS-FM
Clinton Bluffs 96.1 9.3* KFMY
Davenport 103.7 47 WOC-FM
Des Moines 94.1 26.0* KCBC-FM
Des Moines 104.5 27.5* KRNT-FM
Des Moines 97.3 15 KSO-FM
Des Moines 100.3 40.0* WHO-FM
Dubuque 100.5 45 KDTB-FM
Dubuque 103.3 15 WDBQ
Ft Dodge 102.7 10 KFMY
Iowa City* 91.7 16.5 KSUI
Keokuk 102.7 3.7 KOKX-FM
Mason City 101.1 16 KGLG-FM
Muscatine 99.7 9.3* KWPC-FM
Sioux City 94.9 36.0* KSCJ-FM
Storm Lake 101.5 8.9 KAYL-FM
Waterloo 105.7 17* KXEL-FM

KANSAS

Grant Twnsp 94.5 40 KIMV
Hutchinson 93.1 1.5* KWBW-FM
McPherson 103.1 .16* KNEX-FM
Wichita 100.3 11 KFH-FM
Wichita* 89.1 .01 KAMUW

KENTUCKY

Ashland 93.7 4.1 WCMI-FM
Bowling Grn 101.1 8.4 WBON
Henderson 99.5 20 WSON-FM
Hopkinsville 98.7 8.7 WHOP-FM
Lexington* 91.3 2.3 WBKY
Lexington 94.5 2.9* WLAP-FM
Louisville 100.7 30 WBOX
Louisville* 89.3 .01 WFPL
Louisville 99.7 24 WHAS-FM
Louisville 95.1 17 WRXW
Louisville* 90.3 .01 WSDX
Madisonville 103.1 1 WFMW-FM
Owensboro 92.5 60 WOMI-FM
Owensboro 96.1 45 WVJS-FM
Paducah 93.3 32 WKYC
Paducah 96.9 17 WPAD-FM

LOUISIANA

Alexandria 96.9 11 KALB-FM
Alexandria 99.7 4.7 KVOB-FM
Harrison 104.3 3.2 WAFB-FM
Baton Rge 98.1 7.6 WBRL
Baton Rge 101.1 3* WLCS-FM
Baton Rge* 91.7 1.8 WLSU
Lafayette 96.1 15* KMFA-FM
Monroe 104.1 17* WBEH
N Orleans* 89.3 .01 WBEH

N Orleans 105.3 156* WDSU-FM
N Orleans 107.5 8.6* WJBW-FM
N Orleans 92.7 61* WRCA
N Orleans 107.2 55 WSBM-FM
N Orleans 95.7 55 WTPS-FM
N Orleans 100.3 12* WWLH
Shreveport 101.1 11* KRMD-FM
Shreveport 94.5 13* KWKH-FM

MAINE

Bangor 93.1 11 WGUY-FM
Lewiston 93.9 13 WCOU-FM

MARYLAND

Annapolis 99.1 17 WNAV-FM
Baltimore 95.5 20* WBAL-FM
Baltimore 102.7 20 WCAO-FM
Baltimore 93.1 15* WCBM-FM
Baltimore 104.3 20 WTBH-FM
Baltimore 106.7 20* WKRE
Bethesda 94.7 20 WJCP
Bethesda 106.3 .50* WBCC-FM
Brady Hts 96.7 .42 WBUZ
Cumberland 102.9 2.5* WCUM-FM
Cumberland 106.9 2.5* WTBO-FM
Frederick 99.9 2* WFMD-FM
Hagerstown 104.7 1.5 WJEF-FM
Salisbury 97.5 12 WBQC-FM
Silver Sprg 102.3 .44* WGAY-FM
Silver Sprg 95.9 .59* WOOK-FM

MASSACHUSETTS

Boston* 92.9 .38 WBUR
Boston 100.7 20 WBZ-FM
Boston 102.7 20 WCOF-FM
Boston 103.3 20 WEEI-FM
Boston* 88.1 .01 WERS
Boston* 89.7 20* WGBH
Boston 94.5 20 WHDH-FM
Boston 95.5 29* WNAC-FM
Brookton 97.7 .80 WBET-FM
Cambridge 96.9 5* WXHR
Chicopee 100.3 3.2* WACE-FM
Greenfield 98.3 1 WHAI-FM
Haverhill 92.5 20 WHAV-FM
Holyoke 93.1 3.2 WHYN-FM
Lawrence 93.7 20 WLAW-FM
Lowell 99.5 12 WLLH-FM
Lynn 105.5 .52 WLYN-FM
N Bedford 97.3 20 WBSM-FM
N Bedford 98.1 20 WFRB
Paxton 99.1 5* WGTB
Pittsfield 94.3 1 WBEC-FM
Springfield 91.7 20 WBZA-FM
Springfield 94.7 3.2 WMA5-FM
Springfield 101.9 10* WSLF-FM
Springfield 97.9 13 WSPR-FM
W Yarmouth 94.3 1 WOCB-FM
Worcester 96.1 10 WTAG-FM

MICHIGAN

Ann Arbor* 98.7 2.2 WPAG-FM
Ann Arbor* 91.7 4.4 WCOM
Battle Crk 102.1 45 WELI-FM
Bay City 96.1 41 WBCM-FM
Benton Hrbr 99.9 9.2* WMBH-FM
Dearborn 100.3 7.7* WKHM-FM
Detroit 101.9 52 WDET-FM
Detroit* 90.9 2 WDRB
Detroit 93.1 30 KJKB-FM
Detroit 97.9 4.3 WJLB-FM
Detroit 96.3 24* WJR-FM
Detroit 97.1 48 WJWJ-FM
Detroit 101.1 30 WXYZ-FM
E Lansing* 90.5 9.7 WKAR-FM
Flint 101.9 4.0 WJL
Grd Rapids 92.5 10.5 WFRS
Grd Rapids 93.7 55.0* WJEF-FM
Grd Rapids 96.9 50* WLAU-FM
Kalamazoo* 91.1 .40* WMCP
Mt Clemns 106.3 .34 WMLN
Muskegon 106.5 4.7 WKBZ-FM
Oak Park 95.5 20 WLDN
Owosso 103.1 1 WOPM-FM
Pontiac 99.5 20* WCAR-FM
Port Huron 99.1 22 WTHH-FM
Royal Oak 104.3 18 WEXL-FM
Saginaw 98.1 1.7 WSAM-FM
Summit Twp 92.3 16 WJBM-FM
Wyandotte 103.1 1 WJDD

MINNESOTA

Duluth 92.3 62 WEBC-FM
Mankato 103.5 47 KYSM-FM
Minneapolis 97.1 11* WTCN-FM
Minneapolis 105.9 5.3 WUIS-FM
Minneapolis* 97.7 4.4* KUOM-FM
Northfield 95.7 49* WGLA-FM
St Cloud 104.7 50 KFAM-FM
St Paul 102.1 57* KSTP-FM
St Paul 99.5 90* WMIN-FM
St Paul* 89.1 .01 WNOV
Winona 97.5 55 WKNW-FM

MISSISSIPPI

Greenville 101.9 19 WJPR-FM
Gulfport 101.5 3 WJGM-FM
Hattiesburg 97.9 2* WFOR-FM
Jackson 102.9 50 WJDX-FM
Meridian* 88.1 .01* WMMI
Meridian 98.5 3.6* WMOX-FM

MISSOURI

Cp Girard* 95.7 8* KFVS-FM
Cp Girard* 97.7 .29* KGMO

Clayton 99.1 58 * KFUO-FM
 Farmington 100.1 .30 KREI-FM
 Jefferson Cy 98.5 9 KWOS-FM
 Joplin 96.1 70 WAMBH-FM
 Kansas City 94.9 54 KCMO-FM
 Kansas City 98.1 9.7 KOZY
 Kennett 98.9 6.9 KBOA-FM
 Poplar Bluff 94.5 16 KWOC-FM
 Sedalia 99.7 15 KDRO-FM
 Springfield 94.7 11 KTTS-FM
 St Louis* 91.5 12 KSLH
 St Louis 93.7 71 KXOK-FM

NEBRASKA
 Columbus 101.5 6.9* KJSK-FM
 Lincoln 102.9 22 KFOR-FM
 Omaha 98.7 8.7 KBON-FM

NEVADA
 Las Vegas 103.9 .36 KENO-FM

NEW HAMPSHIRE
 Claremont 106.1 1.5 WTSV-FM
 Manchester 100.1 1 WKBR-FM
 Manchester 95.7 3.3 WMUR-FM
 Nashua 106.3 1 WOTW-FM

NEW JERSEY
 Alpine 93.1 6 WFMN
 Asbury Pk 94.3 1 WJLK-FM
 Atlantic Cy 100.7 14 *WBAB-FM
 Atlantic Cy 98.5 15 WFGO-FM
 Bridgeton 96.7 1 WPOE
 Elizabeth 94.7 13.5 WAAT-FM
 Newark 96.7 1 WBOG
 Newark 91.1 2.5 WAGO
 Newark 102.7 20 *WNJR-FM
 N Bruns'w'ck 98.3 1 WCTC-FM
 N Bruns'w'ck 93.5 1 WBDH
 Paterson 103.5 17 WPAT-FM
 Plainfield 103.9 1 WXNJ
 So Orange* 89.5 2 WSOU
 Trenton 97.5 14 WTOA

NEW MEXICO
 Albuquerque* 89.1 .35 KANW

NEW YORK
 Albany 93.9 2.1 *WROW-FM
 Auburn 96.1 18 WABO-FM
 Allegheny 95.7 43 WHDL-FM
 Binghamtn 92.7 .33* WINR-FM
 Binghamtn 100.5 12 WBNF-FM
 Brooklyn 105.9 19 *WBRO
 Brooklyn* 91.5 20 WNYE
 Buffalo 106.5 105 *WBEN-FM
 Buffalo 92.9 48 WBNY-FM
 Buffalo 104.1 7.7 *WWOL-FM
 Buffalo 103.3 4.6 WXRK
 Cherry Vly 101.9 1.4 *WYCV
 Coram 95.5 15 *WFSS
 Cortland 106.1 4.2 WC LI-FM
 DeRytr Twp 105.1 1.3 WVCN
 Endicott 101.7 .54 WENE-FM
 Floral Pk* 90.3 .35 WSHS
 Hempstead 98.3 1 WHLI-FM
 Hornell 105.3 8.3 WWHG-FM
 Ithaca 97.3 40 WHCU-FM
 Ithaca* 91.7 .01 WITI
 Jamestown 93.3 9.5 WITN-FM
 Lockport 92.3 .75 WUSJ-FM
 Massena 105.3 13 WMSA-FM
 N Rochelle 93.5 1 *WGNR-FM
 New York 99.5 18 WABF
 New York 106.7 10 *WALK
 New York 101.1 5.8 WCB5-FM
 New York 107.5 20 *WEVD-FM
 New York 104.3 17 WFDK
 New York* 90.7 3.5 WFLV
 New York 101.9 10 WGHF
 New York 92.3 11 WJZF-FM
 New York 100.3 18 WMGM-FM
 New York 97.1 1.6 WNBC-FM
 New York 93.9 18 WNYC-FM
 New York 98.7 3.4 WOR-FM
 New York 96.3 11 WQXR-FM
 Niagara Fls 98.5 46 WHLD-FM
 Ogdensbrg 106.1 14 *WSLB-FM
 Oswego 104.7 3 WOPT-FM
 Pghkeepsie 104.7 2.3 WHVA
 Rochester 98.2 20 WHFM
 Rochester 97.9 7.7 WRNY-FM
 Schenectdy 101.1 3.5 WBCA
 Schenectdy 99.5 6 WGFJ
 S Briat Twp 95.1 1.3 WVBT
 Springville* 88.1 .01* WSPE
 Syracuse* 88.1 .69* WAER
 Syracuse 102.5 8.5 WNDK-FM
 Syracuse 94.5 9 WSYR-FM
 Troy* 91.3 .46 WEVR
 Troy 92.3 5.4 WEFR
 Troy 102.7 3.5 WTRI
 Utica 96.9 9 WIBX-FM
 Utica 105.7 4.3 WRUN-FM
 Watertown 100.5 14 WWNV-FM
 Wethersfld 107.7 1.3 WFNF
 White Plns 103.9 .12 WFAS-FM

NORTH CAROLINA
 Asheville 92.3 10 WGWK-FM
 Asheville 104.3 9.2 WLOS-FM
 Burlington 101.1 34 *WBBS-FM
 Burlington 93.9 2.8 *WFNS-FM

Charlotte 107.7 7.7 *WAYS-FM
 Charlotte 99.9 27.7 *WBT-FM
 Charlotte 104.7 50 WIST
 Charlotte 103.5 38 WSOC-FM
 Durham 105.1 36 WDNK-FM
 Elkin 100.9 .35 WIFM
 Fayetteville 98.1 12 WNCN-FM
 Forest City 93.3 1.5 WBFO-FM
 Georgia 101.9 11 WGNK-FM
 Goldsboro 93.3 35 WEGR
 Goldsboro 105.5 .41* WFMC
 Greensboro 97.3 23 WFMY
 Greensboro 100.3 37 WGBG-FM
 Greensboro* 89.9 .01 WGPS
 Henderson 92.5 9 WHNC-FM
 Hickory 102.9 210 WHKY-FM
 High Point 95.5 37 WHPF-FM
 High Point* 89.3 .01 WHPS
 High Point 99.5 38 WMFR-FM
 Laurinburg 96.5 8.8 WEVO-FM
 Leaksville 92.7 .82 WLOE-FM
 Lexington 94.3 .30 WBLY-FM
 Marion 105.9 32.5 WMLY-FM
 Marion 93.5 .38* WFAB
 Raleigh 96.1 25 WNAO-FM
 Raleigh 94.7 15 WPTF-FM
 Raleigh 101.5 5.4 WRAL-FM
 Reidsville 102.1 1.6 WREV-FM
 Roanoke Rpd 98.5 16 WCBT-FM
 Rocky Mt 100.7 33 WFMA
 Rocky Mt 92.1 .27 WEED-FM
 Salisbury 106.5 20 WSTP-FM
 Sanford 103.1 .33* WSNB
 Sanford 105.5 .49* WWSG-FM
 Shelby 96.1 2.6 WNSN-FM
 Statesville 105.7 2.4 WSIC-FM
 Thomasville 98.3 .45 WTNC-FM
 Wilmington 96.3 13 *WMFD-FM
 Winstn-Slm 93.1 34 WAIR-FM
 Winstn-Slm 104.1 48 WSJS-FM

OHIO
 Akron 97.5 15 WAKR-FM
 Alliance 101.7 1 WFAH
 Ashland 101.3 10 WATG
 Ashtabula 103.7 52 WAGA-FM
 Athens* 88.1 .01
 Bellaire 100.5 20 WTRF-FM
 Canton 94.9 1.7 WCMW-FM
 Canton 94.1 25 WHBC-FM
 Cincinnati 105.1 10 WCPD-FM
 Cincinnati 101.9 13 WKRC-FM
 Cincinnati 101.1 9 WLWA
 Cincinnati 102.7 15 WSAI-FM
 Cleveland* 103.3 10 WBOE
 Cleveland 103.3 14 WCUC
 Cleveland 98.5 11 WUAB-FM
 Cleveland 100.7 11 *WHK-FM
 Cleveland 104.1 19 WJW-FM
 Cleveland 105.7 14 WTAM-FM
 Clevelnd Hgts 95.3 1 WSR5-FM
 Columbus 92.3 33 WCOL-FM
 Columbus 97.1 4.1 WELD
 Columbus 98.7 15 WHKC-FM
 Columbus 96.3 15 WLWF
 Columbus* 89.7 14 WOSU-FM
 Columbus 94.7 52 WUFI-FM
 Dayton 99.1 19 WHIO-FM
 Dayton 97.5 18 WLWB
 Dayton 104.7 43 WTWO
 Elyria 107.3 15 *WEOL-FM
 Findlay 100.5 8.2 WFJN-FM
 Fostoria 105.5 .45 WFOB
 Fremont 99.3 1 WFRO-FM
 Hamilton 103.5 8.7 WMOH-FM
 Kent* 88.1 .01* WKSU-FM
 Lima 101.2 15 WIMA-FM
 Lima 103.3 25 *WLOK-FM
 Marion 106.9 2.3 *WMRN-FM
 Newark 100.3 8.5 WCLT-FM
 Oxford* 88.1 .01 WMUB
 Portsmouth 104.1 7 WPAV-FM
 Steubenvle 103.5 2 WSTV-FM
 Toledo 101.5 20 *WSPD-FM
 Toledo* 91.3 .73 WTDS
 Toledo 104.7 50 *WTOL-FM
 Toledo 99.9 8.8 WTRT
 Wooster 104.5 13 WNST-FM
 Worthington 97.9 34.0 WRFD-FM
 Youngstown 105.0 50 WFMJ-FM
 Youngstown 98.9 18 *WKBN-FM

OKLAHOMA
 Durant 107.3 2.9 KSEO-FM
 Enid 102.7 5.2 KCRK-FM
 Muskogee 98.5 3.3 KBIX-FM
 Muskogee 101.5 8.7 KMUS-FM
 Norman* 90.7 7 WNAO-FM
 Oklahoma Cy 94.7 17.6 *KOZY-FM
 Oklahoma Cy 105.9 3.3 *KOMA-FM
 Oklahoma Cy 104.3 4 *KTKO-FM
 Stillwater 93.9 3.9 KSPI-FM
 Tulsa 95.5 9.5 *KAKC-FM
 Tulsa 90.7 1.2 *KTUL-FM
 Tulsa* 95.1 1.1 KWGS

OREGON
 Albany 101.7 .71 KWIL-FM
 Eugene* 90.1 40 KRVA
 Eugene 99.1 8 *KUGN-FM
 Grants Pass 96.9 3.1 KGPO

Oretech* 88.1 .01* KTEC
 Portland 92.3 56 *KEX-FM
 Portland 101.1 48 KOIN-FM
 Portland 97.1 1.5 KPFM
 Portland 98.7 44 KPOJ-FM
 Portland 95.5 3.4 KWJJ-FM

PENNSYLVANIA
 Allentown 100.7 6.9 *WFMZ
 Allentown 106.3 .78* WKAP-FM
 Allentown 99.9 8 WSAN-FM
 Altoona 103.7 3.6 WFBG-FM
 Altoona 100.1 .13* WFSW-FM
 Bethlehem 95.1 10 WPGA-FM
 Braddock 96.9 6.9 *WLFM
 Butler 103.9 .72 WBUT-FM
 Butler 97.7 .56 WISR-FM
 Chambersbrg 95.9 .70 WCHA-FM
 Dubeo 102.1 9.5 WCDK-FM
 Easton 98.3 1 WEEK
 Easton 107.9 11 *WEST-FM
 Erie 97.1 2.5 *WEEL
 Erie 99.9 9.7 *WERE-FM
 Erie 97.9 7.8 *WLEU-FM
 Harrisburg 100.9 1 WABX
 Harrisburg 97.3 4 *WHP-FM
 Havertown* 89.3 .01 WHHS
 Hazleton 97.9 7.6 *WAZI-FM
 Johnstown 105.3 11 *WARD-FM
 Johnstown 95.5 8.3 WJAC-FM
 Lancaster 101.3 3.8 *WAGM-FM
 Lancaster 96.9 20 *WCDK-FM
 Lebanon 104.1 4.7 *WLAB
 Lebanon 100.1 7.2 WLBR-FM
 Lewistown 97.9 2.3 WLTN
 Meadville 100.3 10 WAGW-FM
 McKeesport 104.9 .50 WACK-FM
 New Castle 101.1 3 WKST-FM
 Philadelphia 98.1 11 WCAU-FM
 Philadelphia 102.1 10 WFIL-FM
 Philadelphia 95.7 20 WFLN
 Philadelphia 105.3 20 *WHAT-FM
 Philadelphia 94.1 17 *WIBC-FM
 Philadelphia 93.3 20 WIP-FM
 Philadelphia 102.9 20 WPNF-FM
 Philadelphia* 90.1 .01 WPWT
 Pittsburgh 92.9 9 KDKA-FM
 Pittsburgh 98.1 20 KQV-FM
 Pittsburgh 96.1 12 WCAE-FM
 Pittsburgh* 91.5 2.7 WDUQ
 Pittsburgh 99.7 24 WJAS-FM
 Pittsburgh 93.7 20 WKJF
 Pittsburgh 101.5 19 WPIT-FM
 Pittsburgh 94.5 20 WWSW-FM
 Pottsville 95.5 5.1 WPAW-FM
 Pottsville 101.9 2.8 WPRV-FM
 Reading 92.9 9 WEEU-FM
 Scranton 93.7 2.8 *WARM-FM
 Scranton 101.3 1.8 WGBI-FM
 Scranton 92.3 1.8 WQAN-FM
 Scranton* 88.1 .01* WUSV
 Sharon 102.9 26 WPIC-FM
 Sunbury 94.1 4.4 WKOK-FM
 Uniontown 105.7 1.5 WBSB-FM
 Warren 92.1 .55 WNAE-FM
 Washington 104.3 6 WJAF-FM
 Wilkes-Barre 96.5 2.2 WBRB-FM
 Wilkes-Barre 96.1 3.1 WILK-FM
 Wilkes-Barre 103.3 3.1 WIZZ
 Williamsprt 105.1 3.2 WLYC
 Williamsprt 100.3 3.2 WRAX-FM
 York 105.7 13 *WNOW-FM
 York 98.5 8 WRZE
 York 103.3 20 WBSA-FM

RHODE ISLAND
 Providence 95.5 14 WJAR-FM
 Providence 107.7 20 WLIV
 Providence 105.1 20 WPJB
 Providence 92.3 20 WPRO-FM
 Providence* 91.5 2.9 WPTL
 Woonsocket 105.5 .39 WWOV-FM

SOUTH CAROLINA
 Anderson 101.1 41 WCAC
 Charleston 96.9 36 WSCS-FM
 Charleston 95.1 49 WTMA-FM
 Columbia 94.5 1.3 *WIS-FM
 Greenville 92.5 12 WESC-FM
 Greenville 93.7 160 *WFBC-FM
 Greenville 94.9 79 WMRK-FM
 Greenwood 95.7 8.6 WCRS-FM
 Rock Hill 97.5 9.4 WRHI-FM
 Spartanbrg 100.5 11 WCYZ
 Spartanbrg 98.9 4.9 WSPA-FM

SOUTH DAKOTA
 Rapid City 94.7 16 KOTA-FM

TENNESSEE
 Bristol 96.9 10.4 WOPI-FM
 Chattanooga 96.5 42 WDDO-FM
 Chattanooga 98.1 4.2 WVUN
 Jackson 100.7 50 WJTS-FM
 Johnson Cy 100.7 9.7 *WJHL-FM
 Kingsport 98.5 44 WKPT-FM
 Knoxville 93.3 2.8 WBRF-FM
 Knoxville 97.3 76 WROL-FM
 Knoxville* 91.9 3.4 WUOT
 Lenoir City 100.3 8.8 *WLII-FM
 Memphis 106.9 17 WHHM-FM
 Memphis 99.7 260 WMCJ
 Memphis 97.5 71 WSIX-FM
 Nashville 103.3 66 WSM-FM

TEXAS
 Amarillo 100.3 3.4 KFDA-FM
 Beaumont 99.5 14 *KRIC-FM
 Belton 97.1 12 KMHM
 Cleburne 94.3 .33 KCLE-FM
 Dallas* 91.7 .78 KVTI
 Dallas 104.5 34 K1XL-FM
 Dallas 92.5 40 KRLD-FM
 Dallas 109.7 86 KYBS
 Dallas 101.1 68 WRR-FM
 Dallas* 89.3 .01
 Denton 106.3 .76 KDNT-FM
 Edinburg 104.9 1 KURV-FM
 El Paso* 88.5 .01 KYOF-FM
 Ft Worth 100.5 50 WBAP-FM
 Galveston 98.7 8 KLUF-FM
 Goose Creek 92.1 .87* KREL-FM
 Houston 102.9 57 KPRC-FM
 Houston 101.1 29 *KTRH-FM
 Houston* 91.3 9.6 *KHUF
 Houston 96.5 14 *KXYZ-FM
 Longview 105.9 9.8 KTLI-FM
 Lufkin 95.5 2.9 KRBA-FM
 Plainview* 88.1 .01* KHBL
 Sn Antonio 99.5 250 *KISS
 Sn Antonio 92.9 48 *KONO-FM
 Sn Antonio 101.5 15 *KTSA-FM
 Temple 107.5 1.9 KTEM-FM
 Texarkana 98.1 40 KCMG-FM
 Tyler 101.5 4.3 *KQGB-FM
 Vernon 98.7 8 KWVC-FM
 Wichita Falls 99.9 9.7 WKFT-FM

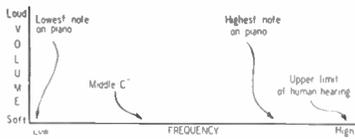
UTAH
 Ephraim* 88.9 .01* KEPH
 Mt Pleasant* 88.1 .01* KNSA
 Salt Lake Cy 98.7 90 KYDL-FM
 Salt Lake Cy 100.3 5.9 *KSL-FM

VIRGINIA
 Arlington 105.1 2.9 *WARL-FM
 Crews 104.7 14 WSVL-FM
 Danville 97.9 32 WDFW-FM
 Harrisbrg 100.7 36 *WSVA-FM
 Lynchburg 97.5 37 WLVA-FM
 Lynchburg 100.1 .94 WWOOD-FM
 Martinsville 96.3 2.7 WMYA-FM
 Newport Nws 96.5 38 WGH-FM
 Norfolk 102.5 8.2 WRVC
 Norfolk 97.3 50 WTRF-FM
 Portsmouth 99.7 100 WSPF-FM
 Richmond 98.1 34 WCOD
 Richmond 102.9 21 *WEEE-FM
 Richmond 94.5 25 WRVB
 Roanoke 94.9 41 WDBJ-FM
 Roanoke 103.7 .28* WROV-FM
 Roanoke 99.1 4.7 WSL5-FM
 Suffolk 107.7 10 *WLPN-FM
 Winchester 92.5 13 WRFL

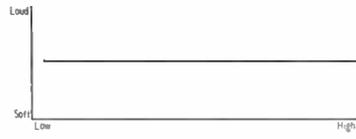
WASHINGTON
 Longview 103.9 .41 KWLK-FM
 Pasco 103.9 .58 KALB-FM
 Seattle 100.7 4.5 KIRO-FM
 Seattle 99.9 2.1 KISW
 Seattle 98.9 14 KOMO-FM
 Tacoma 97.3 10 KNTN
 Tacoma* 91.7 3.5 KTOY

WEST VIRGINIA
 Beckley 101.3 35 WCFC
 Beckley 99.5 34 WLS-FM
 Charleston 97.5 2.2 WTKR-FM
 Clarksburg 95.1 2 WPDK-FM
 Fairmont 92.3 4.8 WJPB
 Huntington 100.5 53 WHTN-FM
 Huntington 102.5 41 WPLH-FM
 Logan 103.3 2.7 WLOG-FM
 Martinsburg 94.3 8.1* WEPN-FM
 Morgantown 99.3 1 WAJR-FM
 Oak Hill 94.1 19 WOAY-FM
 Parkersbrg 106.5 8.9 WPAR-FM
 Wheeling 97.3 16 WKWK-FM
 Wheeling 98.7 15 *WVVA-FM

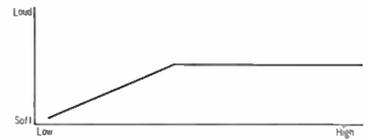
WISCONSIN
 Chilton* 89.3 51 WHKW
 Colfax* 88.3 50 WHWC
 Delafield* 90.7 52 WHAD
 Eau Claire 94.1 60 WEAU-FM
 Greenbay 101.1 14 WJPG-FM
 Greenfield 94.9 37 WWCJ
 Holmen* 90.3 25 *WHIA
 Janesville 99.9 15.5 WLCO-FM
 Madison 104.9 .93 WISN-FM
 Madison 101.5 207 *WIBA-FM
 Madison 98.1 52 *WISN-FM
 Madison* 88.7 9.3 WHVA-FM
 Marshfield 103.9 .25 WDLB-FM
 Merrill 100.7 20 WLIN-FM
 Milwaukee 94.1 35 WEMP-FM
 Milwaukee 102.9 55 *WISN-FM
 Neenah 98.5 3.2 WNAW-FM
 Oshkosh 92.9 3.5 WOSH-FM
 Racine 100.7 15 WJRN-FM
 Rice Lake 96.3 4.4 WJMC-FM
 Sheboygan 106.3 15 WHBL-FM
 Wausau* 95.3 .23* WAUX-FM
 Wausau* 91.9 114 WHRM
 Wis Rapids 103.3 2.1 WFHR-FM



1. This is the basic chart for all the sketches in this series.



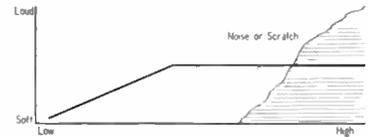
2. If each note on the piano could be struck with exactly the same intensity, a "frequency response" chart would look like this.



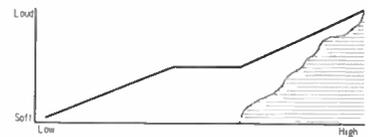
3. For technical reasons, the recording equipment introduces bass droop. The lower the note, the less its recorded intensity.

By VICTOR BROCIER:

Record Compensators and Preamplifiers



4. But needle scratch and noise interfere with the high frequencies.



5. So the recording studio introduces treble pre-emphasis.

What they are . . .

What they do . . .

Why they are needed

A FEW years ago, only a handful of audio hobbyists had ever heard of "record compensators and preamplifiers". Today, such units are to be found on every phonograph system designed to justify the name "high fidelity". This article will describe the function of these units and will explain how the need for them has arisen.

For many years, phonographs have been equipped almost exclusively with crystal pickups. Even today, the low cost and the simplicity with which crystals can be connected makes them the favored unit for commercial and portable radio-phonograph combinations.

When a crystal pickup is used in phonograph equipment, its connection to an amplifier is relatively simple: it can be plugged into the same input as the radio tuner. This is because its output voltage is of the same order of magnitude as that of the tuner. A given setting of the volume control would produce approximately the same degree of loudness from the radio as from the pickup.

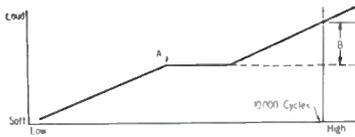
The last few years have seen the introduction of several high-quality magnetic pickups. These are characterized by extended frequency range and very low distortion, but

rather low output, of the order of one one-hundredth that of a crystal pickup. In order to use these pickups it is necessary to provide additional amplification to increase their low output so that it is comparable to that of a radio tuner, and sufficiently strong to be fed into the regular amplifier. This is the primary function of the phonograph preamplifier.

It will be recalled, from previous articles in this publication, that the average audio amplifier increases the strength of a given signal from a point of bare audibility in a pair of earphones, to one which is great enough to fill an over-size room with the sound from the loudspeaker to which it is connected. Thus a preamplifier is a supplementary amplifier, used not only with magnetic pickups but also with equipment such as microphones, which builds up the output of these devices to a point where it is sufficient to drive a power amplifier.

On the other hand, an equalizer or compensator (the two words are used synonymously) does not provide any amplification; in fact, it introduces a *loss* in power. Rather, an equalizer *balances* the frequency response of a pickup so that compensation is provided not only for the characteristics of the pickup but also for "falsifications" of sound used in phonograph recording.

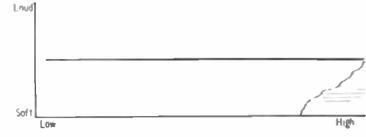
While only perfectionists use equalization (or compensation) with crystal pickups to improve reproduction of high frequency sounds, every user of a magnetic unit must employ equalization to achieve correct frequency response at the *low* frequency end of the spectrum. Thus, an unequalized crystal pickup sounds somewhat muffled and



6. "A" is the turnover frequency. The height "B" at 10,000 cycles is the amount of pre-emphasis.



7. This is the frequency response curve of a record compensator. It is the exact opposite of that shown in sketch 5.



8. Thus, by combining sketch 5 with 7, we get back the original music, as shown in 2, and scratch becomes almost inaudible.

boomy whereas an unequalized magnetic pickup sounds thin because of its rapidly decreasing response below C above middle C. The absence or attenuation of the lower register is a much more serious fault to one's ears than lack of sufficient treble; hence the matter of equalization is much more important with magnetic than with crystal pickups.

It may be of interest to inquire into the necessity for equalization in the first place. From the viewpoint of the reproducing system, the simplest recording characteristic would be a flat one. If all frequencies could be recorded with equal intensity, no equalization of magnetic cartridges would be needed. It happens that this is not only impossible but, in some respects, undesirable. To consider the first aspect: the recording process is such that, with a flat frequency characteristic, the amplitude or width of the side-to-side stylus motion cut into the record *in*-creases as the frequency *de*-creases, for a given power. It can be demonstrated mathematically that this would result in such large amplitudes near the lower end of the musical scale that record grooves would have to be spaced impractically far apart to avoid intersection of adjacent grooves. More important still, no practical recording cutter could cut such a groove and no pickup could follow it.

This problem is solved by recording the bass end of the scale with intensity progressively *de*creased as the frequency *de*creases, and then playing it back with the inverse characteristic, that is, with equipment that progressively *in*creases the intensity as frequency *de*creases. Above a certain frequency — called the turnover frequency — it is feasible to record with a flat characteristic.

Without going into a long discussion of the electro-mechanical characteristics of the various types of pickups, it can be stated that crystal cartridges do not need to employ low-frequency equalization. On the other hand, magnetic cartridges do require equalization.

WHAT of the high-frequency, or treble, part of the scale? Until recently, recording engineers had all they could do to record all the higher notes with equal intensity. Nevertheless, they were able to push the range up to 8,000 to 10,000 cycles. When high-fidelity enthu-

siasts played back these records with equipment capable of reproducing this full range, they found that surface noise, or needle scratch, became quite noticeable and, to most ears, extremely objectionable. Since this problem was the greatest single obstacle to the acceptance of wide-range reproduction from records, a considerable amount of work was done to effect a solution.

The use of better materials from which to make pressings helped a great deal. It was also found that improving the quality of the reproducing system made the surface noise much less objectionable. But the greatest improvement was achieved by increasing or exaggerating (pre-emphasizing) the high notes as the pitch or frequency increased.

By using preemphasis, the high frequency musical sounds are made much louder than the background scratch. If records so made are then played back through an audio system which incorporates the correct degree of *de*-emphasis, the high frequency musical sounds will be reproduced at their correct relative loudness, but needle scratch will become almost inaudible.

The phonograph preamplifier for magnetic pickups must, then, not only provide enough gain to increase the feeble output of the pickup sufficiently to drive the main amplifier, but it must also boost the bass to compensate for the characteristic used in making the recording. It is also desirable that it enable the user to "roll off" the treble range when playing modern records, to counteract preemphasis.

In order to simplify the discussion up to this point, two important problems have been omitted. One is that, unfortunately, there has never been universal agreement on what recording characteristics should be used. Each record manufacturer has simply gone ahead and used whatever degree of low frequency droop and high frequency preemphasis its engineers (or sales department) thought best, and has not hesitated to change its mind on occasion. This has brought about a situation in which 78 rpm. records in a given collection may have turnover frequencies of 300, 500, or 800 cycles, with no preemphasis of high frequencies, or with various degrees of preemphasis. The most nearly perfect phonograph in the world cannot reproduce all these records properly unless it is equipped with some means of adjustment for the recording characteristics of the records themselves.

With the advent of LP records, it appeared that a standard recording characteristic would at last *Continued on page 66*

¹Incidentally, it should be noted that middle C, corresponding to approximately 256 cycles, is generally considered to be in the bass range by the audio engineer, although it certainly is not a low-pitched note from the musician's point of view.

c. g. burke discusses

Opera

buffa on records

WORDS and phrases of alien speech are received into all languages and many become naturalized. Some are not retained; and the process of selection and rejection could produce an entertaining study by somebody else somewhere else. We are not philologists here, although anyone who has thought about it must have wondered why *beau idéal* and *non de plume* were both received with apparent equal favor into English, although the first is useful and would seem clumsy in translation as "ideal beautiful"; while the second seems to serve no purpose and is neither French nor English. What confronts us here is a word, "buffa", which is plainly akin to buffoon, which has not been taken into our language except by the moderately learned, but which implies something for which we have no exact English equivalent. When we use this word we do so as a tender abbreviation for "opera buffa", a phrase of restricted currency. It means something to us; it is certainly *literally* translatable as "comic opera", yet is definitely not to be translated properly by that very fragile art form. A translation will not be attempted here. Readers must be contented with a clumsy definition, accurate nonetheless, and based on musico-dramatic studies rather than lingual. "Opera buffa" describes opera with a farcical bias, the bent being slight, or great, but always present and sometimes predominant. The *Barber of Seville* is buffa and so is its stupendous predecessor, *The Marriage of Figaro*. Formally *Falstaff* almost blatantly illustrates the meaning: but we cannot admit the operettas — the comic operas, light operas, the burlesques with music — of Offenbach to this category, and instinctively we revolt at declaring the fervent and exalted turmoil of *Don Giovanni*

buffa, although it meets the conditions of our definition. Mozart himself gagged at such a qualification and called it a "dramma giocoso", needing a new term for an unprecedented offering.

In the United States, we are considerably troubled by the nomenclature of the musical stage: we are inclined to call anything "grand opera" if it is played at the Metropolitan Opera House, and when *Die Fledermaus* prevails there, we find in this grand operetta a perplexity and an anomaly. The term "grand opera" in fact extorts a measure of contempt, which plain "opera" or "music-drama" does not. The grand implies the spectacular, and *Aida* is conjured, with an emphasis on elephants, lions and other big beasts.

For well more than a year the most arresting aspect of the phonographic repertory has been the issuance of complete operas (grand, comic, music-drama, *singspiel*, *seria* and *buffa*) on LP, the majority recorded for the first time, some never publicly performed in this country and at least one — Haydn's *Orfeo* — not previously performed anywhere in its entirety. Judging entirely by memory, disdaining research when the examples are recollected spontaneously, one can cite the recent appearance of an *opéra comique* by Auber, another by Donizetti, a lyrical tragedy by Cilea, a buffa by Rossini, seven stage works by Mozart expressive of four kinds of opera, the three most famous works of Richard Strauss and three delightful, thoughtless masterpieces of Johann Strauss, three tremendous dramas by Wagner with five more announced, a dozen from Verdi, both hackneyed and obscure, the most enduring of stage comedies, *La Serva Padrona*; and one less buoyant but

older, Alessandro Scarlatti's *Trionfo dell' Onore*, Cimarosa's deft masterpiece, *The Secret Marriage*, Weber's unique, captivating and horripilous *Freischütz*, and, as if to symbolize how incredibly rarified the discal repertory can become, Hugo Wolf's neglected *Corregidor*.

THE phenomenon is large. It must be assumed that a great number of these editions have been successful or we should see the flood waning toward discontinuance. Basically, opera in an uneconomic society would be the most widely popular of the arts, since it contains all seven; but in this multiplication of phonographic operas, this endowment of ten thousand private opera houses, so to speak, across the continent, we find not true opera which is fleshed and visible, architectural and alive, but only what is audible of it.

Of course, it is possible to be jocular here about the advantages of an exclusively aural *Trovatore* over the stupefying spectacle of this lamentable puzzle on the stage. Siegfried and Brünnhilde, as we habitually are forced to see them, meet the magic of the music prepared for them only by a majestic bulk, or by a supremacy of bathos in efforts to characterize ineffable personages.

In expressing this jocular point of view, that it is often easier to stomach the sound of opera than the sight of it, it is quite likely that one is expressing the simple truth. Certain operas — these most often of a serious or weighty sort — are not truly performable although we see attempts to perform them. Without dwelling on the highly variable histrionic ability of singers we may say that in the grandest operas the best singers lack semblance of grandeur: we have no one who looks like Siegfried, or Salomé, or Rhadames, or Alberich or Fafner. We begin to find semblance in operas portraying a more common humanity, as in *Freischütz*, *Meistersinger*, *Traviata* and *Louise*, all of which can be seen in customary performance without pain. Thus, according to this point of view, *Trovatore* and *Götterdämmerung* would realize a completer necessity on records than *Freischütz* or *Manon*, although as a matter of fact all are to be found on records.

In buffa — that form of musical play tinted with farce, rarely exclusively homey and almost never spectacular — we have circumstances which do not prevail in other types of opera. Even in inexpert performances, buffa generally presents someone or something amusing to look at; conventionally there is a bubbling action, a light-hearted inconsistency of situation, that can compel attention and interest over a good period of time.

The trouble with buffa as a practicable stage form is the patent inadequacy of a large part of the cast as farceurs. No opera house in the world has at its command a complete company of singing actors and actresses gifted in their stage conduct with the deft unselfconscious grace required for the highly special quality of lively buffa. It is possible to see very good performances of *Figaro*, the *Barber* and *Falstaff*; but it is impossible anywhere to see performances of these excellent right down the line, perfect in every characterization and every tonal utterance. The Metropolitan Opera House mounts a good *Figaro*: the

effect of such a commendable production is to make us wish for a better. The good established a criterion, and where in one part or another perfection is approached, we are discontented because it is not attained everywhere.

By playing our imaginations and putting the phonograph into action we envision the perfect *Marriage of Figaro*, with every sparkling implication, every subtle allusion, every dexterous glimpse of mood apparent to our closed eyes without any uncomfortable awareness of over-effort. We play the records of *Figaro* and *Falstaff* so that we may see them better. We play the records of *Trovatore* and *Siegfried* so that we will not have to look.

NO musical form has been untouched by recording engineers. Buffa is abundant on records. The form has in the course of its near 250 years of existence undergone many mutations and is now quite unfixed, but the genius of good buffa is quite unseizable by contemporary composers. The phonograph presents the form in all its greatest periods, one company, Cetra-Soria, having spread a recorded panorama through time to embrace its origin, its marvelous development and its rough-house culmination. The value of such a presentation, to students of opera and of buffa particularly, is obviously enormous since three of these important comedies are almost never heard in America, and the value, in pure enjoyment, to music-lovers, is probably higher because purer.

ALESSANDRO SCARLATTI: *Il Trionfo dell' Onore*, or *Il Dissoluto Pentito*.

Opera buffa in three acts to a text by Francesco Antonio Tulio. First performance in Naples in 1718. Recorded in 1951 by Cetra-Soria on two double-sided LP records. No. 1223. 1 hr. 21 mins. Cast: Amedeo Berdini (t), Amalia Pini (ms), Ornello Rovero (ms), Eugenia Zaretska (c), Mario Borriello (bs), Rossana Zerbini (s), Sante Messina (t), Afro Poli (bne). Orchestra of Radio Italiana conducted by Carlo Maria Giulini.

It has long been conveniently assumed that *La Serva Padrona* was the first opera buffa. This is untrue and a cursory glance at musical history shows it to be untrue; but convenience is reluctantly abandoned in favor of truth or anything else. Perhaps we shall never know what was the first buffa, the records of musical antiquity being incomplete and often obscure. We do know that this *Triumph of Honor* was one of the first and almost certainly the first written to a formal — as opposed to dialectal — Italian text. Alessandro Scarlatti — like the first Johann Strauss, a great musician outshone by a greater son — composed more than a hundred operas of which the present is one of the latest and has proved the most enduring. The material is simple and the means fragile. The stock in trade of later operas is already pretty well established: we have sets of lovers contrasted in serious and comic situations with artificial obstacles interposed to their sentimental union long enough to delay the denouement for the necessary three acts. A desirable

soubrette appears, and although the cunning of this one does not reach the rich development of such later marvels as Serpina, Suzanna and Despina, Scarlatti's Rosina must duly be acknowledged as the prototype of her wonderful sisters. An ancient lecher pursues this wench and is thwarted by an ancient termagant. In the course of the succeeding two centuries such characters became integral parts of a venerable tradition.

What matters is how librettist and composer have put them into action. Scarlatti has managed well with the incipient form and has left us a tasty broth of lively and brave melodies interspersed against a steady rhythmic drive from the orchestra of strings and harpsichord. In these early buffas, all the action is indicated by the *recitativo secco*; at some convenient point all action stops to allow the participants a melodic expatiation of the emotion suggested by some phrase in the recitative. What they sing is not necessarily relevant to what they have been doing. A certain number of set pieces for the singers in solo and in concert is required, and Scarlatti, master of tender, sentimental *canzone*, supplied a good deal of decorative, if not pertinent, musical matter.

The Cetra-Soria edition is the only recording ever made of this agreeable pioneering comedy. It contains some excellent singing, particularly from the men, and most particularly in the skillful exposition of a limpid antique *bel canto*. The conductor maintains control over a decidedly baroque creation, and most of the credit for euphonious recapture of a rare and almost forgotten style belongs to him.

PERGOLESI: *La Serva Padrona*.

Opera buffa in one act to a text by Jacopo Angelo Nelli. First performance in Naples in 1733. Recorded in 1950 by Cetra-Soria on one double-sided LP record, No. 50036. 42 mins. Cast: Angelica Tuccari (s), Sesto Bruscantini (bs). Orchestra of Radio Italiana conducted by Alfredo Simonetto. (There is also a version on Vox.) The incredible thing about this utterly impeccable gem is that it had no predecessors. It happened. It was born out of the proportioned instinct of its youthful composer without anyone to point the way. The difference in dramatic and musical style between this and *Il Trionfo dell' Onore* cannot be accounted for by anything that had happened in the fifteen intervening years. *La Serva Padrona* has, in its beguiling simplicity, a classic nicety of plot and action, a bright musical illumination of character and phrase and unconventional use of embellishment unheard and unimaginable in the earlier work. The story of this "intermezzo" has a classic eloquence in its meager touching realization of a single human aspiration put to test. Serpina, soubrette, tires of working for her master without achieving status. She resolves to marry him, sers up a strategem to befuddle him and carries him victimized, reluctant, eager and doting, to the altar. There are two singing characters and a silent one. The orchestra holds no more than strings and harpsichord. With this little assemblage the composer, through recitative, aria and duet, carries the hapless Uberto to his inexorable destiny under the relentless control of the tactician Serpina, with a

vivacity always newly fresh and much nearer Mozart, not yet born, than Alessandro Scarlatti, only a few years dead.

The disc is ably contrived. Both singers are adept in their characterization and at home in the tripping vocal style. Simonetto permits no faltering of the pace and exerts both warmth and diversity from his small band of instruments. The recording, as such, is first-class.

MOZART: *Le Nozze di Figaro*.

Opera buffa in four acts on a text by da Ponte after Beaumarchais. First performance in Vienna in 1786.

Recorded in 1951 by Cetra-Soria on three double-sided LP records, No. 1219. 2 hrs. 29 mins. Cast: Italo Tajo (bs), Alda Noni (s), Fernando Corena (bs), Miti Truccato Pace (ms), Jolanda Gardino (ms), Sesto Bruscantini (bs-bne), Angelo Mercuriali (t), Gabriella Gatti (s), Cristiano Dalamangas (bs), Manfredi Pons de Leon (t), Graziella Sciutti (s). Orchestra and chorus of Radio Italiana conducted by Fernando Previtali.

Recorded in 1951 by Columbia on three double-sided LP records, No. SL 114. 1 hr. 57 mins. Cast: Erich Kunz (bne), Irmgard Seefried (s), Marjan Rus (bne), Elisabeth Höngen (c), Sena Jurinac (s), George London (bs), Erich Majkut (t), Elisabeth Schwarzkopf (s), Wilhelm Felden (bs), Rosl Schwaiger (s), Hilde Czeska (s), Anni Felbermayer (s). Vienna State Opera Chorus and the Vienna Philharmonic Orchestra conducted by Herbert von Karajan.

Recorded in 1935 by RCA Victor (HMV) on 33 sides of 12-in. 78 rpm. records and announced for re-issuance on LP but not received at this time. 1 hr. 54 mins. Cast: Roy Henderson (bne), Aulikki Rautawaara (s), Audrey Mildmay (s), Willi Domgraf-Fassbänder (bne), Luise Helletsgruber (s), Constance Willis (c), Heddle Nash (t), Norman Allin (bs), Winifred Radford (s), Fergus Dunlop (bs), Morgan Jones (t), Italo Tajo (bs). Orchestra and Chorus of the Glyndebourne Festival 1934, conducted by Fritz Busch.

Seventy-five years of buffa preceded the *Marriage of Figaro* and nearly one hundred and seventy-five have followed it; and it is hard to say which fact is the more amazing — that so short a time could suffice for the culmination of a musical form, or that anyone, having heard this, could dare to enter a field already harvested to perfection. Into the hurried and shabby libretto degraded by da Ponte from Beaumarchais' play, Mozart concentrated an intensification of all the facets of a musical genius universal in its sensitivity and always, everywhere, directed by the surest instinctive taste known to art.

In da Ponte's hands the witty and bitter social satire of the dramatist (who outfitted privateers for use against the British in the American Revolutionary War) becomes a commonplace and vulgar farce of sexual intrigue, pushed at too rapid a pace and thus crammed with puzzling stagy expedients. What is commendable in the dialogue is translated direct from Beaumarchais, but there is not much of it. We know that da Ponte had no concept of the nature of the Mozartian genius. We can apprehend

the essence of that genius even more awesomely when we hear how the tired phrases of the librettist have been transmuted into a musical comedy of manners irresistible in its wit, compelling in its intensity and overwhelming with a unified finesse unique and almost frightening.

The central figure in the currents of intrigue is the soubrette, Suzanna, sketched by da Ponte as a resourcefully shrewd young woman, vain in her resourcefulness and pert in displaying her vanity, a little incredible and a little repellent in da Ponte's careless presentation. Illuminated and glorified by the magic of Mozart's musical logic she becomes the greatest woman in the world — wise, tolerant, witty, spiritual, tender, exacting, humble, calm, assured; a treasure and a prodigy, and a justification of the Count Almaviva's overwhelming need to have her. He, the Count, in this exquisite transfiguration of base motives, becomes likeable and ingratiating even, in a melodic bitter display of his wounded pride, hopeless lust and ever-failing, half-hearted efforts to restore himself, to restore his own respect and that of his inferiors who dominate his impulses.

The adolescent eroticism of the page, Cherubino, hurled into convulsive, timid then bold, centrifugal cascades of sketchy attempts to abate its torment, is surely in his music, necessarily given to a woman, a supreme triumph of human imagination; while the Figaro — a strong and vigorous figure impressed even on da Ponte's imagination — is in the composer's incarnation supplied with a moving humanity in full compensation for his over-supply of slick sharp wits.

Countess Almaviva is a lay figure if a libretto ever showed one. In the greatest uninterrupted sequence of imperishable, unbelievable stage music ever written — the finale of Act II — Mozart takes this rather quiescent victim of a husband's waywardness into complicity with vivacious, disingenuous, cunning and ruthless mendacity, altering her flaccid habitual contour into a delightful and appealing, intimidating human guise. This woman and Suzanna, defending themselves with all their weapons against just and unjust suspicions, befuddling and anguishing the males they love, twisting with exquisite desperation to escape the catastrophe imminent from their indiscretion, have been painted life-size, fragile and tough in an unforgettable music incomparably illustrative of transcendent, luscious, perfumed and elegant unconquerable bitchery. It is an impossibility for a sentient man to hear the second act of *Figaro* without acquiring a deepened respect for the resources of womanhood.

In writing the vocal parts for *Figaro*, Mozart, who wrote in a multitude of styles, maintained in this opera more than anywhere else a manner which, although he developed rather than invented it, we think of as Mozartian. This features an utterance, particularly from the women, of supple and fluent purity of line, and an avoidance of obvious bravura display (which for other dramatic effect he used aggressively elsewhere, notably in the *Magic Flute* and the *Seraglio*). It is significant that in *Don Giovanni* and *Figaro*, the greatest of operas, tenors who are capable of the greatest vocal excesses, are used only in subordinate roles. In *Figaro* the feminine voice must most especially

seem to float often, ethereal and even, as if an emanation without propulsive force. Rare is the woman who can do it beautifully with the invisible carry necessary to reach an audience. *Figaro* is full of this kind of vocal difficulty, and the recitative which maintains much of the play requires agility, distinction and intelligence. The recitatives for the men denote extraordinarily their character, and require a thorough mastery by singers of the first quality.

Thus the *Marriage of Figaro* has exceptional demands to make of the members of its cast, and in three recorded versions we have the remarkable feature that there is not a bad singer in the lot. A few are no more than adequate, but the majority are emphatically more than good and some are so rarely good that we have reason to give thanks that so many could be found to appear together.

The earliest version, Glyndebourne, has been since its issuance a true phonographic classic. It is delivered in a most consistently delicate-styled way by a completely unified company under the direction of the regretted Fritz Busch. There is no escape from modal integrity in this performance, which more than the others emphasizes the symphonic aspect of the opera. As Figaro, Willi Domgraf-Fassbänder has the richest voice, and is perhaps, as a whole, the best of the three. The Glyndebourne Almaviva, Roy Henderson, handles recitative better than any of the men in any part in the three versions, and his consistently aristocratic intonation — a dramatic necessity — has a most easy and natural color. The women are more than competent, particularly excellent in point of style. The notes originally accompanying the three albums of this edition, by Walter Legge, are not unworthy of the work.

The fault of the edition is its age. The technical qualities of the recording in 1934 are very superior for 1934; and even now the 78's are highly listenable, with good timbre, fair definition and very good balance. We should call the range narrow today, but this will not be noticeable on many phonographs. The LP's have not been heard by the writer, but it is assumed on the basis of the revealed proficiency of the Victor engineers, that the LP's will be tonally somewhat superior to the prototypes, allowance made for some increase in low-frequency background noise.

The new Columbia edition by members of the Vienna National Opera lavishes an amazing vocal opulence. The women particularly are unsurpassed, with sure technique carrying the round endowment of their voices to near perfection. The men are little behind them; for if George London's Almaviva has less distinctive style than Henderson's, it has a greater warmth and breadth of essential voice while Erich Kunz, Figaro, cannot be reproached for anything. The orchestra is very rich, Karajan's direction of it not dissimilar at any important point from Busch's leadership of the Glyndebourne band. The recording as such belongs to the best current standards, with a very conscientious insistence on repressing the voices into coöperation with the orchestra. Definition is naturally superior to that of the older version.

The qualities specified form a basis for the most captivating performance of *Figaro* this writer has ever heard. Columbia here was right on the brink of producing a

masterpiece of the recording art, quite possibly an imperishable classic. At this point some of those wondrous strategists whose subtly concocts phonographic decisions of a kind so recondite that music lovers can never hope to understand them, intervened determinedly to prevent the calamity of integral triumph. A decision of the utmost spectacular boldness was taken, in accordance with what abstruse rationale no music lover will ever understand. The *recitativo secco*, borne by all the characters, bearing the plot and expressive of minutiae of sentiment and impulse, has been cut out; from beginning to end, all excised. What is left is a senseless and formless monster of exceptional, continuous and clashing beauty, a parade of disconnected wonderful essays on the art of singing; flesh and blood without bones and sinews: a gorgeous tragic monument to Olympian ineptitude.

Compared to the rival editions Cetra-Soria is deficient in vocal ripeness. Without exception, the five principals from Vienna and the five from Glyndebourne have a native beauty of tone superior to that of the corresponding singers from Italy. And yet the latter are all good, and not deficient in dramatic *brío* compared to the others. Furthermore, Tajo's Figaro, less sensuously suave than his rivals', has a forcefulness as frequently appropriate as Domgraf-Fassbänder's insinuation. Gatti is a very persuasive Countess although her soprano has not Schwarzkopf's round splendor; and the versatile intelligent intonation of the Suzanna, Alda Noni, is unmatched. There will be surprise and intermittent discomfort at Previtali's occasionally relaxed direction, which at first can seem the product of indifference. It becomes apparent after a time that this is not so: the conductor's retarded tempos are employed for dramatic contrast and to heighten emotion, and skill of a high order is evident in the ordered equability with which the orchestra adheres to the slowing down of such moving measures as the introduction to *Porgi amor*. Here and elsewhere the treatment is effective and admirable; in some places a brisker movement seems preferable. If there is some loss of sparkle accompanied by some dents in the formal outline there is an increment of warmth, a revelation of hidden harmonic detail. This edition has the imposing merit of sounding better at the third playing than at the first.

The sonic registration is peculiarly excellent. In naked engineering terms the Columbia has fewer faults and is somewhat brighter, whereas the Cetra has some variations in volume, a few moments' difficulty with concerted voices and some saliency of Tajo's voice on one side of a disc. But overriding these slight defects is the solid capture of an orchestra in perfect balance with a remarkable realization of string tone as heard in the theatre. The recording emphasis is centered at a somewhat lower point in the cyclic range than the Columbia engineers preferred, and this deepening of response coalesces very aptly with Previtali's graver direction.

All three versions observe some cuts conventional in performance besides Columbia's sensational elimination of all the recitative. Glyndebourne makes the most extensive cuts of accompanied music and also omits some relatively unimportant recitative. In the Glyndebourne

edition the "unaccompanied" (*secco*) recitatives are accompanied by a piano, in the Cetra, by a harpsichord. Librettos in both Italian and English are furnished with the three editions, the Glyndebourne translation by Faith Mackenzie, the Cetra by Edward J. Dent and the Columbia a singing version of older vintage.

Which is the most desirable? Well, the Glyndebourne is the most expertly stylized by Busch's unified concept. The Columbia is the most superbly sung. The Cetra, humbler, is also the most human. With all its wonder the mutilated Columbia will presumably be unacceptable to Mozartians. The re-recorded tonal values of the Glyndebourne may fall too far short of the convincing realism of the Cetra. It would be prudent to compare Victor and Cetra side by side. Presumably either exclusive choice will produce regret for the one excluded.

CIMAROSA: *Il Matrimonio Segreto*.

Opera buffa in two acts to a text by Giovanni Bertati after a play by Colman and Garrick. First performance in Vienna in 1792. Recorded in 1951 by Cetra-Soria on three double-sided LP records, No. 1214. Cast: Sesto Bruscantini (bs), Ornella Rovero (ms), Alda Noni (s), Giulietta Simionato (ms), Antonio Cassinelli (bs), Cesare Valletti (t). Orchestra of the May Festival, Florence, 1950, conducted by Manno Wolf-Ferrari.

Buffa, an Italian art-form, was glorified beyond concurrence by the Bavarian Mozart, but human vanity and temerity allowed many men, some very talented, to contend for his laurels. But the formula for making Mozart is unique and remains unknown. What the best of his successors achieved was a reflection of his manner and a modicum of his essence. The most brilliant reflection was Domenico Cimarosa's *Secret Marriage*, produced with enormous success in the city where Mozart's successes had been without substance, the year after the composer of *Figaro* had died there in misery.

Il Matrimonio Segreto has been steadily maintained in the operatic repertory ever since. If it is not Mozart, it is a good superficial facsimile. It exhibits in abundance those qualities popularly considered the core of Mozartness: grace, elegance, lofty taste and refinement. (This estimate of Mozart gets to the heart of the composer by scratching his finger; it appraises the handwriting and not the message.) Cimarosa's masterpiece is actually better than a pale imitation of Mozart's method. It shows an instinctive sense of form, with a lively invention shaping the brightly varied melodic geometry. Cimarosa could not reveal and forever fix a character unforgettably as Mozart could, but he could imply it, and the implications, if not profound, are apt and pungent.

The Secret Marriage is froth, high comedy relieved by low in the light farcical tradition. Impediments are put in the way of desires in the first act and tumultuously removed in the second. The desires are familiar, concerned with love, fortune and prestige. An anxious spinster relative replaces the customary soubrette (after the miraculous *Despina* of *Così fan tutte*, composed two years earlier, had left practically nothing for a soubrette to do). Young

love thwarts the comic concupiscence of one of the first of a long procession of opulent stage milords.

The Cetra version of this engaging and spirited fluff is the only one recorded. The performance is one of highly stylized distinction, but unfortunately the technical qualities of the discs fall below the Cetra standard. Intermittently there is both vocal and orchestral opacity, and long extents of the music are burdened with thudding background noises. Were there another edition this one would not be considered, but another lacking, it was felt that the only recorded example of post-Mozart Mozartian buffa could not be ignored.

VERDI: *Falstaff*.

Comedy in three acts to a text by Arrigo Boito after "The Merry Wives of Windsor". First performance in Milan in 1893. Recorded in 1949 by Cetra-Soria on three double sided LP records, No. 1207. 1 hr. 54 mins. Cast: Giuseppe Taddei (bnc), Saturno Meletti (bnc), Emilio Renzi (t), Gino Del Signore (t), Giuseppe Nessi (t), Cristiano Dellamangas (bs), Rosanna Carteri (s), Lina Pagliughi (s), Anna Maria Canali (ms), Amalia Pini (ms). Chorus and orchestra of Radio Italiana conducted by Mario Rossi.

This mighty musical monument to hilarity is not generally classed as buffa because neither composer nor librettist termed it such; but it seems to meet the definition to perfection, and no scruples of terminology are going to deny the greatest Italian comedy in music by an Italian its buhdy place in this outline.

The magic old man was nearly eighty when he composed his masterpiece to one of the finest librettos ever presented to a composer of any quality, and easily the best musical adaptation of a Shakespearean text we have. Boito was a latter-day E. T. A. Hoffmann with profundity substituted for fantasy — poet, historian, composer, journalist, librettist and soldier. He translated Wagner and the late influence of the gigantic German must have influenced Boito to influence Verdi to a readjustment of his operatic way, especially with the old composer already piqued — but not resentful — by his German coeval's contemptuous reference to the Verdi orchestra as "a gigantic guitar".

Hitherto the buffas we have examined are comedies of manners by eighteenth-century composers disciplined by the niceties of the most elegant of centuries. *Falstaff* was composed at the twilight of a century progressively brutifying itself, and its setting is a middleclass milieu in Elizabethan England, an uncouth spot in an adolescent empire in a rough era. Verdi's historical instinct, and Boito's, were as quick as their historical interest. The baseness in *Falstaff* is in itself no more atrocious than the baseness in *Figaro*; but the expression of baseness must aesthetically and historically coincide with the manners of a period which differed as much from Mozart's as the north wind from the south. There is no delicacy in *Falstaff*. The comedy is brandished. The characterizations are burly and immutable. The action is breathless, and the orchestral commentary browbeating. There is no time here for the set-pieces of conventional Italian opera, no insinuating melody justified by its own insinuation. The crowded concerted scenes overwhelm with the accumulation of confusion inherent in the medley of primitive impulses. There is an immense musical babble proportioned to Falstaff's belly, and the subtle individual comments will not be clear at the first hearing or the third. This endows the work with some of the durability of a Beethoven symphony, in which there is always something new to be heard.

The Cetra edition is very good. A full-bodied and brazen recording expresses both the tumult and the detail with shattering realism; and in this opera, where above all others the conductor is boss, Rossi drives his capable subordinates relentlessly through their boisterous paces. It is entirely a credit to all concerned, and not likely soon to become obsolete.

This survey may be reproached for omitting *Così fan tutte* and *The Barber of Seville*. But the first does not exist on LP, and the second, in spite of its easy-going excellence, is so terrifyingly inferior to *Figaro* — exploiting the same characters — in all the miraculous perceptions that make Mozart incomparable, that the writer felt himself simply unable to do justice to Rossini in a discussion centering on Mozart.

Record Critic's Home System

Several readers have suggested that criticism of the sound on phonograph records would have greater validity if the type of equipment used by our record critics were indicated. The suggestion is a good one, but hard to answer specifically.

For instance, the accompanying illustration shows one end of C. G. Burke's living room at the time when he was reviewing records for this issue of HIGH-FIDELITY. The other end was occupied by a group of five speaker enclosures!

We admit, this "mess" is not customary. Burke has been in the throes of collaborating on a book, "The Saturday Review Book Of Recorded Music and Sound Reproduction" which will be published shortly. He wanted to conduct comparative listening tests and, as is more than evident, equipment manufacturers cooperated wholeheartedly!

By comparison, John Indcox strikes a note of complete simplicity. His equipment includes a Pickering cartridge and preamplifier, custom-built amplifier, and a three speaker system which uses an Air-Coupler for the low frequency end.



RECORDS OF THE GREAT

Last August, *House Beautiful* devoted an entire issue to the subject of music in the home. It was a most stimulating issue, full of worthwhile suggestions and ideas. One feature in particular caught our attention: Ten famous artists prepared for *House Beautiful* a brief tabulation of those selections which he or she would choose to form the core of a record library. However, no particular recordings of recommended selections were specified. In some cases, as many as twelve recordings of a single work are available!

So we put the question to John Indcox, asking him to supplement the *House Beautiful* lists with his recommendations as to which of the available recordings he considered the best—best, from the point of view not only of musicianship but also of recording technique. Here are his suggestions and comments (in italics):

JENNIE TOUREL, mezzo-soprano

- Mozart "Ach, ich fuhls" from *The Magic Flute*
Tiana Lemnitz, Victor LP: Album LCT 6101
- Verdi "Ave Maria" from *Otello*
Rosa Ponselle, Victor LP: LCT 10
- Albéniz Ibéria
Claudio Arrau, Columbia LP: ML 4194
- Schubert *Die Schöne Müllerin*
No domestic recording is entirely satisfactory and it is necessary to turn to the Aksel Schlotz performance on HMV 78 rpm: DB 9115-9122
- Verdi "Addio del passato" from *La Traviata*
Claudia Muzio, Columbia LP: ML 4404
- Moussorgsky *Pictures at an Exhibition*
Vladimir Horowitz, Victor LP: LM 1014

DOROTHY KIRSTEN, soprano

- Puccini *Madame Butterfly*
Complete opera by Metropolitan, Columbia LP Album SL104
- Ravel *Daphnis et Chloé—both suites*
Ormandy and Philadelphia Orch., Columbia LP: ML 4316
- Gershwin *Porgy and Bess*
Anne Brown, Todd Duncan etc., Decca LP: DL 7006. Although this is an abridged version of the Gershwin work, and the recording dates from the late thirties, I prefer it to the recently issued Columbia version on LP: SL 162
- Handel *Water Music Suite*
Bales, National Gallery Orchestra, WCFM LP-2. In-

cludes music not found in the recordings by Ormandy (Columbia LP: ML 2054) or Van Beinum (London LP: LLP 214)

- Charpentier Louise
Vallin, Thill etc., Columbia Set MOP 12 (78 rpm.). Deleted this month from the Columbia catalog, but still available in many stores. This is an abridged version made when both Vallin and Thill were at their best.

JAN PEERCE, tenor

- Brahms *Concerto No. 2*
Serkin, Ormandy and Philadelphia Orch., Columbia LP: ML 4014. I prefer this to the bravura performance of Horowitz and Toscanini, recently reissued on Victor LP: LCT 1025.
- Sousa *Stars and Stripes Forever*
Toscanini, NBC Symphony Orch., Victor 11-9188 (78 rpm.)
- Bach *Concerto for Two Violins and Orchestra*
Heifetz, RCA Chamber Orch., Victor LP: LM 1051
- Grieg *Concerto for Piano and Orch.*
Rubinstein, Dorati and RCA Symphony Orch., Victor LP: LM 1018
- Rimsky-Korsakov *Scheherazade*
Monteux, San Francisco Symphony Orch., Victor LP: LM 1002
- Bach *Arias*
Very large number available
- Romberg *Gems from Sigmund Romberg Shows*
Selections from this composer's many operettas and musical comedies may be found on Victor LP: LM 74; LM 89; LM 93
- Rodgers *Selections from Oklahoma*
Original cast recording, Decca LP: DL 8000
- Chopin *Ballades*
On LP records the most satisfactory recording is that by Casadesu on Columbia LP: ML 2137 . . . though it does not compare with the old Cortot performance on Victor DM 399, now deleted from the catalog and quite difficult to find.
- Debussy *La Mer*
Ansermet, Orchestre de la Suisse Romande, London LP: LLP 388
- ANDRE KOSTELANETZ, conductor
- Haydn *Symphony No. 88 in G Major*
Ormandy, Philadelphia Orch., Columbia LP: ML 4109. The Toscanini performance on Victor LP: LCT 7 is one of his least successful recordings.
- Verdi *Requiem*
There is no recording currently available of this choral masterpiece, Victor: DM 734 with Pinza, Gigli, Stignani,

Caniglia, Chorus and Orch. of the Royal Opera of Rome under Srafin, dating from the thirties, having been deleted.

- Mozart Eine Kleine Nachtmusik
Munchinger, Stuttgart Chamber Orch., London: LPS 385
- Stravinsky The Fire Bird Suite
I find it hard to choose between the Ansermet, Orchestre de la Suisse Romande on London: LLP 300, and the Stokowski and Orch., Victor LP: LM 44. I would be quite happy with either.
- Rodgers South Pacific
Original cast recording, Columbia LP: ML 4180
- Gershwin Concerto in F
Levant, Kostelanetz and Orch., Columbia LP: ML 4025

EUGENE ORMANDY, conductor

- R. Strauss Death & Transfiguration
Mengelberg and Amsterdam Orch., Capitol LP: P 8100. Though the recording is not up to present day standards, the Mengelberg performance is excellent.
- Brahms Symphonies No. 1 and 4
Symphony No. 1 — Stokowski and Hollywood Bowl Orch., Victor LP: LM 1070
No. 4 — Krips, London Symphony Orch., London LP: LLP 208
- Beethoven Symphonies No. 3, 5, 7, 9
Symphony No. 3 — Walter, New York Philharmonic Orch. Columbia LP: ML 4228
No. 5 — Walter, New York Philharmonic Orch. Columbia LP: ML 4297
No. 7 — Munch, Boston Symphony Orch., Victor LP: LM 1034
No. 9 — Walter, New York Philharmonic Orch., and soloists, Columbia LP Set SL 156, two 12-in. records
- Franck Symphony in D Minor
Monteux, San Francisco Symphony Orch., Victor LP: LM 1065
- Debussy La Mer
Ansermet, Orchestre de la Suisse Romande, London LLP 388
- Debussy Ibéria
Reiner, Pittsburgh Symphony Orch., Columbia LP: ML 4021, while superior to the André, INR Symphony Orch. on Capitol LP: P 8132, is none too satisfactory, and I am reluctant to recommend it. A new recording by Ormandy and the Philadelphia Orch., on Columbia LP is due to be released in December.

HENRI TEMIANKA, violinist

- Schumann Quintet
Rubinstein and Paganini Quartet, Victor LP: LM 1095
- Beethoven Violin Concerto
Heifetz, Toscanini, NBC Symphony Orch., Victor LP: LCT 1010
- Haydn Cello Concerto
Feuermann and Orch. under Sargent, Columbia 78 rpm.: Album MM 262. Deleted this month from the Columbia catalog. Probably still available.
- Bach B Minor Mass
Scherchen, Vienna Symphony Orch., Akademie Kammerchor, Westminster LP: 50-57/58/59. A magnificent

performance and recording, vastly superior to the version on Victor: LM 6100 by Shaw, RCA Victor Chorale and Orch.

- Beethoven Quartet No. 5, Op. 18
Paganini Quartet, Victor LP: LM 1052
- Ravel Quartet
Stuyvesant Quartet, Philharmonia LP: 104
- Schubert Die Winterreise
Hans Hotter, Decca LP: set DX 111, two 12-in. records
- Mozart G Minor Quintet
Griller Quartet, Gilbert, viola, London LP: LLP 132
- Stravinsky Petrouchka
Ansermet and Orchestre de la Suisse Romande, London LP: LLP 130
- Chopin Either the Etudes, Nocturnes, Mazurkas, or Ballades
Etudes, Brailowsky, Victor LP: set LM 6000 two 12-in. Nocturnes, Rubinstein, Victor LP: LM 6005 two 12-in. Mazurkas, Rubinstein, Victor 78 rpm., albums DM 626 and 656
Ballades, Cortot, Victor 78 rpm., album DM 399

LILY PONS, soprano

- Donizetti Lucia di Lammermoor
Pagliughi, Malipiero etc., Cetra LP: set 1205
- Debussy La Chevelure
Jennie Tourel, Columbia LP: ML 2184
- Mozart Requiem
Krips Soloists and chorus, London LP: LPS 230/231
- Songs of the Auvergne
Madeleine Grey, Columbia 78 rpm., set MM 758. I understand that Columbia is releasing this on LP in December.
- J. Strauss Voices of Spring
Krauss, Vienna Symphony Orch., Capitol LP: P 8061

SIGMUND ROMBERG, composer

- Schubert Unfinished Symphony
Krips, London Symphony Orch., London LP: LPS 209
- J. Strauss Tales from the Vienna Woods
Ormandy, Philadelphia Orch., Columbia LP: ML 2041
- Wagner "Liebestod" from Tristan und Isolde
Kirsten Flagstad, Victor 15964 . . . contained in Victor 78 rpm.: set DM 644
- Debussy Clair de Lune
The beautiful Gieseeking performance on Columbia 78 rpm., record 17166-d disappeared in the recent slashing of the Columbia catalog. If you can find it, buy it. George Copeland's on MGM LP: E 526 is satisfactory, but lacks the magic of Gieseeking's playing.
- Gilbert & Sullivan Selections from H.M.S. Pinafore
D'Oyly Carte Company, London LP: LLP 71/72
- Dvorak Largo, from the New World Symphony
You will have to take the complete symphony to get this 2nd movement of the Dvorak work, and I would suggest the Stokowski and Orch., Victor LP; LM 1013
- DeFalla Fire Dance
This is but one section from DeFalla's ballet score El Amor Brujo, best performed by Stokowski, Hollywood Bowl Orch., Victor LP: LM 1054. A good performance of the Ritual

- Fire Dance* is available on Victor 12-0977, done by the Boston "Pops" Orch., under Fiedler.
- Herbert Selections of Victor Herbert Music
Kostelanetz and Orch., Columbia: ML 4437
- Gershwin Selections of George Gershwin Music
Kostelanetz and Orch., Columbia: ML 2026
- RISE STEVENS, mezzo-soprano
- Bach Brandenburg Concerto No. 2 in F
Munchinger, Stuttgart Orch., London LP: LPS 226
- Mozart Jupiter Symphony
Beecham, Royal Philharmonic Orch., Columbia: ML 4313
- Wolf "Mignon"
There is no recording of this work currently available in any domestic catalog. For those who share Miss Stevens' enthusiasm for the Wolf songs:
No. 1 . . . Heiss mich nicht reden
No. 3 . . . So lasst mich scheinen
are both contained in the HMV Hugo Wolf Society Album Volume 6, sung by Marta Fuchs.
No. 2 . . . Kennst du das Land
sung by Kirsten Thorborg on Victor 18079 is very hard to find, having been cut out of the catalog for some time.
- Smetana The Moldau
I prefer the Szell, New York Philharmonic Orch., Columbia LP: ML 2177, to that of Toscanini, NBC Symphony Orch., Victor LP: LM 1118
- Debussy Pelléas et Mélisande
Joachim, Jansen Cernay etc., Victor LP: set LCT 6103 three 12-in. records, Victor has just issued this marvelous work in a fine performance by French artists.
- Puccini La Tosca
No recording is available of this opera. Columbia's old 78 rpm. set MOP 6 having been deleted. It is just possible that Cetra will get around to this soon.
- Gershwin Concerto in F
Levant, Kostelanetz and Orch., Columbia LP: ML 4025
- Brahms Violin Concerto in D
Rybar, Moltkau and West Austrian Radio Orch., Concert Hall LP: CHS 1113
- R. Strauss Der Rosenkavalier
For the complete opera Urania LP: set 201, is available, though I am not exactly hypnotized by the work of Baumer or Lemnitz. On Columbia LP: ML 2126, are some excerpts from the work beautifully sung by Schwarzkopf and Seefried, which I can recommend.
- Beethoven Fidelio
The only available recording is the Oceanic LP: set 301 . . . another rather disappointing performance by Baumer, makes it less than acceptable.
- CLAUDIO ARRAU, pianist
- Mozart The Magic Flute
This month's release of the Berger, Lemnitz, Roswaenge Husch, with Beecham and the Berlin Philharmonic Orch. and Chorus, Victor LP: set LCT 6101, restores to the catalog a gem, long admired.
- Verdi Act III Duet from Rigoletto
Pagliughi and Sved, Cetra LP: 50003
- Debussy Reflets dans L'Eau
Gieseking, Columbia LP: ML 2188
- Schubert Sonata in D Major
If you can find the old Schnabel recording on Victor 78 rpm., DM 888, I would suggest you take it.
- Rossini "Una Voce Poco Fa"
A superb performance by Supervia is to be found on Decca LP: DL 9533
- Fauré L'Horizon Chimérique
You will be well rewarded if you can discover the deleted Victor album DM 476 by Charles Panzera.

LIST OF LP RECORD MANUFACTURERS

Academy Records, 201 West End Ave., N. Y., N. Y. — *Classic piano*

Aladdin Records, 451 N. Canon Dr., Beverly Hills, Calif. — *Race records*

Alco (Musart Record Co.), 8373 Melrose Ave., Los Angeles 46, Calif. — *Serious music in contemporary idiom*

Allegro Music, 2 Columbus Circle, N. Y., N. Y. — *Considerable repertory of discs representing all periods*

Apollo Records, 457 West 45th St., N. Y., N. Y. — *Modern Jazz; some race*

Artist Records, 1653 North Argyle, Hollywood, Cal. — *Mainly modern music*

Atlantic Records, 234 W. 56th St., N. Y., N. Y. — *Modern piano specialists; some race*

Bach Guild Records, 799 Broadway, N. Y., N. Y. — *The name reveals the specialty*

Banner Records, 33 Union Sq. West, N. Y., N. Y. — *Musical comedy tunes; some jazz*

Barrok Records, 309 West 37th St., N. Y., N. Y. — *Devoted almost exclusively to the works of Bela Bartok*

Bibleton Records, 50 East 11th St., N. Y., N. Y. — *Sacred music*

Blue Note Records, 767 Lexington Ave., N. Y., N. Y. — *Jazz re-issues*

Brunswick (Decca Records), 48 West 57th St., N. Y., N. Y. — *Swing and jazz re-issues*

Capitol Records, 1507 N. Vine St., Hollywood, Cal. — *Large catalog of records of all types*

Cetra-Soria Records, 38 West 48th St., N. Y., N. Y. — *Principally but not exclusively: an impressive list of Italian operas*

Circle Records, 778 Tenth Ave., N. Y., N. Y. — *Jazz and Dixieland; Jelly Roll Morton's Library of Congress records*

Classic Editions, 47 Norfolk St., N. Y., N. Y. — *Classical music and some operas*

Colosseum Record Co., 27 William St., N. Y., N. Y. — *Russian music principally*

Columbia Records, 1473 Barnum Ave., Bridgeport, Conn. — *Instigator of LP; extensive repertory of all kinds of music*

Commodore Record Co., 136 East 42nd St., N. Y., N. Y. — *Jazz, swing and Dixieland re-issues*

Concert Hall Society, 250 West 57th St., N. Y., N. Y. — *Sizeable and growing catalog of music of every epoch*

Continental Record Co., 263 West 54th St., N. Y., N. Y. — *Some operatic recitals; also popular records*

Coral Records, 48 West 57th St., N. Y., N. Y. — *Popular music; some jazz re-issues*

Dana Music Co., 120-33 83rd Ave., Kew Gardens, N. Y. — *Polkas*

This list includes only those companies which are currently active and about which we have up-to-date information.

Decca Records, 50 West 57th St., N. Y., N. Y. — *Cover all fields*

Dial Records, 520 West 50th St., N. Y., N. Y. — *Records of modern composers*

Discovery Record Co., 707 N. Irving Blvd., Los Angeles, Cal. — *Jazz and race*

EMS, Record Producers, 1847 Broadway, N. Y., N. Y. — *Tiny list of good records*

Esoteric Records, 75 Greenwich Ave., N. Y., N. Y. — *Obscure and esoteric items; Charley Christian guitar recital; Muzio re-issue*

Eterna Records, 778 Tenth Ave., N. Y., N. Y. — *Re-issue of old German Odeon; Tauber, Slezak, Schwarz*

Festival Recordings, 125 Mt. Vernon St., Boston, Mass. — *A few records of great choral music*

Folkways Records & Service Corp., 117 West 46th St., N. Y., N. Y. — *Ballads and folk songs*

Goodtime Jazz Record Co., 707 N. Irving Blvd., Los Angeles, Cal. — *Modern Dixieland; Firehouse Five plus two*

Handel Society, 250 West 57th St., N. Y., N. Y. — *Two oratorios*

Haydn Society, 30 Huntington Ave., Boston, Mass. — *An unprecedented catalog of*

Continued on page 48

RECORDS

in REVIEW

J. F. INDCOX • C. G. BURKE

NOTES ABOUT

RECORD REVIEWS

To facilitate reference to this section, all classical LP releases are arranged alphabetically by composer. Miscellaneous collections, not normally identified by composer, are collected at the end of the record review section.

Where two or more composers appear on one record, the reviews are cross-referenced but not repeated.

Playing time is reported for each release and, unless otherwise indicated, is the total for both sides of a single disc or, in the case of albums, is the total for all records in the set.

The Editor welcomes suggestions for improving the Records in Review section of HIGH-FIDELITY.

BACH, J. S.: *Musical Jubilee*

E. Power Biggs, Organ. Columbia Chamber Orch.; Richard Burgin, cond. Columbia 12-in. ML 4435. 40 mins.

A collection of twelve Cantata movements and Organ Chorale-Preludes: Sinfonia to Cantata No. 29; Chorale-Prelude, in Dulci Jubilo; Chorale-Prelude, Rejoice, Beloved Christians; Concerto and Chorale "Alleluia" from the Christmas Cantata No. 142; Chorale, Jesu, Joy of Man's Desiring from Cantata No. 147; Chorale-Prelude, In Dulci Jubilo (Fantasia); Chorale: Now Christ doth end in triumph, from the Christmas Oratorio; Duet, My Spirit Be Joyful, from the Easter Cantata No. 146; Sheep May Safely Graze, from the Birthday Cantata No. 208; Chorale-Prelude, Now thank we all our God, from Cantata No. 79; Sonata to Cantata No. 182; and Chorale, Awake thou wintry earth, from Cantata No. 129. — We list here the various selections because some of them are out of the ordinary and seldom found before on records. Otherwise, there is nothing unusual about this disc, except possibly the ability of the flutes — usually thought of as rather timid instruments

easily cowed by a mighty organ — to put this organ completely to rout. In fact, all the instruments used in the orchestra appear to be at least 500 ft. nearer the listener than the organ . . . definitely poor microphone balance, to our way of thinking. E. Power Biggs plays as he always has and, apparently, always will: punctiliously, precisely, intellectually, without ever raising his voice (or that of the organ) in even a faint glimmer of emotion. We do not believe that Bach never wept, never shouted.

The recording is unexciting, technically. Hi-fi fans looking for rolling pedal notes will not find them on this recording. — D. A.

BACH, J. S.: *Italian Concerto* • *Four Duets* • *Aria with Ten Variations in the Italian Style*

Rosalyn Tureck, piano. Allegro 12-in. AL 1117. 42 mins. total.

This is the sixth LP in the Allegro series of Bach recordings by Miss Tureck. Eventually, this accomplished Bach authority will record all of the works in Bach's *Clavierübung*.

No fault can be found in the musicianship, and but little in the recording technique. In this group of reviews, we had occasion to listen to an unusually large number of piano recordings. This disc comes closest of any to matching the hard, clean, and crisp tonality of the Liszt *Sonata in B Minor* on London. The Allegro piano has the same definition, the same overall balance of tone reproduction, but it sounds thinner and lacks to a small degree the presence of the London Liszt. This may well be a difference in pianos, rather than in recording technique, and it will be a matter of personal taste which is preferred.

The piano here is slightly wavery in spots, a hazard of tape recording, and the surfaces of the record tend to be crackly. Aside from these rather minor flaws, this is a worthwhile piano recording, particularly since some of the music is given its LP première. — D. A.

BARTOK: *Mikrokosmos* (excerpts)

Bela Bartok, piano. Columbia 12-in. ML 4419. 46 min.

Of the one hundred and fifty-three pieces that go to make up the six volume work of Bartok's known as *Mikrokosmos*, thirty-five

are presented here, with the composer at the piano. This is number three of the new Columbia series "Meet the Composer", and by all odds the most interesting. Never before have as many of these short studies been available on records, and they should prove of the greatest value to students interested in the style and technique of modern composition.

Columbia has done a remarkable job of transferring these to LP, since they were originally made around 1942. The piano tone approximates much that is being released today, and the composer is in remarkable form.

Surfaces are excellently quiet. — J. F. I.

BEETHOVEN: *Piano Sonatas No. 9 in E, Op. 14, No. 1* • *No. 24 in F Sharp, Op. 78* • *No. 31 in A Flat, Op. 110*

Kurt Appelbaum. Westminster 12-in. WL 5090. 14, 10 and 21 min.

This is an amusing diversification of Beethoven and virtuoso playing of a very musicianly sort, completely controlled by a solid conception, biting in *staccato* and fluid in *legato*. Good piano sound in this best-to-date of the Appelbaum series of the thirty-two sonatas. — C. G. B.

BEETHOVEN: *Piano Sonatas No. 11 in B Flat, Op. 22* • *No. 14 in C Sharp Minor (Moonlight) Op. 27, No. 2*

Kurt Appelbaum. Westminster 12-in. WL 5078. 26 and 16 min.

Beethoven entitled *No. 14* very carefully "Sonata quasi una Fantasia". A contemporary's moonshine tagged it "Moonlight". The tag is convenient, not particularly inappropriate, and is certainly going to last. Mr. Appelbaum plays the eponymous opening adagio with an undeviating restraint to set off his prim allegretto and tumultuous finale. This way is worth imitation: we usually have an opening tone-poem trailed by two subsidiary irrelevant additions. The recording is above average for the instrument, and this is probably as good a version as the phonograph has vouchsafed.

No. 11 is a superb indication that the old sonata, as Beethoven had found it, was about to burst under his virile imagination. This one has been neglected mainly because Beethoven wrote thirty-one other

sonatas. Here we have it in a fluid, understanding and direct statement — persuasive indeed; while the piano is reproduced with an exactitude unsurpassed by many records. — C. G. B.

BLOCH: *Schelomo*

See SAINT-SAENS.

BOCCHERINI: *Flute Quintet in E Flat*

See HAYDN

BRAHMS: *Sonata No. 1 in G major for violin and piano*

Isaac Stern, violin. Alexander Zakin, piano. Columbia 10-in. ML 2193. 27 min.

This is a tender and lyrical sonata . . . dark and introspective in mood. An undercurrent of humor runs throughout; the third movement is gay and utterly charming.

Stern's approach is just right, both in tempo and dynamics. Playing with gleaming tone and spirited affection, he gives the best performance I have heard of the work.

The recording is remarkable for its faithful transference of violin tone: full, suave, at times glistening, but never edgy. Zakin gives excellent support at the piano.

Surfaces are none too quiet, and the piano might have been a little nearer the mike. — J. F. I.

BRAHMS: *Symphony No. 1 in C Minor, Op. 68*

Berlin Philharmonic Orch.; Joseph Keilberth, cond. Capitol 12-in. P 8153. 43 min.

This is a massive recording, with very heavy bass and forward treble, both correctable by flexible amplifiers, presenting what is certainly the best realization of the monumental architecture of this Symphony yet to have appeared on LP's. It is a granite structure that the conductor and orchestra re-create, and the somewhat deliberate tempos and heavily-blocked chords are part of the scheme to make the edifice everlasting. — C. G. B.

CHAUSSON: *Poème (for violin and orch.) Op. 25*

SAINTE-SAENS: *Introduction and Rondo Capriccioso, Op. 28*

Zino Francescatti, violin. Philadelphia Orch.; Eugene Ormandy, cond. Both on Columbia 10-in. ML 2194. 16 and 9 min.

A neat opportunity for violin and orchestra to display their versatile virtuosity, since the first of these short concertos is all introspection and the second, all dash. It is a bold recording in which the violin is big and the orchestra bigger. Francescatti specializes expertly in these things which are child's play for the Philadelphians. Good in all respects, after unusually drastic treble reduction has been effected. — C. G. B.

CHOPIN: *Preludes 24, Op. 28*

Claudio Arrau, piano. Columbia 12-in. ML 4420. 40 min.

In recent years Arrau's excursions into the recording studio have produced nothing

that has added to his stature as a pianist. Nor will this release do anything to change the status quo, being marred by affectation, odd tempos, and exaggerated dynamics. It is all the more disappointing since we need a good modern recording of these pieces. The Novas, of recent issue, appealed only slightly more to me than this — some peculiar liberties with the work having been taken by her.

On the recording as such, Columbia has done a rather handsome job, fine full tone, occasionally slightly percussive, but the piano seems rightly placed. I notice some flutter on my copy, and the surfaces are not as quiet as one expects today. — J. F. I.

DEBUSSY: *Nocturnes • Afternoon of a Faun • Clair de Lune*

Women's Chorus, trained by Robert Shaw. Leopold Stokowski, and Orch. RCA Victor 12-in. LM 1154. 26, 10 and 5 min.

A ripe and blooming reproduction of a splendid orchestra, sensuously and beautifully responsive to a direction of straining, lingering and over-ripe languor. — C. G. B.

GRIEG: *Concerto in A Minor For Piano, Op. 16*

Walter Gieseking. Philharmonia Orch.; Herbert von Karajan, cond. Columbia 12-in. ML 4431. 29 min.

In poised and proportioned articulation, in an innate sense of interval and the hands to assert it, Gieseking has no peer at the keyboard. The distinctness of his attack persists even when he is most vigorous, and the incised refinement of his utterance is notable in everything he plays. The quality, deftly complemented by Karajan's sharp direction of the excellent Philharmonia Orchestra, restores some of the gloss to this unique concerto so ruthlessly handled in recent years by the predators of Tin Pan Alley. It is preferable in performance to the other versions, but the reproduced sound seems vaguely incomplete. It is not specifically faulted, but there is a persisting, indefinite obscuration of orchestral detail, not flagrant, but discomfiting. — C. G. B.

HANDEL: *Dettingen Te Deum*

Vocal Quartet, Chancel Choir of the National Presbyterian Church, National Gallery Orch., Washington; Richard Bales, cond. WCFM 12-in. LP 6. 44 min.

This magnificent *pompso* acknowledgement of God's benevolence to British arms is the most enduring monument to the lucky victory over the French at Dettingen during the war of the Austrian Succession, a campaign which was led by George II in person and which was the last time an English monarch took the field. No one expresses the might of Godhood — even periwigged — more powerfully than Handel, and if the *Dettingen Te Deum* is a little less flamboyant in its worship than the *Royal Fireworks*, after all the King was more tangible. Basically, a *Te Deum* is a paean congratulating the Father for His wisdom in making us victorious, and the alternations of solemn devotion with showy acclaim dominated by high trumpets produce a splendid im-

perial show. The values of this recording — another example of WCFM's sharp program sense — are throughout somewhat above average. Tonal quality is good, the soloists are efficient and the chorus well-trained. The trumpetry of Lloyd Geisler is spectacular. For an ultimate performance it would have been preferable to have more drive, more contrast and a greater sense of dramatics; but this is a *Te Deum*, designed to be sung in churches, and this is a performance better than most churches ever have. — C. G. B.

FRANZ JOSEF HAYDN: *Divertimento in C • Four Marches*

MICHAEL HAYDN: *Divertimento in C*

BOCCHERINI: *Flute Quintet in E Flat* London Baroque Ensemble; Karl Haas, cond. Westminster 12-in. WL 5080. 40 min. (all)

The Eighteenth Century on holiday, although the general lightness of the music was created with the skill that is never seen until pointed out. The principal work is the Boccherini who, thanks to Westminster, is becoming known as a man of stature. The Franz Josef Haydn *Divertimento* is the only piece that can be called familiar, since the composer drew its material from the deep spring of his own works already composed. The performances are invariably expert, and sonic quality is first-class. — C. G. B.

HINDEMITH: *Quartet No. 3, Op. 22*

PROKOFIEV: *Quartet No. 2, Op. 92* Hollywood String Quartet. Capitol 12-in. P 8151. 24 and 22 mins.

RAVEL: *Quartet in F Major* Juilliard String Quartet. Columbia 10-in. ML 2202. 28 mins.

These two discs are juxtaposed for review purposes in order better to compare the sound reproduction. It has been axiomatic that the piano is the hardest instrument to record correctly; these discs tend to refute that axiom and to give top honors (?) to the violin. Perhaps it is not only that the violin is hard to record, but even harder to reproduce: it taxes the pickup and the tweeter.

On the Columbia, the two violins, viola, and 'cello are clean, distinct, and well-separated, sonically, from one another. The balance is good. The plucked strings, toward the end of side 1, are unusually realistic. But the violin has a razor-sharp edge. Adjustment of treble deemphasis did not alleviate the edginess without dulling the brilliance of the ensemble. The feeling of presence — of the quartet being in the living room — is excellent. Possibly, sharp attenuation by means of a treble cut-off control would be the answer — but we do not have such an adjustment and do not feel that we should be required to use one.

On the other hand, the violin on the Capitol is much less wiry and more listenable — but the four instruments as a whole lose brilliance and presence. The separate tonalities are not as distinct as on the Columbia; the feeling is that the quartet is playing in the living room while we sit and listen in an adjacent room.

Further, though the Capitol is better on the extreme highs, the Columbia is better on the middles and lows. Columbia was played back with a turnover point of 300 cycles. With the same setting, the Prokofiev side of the Capitol was so weak that we brashly turned the control up to 800, regretted our haste, and settled at 500. The bass was better on the Hindemith side; we cut back again to 300. However, the highs slipped further into oblivion, and we turned the deemphasis control up from 16 to 8 db. Even so, there was less feeling of presence on the Hindemith side of the Capitol than on the Prokofiev side.

This is the dilemma of the recording engineer; it is also—and more so—the dilemma of the audiophile. Here are two recordings, which should sound identical when reproduced. Yet they definitely don't. And not only that, but two sides of the same record sound different. The reviewer, too, is in a quandary because, considered solely from the point of view of sound reproduction, a recommendation of "best" would depend on the reproducing system. Given a system tending toward hardness and brilliance, the Capitol is to be preferred; given a "soft" system, the Columbia is best.

To help resolve this problem, these records were reviewed side by side.—D. A.

HUMPERDINCK: *Moorish Rhapsody*
Gewandhaus Orch., Leipzig; Hermann
Abendroth, cond. Urania 12-in. 7020.
40 min.

This is an exceptional record in its orchestral naturalness; particularly in view of the elaborate and subtle Wagnerian scoring employed by the composer in this lush, leisurely and heated tour. The orchestral playing is splendid. A very superior disc for those whom superficial North Africa will not cloy.—C. G. B.

IPPOLITOV - IVANOV: *Caucasian Sketches*

TCHAIKOVSKY: *Sleeping Beauty (five excerpts)*
Paris Conservatory Orch.; Roger
Désormière, cond. London 12-in.
LLP 440. 23 and 17 min.

More of the *Sleeping Beauty* has been more richly done by Stokowski on Victor LM 1010, but Désormière's new presentation of the familiar *Caucasian Sketches* is admirable if not arresting. The conductor is restoring this music to a musical condition. We have known it for years as a display vehicle for virtuoso orchestras, whereas Désormière, in reducing speed, lengthening phrases and curbing excess of dynamics, has brought about an emanation of melancholy from these paintings, a suggestion of grimness in the pomp, that most other conductors do not evoke. Aside from background rumble, the disc is technically first-rate and the strings of the Paris Conservatory Orchestra are very effective in velvet *cantabile*.—C. G. B.

LISZT: *Sonata in B Minor*
Nikita Magaloff, piano. London 10-
in. LPS 392. 24½ mins.

We have suggested in another review in this issue that the violin may well supplant the

piano as the most difficult instrument to record and reproduce realistically. This record is evidence that the problems of piano recording can be overcome to a very large extent indeed. The piano tone is bold, clear, and true, giving an exceptionally realistic facsimile of a hard-tuned concert-grand Steinway. Even in the bass there is no appreciable blur or indistinctness; the vibrant quality of the very low notes is quite audible. Balance between highs and lows is good; a turnover of 300 and deemphasis of 12 db. worked well for us. Dynamic range is above average, varying from a whisper to a shout. This is a piano record which may well be added to the library as something against which other recordings can be compared. Not all will like it; the richer, more mellow piano tone reproduced by Westminster may be preferred by some.

Magaloff does a very able job. He may perhaps be criticized for almost too much of a range between—well, whisper and shout, again . . . too much violence, too much tranquility, and from one to the other with too much abruptness. Nevertheless, it's a wonderful recording.—D. A.

MESSIAEN: *La Nativité du Seigneur*
Robert Noehren, organ. Allegro 12-
in. ALG 3030. 40 mins.

We recommend that hi-fi fans, conscious of low frequency reproduction, go right out and buy this record . . . regardless of whether they like or dislike Messiaen's work. It is a record to disprove once and for all the oft-bruited statement that "you can't record 16-ft. pedal notes, anyway". Let these doubters try bands 3, 4, 5, 7 and 9—3 in particular.

Aside from this one aspect of the disc, it is a splendid organ recording of an especially fine organ, that of the Grace Episcopal Church in Sandusky, Ohio. Allegro gives interesting details of the organ in its liner notes, and is to be commended for so doing. The organ tone is full and vibrant. It reminds this reviewer of the old and great organs of Europe, and is startling in comparison with some of the other organs recently heard on records.

We also suspect that even adamant Messiaen dislikers will weaken after listening to certain ones of these *Nine Meditations for Organ*, particularly after the third or fourth playing.—D. A.

MOZART: *Concerto for Two Pianos in E Flat* (KV 365) ● *Concerto for Two Pianos in F* (KV 242)

Paul Badura-Skoda, Reine Gianoli, pianists; Vienna State Opera Orch.; Hermann Scherchen, cond. Westminster 12-in. WL 5095. 26 and 24 min.

Good performances of both exist on an old LP, Columbia ML 4098. This new edition has its principal point of superiority in Scherchen's perceptive and finely-detailed direction of the *Concerto in E Flat*, by far the greater work, and in the more robust recording of this Concerto, which employs a larger orchestra. In the slighter *Concerto in F*, with a reduced band, there is some improvement in all-around tonal values, although not so much as we should have expected from Westminster at this date. The piano brace, palpably proficient in

Mozart, are at their best in the latter work tending to a somewhat portentous expression in KV 242 that its simplicity does not justify.

In its original form, it was written for three pianos.—C. G. B.

MOZART: *Concerto No. 20 in D Minor for piano and orchestra* (KV 466)
Rudolf Serkin, piano. The Philadel-
phia Orch.; Eugene Ormandy, cond.
Columbia 12-in. ML 4424. 30 min.

Some clean, thoughtful, well phrased and finely executed playing by Serkin, which for me is so coolly detached, dispassionate, and devoid of any warmth as to make this release a disappointment. This, the most popular of all Mozart concertos for piano, still awaits an entirely satisfying recording. The Kraus (Westminster WL 5054) and Haskill (Vox PL 6290) are both plagued by pianistic idiosyncracies that make them unrewarding. In general, the recording is beautiful. Surfaces are slightly buzzy, and the piano is a little out of balance—it could be closer.—J. F. I.

MOZART: *Concerto for Horn and Orchestra No. 3 in E Flat* (KV 447) ● *Zaide — Rube Safft* ● *Exsultate, Jubilate (Motet)*, (KV 165)
Mason Jones in the Concerto; Barbara Troxell, soprano, in the aria and the Motet; National Gallery Orch., Washington; Richard Bales, cond. WCFM 12-in. LP 8. 15, 6 and 15 min.

Three delectable items in the best sonic realization yet obtained by this conscientious small musical company. Jones is an insinuating master of his difficult instrument and is well supported by the orchestra in an eloquent reading of the Concerto. The exuberance of Miss Troxell's big, young soprano frequently eludes her control in both the lovely aria from the abandoned sing-spiel and the more familiar Motet.—C. G. B.

MOZART: *The Magic Flute* (complete)
Anton Dermota (t), Sena Jurinac (s), Friedl Riegler (s), Else Schürhof (ms), Erich Kunz (bne), Wilman Lipp (s), Peter Klein (t), Irmgard Seefried (s), Hermine Steinmassl (s), Eleonore Dörpinghans (ms), Annelies Stückl (c), George London (bs-bne), Erich Majkut (t), Harald Pröglhoff (bs), Ludwig Weber (bs), Ljubomir Pantschew (bs), Emmy Loose (s). Chorus of the Friends of Music, Vienna. Vienna Philharmonic Orch.; Herbert von Karajan, cond. 3 12-in. Columbia SL 115. 2 hrs. 8 min.

The four glories of the Victor 78-rpm. catalog have for years been four Mozart operas, including a superb performance of the *Magic Flute* recorded in 1939 with principals of the Berlin National Opera and the Berlin Philharmonic Orchestra conducted by Sir Thomas Beecham. Some assaults have been made upon these glories. The Haydn Society failed in an effort to displace the Glyndebourne *Don Giovanni* despite a vast improvement in recording technique over the old version, and Columbia has fired two barrels in an attack on the *Magic Flute* and the

Marriage of Figaro (examined in the article *Opera Buffa* elsewhere in this issue).

The Victor *Magic Flute* is nearly thirteen years old and has not frayed in the aging. It has been announced for re-issue on LP, but up to this writing has not appeared in microgroove form. The estimate here of the relative values of the Columbia and Victor editions is perforce based on the 78-rpm. albums of the latter.

Both editions are sung and played with stunning mastery by nearly everyone concerned. Starting with first things we find a basic similarity of concept in the direction, with Beecham a little gayer in gay passages and somewhat less grave in grave passages than Karajan, but the differences are of detail, and not in general tendency. Both orchestras are excellent, with the Vienna band more lingeringly luscious, less sparklingly loquacious, than the Berliners. The rich appeal of the Vienna Philharmonic is of course emphasized by the modernity of the Columbia recording which is unfailingly faithful and expansive, whereas the Victor version, definitely in advance of the standards for its time, could naturally not do entire justice to the Berlin Philharmonic potential.

Similarly, direct comparison of the singers engaged in the two versions, when each group has approximately equal merit, risks doing injustice to some in the older recording: Lemnitz, for example, whose voice in the former edition does not show the blooming beauty of Seefried's in the present. The Strienz of that period was a Sarastro superior even to Ludwig Weber, and Hüsich's condescending Papageno had a lush appeal of wonderful voice that no recording inadequacy could thwart. Berger, then, may have been superior to Lipp now, as Queen of the Night, but the evidence of the disc favors Lipp, while Rosewänge's fine Tamino must yield precedence to Dermota's sensuous mastery.

Music-lovers would be wise to await the re-issuance of the Victor version on LP, even if it seems unlikely that it can match the all-around merit of the new edition.

As in the Columbia *Figaro*, all parts not orchestrally accompanied have been omitted from the recording, but whereas the dramatic and formal flow of *Figaro* was evilly distorted by this cavalier treatment, the amorphous and episodic *Magic Flute* endures it without important damage. The complete text is furnished in both German and English. — C. G. B.

PROKOFIEV: *Quartet No. 2, Op. 92*

See HINDEMITH

PROKOFIEV: *Lieutenant Kije Suite, Op. 60* • *Scythian Suite, Op. 20*

Vienna Symphony Orch.; Hermann Scherchen, cond. Both on Westminster 12-in. WL 5091. 22 and 21 mins.

This is the best orchestral recording ever made. It is so exceptionally effective that we face the dismal prospect of hearing Lieutenant Kije as a test recording on all sides until all manufacturers have attained the same standards. The disc triumphs above all in distinctiveness of timbre and differentiation of choirs and instruments, whether in solo or in mass. Auditors cannot

help hearing individually trombones, flutes, cellos and violins playing simultaneously. The cymbals are intimidating and the drums as solid as ordnance. The record reproduces well at low volume and well at mid volume. At high volume it is perhaps dangerous — the slight music has a witty argument and a clever orchestral texture. Dr. Scherchen plainly has an affinity for it, and the orchestra disports itself with enthusiastic brilliance. — C. G. B.

RACHMANINOFF: *Symphony No. 2 in E Minor, Op. 27*

Philadelphia Orch.; Eugene Ormandy, cond. Columbia 12-in. ML 4433. 46 min.

This seems to be the completest statement of the wonderful actuality of the Philadelphia Orchestra on records. The work is lyric, with a very long line to its tunes upon which Mr. Ormandy dwells with no cloying emphasis, but with a proud knowledge of the capabilities of his musicians. The engineers have been able to imprison on this disc much of the silken persuasion of the Philadelphia strings, not a commonplace in LP recording. As a demonstration of the Rachmaninoff *Second Symphony* this is *hors concours* and likely to remain so indefinitely. — C. G. B.

RAVEL: *Quartet in F Major*

See HINDEMITH

SAINT-SAENS: *Concerto for 'Cello, No. 1 in A Minor*

BLOCH: *Schelomo*
Leonard Rose, 'cello. New York Philharmonic-Symphony Orch.; Dimitri Mitropoulos, cond. Both on Columbia 12-in. ML 4425. 19 and 22 min.

Substantial and expansive recordings emphasizing orchestral totality with some detriment to detail, and with consistent overstatement of Mr. Rose's 'cello, almost a venial fault in view of its steady power and suave song. A metallic shimmer has been gratuitously added to his treble string; if this is reduced in the amplifier the high winds lose much of their quality. It is equally hard to commend or reject this disc whole-heartedly. — C. G. B.

SAINT-SAENS: *Introduction and Rondo Capriccioso*

See CHAUSSON

SCHUBERT: *Octet in F, Op. 166*

Vienna Konzerthaus Quartet augmented by clarinet, bassoon, horn and string bass. Westminster 42-in. WL 5094. 54 min.

The records of the Vienna Konzerthaus group, particularly of Schubert, have been successful and with reason. There are some reasons for this one to enjoy a smaller esteem: the slow Konzerthaus tempos threaten the melodic sense of this engaging music without being able to realize a profundity of emotion which simply is not there. The four additional instruments jibe softly with the familiar euphony, balanced phrasing, and unanimity of attack which characterize the Quartet's records. It is

tonally rich except in the higher reaches of the violins, which are accompanied by thin foreign harmonics very hard to subdue. — C. G. B.

ROBERT SCHUMANN: *Concerto in A Minor for Piano and Orch., Op. 54*

Dinu Lipatti, piano. Philharmonia Orch.; Herbert von Karajan, cond. Columbia 10-in. ML 2195. 29 min.

The finest version of this popular Concerto currently available on records. For some time, European critics have been loud in their praise of Lipatti, who died last December at the early age of 33. That such praise was well-founded and deserved, this beautiful performance proves. It shows him to be an artist of rare sensitivity and communicative powers, fleet of finger, clean in execution, and a molder of lovely phrases. I was hardly prepared to find his playing as virile, thinking the ravages of the disease from which he died, leukemia, might well have robbed him of such digital power. I was mistaken; his playing is forceful though not rough, at other times affecting but not sentimental.

The Philharmonia, under von Karajan's discerning leadership affords him excellent support, in a recording that for its age, (it was made in April 1948) can easily stand comparison with some recent Columbia releases.

Surfaces are quieter on this than many recent Columbia recordings. — J. F. I.

SCHUMANN: *Quintet in E Flat for Piano and Strings, Op. 44*

Clifford Curzon and the Budapest Quartet. Columbia 12-in. ML 4426. 31 min.

In general Schumann's most spontaneous and transparent work in any form makes an identical appeal — since it has nothing to hide — to musicians. The shape of one performance is much like another, only the details tending to differ in accordance with the abilities or conceits of the players. Of the three well-played LP recordings of this Quintet — Curzon-Budapest on Columbia ML 4426, Rubinstein-Paganini on Victor LM 1095, and Serkin-Busch on Columbia ML 2081 — the palm goes to this one because the engineers have more thoroughly expressed the sinuous resonance of the five men than was true for the preceding versions. — C. G. B.

STRAVINSKY: *Petrouchka*

New York Philharmonic-Symphony Orch.; Dimitri Mitropoulos, cond. Columbia 12-in. ML 4438. 36 min.

The severe opposition here is by the excellent — sensational at issuance — version of Ernest Ansermet for London, recorded two years earlier. The developments in that period make us expect improvement, and there is some, but not enough to justify an exchange on the basis of tonal values alone. The performances are generally similar, with the salient differences mainly in the recording emphasis. The greater solidity of the Columbia version suggests that Mitropoulos' orchestra was larger than the Suisse Romande for this occasion, and the New York Philharmonic also has more concerted cohesion than the Geneva band. The principal points of Columbia's superiority are

in a decided improvement of brass timbre and a more even distribution of the choirs, plus the solidier mass mentioned. — C. G. B.

TCHAIKOVSKY: *Souvenir de Florence*
Strings of the Vienna National Opera
Orch.; Henry Swoboda, cond. West-
minster 12-in. WL 5083. 39 min.

Fragile, not without a recurrent charm, so resourcefully written for the instruments — originally violins, violas and 'cellos doubled — that it suggests a completer ensemble. This least-known of the composer's larger works receives here more massive recording than is customary for strings in an orchestra. In fact, from the technical aspect, it is probable that never before have we been able to hear so many strings so well reproduced, both in definition and solidity. The string playing is exceedingly skillful, so that this disc will evoke expressions of admiration for everything it contains except the musical idea. Not that the music is slighted in Swoboda's energetic performance: it is eclipsed in impression by the technical excellences. — C. G. B.

TCHAIKOVSKY: *Sleeping Beauty* (five excerpts)

See IPPOLITOV-IVANOV

WAGNER: *Die Walküre, Act I*

Lotte Lehmann (s), Lauritz Melchior (t), Emanuel List (bs). Vienna Philharmonic Orch.; Bruno Walter, cond. RCA Victor 12-in. LCT 1033. 1 hr.

This is a dubbing from the celebrated and noble sixteen sides issued sixteen years ago. One must grant a respectful admiration to the Victor engineers who have accomplished the transfer with a success that must transcend anyone's expectation. The copy is an improvement over the original, in its day a splendid recording of an unforgettable performance wherein Lotte Lehmann and Bruno Walter were at their best and the others more than competent. If, compared to a modern original microgroove, this recording has less ringing brightness, it has no intimation of soprano shrillness and metallic violins. It is not high-fidelity, but in those negative aspects it is superior; and Lehmann and Walter no longer are in posture to give us their magic in a completely new version. — C. G. B.

WEBER: *Der Freischütz* (complete opera)
Bernd Aldenhoff (t), Kurt Böhme (bs),
Elfride Trötschel (s), Irma Beilke (s),
Karl Paul (bs), Heinz Krämer (bs).
Chorus of the Dresden National
Opera, Saxon National Orch.; Rudolf
Kempe, cond. Urania 3 12-in. 403.
2 hr. 3 min.

Nothing is so essentially true to the traditions of German folklore as Weber's rich, dark masterpiece. Why it never had a complete recording until 1951 is as much of a phonographic enigma as the appearance in one month of three editions of *Die Fledermaus*. This Dresden version is remarkable first of all for the extraordinary clarity of the recording, wherein every instrument and every choir retain their full volume with a startling distinctness and in very judicious balance. There is a resemblance

to the recent *Fra Diavolo* in the slight effect of distance and careful intimation of reverberance which give a strong impression of presence in the theater. From time to time, some of the singers are closer to the microphone than we would prefer, a little injuriously in some of the concerted pieces.

Were it not for these detriments, which are not consistent, this could be esteemed technically the peer of any operatic recording.

The performance by orchestra and chorus is sagacious, bright and nervous; Kurt Böhme is a very fine Kaspar and Irma Beilke a good Aennchen. Elfride Trötschel has a voice not without beauty, but insufficiently developed to realize all the demands made upon it by Agatha. Bernd Aldenhoff is a miserable Max. The minor parts are capably sung. Enough of the dialogue is retained to preserve the dramatic continuity, but the cuts in the dialogue are not indicated in the Getman text supplied, which is tormented by a shuffling English translation. Continuing its laudable practice, Urania dates the recording, credits the engineers and editors, and states the duration of each disc (although some of these durations are given a little inaccurately). — C. G. B.

MISCELLANY

ADAM, BOIELDIEU and HEROLD:
Famous Overtures

London Philharmonic Orch.; Jean
Martinon, cond. London 12-in. LLP
351. 31 min. (all)

Let us not sneer at these four bright, melodious masterpieces. Boieldieu particularly, here represented by the deathless overtures to *La Dame Blanche* and the *Caliph of Bagdad* was not less a great composer for being easily assimilable. Martinon guides this bright swinging vivacity with loving respect, nor is there anything offhand in the exciting, uproarious reproduction. If occasionally we have some impression of concertos for triangle and tambourines, no real harm is done, and the engineers must have been delighted with this superficial declaration of high-fidelity, not superficial elsewhere on the disc. — C.G.B.

AMERICANS IN PARIS

GERSHWIN, *An American in Paris*.
DUKE, *April in Paris*
LENOIR, *Parlez-moi d'amour*
POULENC, *Mouvements perpétuels*
TAILLAFERRE, *Le Tirelittain*
DEBUSSY, *Fetes*
FAURE, *Nocturne*
RAVEL, *Pièce en forme de Habanère*
OFFENBACH, *Can-Can*

Morley & Gearhart, duo-pianists.
Columbia 10-in. ML 2197. 30 min.

Thanks to the tasteful and imaginative

Gearhart arrangements, some well co-ordinated key board work, and the diversity of the music, this makes for thirty minutes of enjoyable listening.

The arrangement of the Debussy *Fetes*, while interesting and courageous, seems to have been ill-advised. The limited tonal capacities of the piano simply will not cope with the coloring of this masterpiece of orchestral writing. The remainder are quite successful, particularly the Fauré and Tailleferre works. It might be mentioned that the latter and the Poulenc were not arranged by Gearhart.

The playing has considerable charm, spirit, and well controlled dynamics, their fine tone being well reproduced on surfaces that are rather noisy. — J. F. I.

BIZET: *L'Arlesienne Suites, Nos. 1 and 2*
André Kostelanetz and his Orch.
Columbia 12-in. ML 4409. 39 min.

It is possible that we are witnessing an attempt to put Mr. Kostelanetz in the position so long and honorably occupied by Arthur Fiedler as a cheerful propogandist for the most immediately likable works in the orchestral repertory. Persons familiar with Mr. Kostelanetz' way know that he savors this kind of music without delineating; assuming that it is light, he is inclined to make it lighter. His performances are easy to hear and they are not durable. There is more in the Bizet Suites than he cares to project, and one is compelled to say that in this big, brilliant, fairly harsh recording with a curiously dry resonance, the famous Kostelanetz string tone is often adulterated. — C. G. B.

CHRISTMAS CAROLS

The Randolph Singers. Westminster
12-in. WL 5100. 33 min.

Nineteen carols, from the most familiar *Ades te Fidelis* to the rather recondite *Lullay My Liking*, madrigalized and sung with pretty precious skill in a recording of startling, intimate proximity. An interesting innovation is suggested by the booklet of words and music issued in conjunction with the record, so that those inclined may join their voices to the Randolphs', not necessarily with the same ability. — C. G. B.

SONGS FOR CHRISTMAS

Nelson Eddy, baritone. Paul Weston,
his Orchestra, and an unnamed Chorus.
Columbia 12-in. ML 4442. 27 min.

Thirteen favorites: Jingle Bells; Joy to the World; Good King Wencelas; Away in a Manger; God Rest Ye Merry, Gentleman; O Holy Night; O Come All Ye Faithful; O Little Town of Bethlehem; White Christmas; Hark! the Herald Angels Sing; The First Noel; Deck the Hall with Boughs of Holly; Silent Night, Holy Night.

Nelson Eddy brings his rich and full voice to a group of long-time favorites in a recording that is outstanding for brilliance and balance. When played back moderately loud, the volume level of the orchestra seems entirely normal and is steady throughout — nor raised and lowered depending on whether or not Eddy is singing. The bass is full and rich, the treble clean and

bright. The middles are a little weak, but use of the 500 position on the turnover control will correct this condition. The singer has also been recorded wide open, but at an evenly higher volume level. The overall effect is unusual and startlingly different from the familiar orchestra-accompanying-soloist recording practice, wherein the soloist may be entirely natural, but the accompanying group held back and obscured, as if by a veil or curtain.

As background music, the recording is adequate but needs a loudness control or bass and treble boost to preserve the frequency balance observable at high volume levels.

We wish we knew the name of the recording engineer here, as we would like to compliment him on an excellent job of microphone placement and control. — D. A.

CORINNE CHOCHER'S COLLECTION OF FOLK DANCES: *Four Horah Dances* (For orch. and chorus) Music arranged by Leonard Bernstein, David Diamond, Darius Milhaud, Ernst Toch. Larry Adler, harmonica solo; Victor Young, cond.

Other Folk Dances (3) for orch. and chorus.

Music arranged by David Diamond, Trude Rittman, Ernst Toch. Max Goberman, cond. Alco 10-in. 1009. 21 min.

Not knowing a thing about the music of Palestine, I can only report that this recording of folk dances interested me for the surging rhythmic impact of its music, some splendid choral work, and for the excellence of the recording. According to the liner notes, the Horah is often compared to the American square dance . . . to my ears the folk dances of Russia seem to be much closer in feeling and rhythm. I would like to hear these done without benefit of the orchestrations of the above eminent composers. Folk music is seldom improved by such attentions, and this certainly has enough strength to stand on its own.

Alco has done a remarkably good recording job . . . fine balance . . . good orchestral reproduction, the wind instruments being particularly well recorded. The surfaces are extremely quiet, as I have had occasion to point out previously when reviewing Alco releases. — J. F. I.

FRENCH WOOD WIND MUSIC:

IBERT, *Trois pièces brèves.*

MILHAUD, *Two Sketches.*

BOZZA, *Variations sur un thème libre.*

TAFFANEL, *Quintette.*

New York Woodwind Quintet. Esoteric 12-in. ES 505. 50 min.

This will be caviat to the general, but to the connoisseur of wood wind music, a delight. The quintet, a truly wonderful ensemble, plays with exquisite style and remarkable technique. It is unfortunate that such ability seems wasted on the two arid pieces of Ibert and Milhaud. Of much more import is the *Quintette* by Taffanel, a charming and ingratiating work, in both its writing and performance. The Bozza, though it seems stretched beyond its

reasonable limits, has moments of absorbing interest.

Acoustically, this is a superb recording, with a balance that is uncannily correct, so that the blending of the instruments is marvelously clear and free from any thickness of sound. Surfaces almost entirely free of noise. — J. F. I.

GERSHWIN: *Porgy and Bess*

Lawrence Winters (bne), Camilla Williams (s), Inez Matthews (s), Warren Coleman (bne), Avon Long (t) and cast. J. Rosamond Johnson Chorus, and unnamed orchestra; Lehman Engel, cond. 3 Columbia 12-in. Set SL 162. 2 hrs. 9 mins.

Another feather in Columbia's operatic cap.

The rapidly growing library of complete operas opens endless new vistas to music lovers unable to attend live performances. *Porgy and Bess* is a case in point. For so many, it has been a work read about in the Sunday theatre sections of metropolitan newspapers, and heard only in snatches of particularly popular songs. Now, for the first time, anyone with even an inexpensive LP record-player attachment can hear all of *Porgy and Bess* and will, no doubt, find many a song or melody which will become better loved than some of those previously in the record library. As a matter of fact, the listener to these records will hear some sections which the average theatregoer has not heard; some sections of the original score, omitted on the stage, have been reinstated.

The man with a hi-fi listening system will be rewarded indeed, for the sound on these discs is typical of what can be done when a record manufacturer decides to do its best. And this best can be, today, wonderful to hear. The voices throughout are natural and full . . . resonant for the baritones, never edgy or sharp for the sopranos. Frequency range and frequency fidelity are equally well preserved for the orchestra and chorus. The bass is very good; it is well balanced by middles and highs. There is noticeable fading in and out of the orchestra when soloists are singing, thus preserving for the listener the effect of being in the recording studio. Recreation of the original, in the home, is the goal Columbia set for itself and, as with several others of its opera recordings, has achieved this end to a remarkable degree.

Columbia is also to be congratulated on a very deft handling of sound effects. These sounds — walking, doors closing, coins dropping — are held to naturalness; the stage is not suddenly stilled, a door slammed with a crash, and then the actors brought back to life again. Thus the aural illusion of being present is helped by the visual illusion, and reality is recreated.

The album is furnished with a complete text, but this is hardly necessary since the diction is clean and clear from beginning to end. The voices are competent, the interpretation sincere and true. — D. A.

HERBERT: *Music of Victor Herbert*

André Kostelanetz and his Orch. Columbia 12-in. ML 4430. 33 min.

A "Second Edition" of Columbia's ML 4094, re-processed by the use of new sound recording techniques, and a release that bears

eloquent testimony to the startling advances in that field.

The extended highs and lows, plus an even greater sonority in the middle register, add further lustre to the already rich texture of the orchestrations favored by this conductor. Whether some of the simple, but lovely, melodies that Herbert wrote can sustain these orchestral trappings, I doubt — for their great charm lies in their very simplicity, but lovers of the lush, velvety Kostelanetz treatment will thoroughly enjoy this.

Surfaces were rather gritty. — J. F. I.

SONGS OF VICTOR HERBERT

Eleanor Steber, soprano. Percy Faith with his Orchestra and Chorus. Columbia 10-in. ML 2192. 25 mins.

Included: Sweethearts; Ah! Sweet Mystery of Life; I'm Falling in Love with Someone; Thine Alone; Kiss Me Again; A Kiss in the Dark; When You're Away; and Italian Street Song.

A nice enough collection of old favorites, sung with artistry and ability, accompanied by an orchestra and chorus which suffered rather badly in the recording. Cutting the preemphasis to produce a natural tone in the voice kills the brilliance of the orchestra, and nothing except drastic reduction of the bass tone control will eliminate a luscious beer barrel boom noticeable in some of the bands, particularly (and unfortunately) in No. 1 on Side 1! This record is not for background music; play it as near to wide open as the neighbors will permit. — D. A.

THE ITALIAN MADRIGAL

The Vassar Madrigal Singers; E. Harold Geer, cond. Accompanied by unnamed instrumentalists and instrumentalists. Allegro 12-in. ALG 3029. 35 mins.

As the excellent liner notes with this disc point out, the term "madrigal" has been applied to secular part songs of various types. Its earliest use was by Italian composers of the 14th century, at which time the *madrigal*, *caccia*, and *ballata* were the most characteristic expression of the *Ars Nova*. A hundred years later, composers returned to the madrigal. The earliest known collection was published in 1530. This record includes three madrigals, a *caccia*, and a *ballata* from the 14th century period, and nine selections from the 16th century.

The Vassar Madrigal Singers treat the music with delicacy and erudition. We have the feeling that they are recreating the original as correctly as possible. The music is intriguing and interesting, the record worth having as a specialist's item or as part of a library representative of musical history. The sound reproduction is good but not startling. Balance is good, microphone placement good. The occasional instruments which support the singers are in proportion. — D. A.

PINEAPPLE POLL, a ballet based on the music of Sir Arthur Sullivan. Sadler's Wells Orch.; Charles Mackerras, cond. Columbia 12-in. ML 4439. 44 mins.

The score is derived from operettas by Sir Arthur Sullivan: *The Mikado*, *Trial*

by Jury, The Sorcerer, Patience, The Gondoliers, The Pirates of Penzance, Ruddigore, Princess Ida, Iolanthe, Pinafore, and The Yeomen of the Guard. The ballet was first performed in London on March 13, 1951 where, according to the liner notes, it "evoked such rapturous outcries from the press as 'one of the gayest end-pieces since *Gaité Parisienne*'".

In listening to the recording, we have the feeling that it evoked rapturous cries from the recording engineer. For, since the score was derived from 12 operettas, it was logical that he should be supplied with 12 microphones through which to derive this disc. 12 microphones, 12 control knobs . . . what more can a recording engineer ask for?

But the listener may well ask for a good deal less. Try out the beginning of side 2. There is some wonderful sound here, brasses are full and brassy, the woodwinds true to life. The murmuring in the background will soon be recognized as the strings, temporarily relegated to a position somewhere behind the backdrop. In a moment, however, knob 4 will be turned up, and the strings will soar in full beauty. In another minute, all the knobs except No. 12 will be turned down. The entire orchestra will scurry under the stage, while the harp — usually barely audible — will override a large orchestra, or whatever was used.

Perhaps it is not as bad as we picture, but this is the kind of "phony" recording which irritates us (obviously!). The overall tone is exceptional, with a tendency toward full bass. We might have had an outstanding job here, if the recording engineer had been sick that day.

And it was all so unnecessary! Compare our comments under CHRISTMAS CAROLS with Nelson Eddy — also a Columbia disc. — D. A.

PUCCINI ARIAS

Dorothy Kirsten, soprano. Metropolitan Opera Association Orch.; Fausto Cleva, cond. Columbia 10-in. ML 2200. 26 mins.

Included in this group are: *Gianni Schicchi*, *O mio babbino caro*; *Tosca*, *Vissi d'arte*; *Mme. Butterfly*, *Un bel di, vedremo*, and *Tu, tu*; *La Rondine*, *Ore liete divine*; *Turandot*, *Tu che di gel sei cinta*; *Manon Lescaut*, *Sola, abbandonata*. — If you are one of the many Kirsten admirers, and like her in three-minute snatches, this will be as good a record as any — provided you also like the volume way up. The orchestral accompaniment is well recorded, but its volume level has its ups and downs in order to avoid conflict with Miss Kirsten. The sharpness of the voice will be helped by keeping the record compensator down to 16 and possibly 20 db. — D. A.

SONGS: Russian, Spanish and Portuguese

Jennie Tourel, mezzo-soprano. George Reeves, piano. Columbia 10-in. ML 2198. 26 mins.

A group of six Russian and six Spanish and Portuguese songs, ranging from typical Russian songs to an unusual and cute imitation of a cat meowing, conceived by Villalobos. Miss Tourel seems more at home with the lively Spanish and Portuguese songs than with the Russian numbers.

Recording only fair. The voice is often edgy; the piano is backgrounded in customary singer-accompanist fashion, but even so the weakness of the bass is noticeable, and the treble has its troubles, particularly

at the opening of the last band on side 2. Try a compensator setting of 500 turnover and 16 db. preemphasis. — D. A.

SONGS OF SCANDINAVIA

Tii Niemela, soprano. Pentti Koskimies, piano. WCFM 12-in. LP-5. 41 mins.

Four songs by Edvard Grieg, four more by Jan Sibelius, and two song cycles by Yrjo Kilpinen are sung by Tii Niemela, one of Finland's best known *lieder* singers. She toured this country in 1949 and again in 1951 and was enthusiastically received. She receives excellent support from her accompanist-husband.

We find the songs delightful and interesting. They are tender, quiet, sometimes introspective, occasionally somber, often having the quality of a wistful lullaby. Mme. Niemela's voice seems admirably suited to this type of music. Her artistry is delicate, thoughtful, restrained and yet rich.

It is especially interesting to contrast the effect of playing the disc at high volume level and then at low level, just above audibility. In the first case, a concert hall performance will result. The *lieder* become dynamic and powerful. At low level, the wistfulness and tenderness are emphasized.

This is an interesting test to make, one which very few artists and recordings can withstand successfully. Kudos to both Mme. Niemela and to Warren McDowell, the recording engineer.

Small points: the liner notes are excellent, either the full song or a résumé being given in English, as well as a brief discussion of the composers' works. Record is a bit crackly, but otherwise it will reproduce well with the compensator set at LP and 12 db — D. A.

LP RECORD COMPANIES

Continued from page 41

Haydn plus leading works of Mozart and Bach
Horace Heidt Records, 119 Fifth Ave., N. Y., N. Y. — *Mostly accordion music*

Imperial Records, 6425 Hollywood Blvd., Hollywood, Cal. — *Folk dances*

Jazz Panorama (Century Record Co.), 737 Fox St., N. Y., N. Y. — *Jazz re-issues*

Jazz Time Records, P. O. Box 246, Flushing, N. Y. — *Dixieland and jazz re-issues*

Jolly Roger (Paradox Industries Inc.), 139 East 47th St., N. Y., N. Y. — *Re-issues of jazz, Dixieland and band vocalists, including Bessie Smith*

Jump (The Turntable), P. O. Box 622, Hollywood Station, Hollywood, Cal.

Swing re-issues
Key Records, 1457 Broadway, N. Y., N. Y.

Choral and organ music
London Gramophone Corp., 531 West 25th St., N. Y., N. Y. — *Creator of FRR; huge and rapidly expanding array of recordings in all serious fields*

Lyrichord Records, 464 West 51st St., N. Y., N. Y. — *Comparatively few discs; the rather remote and the quite recent in music*

Magic-Tone Records, 545 Fifth Ave., N. Y., N. Y. — *Shakespeare songs; short classical records for piano, violin and cello*

Mercury Record Corp., 839 So. Wabash Ave., Chicago, Ill. — *A large general catalog*

MGM Records, 701 Seventh Ave., N. Y., N. Y. — *Popular in the main; a few records of serious import*

National Record Co., 1841 Broadway, N. Y., N. Y. — *Mostly race records*

New Records, 141 East 44th St., N. Y., N. Y. — *Colonial and early American music; some rare classical recordings*

Oceanic Records, 15 Park Row, N. Y., N. Y. — *Not many titles yet but very impressive ones*

Oiseau-Lyre Records, 778 Tenth Ave., N. Y., N. Y. — *French; a few rare items distributed by Period*

Oxford Recording Co., 49 West 55th St., N. Y., N. Y. — *Minor classics, mainly woodwind music*

Parade Records Co., 107 Lorimer St., Brooklyn, N. Y. — *Popular; show and film music*

Paradox Industries, 139 East 47th St., N. Y., N. Y. — *Modern jazz*

Period Music Co., 778 Tenth Ave., N. Y., N. Y. — *Tendency towards lesser known but not obscure classics*

Prestige Records, 754 Tenth Ave., N. Y., N. Y. — *Modern Jazz*

Program Records, 778 Tenth Ave., N. Y., N. Y. — *Mainly chamber music*

Rachmaninoff Society, 778 Tenth Ave., N. Y., N. Y. — *Works of Rachmaninoff on subscription only*

Rainbow Recording Corp., 767 Tenth Ave., N. Y., N. Y. — *Flanagan and similar bands*

RCA Victor, Radio Corp. of America, RCA Victor Div., Camden, N. J. — *Huge repertory of records of all types*

Remington Records, 264 West 54th St., N. Y., N. Y. — *A growing list, principally of standard classics*

Renaissance, 778 Tenth Ave., N. Y., N. Y. — *Records of considerable interest in musical history*

Rexford Record, 1440 Broadway, N. Y., N. Y. — *Some modern classical music*

Rondo Records, 220 Locust St., Chicago, Ill. — *Mostly organ by Ken Griffin*

Roost Records, 20 East Elizabeth Ave., Linden, N. J. — *Jazz Records*

Savoy Record Co., 58 Market St., Newark, N. J. — *Be-bop; Erroll Garner and race records*

Secco Records, 1395 Fifth Ave., N. Y., N. Y. — *Latin American music*

Spanish Music SMC, 1291 Sixth Ave., N. Y., N. Y. — *Spanish and Latin American dance music — some authentic*

Standard Phono Corp., 163 West 23rd St., N. Y., N. Y. — *Miscellaneous popular; foreign language records*

Stinson Trading Co., 27 Union Sq. West, N. Y., N. Y. — *Mixed catalog includes jazz at the Philharmonic Vol. I, to Burl Ives*

Stradivari Records, 79 Buff Rd., Tenafly, N. J. — *Rare chamber music*

Tempo Record Co., 8540 Sunset Blvd., Hollywood, Cal. — *Covers many fields*

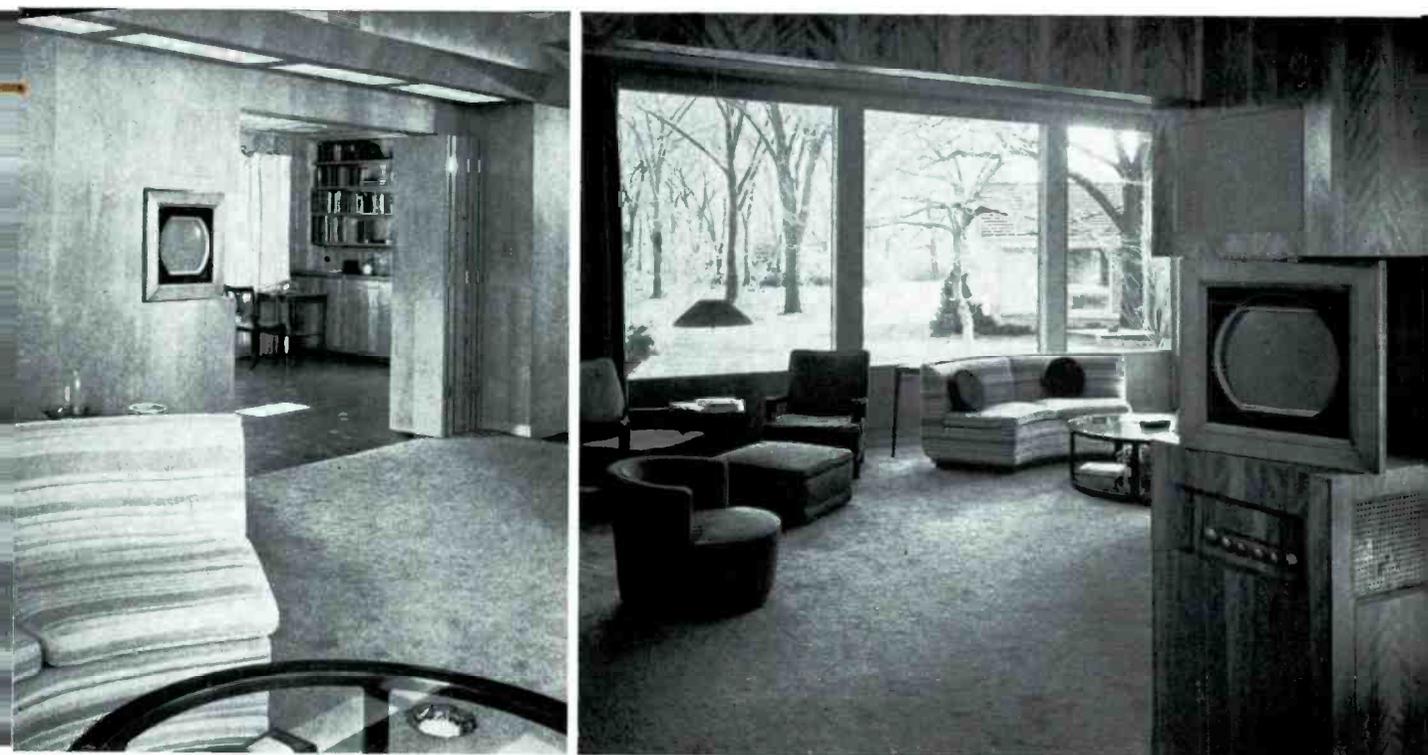
Urania Records, 667 Madison Ave., N. Y., N. Y. — *Has suddenly produced a startling affluence of large works, many in their first editions*

Vanguard Recording Society, 799 Broadway, N. Y., N. Y. — *Classical music — Handel, Bach, Mahler*

Vox Production, 236 West 55th St., N. Y., N. Y. — *Impressive catalog representing many schools*

WCFM, 1120 Connecticut Ave., Washington, D. C. — *Small but intelligently compiled list of classics*

Westminster Recording Co., 233 West 42nd St., N. Y., N. Y. — *A phenomenon of growth whose expanding catalog is a monument to musical discrimination*



In the installation above, the television chassis is built into a wall, and can be swivelled for viewing in either room.

Home installations that make you

Stop, Look and Listen!

VERSATILITY is the keynote of the custom installations shown on these pages. Not only are these home systems designed to fit into the general decor of the living quarters, but some have been constructed as an integral part of the house at the time it was built; others have been installed into existing surroundings.

The problems facing the custom installation designer are manifold. First, he must provide the finest in listening enjoyment for his customer. Second, he must accomplish this within the limits of a budget. Third, his design must fit into the furnishings of the house so that it is either completely unobtrusive — or, exactly the opposite, it must become a focal point in the decorative scheme. Fourth, he may have to use considerable ingenuity in fitting the desired audio and video facilities into exist-

ing and often limited space. At the other extreme, he may be called upon to work with an architect in planning the basic design of a house.

An example is shown of the completely unobtrusive type of installation, at the lower left on the next page. When the cabinet doors are closed, there is no visible evidence of radio, phonograph, or television in the room.

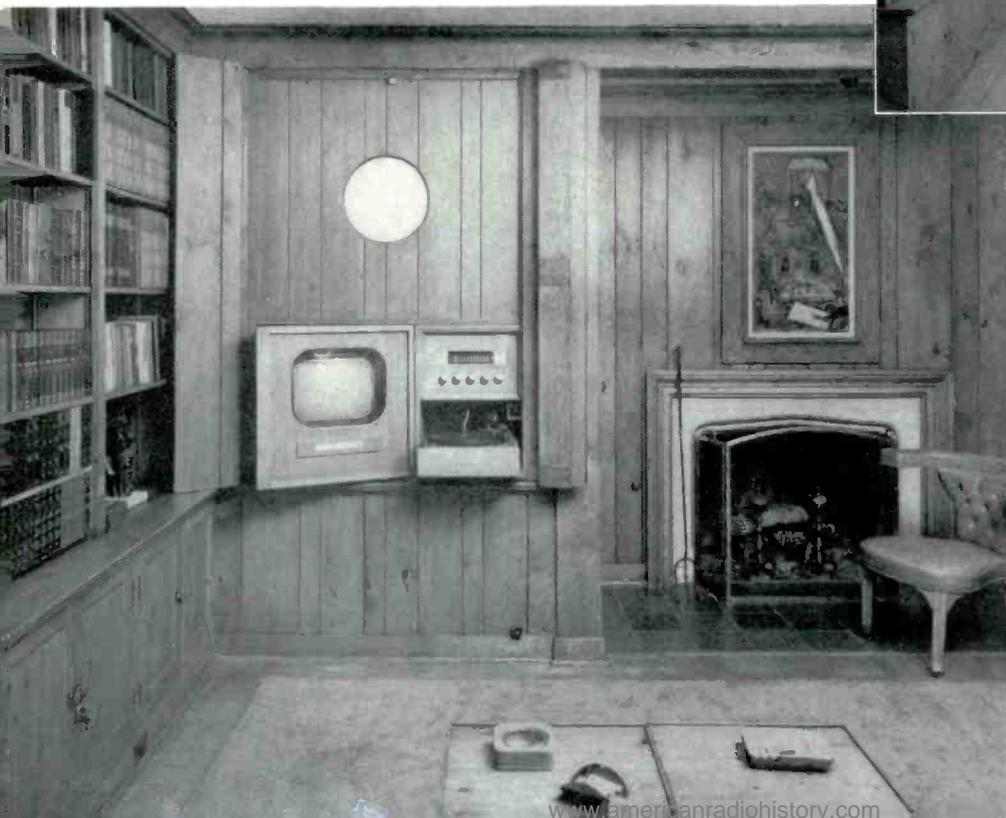
The two pictures at the top of this page illustrate not only construction of the system as an integral part of the house, but also a unique feature of many of these custom installations: the television tube or chassis which swivels so that correct viewing angle can be maintained. The amount of swivel may be small, as in the photograph on the next page, or can be a full 180° so that the screen can be watched from either of two rooms. When

the TV screen can be turned from one room to another, a major saving is effected because one chassis does the work of two. In many of the illustrations, the decorative scheme is definitely modern. Very interesting use is made of cabinet-partitions. Some of these are of the built-in type, forming part of the house structure. Others are built-out; they are movable cabinets, shelves, and storage walls. Some of the installations are essentially simple, as the one at the lower left on page 52; others, such as the one at the top of page 51, are complete in every detail.

All photographs for this section are of custom installations which have been designed and installed by Voice and Vision of Chicago, whose work in this field has earned a well-deserved reputation for its versatility and originality.



The specially designed living and dining area divider cabinet shown above has 16-in. TV, FM-AM radio, and phonograph on the living room side, and storage space for china, crystal, and silver on the dining room side. In the illustration below, the TV chassis swivels for optimum viewing angle; tuning controls are located across the room.



The two photographs at the right show open and closed views of a system which includes, FM, AM, TV, phono, and—above the TV picture tube—a motion picture screen which pulls down like a window shade. Servicing of the equipment is made easy by mounting TV and amplifier equipment on a sliding drawer which can be pulled forward, and to which the front panel is attached.



The 11-ft. bleached mahogany cabinet, below, houses DuMont TV-FM chassis, record changer and, in the extreme right hand section, a bar.



The installation at the left was made after construction of the house had been finished, by cutting out an area in the partition and setting in a prefabricated cabinet. Note that both record changer and tape recorder are mounted on pull-out drawers.





The illustration above shows an along-the-wall arrangement which includes a McIntosh amplifier, Altec 604-B speaker, Lincoln record changer, Crestwood tape recorder, and Radio Craftsman FM-AM tuner. Bass reflex speaker enclosure is fitted into a former fireplace. The small photograph in the upper right shows the arrangement of some of the equipment in the cabinet. Compare the arrangement shown here with the one on page 54.



In the installation above, radio, television, and phonograph equipment is built in as part of the house. Storage and desk space is also provided in this modern arrangement.

Cabinets and bookcases at the left were added as built-out furniture. FM-AM, phonograph and amplifier cabinet, which also incorporates desk space, may be separated from the speaker cabinet should furniture rearrangement require it.



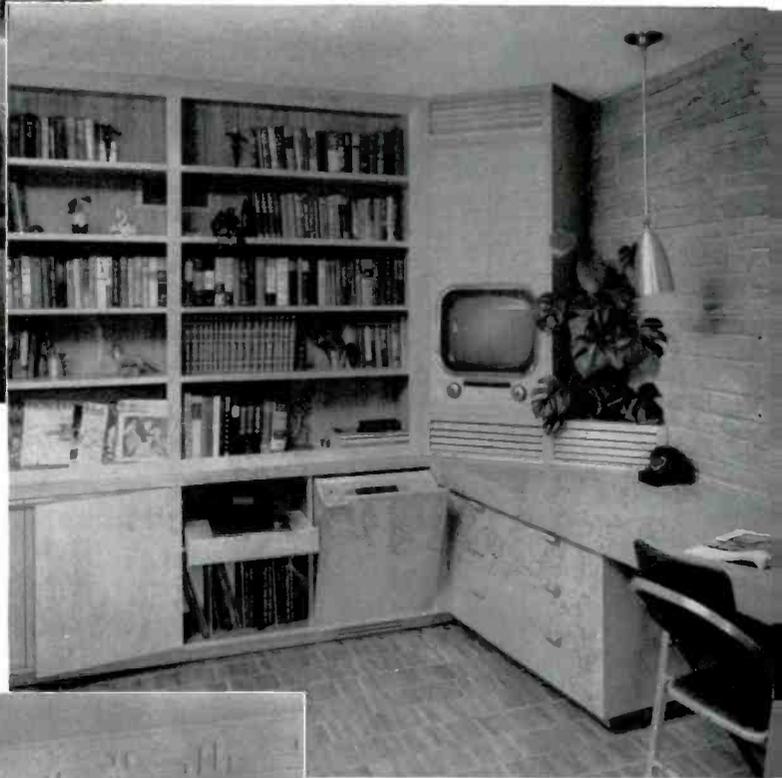
In the photographs above and right, the radio and TV installation has been made in a storage-wall partition between living room, above, and dining-den area, right. The television chassis swings completely around so that it may be watched from either room. Separate speakers are used in each room.



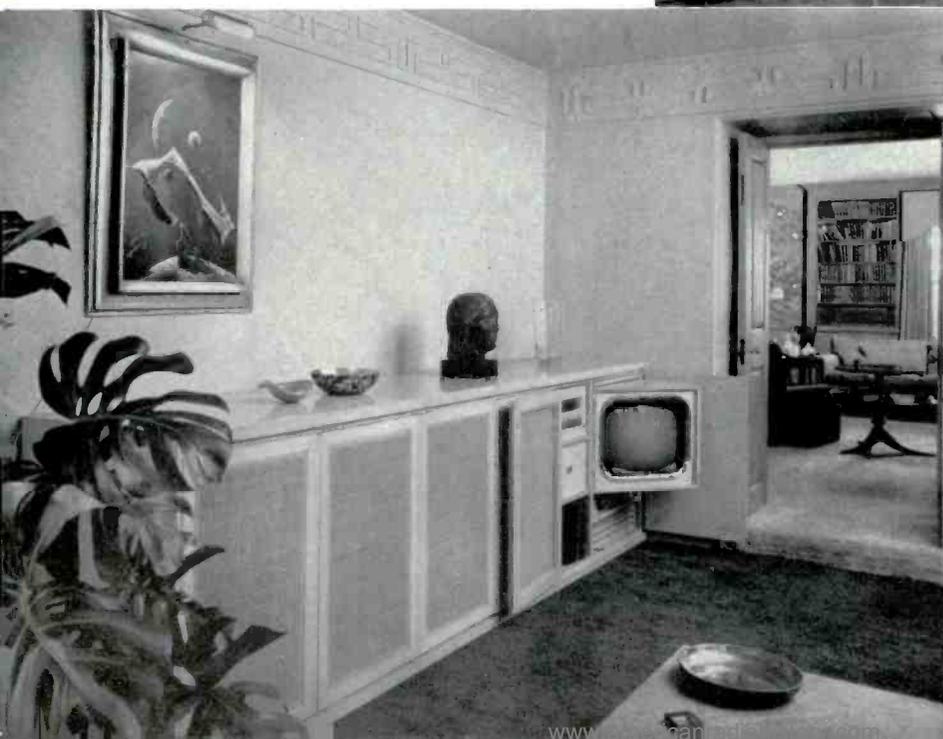
A completely detached cabinet, made of dark mahogany veneer, houses a 3-speed record changer, FM-AM tuner, 20-inch TV chassis, and the loudspeaker. All doors are operated by spring catches which release when the door is pushed inwards gently.

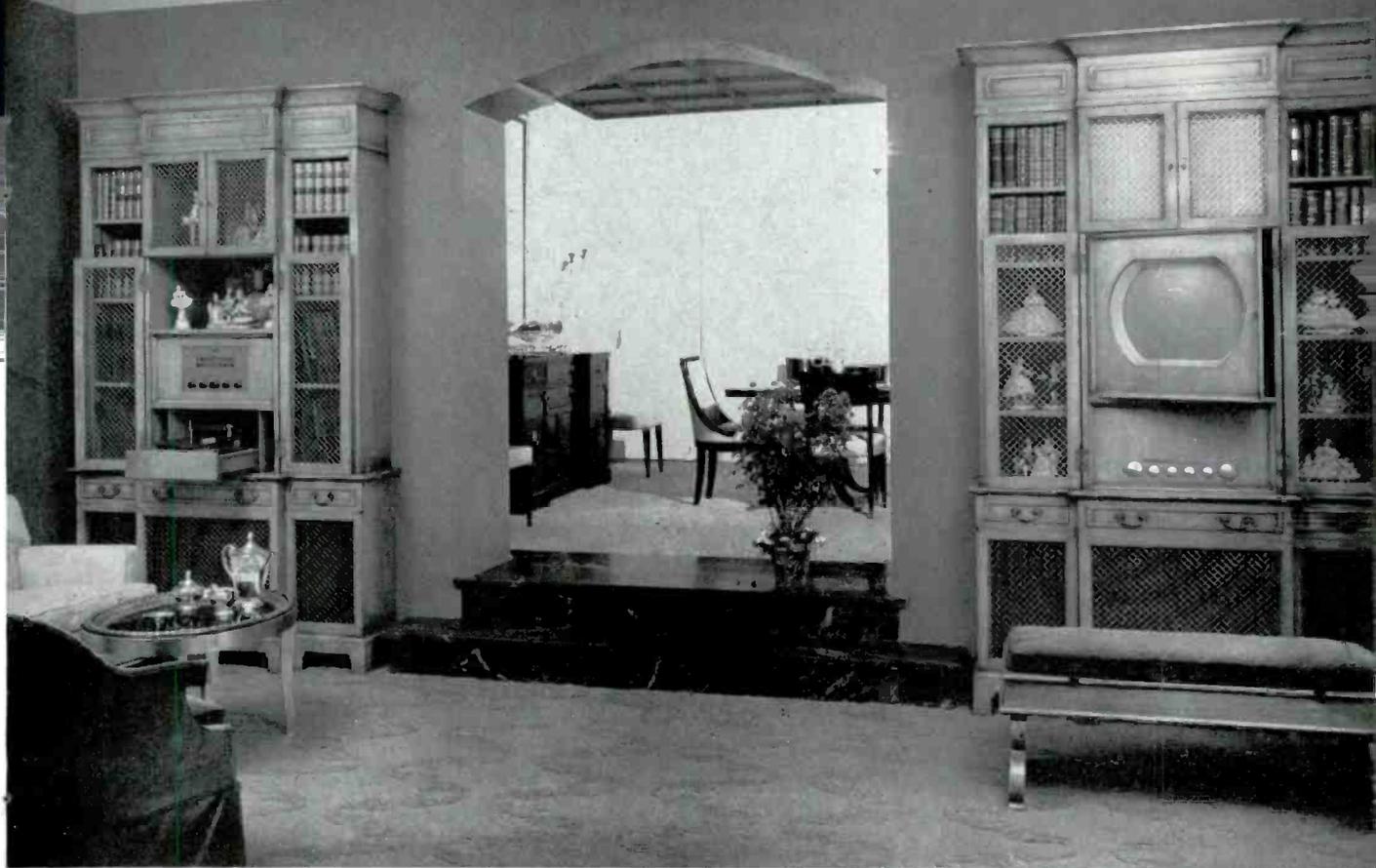


In the illustration at the left, a DuMont 19-in. TV and FM chassis, with an Altec 603-B speaker, has been installed in a large built-out cabinet which also serves as a writing desk and for general storage. In the installation pictured below, a unique feature is the floor-bin arrangement for the Craftsman FM-AM tuner. The loudspeaker is an Altec mounted above the 20-in. Radio Craftsman TV tuner. Note ventilation louvres above and below TV receiver.



In the long, narrow living room shown below, all equipment has been installed in a single cabinet along one wall. The picture tube on the TV set swivels out 45° to correct viewing angle. The small photograph shows the appearance with all cabinet doors closed.





In the illustration above, period cabinets flanking the living room doorway house all FM, TV, and phonograph equipment. Record changer and tuner are at the left; television chassis and speaker are at the right. Below, in an across-the-room installation, the speaker is mounted in one corner of the room at ceiling height, while the FM-AM tuner and record changer are installed in a built-out record storage cabinet, left.



T A P E

PART 2

RECORDING

By ALAN C. MACY

IN THE previous issue of HIGH-FIDELITY, we reported on the various types of tape recording equipment and on our experiences with the installation and operation of a typical unit. Methods of recording programs from radio and television stations, and from phonograph records, were discussed in detail. In this article, we shall tell of our experiences with a microphone: the recording of live program material.

Our experiences have been many and in some cases, puzzling and even alarming! The first time we turned on all the equipment, and before we had an opportunity to speak so much as "test-one-two-three" into the microphone, we were subjected to an ear-splitting wail which rapidly grew in intensity until we were almost deafened.

REPRINTED BY SPECIAL PERMISSION OF SATURDAY EVENING POST. COPYRIGHT 1951 BY CURTIS PUBLISHING CO.



Selecting the Microphone

Before we discuss the actual recording of live music, the selection of a microphone must be considered. Microphones are supplied with many of the tape recorders listed in the preceding article. Most of these recorders are packaged units. That is, they are provided with microphones and built-in power amplifiers and loudspeakers. Purchase of such units reduces to a minimum the problems discussed in this article. However, our work was conducted with a Concertone,¹ which is particularly well adapted for addition to an existing high-fidelity system. Most of the reasons for its selection have already been reported. Also, we wanted to go through the experience

of selecting and connecting, as well as using, a microphone. In other words, we wanted to meet and surmount every problem which might confront an audiophile under similar circumstances.

To help in the selection of a microphone, we wrote to three manufacturers, asking: "What one or two microphones would you recommend for use with tape recorders in each of the three brackets: under \$200, \$200 to \$500, and over \$500? Why do you make these recommendations? What are the specific applications, advantages, and disadvantages of each microphone recommended as compared with the others?"

The answers which we received are reproduced on this and the following pages, along with illustrations of the particular microphones under discussion. It should be pointed out that these manufacturers were selected because they pro-

¹Berlant Associates, 4917 W. Jefferson Blvd., Los Angeles 16, Calif.

duce a wide range of microphones, from inexpensive to top quality instruments providing optimum fidelity. Hence, they were in a particularly good position to make suggestions to purchasers of new tape units, whether they cost \$200 or \$1000.

In general, the recommendations of these manufacturers can be summarized as follows: if the tape recorder is supplied with a specific microphone, it will be well to use this or a very similar unit, because the microphone will have characteristics balanced to those of the tape recording and playback equipment. When no microphone is supplied, and if the recorder incorporates an equalizing circuit, it is wise to choose the best microphone which the budget will stand. Of course, the uses to which the microphone will be put should be borne in mind.

Preamplification for the Microphone

Almost without exception, modern microphones are low output devices. The situation is analogous to that of phonograph pickups. The crystal cartridge is a high output device; it can be connected to the same terminals on the amplifier as an FM, AM, or TV tuner. Magnetic cartridges are low output devices, and preamplification is required in order to drive an average power amplifier.

Similarly, microphones generate very low voltages and, therefore, require preamplification. In nearly all tape recorders, this preamplification is already built in or comes as part of the basic equipment. The Concertone, for instance, has two input connections. One is marked **LOW GAIN**, the other **HIGH GAIN**. The low gain input is used for high output devices such as radio and television tuners, and for crystal cartridges. The high gain circuit is for low output equipment such as microphones.

Let it be noted here that the preamplifier required for magnetic phonograph cartridges cannot be used as a microphone preamplifier, at least without modification. Conversely, a microphone preamplifier cannot be used with a magnetic pickup. The reason is that considerable bass boost is incorporated in the circuit for the magnetic pickup preamplifier, whereas a microphone preamplifier should have no comparable bass boost. For instance, in the article on the Air-Coupler tests, elsewhere in this issue of **HIGH-FIDELITY**, mention is made of a modified Pickering preamplifier. The modification was the removal of the bass boost circuit.

This point is emphasized lest someone try attaching the output of a magnetic phonograph cartridge direct to the high gain connection on the Concertone or similar recorder.

In our own case, we used two microphones. One was an Electro-Voice Model 650, which is described in the section on microphones. We connected this microphone through an impedance matching transformer (impedance matching will be discussed later) to the high gain input terminal on the Concertone. The other microphone with which we experimented was an Altec 21-B. This is a broadcast type which was, for us, more or less special equipment, since it was being used in conjunction with laboratory work which required exceptionally flat response

Microphone Recommendations

From ELECTRO-VOICE

A survey of the tape recorder field reveals that your choice of three divisions or classes of tape machines is quite apropos, although we invite your attention to the first price break of \$200. A review of the catalogs discloses \$159.50 as the top price of the competitive 7½ ips. machines on the market. This is the portable class. In the next bracket we find only one machine — selling for \$345. Starting in the neighborhood of \$500, we consider ourselves in the semi-professional and professional class combined, as there seems to be no distinct line of cleavage until the \$800 mark is reached. Although many audio-philosophers purchase machines over this sum, such models are actually intended for professional use.

CLASS I: \$100 to \$160. There seem to be no units under \$100. In the \$100 to \$160 bracket we find all machines are of the packaged type, highest tape speed 7½ ips., some with 3¾ ips. optional. Other significant features are that they have small speakers of the low-fidelity type and, insofar as we have investigated, none employs tape equalization. These factors are important in the choice of microphones. The curve of 7½ ips. unequalized response shows rapid attenuation after 6,500 cycles. In the other direction, attenuation is at the rate of 6 db. per octave. This sets the prescription for the microphone: a compact, a highly-tuned, low-cost, high-value item, with response which exceeds the limits of the recorder. The recommended all-around microphone is our Model 915 crystal.

Without exception this Class I tape machine is supplied with a microphone by the manufacturer. However, an individual seeking a replacement microphone for his recorder will in most cases take the opportunity to buy something better. In this case he will find the Model 920 of advantage because it is non-directional. A still better unit is the Model 911.

CLASS II: \$160 to \$500. Most familiar machine in this class is the Berlant "Concertone", at \$345. It is the only non-professional machine which currently delivers a 15 ips. tape speed, as well as 7½ ips. Moreover, these speeds are equalized. Accordingly, the microphone recommendation here calls for a unit with response range paralleling the tape response. Because such a tape machine is used for making listenable music recordings, both vocal and instrumental, as opposed to "home documentary" transcripts, the microphone must be versatile. The Model 636 is excellent for all music and dialogue applications, and is non-directional.

The Model 630 is probably the highest quality, highest value, most versatile "work-horse" in the entire E-V line. It is mildly directional, has better than usual response range, and is rugged. Strongly recommended for Class II. For applications involving highly reverberant locations, such as halls and large living rooms, the Model 950 crystal cardioid solves the problem of discriminating against random and reflected sound, while preserving the widest range response.



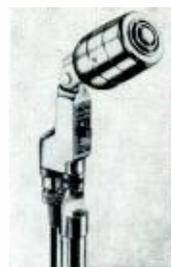
Model 915. Crystal. High impedance. 60 to 7500 cps.



Model 920. Crystal. High imp. Omni-directional.



Left: model 911. Crystal. High imp. Right: model 636. Dynamic. High or low imp. 60 to 13,000 cps.



Model 630. Dynamic. Both high and low imp. models.

Microphone Recommendations, cont.



Model 950. Cardioid. Directional. High impedance.



Left: model 654. Omni - directional. Low imp. Right: model 726. Dynamic. Directional. High or low imp.



Model 650. Dynamic. Semi-directional. Low imp.



Models 510 and 710. 510 is magnetic; 710 is crystal.

CLASS III: \$500 to \$800. Semi-professional and professional types include the Magnecorder, and the Ampex. These operate at 7½ and 15 ips. The true audio enthusiast, having spent over \$1,000 on a tape recorder and other components, expects and deserves professional results. Just one type of microphone won't do what this Class III person will insist upon.

Purely instrumental pickups with 10 pieces or more, or vocals with piano accompaniment, permit a single microphone pickup technique. The E-V professional microphone, Model 654, would cover this requirement. While this Model 654 is a versatile microphone, it is of the overall pickup type, and is most suited for omnidirectional use.

In order to record dance bands with professional accuracy, an accent microphone must be employed on the rhythm section (drums, piano, bass fiddle) of the band. This microphone must be highly directional in order to isolate the rhythm section and permit control and balance. The ideal unit in this category is the Model 726 cardioid. Too, the cardioid subdues the effect of reverberation in bad locations.

The case of a vocalist with orchestral accompaniment unequivocally demands a separate microphone of the 726 cardioid type. The 654 is used as the overall orchestral mike, and faded out as the 726 "singer" mike is faded in. This is almost mandatory. Otherwise, the singer cannot overcome orchestra level, particularly the high sound pressures from the brass section. The 726 is at right angles, pickup-wise, to the orchestra, allowing the band to balance the vocal. More signal from the 654 is available for balance if necessary by simply turning up the mixer control.

For highest quality, wide-range application, the Model 650 dynamic offers a higher signal-to-noise ratio than any other E-V microphone.

From SHURE BROS.

Assuming that the price of a microphone should be in pretty much of a ratio with the price of the recorder with which it is being used, we have selected our recommendations accordingly. Listed below are the groups by price range, and the recommended microphone for use with each:

Recorder Price	Recommended Microphones
Less than \$200	510C, 510S, 710A, 710S
\$200 to \$500	51, 737A, 55S, 55
Over \$500	556S, 556

The 510 series uses an internal unit based on our new controlled reluctance magnetic principle. They feature exceptionally good voice reproduction with extremely rugged construction. In addition to having a high output level, the 510 series is also tropicalized, making it practically immune to heat and humidity. These microphones are extremely popular in the southeastern part of the country, and in the export market where heat and humidity are quite prevalent.

at very low frequencies. It is non-directional, as compared with the directional Electro-Voice model 650.

The Altec microphone requires not only the usual preamplification mentioned above, but also a special power supply for a tube mounted as part of the base of the microphone. The power supply is part of the accessory equipment supplied with the microphone. It is shown on page 25, Fig. 4, along with the Altec microphone.

As has been stated, most tape recorders come equipped with sufficient preamplification to accommodate nearly all microphones. If this feature is not already built in, it is almost certain to be available as accessory equipment. However, if desired, a standard preamplifier for magnetic phonograph pickups can be used provided it is modified to remove the bass boost circuit. To find out exactly what happened in this case, we took out the bass boost circuit in a Pickering unit. Then a comparison was made between the position of the master volume control when recording speech over the microphone, and when recording speech from a radio broadcast. With an FM tuner connected, a master volume control setting at about 7 resulted in normal volume on voice, and was ample for recording purposes. When the microphone was used with the Pickering preamp, modified *only* to the extent of removing the bass boost circuit, the setting for the master gain control had to be reduced to 2½ for a volume level comparable to that from the FM tuner. Therefore, the Pickering was further modified to reduce its overall gain to a point where the output was approximately equal to that of the FM tuner. Of course, when this special preamplifier was used, it was connected to the *low gain* input of the Concertone — *not* the high gain input.

Subsequent experiments included connecting the Altec directly to the high gain input of the Concertone, without using the modified Pickering preamp. Likewise, the Electro-Voice 650 mike was connected first through the Pickering into the low gain input, and then directly into the high gain input without the Pickering unit. It was found that with these two microphones, the gain of the preamplifier section of the Concertone was about equal to that of the Pickering, before reducing its gain.

Output Level of Microphones

This brings up the subject of the output voltage of a microphone. In addition to the basic fact that microphones are low output devices, some have lower output than others. The output is usually expressed, technically, as minus so many decibels, relative to a given amount of sound pressure. This method of rating is a complicated matter. It is enough to say that cursory examination of one microphone manufacturer's catalog shows a range from minus 55 db. to minus 46 db. Both the Altec 21-B (with its associated power supply and amplifier) and the Electro-Voice 650 are relatively high-output microphones.

Impedance Matching

The impedance of a microphone is another important characteristic which must be considered. Microphones

generally fall into two classes: high or low impedance. High-impedance units should be connected to a high impedance input, such as the grid of the first tube of the preamplifier. For example, the high gain input connection on the Concertone is for a high impedance input. Other microphones are low impedance devices, and connecting them to an input such as that on the Concertone requires a matching transformer.

Specifically, the Electro-Voice 650 is a low impedance unit. In order to connect it either to the modified Pickering preamp, or to the high gain input of the Concertone, we had to use an impedance matching transformer. Such units are available from most transformer manufacturers. They have a series of connections on the primary side to match 50, 300, or 600 ohms. Usually there is a similar series of connections on the secondary side, one of which will match 50,000 to 70,000 ohms. In high fidelity applications, care should be taken to purchase a unit which has good frequency response characteristics. In *all* applications, the transformer must be designed to minimize hum level. Hum level is a specification which is usually stated in manufacturers' literature. The UTC A-11 and the Peerless K221-Q are typical impedance matching transformers.

The Altec microphone presents a peculiar situation which the audio-ophile may encounter: it is actually a high impedance device. But, because most broadcast stations have standardized on low impedance input lines, Altec provides an impedance matching transformer designed to work into 50, 300, or 600 ohms.

To summarize: the purchaser of a microphone should determine first whether the input to his tape recorder is of a high or low impedance type. Then an impedance matching transformer can be acquired if necessary.

Connection of a Single Microphone to the Recorder

Once the impedance question has been settled, the microphone can be connected to the tape recorder. If the cable coming from the microphone has *three* wires (or if connections at the microphone are for a three-wire cable), it is likely that the unit is of low impedance. One of the three wires is a shield; the other two should be connected to the correct taps or lugs on the primary of the impedance matching transformer. Such a transformer usually has an extra lug or connection, going to an internal shield. This should be connected to the shield on the microphone cable, as should that tap on the *secondary* of the transformer which goes to ground. Further, the shield on the cable from transformer to tape recorder input should be connected to the common ground.

The input connection to the recorder will probably have two terminals, one grounded for connection to the cable shield, and the other for the hot wire.

If the microphone cable is a two-wire type, it is probably a high-impedance microphone. This would be connected directly to the tape recorder terminals.

Connectors may be a problem. The input connection on the Concertone, for instance, is an RMA plug, familiar

Microphone Recommendations, cont.

The model 710 series are crystal-type microphones featuring high level, good general response, and low cost. They are excellent microphones for use in areas where so-called normal year-round temperatures prevail.

The next price bracket — \$200 to \$500 — is quite a spread. Our recommendations are based on both price and performance. We say performance because, in this price bracket, more often than not, the recorder is used in areas and for applications where a highly directional microphone is essential. Therefore, the grouping features three directional microphones with the model 51 being the only conventional, semi-directional microphone. Notice also that three are moving coil dynamics with the model 737A being the only crystal microphone.

The model 737A is quite a unique microphone. It is the only super-cardioid crystal microphone available on the market. It has an excellent general-purpose response, high output level, and a highly directional front-to-back ratio (14 to 1). In addition, it uses a tropicalized crystal element. The crystal is wrapped in a special metal foil and additionally sealed with a plastic solution. This processing gives the metal-seal crystal several times the life of the conventional crystal element.

So, while the 737A is a crystal, it overcomes the objection to the use of a crystal device in hot, humid areas. This microphone is recommended for all applications where a directional microphone is a must, and where price is a major consideration.

The model 51 is slightly more expensive, but differs in many respects. It, too, features a high output level, but is a moving-coil dynamic which has the conventional semi-directional pickup pattern, with an exceptionally smooth peak-free response which, of course, is ideal for use with expensive recorders where top quality reproduction is a number one consideration.

In other words, the model 51 is recommended in all cases where a good quality moving-coil dynamic microphone is required and where the pickup pattern is not a major consideration.

Models 55 and 55S are recommended whenever the requirement is for top quality with a directional pattern, as for public address work. Its highly directional super-cardioid pattern makes it ideal in all applications where acoustic feedback is a problem, or where the cancellation of extraneous and unwanted background noises is necessary. In addition, its smooth, peak-free response makes it suited for use with all types of better-than-average quality recorders.

The new, small model 55S embodies all of the desirable features of the 55. In addition, it has a slightly improved overall frequency response and a slight difference in the pickup pattern which offers not only considerable cancellation at the rear of the microphone, but also a wide-angle pickup across the front of the microphone. It is recommended for applications similar to the 55, and especially where small size is important.

For the last category of recorders, we recommend our broadcast-type 556, and the small model 556S. These microphones



Model 51. Dynamic. Semi-directional. Low and high impedance.



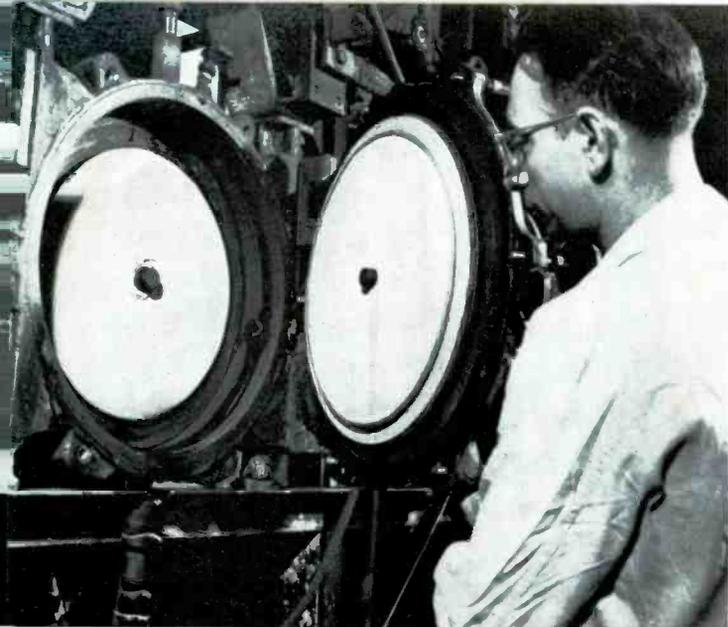
Model 737A. Super-cardioid. Directional. Crystal.



Model 55 and 55S. Dynamic. Directional.



Model 60X. Crystal. 70 to 7,000 cps.



COPPER BACKING: To provide a metal layer of the required strength, additional copper plating, to a thickness of .06 in., is necessary. This is done in a sealed chamber containing acid copper electrolyte. The circular copper anode is spaced close to the disc, and the two are rotated in opposite directions. In this way, a metal matrix (negative copy of the surface of the master record) is built-up. The matrix must be strong enough that it can be stripped off the master record without being damaged.

used only when destruction of the master record can be risked during the stripping stage, and no more than 200 pressings will be needed.

If a larger number of pressings will be needed, or if the master must be kept intact for future use, a metal

ELECTRO-CLEANING: After stripping, the matrix is cleaned thoroughly by immersion in a strong alkaline solution, agitated by an electric current. In this way, impurities can be removed without damaging the delicate negative copy. One particle might cause a click when the record is played.

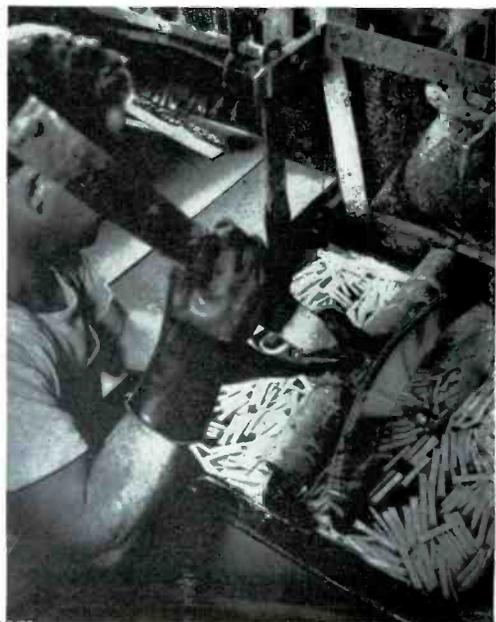


STRIPPING: The matrix is finally stripped off the master record, disclosing a bright gold or silver surface that is an exact negative copy of the record grooves. Great skill is required in this operation.

“mother” is made by plating the matrix. The mother is an exact duplicate of the master recording, from which additional matrices or stampers can be produced at any time.

These illustrations were made available through the courtesy of Audio Devices, Inc., manufacturers of the blank

CHROME FACING: Vinylite plastic material tends to stick to silver or gold. Therefore, a thin coating of chromium is plated on the gold. If silver is used, it is removed, and chromium is deposited on the surface of the copper preplate. The coat of chromium is so thin that it does not affect the highest frequencies recorded, but it is hard enough to withstand 2,000 pressings without wearing away. This is the last step in preparing the working surface for pressing copies of the master record.





NEW **E-V** DEVELOPMENT IN A COMPLETE, COMPACT

800 cps Separate 2-way Speaker System

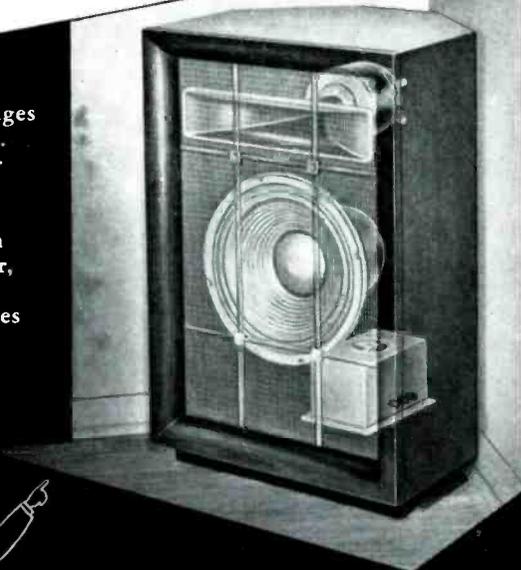
(CROSSOVER)

**GIVES SMOOTHER, CLEANER
REPRODUCTION OF
EXTENDED LOWS AND HIGHS**

Aristocrat I and II

For the first time, you have all the advantages of super-efficient separate 2-way operation . . . in such a compact, integrated, low-cost speaker system. Superb bass response . . . new E-V diffraction principle of high frequency sound dispersion . . . and a low crossover point with high transfer efficiency . . . assure smoother, cleaner, more extended lows and highs. New patented Hoodwin Diffraction Horn provides perfect dispersion of high frequencies through a 180° solid angle.

Supplied complete in beautiful ARISTOCRAT Corner Cabinet, or can be used separately in wall, door or other existing enclosures.



ARISTOCRAT II • Includes E-V Model 111 DeLuxe 800 cps Separate 2-way Speaker System completely wired and installed in ARISTOCRAT folded corner horn cabinet enclosure. 29½" high x 19" wide x 16½" deep. Net wt. 91 lbs.
List Price: Mahogany, \$340.00; Blonde, \$346.50

Model 111 DeLuxe 800 cps Separate 2-Way Speaker System • Consists of 12W L-F Driver, T-25 H-F Driver, 8-HD Hoodwin Diffraction Horn, X-8 Crossover Network, AK-1 Accessory Kit of mounting hardware and black flat baffle with cut ports. 27" h. x 18" w. x 13½" d. Net wt. 48 lbs.
List Price, less cabinet \$255.00

ARISTOCRAT I • Includes E-V Model 108 Economy 800 cps Separate 2-Way Speaker System, completely wired and installed in ARISTOCRAT folded corner horn cabinet enclosure. 29½" h. x 19" w. x 16½" d. Net wt. 72 lbs.
List Price: Mahogany, \$265.00; Blonde, \$271.50

Model 108 Economy 800 cps Separate 2-Way Speaker System • Consists of 12BW L-F Driver, T-10 H-F Driver, 8-HD Hoodwin Diffraction Horn, X-825 Crossover Network, flat black baffle with cut ports and AK-1 Accessory Kit of mounting hardware. 27" h. x 18" w. x 12½" d. Net wt. 29 lbs.
List Price, less cabinet \$165.00



ARISTOCRAT (Klipsch-Licensed) Folded Corner Horn Enclosure for single 12" full range speaker.
Mahogany, less speaker. List. \$ 99.50
Blonde, less speaker. List. \$106.00



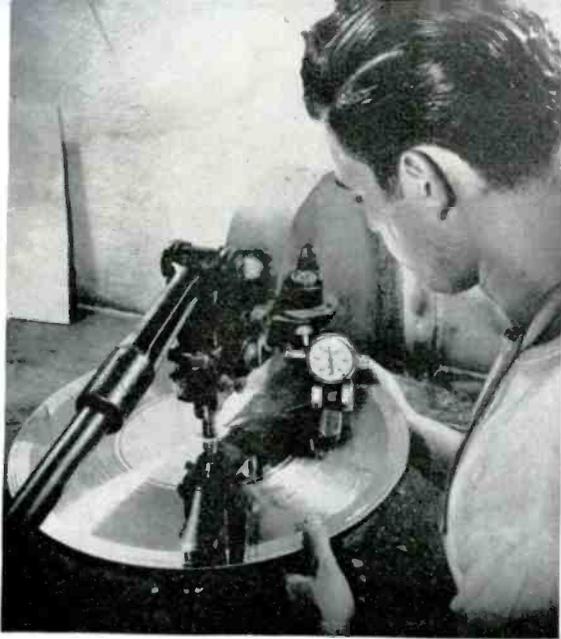
Send Now for Bulletin 189

Electro-Voice

425 CARROLL STREET • BUCHANAN, MICHIGAN

Suppliers to the Radio and TV Networks

HI-FI SPEAKERS • MICROPHONES • PHONO PICKUPS • TV BOOSTERS
Export: 13 East 40th Street, New York 16, U.S.A. Cables Arlab



CENTERING: *The center hole is located precisely with a dial indicator. An error of a few thousandths of an inch would cause objectionable wow when a record is played. A metal center-hole insert is soldered to the matrix, for use in the molding press.*



BACK TURNING: *The back of the matrix must be ground or turned perfectly smooth, since any high spots in the plating would deform the matrix during the pressing operation.*

discs from which the master recordings are made. The photographs were taken at the K. R. Smith division of Allied Record Manufacturing Company, New York. This company specializes in producing transcriptions for broadcast stations, and other uses where exceptionally high audio quality is required. Standards of quality control and inspection are very much higher than in plants devoted to big-run production of commercial phonograph records.

Hence the much higher cost of transcriptions. For example, every tenth transcription pressing is played all the way through on special monitoring equipment. Thus, any imperfections which may develop in the stamper during successive pressings are detected promptly.

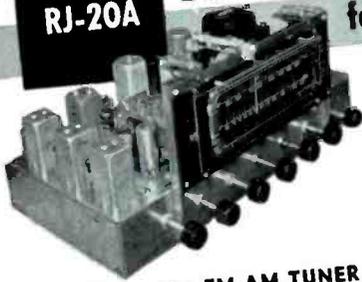
This company has published a handbook entitled "Suggestions for Professional Recording", which is available without charge. The address is 619 W. 54th Street, N. Y.

PRESSING: *Two matrices are mounted in the press. Then a preform of Vinylite is put between the stampers, and the press is closed.*

MOLDED TRANSCRIPTION: *When the press is closed, the Vinylite material is heated and subjected to 1,800 to 2,000 lbs. pressure. A cycling control releases the press after 25 to 75 seconds, depending upon the size of the disc and the kind of material being molded. Excess material is squeezed out around the edges. Therefore, the final operation is to trim and polish the circumference of the disc. Since the labels are molded onto the disc during the pressing operation, the disc is ready, after it is trimmed, to be packed and shipped.*



MODEL RJ-20A



leading audio engineers choose BROWNING FM-AM TUNERS for discriminating listeners

For custom installations, audio engineers know they must please the most severe judge of high-fidelity — the serious music listener. These engineers know, too, that only the best engineering resources can produce such gratifying performance.

... And that is why leading audio engineers choose from these BROWNING models for their exacting custom installations.

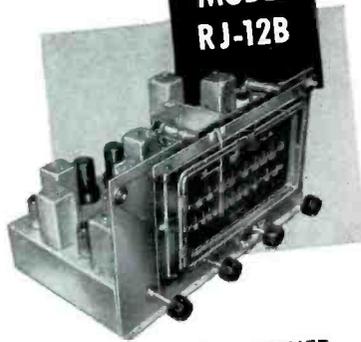
MODEL RJ-20A FM-AM TUNER

- Armstrong FM circuit; 20 db quieting with 6½ microvolts
- Separate r.f. and i.f. on both bands
- AFC on FM with ON/OFF switch
- AM bandwidth selection, 9 kc. and 4 kc.
- Drift-compensated
- FM audio 15-15,000 cycles $\pm 1\frac{1}{2}$ db.
- 20 db treble and bass boost
- self-contained power supply.

MODEL RJ-12B FM-AM TUNER

- Armstrong FM circuit; 20 db quieting with less than 10 microvolts
- Separate r.f. and i.f. on both bands
- AFC on FM with ON/OFF switch
- Drift-compensated
- FM audio 15-15,000 cycles $\pm 1\frac{1}{2}$ db
- AM audio 20-6600 cycles ± 3 db
- Triple-tuned i.f.

MODEL RJ-12B

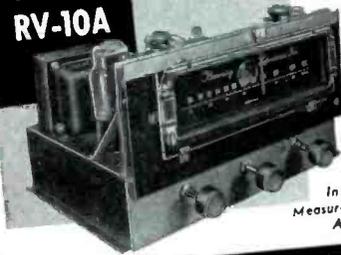


MODEL RV-10A FM TUNER

- Armstrong FM circuit; less than 10 microvolts for complete limiting
- AFC on FM with ON/OFF switch
- 2-stage cascade limiter
- Tuned r.f. stage
- Drift-compensated
- High impedance output.

Learn the full specifications for Browning high-fidelity — write for complete performance curves and data on these models.

MODEL RV-10A



In Canada, address:
Measurements Engineering Ltd.
Auriprior, Ontario.

BROWNING
Laboratories, Inc.
Winchester, Mass.



ENGINEERED
FOR
ENGINEERS

ALL BROWNING MODELS
ARE EQUIPPED WITH SELECTABLE
AUTOMATIC FREQUENCY CONTROL

for those who treasure

the art of listening

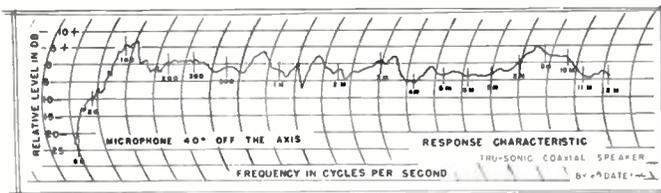
STEPHENS TRU-SONIC SPEAKER SYSTEMS ARE SUPREME

Acceptance by the leaders both in the commercial and custom set building fields has been the award most prized by Stephens engineers through the years. They know this recognition is a verdict of the truly discriminating ear and it serves as a spur in Stephens' never-ending search for new peaks of perfection in sound reproduction components.

Stephens proudly presents . . .

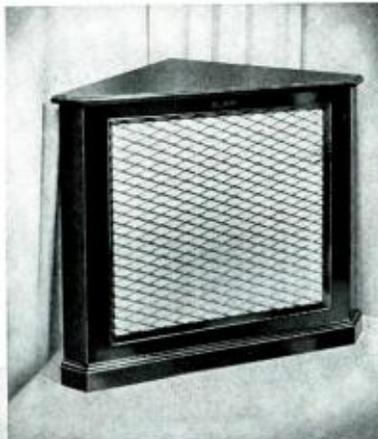


THE 106AX COAXIAL 2-WAY SPEAKER for full, rich, natural sound across the entire tone spectrum at all volume levels. One compact assembly combining a cone-type, low-resonant, low-frequency unit with multi-cellular type, wide-angle high-frequency dispersion (eight cells, $40^\circ \times 80^\circ$). A 1200-cycle crossover network channels high and low tones to units designed to reproduce them. Power rating—20 watts. Impedance—16 ohms. Frequency response—40 to 12,000 cps. Diameter— $15\frac{1}{8}$ ". Baffle opening— $13\frac{1}{2}$ ". Depth behind mounting panel— $10\frac{1}{2}$ ". Weight—30 lbs. Recommended for broadcast monitoring, motion picture sound, and—especially—FM and record reproduction.



And

THE MODEL 418 CORNER CABINET, the finest custom-quality home reproducer in the Stephens TRU-SONIC line. It features two 15" permanent magnet speakers with extended range for low tones, plus the full coverage in the high ranges afforded by the use of a Model 824H 2x4 800-cycle horn, a Model 108 high-frequency driver, and a Model 800X crossover network. Cabinet dimensions: Width—41"; Depth—23"; Height—36"; Weight—155 lbs. Available in blond or mahogany.



STEPHENS
TRU-SONIC

WRITE FOR FREE LITERATURE TODAY!

MANUFACTURING CORPORATION

8538 WARNER DR., CULVER CITY, CALIF.

RECORD COMPENSATOR

Continued from page 32

be adopted. However—and unfortunately—such has not been the case, and a wide range of characteristics is in evidence.

How important are all these factors, anyway? To the user of the average commercial phonograph they may be of little importance, because, in the first place, many of them use crystal cartridges which have a drooping high frequency response and, in the second place, few commercial phonographs have a sufficient degree of high-fidelity to make these recording characteristics noticeable. To the audio-ophile, who would be scandalized at the thought of buying an amplifier that was more than a fraction of a decibel away from flat response over the range from 20 cycles to well above 20,000 cycles, the answer is that the difference due to preemphasis alone can be as great as 10 db. (10 times, in power) in certain ranges of frequency. And to the music lover who doesn't know or care what a decibel is, the answer is that if he has a good loudspeaker and amplifier, the difference is decidedly audible.

THERE is a point which should be clarified in connection with amplifiers incorporating phonograph preamplifiers, and with preamplifier design in general. It is relatively expensive to design a preamplifier that is compensated correctly in the extreme bass range, especially if the hum level must be kept low, as it certainly must. Since careful design at this point is thought to be either unimportant or not appreciated, many preamplifiers are equalized fairly accurately down to 50, 60 or even 80 cycles, and then allowed to "droop" rapidly. This leaves out at least an octave of the bass range, which removes much of the richness and power of the music to be reproduced. It is sometimes argued that this procedure is desirable because 1) it reduces rumble from phonograph turntables, 2) it avoids overloading the average loudspeaker, and 3) the loudspeaker cannot reproduce the 30 to 80-cycle range anyway.

Perhaps so, but the concern here is with excellent amplifiers and excellent loudspeakers. And in any case, how does the argument explain the application of this design theory to expensive amplifiers? Who needs an amplifier that can handle full power at 40 cycles if the preamplifier does not permit 40 cycles to get to the amplifier?

Regarding adjustments for turnover and roll-off, the question arises: why not use bass and treble tone controls to accomplish the same result? The answer is that they can be so used after a fashion, but the results are quite imperfect because they are designed for a different purpose. The tonal ranges over which they are effective are not the same as those requiring compensation for recording characteristics. For example, if a preamplifier equalized for a turnover frequency of 400 cycles is used with a record that requires an 800 cycle turnover, the music will sound rather thin. If the bass tone control is now turned up, the drums

Continued on page 68



You don't have to look, because
THERE ARE NO SPLICES
in **audiotape***



...but this "transparency test" shows some other important things about Audiotape quality

■ When you hold a reel of plastic base Audiotape up to the light, notice its extremely uniform translucency—free from dark rings or fuzzy areas. You can see your fingers right through it, sharply outlined against the light. This is proof of the clean, straight line slitting that makes Audiotape track and wind absolutely flat. There are no rough or turned-over edges which would lift the tape away from the heads, causing loss of high-frequency response. Of course this test also proves that the tape is entirely free from splices. But with Audiotape you can be sure of that without looking. For all 1250 foot and 2500 foot reels of plastic base Audiotape are *guaranteed splice-free!*

You can see the output uniformity of Audiotape, too. For every 5-reel package includes an Esterline-Angus output chart, showing the measured output of the entire length of one of the reels in the package. And since all 5 reels are slit from the same roll after coating, the chart actually measures the uniformity of all the tape in the package. This gives positive visual proof of Audiotape's unequalled output uniformity.

NO OTHER TAPE OFFERS YOU ALL OF THESE EXTRA-VALUE FEATURES:

- **Splice-Free Reels.** All 1250 and 2500 foot reels of plastic base Audiotape are *guaranteed* to be free from splices.
- **Unequalled Uniformity.** Plastic base Audiotape is guaranteed not to exceed $\pm 1/4$ db within the reel and $\pm 1/2$ db from reel to reel.
- **Output Curves** in every 5-reel package of plastic base Audiotape show actual measured output of the tape contained in the package.
- **Maximum Output with Minimum Distortion.** Oxide formulated to give high output at bias which results in low harmonic distortion.
- **Safe-Handling Package** for 2500 and 5000 foot reels permits loading onto turntable without danger of spilling tape from hub, simplifies attachment of reel flanges, and provides safe storage without flattening bottom of roll.

*Trade Mark

AUDIO DEVICES, Inc.

444 Madison Avenue, New York 22, N. Y.

Export Dept.: 13 East 40th St., New York 16, N. Y., Cables "ARLAB"

The ONLY
truly high-fidelity high-
performance tape recorder
in the popular price
field!

Concertone RECORDER



Model
1401 Recorder
installed in Model
501 Carrying Case

"just like
being there"

Equalization conforms to NAB recommended standards. Extended frequency response, 50 to 15,000 c.p.s. \pm 2 db. Tape noise down to random level. Three dynamically balanced motors. Separate heads for high frequency erase, record and playback. Simultaneous monitoring from tape while recording. Instantaneous choice of 7.5" or 15" per second tape speeds. All controls interlocked to prevent spilling or tearing tape.

MODEL 1401—BASIC RECORDER Ready for custom installation, includes drive mechanism, power supply, erase, record and playback preamplifiers, all mounted on rigid base plate. **Professional Users Net Price, dual or single track heads \$345.00**

Available with hysteresis synchronous motor on special order.

MODEL 501—CARRYING CASE Complete with monitoring amplifier, high fidelity 8" speaker, and all connections for portable system. **Professional Users Net Price \$82.50**

Without monitoring amplifier and speaker, for professional usage \$47.50

MODEL 1702—CONSOLE CABINET All metal construction. Features rack panel set-up for mounting a complete sound system. Completely enclosed. **Professional Users Net Price \$97.50**

Write For Bulletin #106

Manufactured By

Berlant Associates

4917 W. Jefferson Boulevard
Los Angeles 16, California

RECORD COMPENSATOR

Continued from page 66

begin to sound louder, as do the double-basses and the tuba, but something seems to be missing in the middle register, about an octave above middle C. Why? Because the need is for a fixed increase in response from the very lowest frequency up to 800 cycles. What the bass control gives us is a great deal of increase at the very bottom of the range, more than we need, and practically no correction in the middle register, where it is most noticeable.

To summarize, turnover and roll-off compensation counterbalance the so-called recording characteristics incorporated into phonograph records by the manufacturer. By providing a series of different turnover and roll-off frequency characteristics, the ideal of exact compensation for the various recording characteristics in common use today can be approached. The result is the best possible facsimile of exact reproduction of the music as it was played in the recording studio.

TAPE RECORDING

Continued from page 60

types of microphones with alarming success. We encountered a practical example of this in our experiments. Recorder motors tend to make a grinding noise, particularly when they are new. In the Concertone, this is audible 3 ft. away² and can be picked up by a sensitive microphone even 6 ft. distant. In our early experiments, this background noise was quite annoying, until we discovered that putting a rug under the metal base of the mike stand eliminated most of it! Transmission of the sound was not through the air, direct from the Concertone to the microphone, but through the base of the Concertone cabinet, through the floor, and up through the microphone stand. Again, the user of a tape recorder is urged to experiment. Some microphones are more sensitive to mechanically-transmitted sound than are others.

External noises can be very troublesome, and sometimes difficult to control. Trucks rolling by the front of our house produced appreciable background noise. In fact, it was so real that when neighbors came in to hear some of our tapes, they looked out the window to see what was going by! And the dog, walking on the bare floor, set up a considerable clatter with his toe nails — until we got the microphone up on a shock mount.

Positioning the Microphone

There is only one way to determine the best position for a microphone: take a reel of tape and experiment. Long articles

Continued on page 69

²See our discussion in the previous article about shock mounting to deaden this noise

The Magic Number is

113

The magic of music is
now available on 113
different LP labels

WE CARRY THEM ALL

We can send you any recording, currently listed in the Schwann LP catalog — the same day your order is received.

You can solve your small-label problem with us, quickly and efficiently. Records are mailed postage prepaid on receipt of your check or money order — or C. O. D., if you prefer.

The Music Box
279 Main Street
Great Barrington, Mass.

TAPE RECORDING

Continued from page 68

have been written on the subject for the benefit of studio engineers, yet they operate under relatively ideal conditions. In the home, room acoustics play havoc with the recording of live sound.

There is not much problem with the recording of one or two speaking voices, because the microphone can be positioned within, say, a few feet of the individuals and the input level control turned down to a point where reflections from the wall are too feeble to be picked up.

But try recording a piano! That is one of the toughest instruments to record correctly even under the best acoustic conditions. In the home, repeated experimenting is necessary to find the best spot for the mike. Strangely enough, the ear is no guide to locating that position. No doubt the piano sounds best, to the ear, near the big chair in the corner. But put a microphone over there — particularly a non-directional model — and the result is likely to be horrendous! Certain notes will stand out like the proverbial sore thumb, completely out of balance with the rest of the musical scale. Others will be almost inaudible. Still others will echo and re-echo. We still have to locate the best spot in our workshop, (if there is any such!), but so far we find that being *un*-equally far from everything is a good rule. The exact center of the room is bad; directly on the center line of the piano is bad; corners are very bad.

Using the Playback Head for Monitoring

With something of an evil gleam in our eye, we have postponed a discussion of monitoring, or listening to what is being recorded, in the nasty hope that our readers would enjoy the experience for themselves, un-forged.

It was pointed out in the previous article that, in the Concertone and many other tape machines, it is possible to monitor what is being recorded while the recording is being made. The tape feeds past the erase head, then the record head, and finally the playback head. Thus, when the function selector is in the record position, and the tape is passing through the recorder, the playback gain control can be advanced until what is being recorded on the tape can be heard on the loudspeaker.

This system works excellently when the recording is being made from a phonograph record or from an FM, TV, or AM tuner. We were naive to think that it would work equally well with a microphone. We connected the microphone, started the recorder, began to talk into the mike, and then turned up the playback level control so we could hear how the recording sounded. For about one second, everything was wonderful. Then there came out of the speaker a series of sounds like a Les Paul echo effect gone completely out of control. It took us a while to figure out what was happening. The sequence of events was this. Address-

Continued on page 70



Years ahead in listening pleasure

When you own a Newcomb amplifier you own more than just a carefully built piece of electronic equipment that measures up to the most exacting mechanical requirements. You also own... what you *really* want... the phonograph amplifier that's designed to give you *the most in listening quality.*

Let your own ears be the judge. When you listen to a Newcomb you hear your favorite recordings or radio and television shows come gloriously to life. These superb amplifiers are subjected to rigorous testing procedures throughout their production to insure mechanical and electrical perfection. BUT... *more than that...* they must meet the most critical *listening quality* tests.

Newcomb Model KXLP-30 is a 20-20,000 cycle, low distortion, 30 watt phonograph amplifier providing the reserve power to make full use of its special tone control circuits. Superbly balanced electrical design, the result of many years experience, gives you remarkable *listening quality.* The *Magic Red Knob* four stage record condition compensator frees tone controls from the function of controlling surface noise. Thus any desired tonal balance may be obtained under any condition of operation at any volume level. Adaptable for use with AM-FM radio tuners, TV, wide range loudspeakers and magnetic or crystal pickups, it is engineered for *your listening pleasure.*

Write for complete descriptive literature

Newcomb

THE SOUND THAT QUALITY BUILT



Model HLP-14, 14 watt
Phonograph Amplifier



Model P-10A, 10 watt
Phonograph Amplifier



Model R-12, Three Speed
Portable Phonograph



Model RC-12, Three Speed
Portable Phonograph



Model B-100 Radio

NEWCOMB AUDIO PRODUCTS CO., DEPT. W, 6824 LEXINGTON AVENUE, HOLLYWOOD 38, CALIFORNIA
MANUFACTURERS OF P.A., PHONOGRAPH, MOBILE, INSTRUMENT AND WIRED MUSIC AMPLIFIERS
PORTABLE SYSTEMS, PHONOGRAPHS, RADIOS, TRANSCRIPTION PLAYERS AND RACK EQUIPMENT

FAR MORE than an AMPLIFIER

Type 210-B
DYNAURAL
Amplifier



... it's a complete music-control system

- A control system
- A compensating system
- A superb amplifier
- Full year warranty

Frankly, whether you buy H. H. Scott amplifiers or second-best, your wisest investment is as versatile an amplifier as you can afford. Why? In operation, you must cope with many recording characteristics and all kinds of records — old, new, noisy, quiet, clean, distorted. The real test of amplifier quality is superb music under all conditions, poor as well as good. H. H. Scott amplifiers give exactly that.

No other amplifiers have any of the exclusive H. H. Scott control and compensating features:

- ... Wide-range listening flexibility of unique continuous 5-channel tone controls
- ... New automatic loudness control compensating for the different response of your ears to high and low notes at different volumes
- ... The amazing DYNAURAL noise suppressor which virtually eliminates record scratch and LP hiss without losing music, combined with
- ... A record-distortion filter and a pickup level adjustment

In all-around performance, H. H. Scott amplifiers stand unique in the field. Write us for the name of your nearest distributor.

Hear these amazing amplifiers
at the Audio Specialists below:

NEW YORK CITY
Leonard Radio, Inc.
69 Cortlandt St.
Terminal Radio Corp.
85 Cortlandt St.
Lafayette Radio
100 Sixth Ave.
Hudson Radio
48 W. 48th St.
Grand Central Radio
124 E. 44th St.

Federated Purchaser
66 Dey St.
BOSTON
Lafayette Radio
110 Federal St.
Radio Shack Corp.
167 Washington St.
DeMambra Radio
111 Commonwealth

CHARLOTTE, N.C.
Shaw Dist. Co.
205 W. First St.
PITTSBURGH
Cameradio
963 Liberty Ave.
Tydings Co.
5800 Baum Ave.
PHILADELPHIA
Air Tone Sound
1527 Chestnut St.

CHICAGO
Allied Radio Corp.
833 W. Jackson Blvd.
CINCINNATI
Steinberg's, Inc.
633 Walnut St.
HOLYOKE, MASS.
Tel.-O-Wire Sound
24 Newton Place

LANSING, MICH.
Offenhauer Co.
227 W. Washtenau St.
ROCHESTER, N.Y.
Rochester Radio
114 St. Paul St.
WASHINGTON, D.C.
Shrader Mfg. Co., Inc.
2803 M St., N.W.

TAPE RECORDING

Continued from page 69

ing the microphone, we spoke one word: "Test". A fraction of a second later, "test" was played back through the speaker. The microphone picked it up, re-recorded it, played it back all over again — and the process kept repeating itself. If a whole sentence is spoken, instead of just the word "test", the result is the worst mess of gobbledegook man ever heard. It is also likely that a microphonic wailing will start in before long, adding its racket to the overall bedlam.

Distance of the microphone from the speaker, and the playback volume level, alter the results — should anyone want to try deliberately to achieve this effect. If the sound from the speaker reaches the microphone at a level louder than the original (close mike or advanced playback control), the volume will gain momentum until it becomes deafening. If the sound from the speaker reaches the mike at a lower volume level than the original, everything will fade out — eventually.

To summarize, we found it impossible to monitor program material being recorded with a microphone, unless the loudspeaker was in an entirely different part of the house, so that the sound from it could not be picked up by the microphone.

This difficulty would be overcome if headphones could be used. However, no provision is made on the Concertone for connecting headphones, but certain other recorders do provide this facility. There seems to be no theoretical reason why a headphone jack could not be added to the Concertone. We plan to make this change and will report results in the next issue of HIGH-FIDELITY.

Conclusion

Tape recording is a lot of fun and a most fascinating experience. The recording of program material from FM or TV tuners, or from phonograph records, is an operation which can be mastered in a very short time, but it opens up endless possibilities for experimenting. Recording live program material is definitely more complicated, but how much more complicated depends almost entirely on the degree of perfection or professionalism it is desired to achieve. Experimenting is in order, again.

It is hoped that the foregoing discussion has been not only entertaining but instructive and helpful. We would sincerely appreciate reports from our readers on their experiences with recording in general, with specific equipment, and with special types of recording problems.

EDITOR'S NOTE: Space limitations have prevented us from including additional material by Mr. Macy, discussing his experiences with recording outside the home, the construction of a special carrying case for the Concertone and associated equipment, and a method for recording two program sources by fading each one in and out as desired. Therefore, his series will be continued in a forthcoming issue of HIGH-FIDELITY.

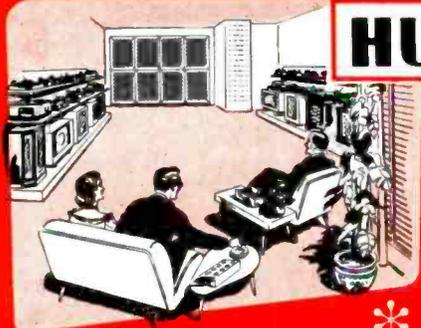


**HERMON
HOSMER SCOTT, INC.**

"PACKAGED ENGINEERING"

385 PUTNAM AVE. • CAMBRIDGE 39, MASS.

HUDSON has the RIGHT COMBINATION for Your Complete HI-FI Satisfaction!



- ALL FAMOUS HIGH FIDELITY EQUIPMENT IN STOCK
- NEWEST, PUSH BUTTON AUDIO-COMPARISON SOUND STUDIOS
- EXPERT TECHNICAL ASSISTANCE
- LOWEST POSSIBLE PRICES

The Only True High Fidelity — High Performance Tape Recorder in the Popular Price Field!

FAMOUS

Concertone TAPE RECORDER

By Any Standard of Comparison It is The Best Buy in the Tape Recorder Field!



The Concertone meets all professional requirements, yet is priced Exceptionally Low. Equalization conforms to NAB Recommended Broadcast Standards. Extended Frequency Response is 50 to 15,000 cps \pm 2 db at 15" per second speed. Tape Noise down to random level. Also has 7.5" per sec. Speed. Pre-aligned heads quickly interchangeable for

Dual or Single Track Recording. Total Harmonic Distortion less than 2% at normal maximum signal level. Has 3 dynamically balanced motors, separate heads for recording, erase, and playback. Simultaneous monitoring from tape while recording. Instant choice of 7.5" or 15" per second speeds. Fast Forward, Rewind, and Reverse (2500 ft. per min.). All controls are interlocked to prevent spillage or tearing of tape. Size of basic recorder: 22 x 14 x 5" mtg. depth below panel. Use with any good quality amplifier.

AVAILABLE AS BASIC UNIT WITH CARRYING CASE OR CONSOLE CABINET

BASIC RECORDER, 1401D: Drive mechanism, power supply, erase, record, and playback preamplifiers, mounted on base plate, ready for installation. **\$345.00**

With Dual Track Heads. No. A16147, Net **\$345.00**
Model 1401S, same with Single Track Heads, Net **\$345.00**

FAMOUS COLLINS HI-FI TUNERS

High Fidelity At Its Best!

All the technical skill and craftsmanship possible have been incorporated into Collins Audio Products. As a result these units closely approach custom-built quality, which is apparent upon inspection and demonstration.

COLLINS FM-11 FM TUNER. Surpasses the performance of any unit in its price class. 9 miniature tubes, plus tuning eye and rectifier. 19 1/4 x 12 x 7 1/4". No. A3001 **NET \$59.50**



RADIO CRAFTSMEN 500 AMPLIFIER

Williamson All-Triode Circuit
99.999% Distortion-Free

Terrific Performance! This new 12-watt "Ultra-Fidelity" amplifier uses the famous Williamson All-Triode circuit to set a new high in audio fidelity. Frequency response: \pm 0.1 db, 20-20,000 cps. \pm 2 db 5 to 100,000 cps. 12 watts \pm 2 db, 10 to 50,000 cps. Total harmonic distortion less than 0.01% at average listening level below 1 watt. Tubes: 2-6SN7GTA, 2-KT66, 5V4G rectifier. One chassis, uses the finest component to produce unexcelled listening quality with practically no distortion. At this price there's nothing better! No. A10964, List \$166.00 **Net \$99.50**



Amazing Performance! Truly Sensational Value!

Exclusive at HUDSON

audio-pacific

TRUE HIGH FIDELITY AMPLIFIERS

Startling Performance at a price everyone can afford! These famous amplifiers give a new concept to the phrase Hi-Fidelity. They have been rated "Superb" by sound engineers who know!

Leading consumer research organizations have found them very conservatively rated! The frequency response is from 18 to well beyond 20,000 cycles within .1 Db. Presence effect is truly astounding, reproduction is rich, brilliant and crisp. Noise, hum and harmonic distortion have been reduced to the vanishing point, — 85 Db below 20 watts.

Harmonic distortion is only 1/2% at 19.6 watts (40 watts peak), with 40 Db feed back. Hum, and noise measure less than 1 milli-volt across a 10 ohm load.



MODEL 4 LH—The basic amplifier of medium gain for use with tuners and as studio monitors, etc. Expressly designed for tuners incorporating bass and treble controls and pre-amplifier stage for phono. Tube complement, 1-6J5, 1-6SN7, 2-6L6G, 1-5U4. Size 7" W x 8" H x 11" L. Net price **\$64.00**



MODEL 4—Same as above with with remote control panel on which is located a master level control, four position selector switch, and a low level listening control designed to allow full round, rich tone at whisper levels. Tube complement 1-6J5, 1-6SN7, 2-6L6G, 1-5U4. Size as above. Net price **\$68.00**



MODEL 3—Same as 4 LH but with an additional 1-6J5 for the bass and treble boost controls which are incorporated. Size same as Model 4 LH. Net price **\$85.00**

ALL FAMOUS MAKES IN STOCK

GE S1201D 12" High Fidelity Speaker	Net \$19.95
Western Electric 728B 12" Speaker	Net 35.70
RCA 51551 15" Duo-Cone Speaker	Net 35.57
RCA 51552 15" Duo-Cone Speaker	Net 48.50
Altec-Lansing 604B 15" Dia-Cone Spkr	Net 140.00
Altec-Lansing 603B 15" Dia-Cone Spkr	Net 75.00
University 6201 12" Coaxial Speaker	Net 44.10
New Bell 2122A Amplifier	Net 49.45
New Bell 2145A Amplifier	Net 175.52
Brook 12A3, 10 Watt Amplifier	Net 198.00

All Preamps, Equalizers, Cartridges, Arms in Stock!

WE STOCK AND DEMONSTRATE ALL STANDARD MAKES OF ELECTRONIC AND AUDIO EQUIPMENT . . . High Fidelity Tuners, Amplifiers, Speakers, Pickup Arms and Cartridges, Accessories, Record Changers, Tape and Disc Recorders, Cabinets, Replacement Parts, Tubes, Television Chassis and Components, etc. by such famous names as

- | | |
|------------------------|-----------------|
| ALTEC-LANSING | • ASTATIC |
| AUDAK | • BELL |
| BOGEN | • BROOK |
| BROWNING | • COLLINS |
| CLARKSTAN | • ELECTRO-VOICE |
| ESPEY | • GARRARD |
| GENERAL ELECTRIC | • GRAY |
| HALLICRAFTERS | • JENSEN |
| MARKEL | • MASCO |
| PICKERING | • RCA |
| RADIO CRAFTSMEN | • REK-O-KUT |
| H. H. SCOTT | • STEPHENS |
| UNIVERSITY | • WEBSTER |
| WESTERN ELECTRIC, Etc. | |

NEW! BOGEN Model HO-10 TRIODE POWER AMPLIFIER



with Model RXPX High Fidelity Remote Control

Features HO-10: 10 Watt Triode Amplifier. Distortion—1.3% at rated output 20-20,000 CPS—35% at 1000 CPS. Cathode follower, damping factor 25.

Features RXPX: Used as remote up to 25 ft. Provides remote control of Power, Selector, Volume and Separate Bass and Treble. Pre-amplifier inputs for all magnetic cartridges. Gain: HO-10 75 db, with RXPX at 80 db. Frequency response of 10 watts HO-10 .02 db from 10 to 20,000 CPS. HO-10 with RXPX 1.5 db from 10 to 20,000 CPS. Tubes (8): 1-6SL7GT, 2-6SF5, 1-6SN7GT, 1-6BA8, 1-6X5GT, 1-5V4G. Output impedance—12 ohms. HUM FUND.—70 db MAX.—60 db.

NET PRICE MODEL HO-10 **\$94.08**
NET PRICE MODEL RXPX **\$53.37**

HUDSON

RADIO & TELEVISION CORP.

Formerly Newark Electric Co., Inc. of New York

REVOLUTIONARY NEW SOUND STUDIOS!

UPDOWN:
48 West 48th St., New York 19, N. Y.

DOWNTOWN:
212 Fulton Street, New York 7, N. Y.

PHONE Circle 6-4060

Our uptown store features the most advanced installation anywhere! Relax in an easy chair . . . select and operate ANY combination of world famous high fidelity components by PUSH-BUTTON Remote Controls. Every music lover, engineer, sound technician and high fidelity enthusiast will be fascinated by this new ingenious approach to audio-comparison. Sound studios at Both Stores.

for flawless reproduction
**NO OTHER CARTRIDGE CAN
 PERFORM LIKE A PICKERING**
patented design
Spickering
provides **DYNAMIC COUPLING***
throughout the entire audible range

*** DYNAMIC COUPLING ASSURES**

- constant stylus contact with the record grooves over the entire audio spectrum (20-20,000 cps)
- full frequency response
- full transient response

**NO RESONANCES
 NO MISTRACKING
 NO GRINDING OF GROOVE WALLS**

Well-informed engineers and technicians, schooled in the science of electro-mechanics, know that only wide-range frequency response provides full transient response; the electronic phenomena which enables the reproduction of orchestral music with all the subtle sounds that give each musical instrument its individual character.

Pickering engineers and designers have but one objective . . . to produce products that will please the music lovers' insatiable appetite for the flawless recreation of recorded music . . . for the utmost in quality insist upon Pickering Audio Components.

Pickering Cartridges transmit all of the sounds in the musical spectrum, without loss of definition, just as a fine optical lens passes all of the colors in the rainbow.
 For literature address Dept H



NOTED WITH INTEREST

Continued from page 8

even those not living near the RR tracks can have a lot of fun astonishing their friends with its realism.

And last — but we hope by no means least — HIGH-FIDELITY'S own exhibit, which boasted the only sound-retarding partition at the Fair, and the corner Air-Coupler described in this issue. Both partition and Air-Coupler were a great success; the partition kept our sound in, the sound of others, out. The Air-Coupler gave off with plenty of full-bodied bass even at low volume levels.

The Fair was, in short, colossal . . . two full floors of the Hotel New Yorker . . . 8,000 to 10,000 attendance during the three-day period — nearly double last year's. Eighty-three exhibitors (listed on page 84 of this issue, so those who were not among the 10,000 can write for latest information on the new equipment exhibited). For us, it was one of the most rewarding and encouraging experiences in many years. To the thousands of HIGH-FIDELITY readers who came to meet us, to comment on the Magazine, and to discuss their audio problems, our most heartfelt appreciation of their good wishes, their enthusiasm, and their sincerity.

Plans are being formulated now for a 1952 audio show in Chicago and, with the fast-spreading interest that is developing from Seattle down to Houston, we expect to hear that there will be a West coast show, too. These will be entirely apart from the established trade and engineering conventions, since the purpose is to acquaint the general public with the use of audio equipment for home entertainment.

Continued on page 74

**The music you love sounds better
 with a**



50W-2 Amplifier
 50 Watts (Peak: 100)



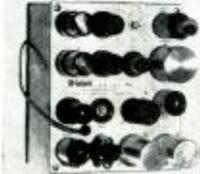
World's Most Efficient Amplifier

Unsurpassed for performance and quality — your entire record collection (either tape or disc) will reproduce better with lifelike reality through this new amplifier circuit.

Unequaled for quality reproduction of any sound source, the McIntosh offers **OVER 65% EFFICIENCY; DYNAMIC RANGE OVER 70 db.; FREQUENCY RESPONSE 20-20,000 cps.**

Music lovers agree that McIntosh gives superlative audio reproduction!

- Reaches audio peaks from 200 to 400 times the average power of speech and music
- Less than 1% distortion at peak power
- Works perfectly with variable impedance load
- 1% intermodulation distortion at peak power



20W-2 Amplifier
 20 Watts (Peak: 40)



AE-2 8-stage Amplifier Equalizer perfectly matches the stable, distortion-free amplifier performance.

Send for Free Catalog

McINTOSH ENGINEERING LABORATORY, Inc.
 320 WATER ST. • DEPT. D-11 • BINGHAMTON, N.Y.

**CHRISTMAS
 GIFT RATES**

If you have enjoyed High-Fidelity why not spread this enjoyment by giving gift subscriptions to your friends at Christmas? Each gift will be acknowledged to the recipient with an attractive Christmas card bearing your name as donor. Rates are as follows:

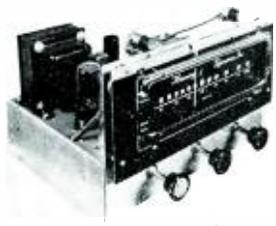
One 1-yr. gift \$3.00	Three 1-yr. gifts \$6.00
Two 1-yr. gifts \$5.00	Four 1-yr. gifts \$7.00
Five or more 1-yr. gifts \$1.60 each	
CANADA: Add 50c per yr.	
FOREIGN: Add \$1.00 per yr.	

Use the handy gift order card bound between these pages and, **to make sure the acknowledgment reaches the recipient in time for Christmas, send your order today.** Remember also, your remittance must accompany the order. Send to:

**CHRISTMAS GIFTS
 High-Fidelity Magazine
 Great Barrington, Mass.**



WORKSHOP FM ANTENNA AND MAST



BROWNING LABS FM-AM TUNER



PICKERING ARM, DIAMOND STYLI



REK-O-KUT 3-SPEED TURNTABLE



H. H. SCOTT 210-B AMPLIFIER



GARRARD CHANGER, AUDAK PICKUP



ALTEC 604B SPEAKER & NETWORK

FIRST AWARD INCLUDES ALL THE EQUIPMENT ILLUSTRATED HERE

FREE Complete Equipment for a \$700.00 Hi-Fi Radio-Phonograph Installation

As a means of encouraging high-fidelity enthusiasts, eight of the leading manufacturers of fine audio equipment have joined HIGH-FIDELITY Magazine in offering 16 Awards to those who send in

the largest number of subscriptions to HIGH-FIDELITY, in accordance with the Rules below. Awards will be made immediately after the close of the contest, on February 29, 1952.

FIRST AWARD

The First Award comprises the equipment illustrated above, valued at \$700, including a Browning FM-AM tuner, H. H. Scott amplifier, Pickering tone arm with 2 diamond-stylus pickups, Rek-O-Kut turntable, Garrard changer and Audak Polyphase pickup, Altec 604B coaxial speaker and network, and a Workshop Associates FM antenna.

2nd AWARD — \$100.00 CASH

The Second Award, of \$100.00 in cash, will be paid by HIGH-FIDELITY Magazine for the second highest score.

3rd AWARD — \$50.00 CASH

The Third Award, of \$50.00 in cash, will be paid by HIGH-FIDELITY Magazine for the third highest score.

Rules of the Hi-Fi Awards Contest

The Hi-Fi Awards Contest is open to everyone except subscription agencies and members of the High-Fidelity Magazine staff. In case of a tie for any Award, duplicate Awards will be presented.

Each participant will be rated on a score of points for new or renewal subscriptions for HIGH-FIDELITY Magazine, as follows: One Point for each 1-year subscription; Three Points for each 3-year subscription.

Subscription orders must be accompanied by checks or money orders for: each 1-year subscription, \$3.00; each 3-year subscription, \$6.00. NOTE: it is necessary

4th AWARD \$25.00 CASH

The Fourth Award, of \$25.00 in cash, will be paid by HIGH-FIDELITY Magazine for the fourth highest score.

5th to 16th AWARDS — \$10.00

Fifth to Sixteenth Awards, of \$10.00 in cash, will be paid by HIGH-FIDELITY for the 5th to 16th highest scores.

to add 50c for each year on Canadian subscriptions, and \$1.00 for each year on foreign subscriptions. Only orders sent in at the above rates will be credited to your score.

To count on your score, orders must be postmarked November 25, 1951 to February 29, 1952, inclusive, and addressed to Hi-Fi Awards Contest, Great Barrington, Mass. In addition, each subscription must be marked "Credit to . . ." followed by your name and address.

Scores will be tallied daily, and the Awards presented immediately at the close of the Contest. Names of contestants, in the order of their scores as of January 2nd, will be published in the February issue of HIGH-FIDELITY. Names of the winners will be published in the April issue.

HI-FI Awards Contest

GREAT BARRINGTON,
MASSACHUSETTS



*Professional
Sound Quality
for the home...*

**at your
fingertips**

A-433A



The new ALTEC two-unit amplifier system...

Engineered to the Altec standard of perfection, this new system is the finest quality, most flexible and most practical home amplifier ever produced. The remote "fingertip" unit, finished in beautiful brushed brass, has comprehensive controls for variable bass and treble rise and droop — for the selection of the proper record crossover and equalization — for the selection of any of three input channels and for volume control.

Connect this compact control unit to the "hidden" power amplifier and any sound system will sound better. Of course, it takes an Altec speaker to fully realize all the marvelous potential of this wonderful new amplifier system.



A-333A "hidden" amplifier.

- ★ 27 watts, less than 5% total harmonics; 20 watts, less than 2% total harmonics; less than 1/2% at 15 watts!
- ★ +0, -1 db, 20-20,000 cycles; flat to 3 db to 100,000 cycles!
- ★ Listen to this latest Altec achievement at your nearest dealer.

ALTEC
LANSING CORPORATION

9356 Santa Monica Blvd., Beverly Hills, Calif.
161 Sixth Avenue, New York, New York

NOTED WITH INTEREST

Continued from page 72

Another Concert Station

October 6th saw the birth of FM station WGBH in Boston, operated by the Lowell Institute Cooperative Broadcasting Council as a non-profit, educational undertaking featuring wonderful FM listening, such as live broadcasts of the Boston Symphony. WGBH operates on 89.7 mc. with a power of 20,000 watts. Write to the Lowell Institute, 28 Newbury Street, Boston 16, Mass., for complete information about its schedule and programs.

Help for the Tape Recording Enthusiast

Response to the article on tape recording in the Fall issue of HIGH-FIDELITY indicates that interest in the subject is a lot more widespread than we had anticipated. We'll continue to cover it regularly, but meantime, tapers (if we may call them that) should make certain that they are on the list to receive the "Audio Record", a bulletin published by Audio Devices, Inc., 444 Madison Avenue, New York 22, New York. Audio Devices makes fine tape, and is also an alert organization, ready to help with users' problems in the tape recording field.

Those considering the purchase of tape recording equipment will find the August-September 1951 issue of the "Audio Record" particularly helpful: it contains a detailed summary of specifications on all currently available recording equipment. The bulletin will be sent to HIGH-FIDELITY readers without charge.

Also on the Audio Devices publication list, and just off the presses, is "Fundamentals of Magnetic Recording," which is a semi-technical publication containing a wealth of information on the subject. It is also available to our readers.

More on Pre-recorded Tapes

At the Audio Fair, we had a long talk with D. W. Perry, of East Lansing, Michigan. Perry is just beginning to get his feet under him in the pre-recorded tape business. He has imported a whole series of new tapes recorded at 30 ips. by the Bremen Philharmonic Orchestra and other European groups, covering a wide range of classical and semi-classical compositions. He plans to make the tapes available either on a direct sale basis at something under \$10 per 60-min. reel (7 1/2 ips.) or on a tape-of-the-month basis. His tapes can be secured on special order, at 3 3/4 or 15 ips. The list which he showed us included 29 reels which are currently available.

Perry wants all the help and suggestions he can get from HIGH-FIDELITY readers. He needs to know the type of music wanted, preferred tape speed, suggestions on his idea of a tape-of-the-month club arrangement, how many of our readers would be interested in pre-recorded tape, and so on. Since this information will be helpful to us in preparing editorial material, we agreed to act as a clearing house for Perry. So will readers please give us the benefit of their

Continued on page 77



Enjoy the Ultimate in
HIGH-FIDELITY MUSIC
 from radio or records

select your custom components at



Now you can enjoy brilliant high-fidelity reproduction of radio and recorded music. It's simple to assemble your own fine custom audio components to gratify your personal listening desires and to blend beautifully with your home decor. Look to ALLIED—high-fidelity custom specialists—to help you select the proper components at very substantial savings. We carry the world's

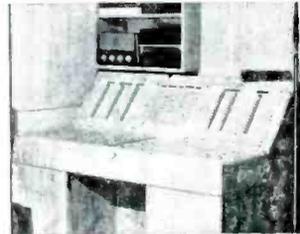
largest stocks of high-fidelity audio equipment—amplifiers and speakers in all famous makes, all leading FM and AM radio tuners, the latest 3-speed record changers, custom furniture and complete accessories. Write today for complete FREE Catalog, or visit our High-Fidelity Studio for actual comparative demonstrations through ALLIED's famous Hi-Fi Auditor.

world's largest stocks of all famous makes

- | | | |
|-------------------|---------|------------------|
| ALTEC | LANSING | MAGNECORD |
| AUDAX | | MARKEL |
| AUDIO DEVELOPMENT | | MASCO |
| BELL | | MEISSNER |
| BOGEN | | McINTOSH |
| BROOK | | PFANSTIEHL |
| BROWNING | | PICKERING |
| CLARKSTAN | | PRESTO |
| CONCERTONE | | RCA |
| CRAFTSMEN | | REK-O-KUT |
| ELECTRO-VOICE | | H. H. SCOTT |
| GENERAL ELECTRIC | | STEPHENS |
| GROMMES | | THORDARSON |
| JENSEN | | UNI-MODE |
| KNIGHT | | UNIVERSITY |
| JIM LANSING | | V-M CORP. |
| LEAK | | WEBSTER-CHICAGO |
| LIVINGSTON | | WESTERN ELECTRIC |



ALLIED'S famous Hi-Fi Auditor



we are specialists in high-fidelity

Photo above shows our Hi-Fi Auditor, a push-button controlled console capable of demonstrating more than 350,000 combinations of audio components. All equipment is subjected to complete tests by ALLIED engineers. Our staff of Hi-Fi specialists is ready at all times to assist you in selecting audio components to meet your individual requirements. Whether you are planning a new custom installation or modernizing old equipment—write us for complete information.



FREE 1952 CATALOG

Write today for our complete Buying Guide listing the world's largest selection of High-Fidelity components. Obtain all of your audio equipment from one dependable supplier, with the specialized knowledge and experience that will help bring you optimum high-fidelity reproduction. If it's Hi-Fi, you'll find it in your ALLIED Catalog. Send for it.

ALLIED RADIO

ALLIED RADIO CORP., Dept. 49-L-1
 Chicago 7, Illinois

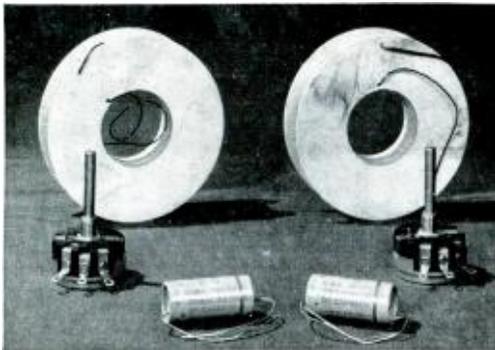
Send FREE 1952 ALLIED Catalog.

I am interested in the following equipment:

Name

Address

City State



CROSSOVER NETWORKS . . .

If you are now using a single speaker — or a coaxial — of any type, you can get richer, deeper bass response by adding a single cross-over network and an Air-Coupler.

G. A. has both.

To get **immediate** delivery of a cross-over network operating at 350 cycles, order our No. 4 to match a 16-ohm low frequency woofer. To match an 8-ohm bass speaker, order our No. 8. Either one is only \$17.50 **complete** with inductors, capacitors and level controls, f.o.b. South Egremont, Mass. Add 75 cents and we'll ship by parcel post prepaid and insured to any part of the United States.

Actually, by a judicious selection of associated components, the three values of network inductors on which G. A. has standardized enable our customers to secure low-cost crossover networks which will operate at **14 different crossover frequencies!** They are described in full in the instruction sheet which is sent without charge with every order for networks. If you would like a copy, just send us 10 cents in stamps or coin to cover mailing charges and we'll get it off to you by return mail. These networks, by the way, can be used with systems employing **two to eight** speakers.

AIR-COUPLERS . . .

We can ship you an Air-Coupler **completely assembled!** Yes, the **new design** developed by the group at **Radio Communication and High-Fidelity** gives much better results but it is also more complicated to build. The internal partitions must be positioned in **exactly** the right places and it requires a lot more screwing and gluing. So we have arranged to carry them **completely assembled**, with a hole cut for a 12-in. speaker, everything ready for you to put into immediate operation. They are made out of selected $\frac{3}{4}$ -in. plywood, all joints are glued and screwed together. The cost is only \$47.50, f.o.b. South Egremont, Mass.

AND — if you have the time and inclination to put everything together yourself, the new Air-Coupler is also available in knock-down form, all parts precisely cut and carefully matched, for only \$34.50. Immediate delivery on either knock-down or completely assembled models.

MISCELLANY:

... we continue to carry in stock ... Altec 600-B 12-in. speakers, a best buy under any circumstances, a must for Air-Couplers; only \$46.50; Peerless 5-230Q output transformers \$26.00; Peerless R-560A power transformers, \$16.00; Peerless C-455A power chokes, \$10.00. . . A new supply of the English KT-66 tubes (specified for Williamson amplifiers) has just been received; they're only \$4.95 each. There's no exact U. S. equivalent.

General Apparatus Co.

South Egremont, Mass.

NEW **IMPORTANT BOOK FOR**

- SOUND TECHNICIANS
- AUDIO ENGINEERS
- CUSTOM BUILDERS

VOLUME 3!
HOWARD W. SAMS'
"AUDIO AMPLIFIERS"



Full Analysis of 50 Important Audio Amplifiers and 22 Popular FM & AM Tuners
Based on Actual Study of the Equipment

Covers Latest Audio Equipment

Latest volume in the SAMS' "AUDIO AMPLIFIERS" Library. Provides detailed, clear, uniform analysis of 50 important audio amplifiers, and full coverage of 22 FM and AM tuners, produced during 1950. Each unit is thoroughly analyzed in from 4 to 10 pages; includes circuit diagrams, design data, parts information, full technical coverage described in uniform detail and profusely illustrated by photographs and diagrams. Based on study of the actual equipment. Entirely new material, continuing audio equipment coverage begun in Vols. 1 and 2 (see below). Never before available in a single complete, accurate compilation. Indispensable to public address and sound technicians, custom installers, BC engineers and students — a "must" for everyone in the field of Sound. 362 fact-packed pages; 8½ x 11"; sturdily bound.

ORDER AA-3. Only. **\$3.95**



VOL. 2. Covers 104 well-known audio amplifiers and 12 important tuners produced during 1949. Includes uniform, detailed circuit and design data based on original lab study of the actual equipment. Profusely illustrated. 368 pages; 8½ x 11"; durably bound.

ORDER AA-2. Only. **\$3.95**

VOL. 1. This is the initial volume covering audio equipment produced after the war, through 1948. Covers 102 audio amplifiers and FM tuners, plus data on important wire and tape recorders. 352 pages; fully illustrated; in sturdy binding. 8½ x 11"

ORDER AA-1. Only. **\$3.95**

OWN ALL THREE VOLUMES FOR A COMPLETE, AUTHORITATIVE SOUND LIBRARY

HOWARD W. SAMS & CO., INC.

Order from your Parts Jabber today, or write direct to HOWARD W. SAMS & CO., INC., 2201 East 46th Street, Indianapolis 5, Ind.

My (check) (money order) for \$ enclosed. Send the following books:

AA-3. AA-2. AA-1. \$3.95 each

Name

Address

City Zone State

NOTED WITH INTEREST

Continued from page 74

thinking — be it on a postcard or a 3-page letter — and address it to HIGH-FIDELITY Magazine, P. O. Box 600, Great Barrington, Mass.

New Books

Designed primarily as a text book for students of music. "Creative Harmony and Musicianship"¹ is a valuable addition to the serious music lover's bookshelf. The book contains the material presented in first year college harmony, keyboard, ear-training and music-reading classes. Only a knowledge of notation and of keyboard design is necessary as a basis for Chapter I; even this is summarized in an appendix. Subsequent chapters are arranged on a weekly assignment basis for college students. The advanced layman, following through these pages and the accompanying assignments for writing, playing, listening, and analysis, will develop an understanding of the structure of music which will enhance his enjoyment and appreciation. The authors analyze the structure of music and harmony from the point of view of chords, rather than of scales. An exceptionally large number of illustrations, in the form of music fragments, are included.

Help Wanted Column

We have received a number of requests from all parts of the country for names of reputable CARPENTERS and cabinet makers who have had at least some experience building shelves and simple cabinets for audio equipment. We'd like to start a card file, so we can answer these requests by return mail. Will readers please send us the names of individuals or concerns with whose work and capabilities they are familiar? Give us some sort of a rating — excellent cabinet maker, careful carpenter, or whatever.

Carefully Speaking

From now on, we'll have to watch our language. As of July 31, 1951, the American Standards Association approved standards of Acoustical Terminology, so that we now have a dictionary of terms used in acoustics. Henceforth, we'll do our best to write with exactitude. Others who would do likewise can secure a copy of Acoustical Terminology from the American Standards Association, Inc., 70 East 45th St., New York 17, N. Y., for \$1.50 per copy.

Christmas Shopping Guide

If you are faced with a Christmas gift problem, just send us your shopping list and we'll take care of everything. If you have 5 or more on the list, our charge is only \$1.60 per person . . . and each and every one will receive an attractive gift card plus a full year's subscription to HIGH-FIDELITY. For complete details, back up to page 72, please!

¹"Creative Harmony and Musicianship" by H. A. Murphy and E. J. Stringham. Prentice-Hall, 1951. 680 pages 8 1/2 by 5 3/4 ins., 240 illustrations. \$6.65

The Discriminating Eventually Come to Leonard's!



SOUND STUDIO "A"
ONE OF THREE

Why do most people prefer to do business with but one organization?

• This question has plagued merchandisers ever since an enterprising snake first sold Adam the proverbial apple. Time and again, we have seen the same familiar faces return to Leonard's. The high standards we set upon our merchandise had something to do with it; but we knew that this in itself could not be the reason. Then, *what* was the inducement that brought them back? Suddenly we came upon the answer. It was not what we sold . . . it was what we gave! It has long been a conviction at Leonard's that the kind of SERVICE we render our customers is as essential to our success as the quality of our wares. Our growth is only important because it enables us to give near-perfect service to the largest purchaser . . . and nothing less to the smallest.

We don't expect to wind up occupying a niche in anybody's hall of fame. But we do get a kick out of knowing that throughout the country, people interested in fine music reproduction are using our sound equipment . . . and that it is contributing a little bit more to their happiness. Added to this, of course, is the extreme pleasure we get when once again we hear that oft repeated phrase,

"We Like To Do Business With Leonard's"

Announcing the all new Radio Craftsmen Ultra-fidelity
Amplifier - C-500



Here at last, is the amplifier audiophiles have been waiting for! Based upon the now famous Williamson circuit, the amazing performance of this instrument will amaze even the most severe critic. Power output — 15 watts. Frequency Response — ±0.1 db, 20 to 20,000 cps.; ± 2 db 5 cps. to 100,000 cps. Total Harmonic Distortion—less than 0.1% at 10 watts at mid-frequencies. Tube Complement—6 6SN7GTA amp. and inverter, 6 6SN7GTA push-pull driver, (2) 6KT66 power output, 5V4G rectifier.

NET \$99.50

You will want our new High Fidelity catalogue.

Write Dept. A

TELEPHONE: CORTLANDT 7-0315

Leonard Radio inc.

the house
built on
SERVICE

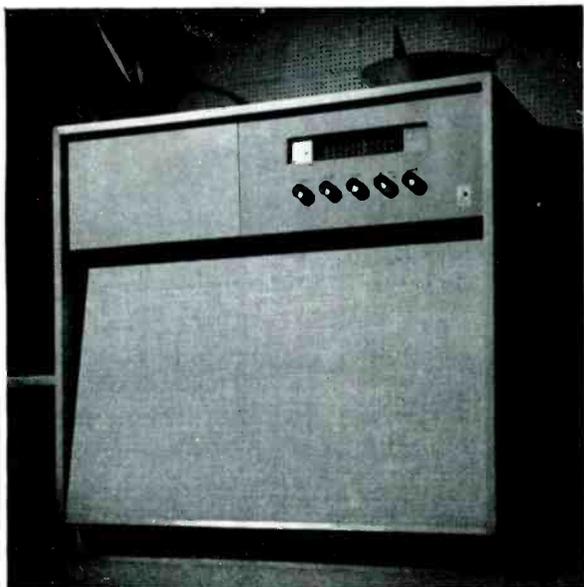
69 CORTLANDT ST., NEW YORK 7, N. Y.

APPROVED • ASTATIC • ATLAS • AUDAK • AUDIO DEVELOPMENT • BELL • BOGEM • BOZAK • BROOKS • BROWNING • BRUSH • CHALLENGER • ELECTRO-VOICE • JENSEN • ESPE

PENTRON • PICKERING • RACON • RADIO CRAFTSMEN • REK-O-KUT • H. H. SCOTT • SHURE • SONAR • UNI-MODE • UNIVERSITY • V.M. • WEBSTER-CHICAGO • WEBSTER-ELECTRIC



Now you, too, can own the ultimate in high-fidelity. The world's finest component parts, combined with Voice and Vision's "exact cubic-content" loud speaker chamber, provides incomparable reproduction. Birch, ebony, bleached oak, bleached walnut, or mahogany. Write for brochure or order direct.



the award-winning PROFESSIONAL SERIES
by the nation's most acclaimed custom-builder

PROFESSIONAL SERIES I	\$695
PROFESSIONAL SERIES II	\$875
PROFESSIONAL SERIES III	\$1250
PROFESSIONAL SERIES CABINET only—install your own components	\$260



Voice and Vision, inc.

316 N. MICHIGAN AVE. • CHICAGO I, ILL. An 3-3891

Music . . .



*Pre-Recorded on
Magnetic Tape!*

Here is the A-V TAPE LIBRARY... it's new... it's exciting... it's recorded music on magnetic tape, the modern recording method that brings you the most life-like reproduction of sound with none of the disturbing needle scratch and crackling noises of disc recordings.

A-V TAPE LIBRARIES magnetic tape recordings are unbreakable. They can be played over and over for thousands of delightful times without wearing out. Radio stations and professional recording companies all over the world... where quality sound is a must... use magnetic tape for recording purposes.

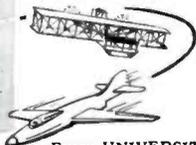
The individual programs are available on reels which fit all home model tape recorders and most professional tape recorders and are recorded in two different speeds: 3.75" and 7.5" per second; single track or double track. All home model tape recorders operate at one or both of these two speeds.

The program-reels are individually enclosed in handsome and durable boxes. The boxes are compact, only half an inch deep and fit neatly on any shelf or bookcase between book ends. The 14 program-reels listed in the initial catalog contain a total of 7 hours of music and require only 8 inches of shelf space.

Send now for your free copy of the latest A-V TAPE LIBRARIES CATALOG and the name of the dealer nearest you. Write: Dept. HF

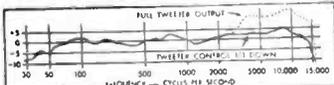
University
LOUDSPEAKERS
WITH A TRADITION FOR
Quality and Dependability

... designed by
**PROGRESSIVE
ENGINEERING!**



MODEL 6201 COAXIAL SPEAKER

You'll find no compromise in the model 6201 — a TRUE coaxial system, completely self-contained with LC network and attenuator, at a sensible price. Full range response 45 to 15,000 cps, power capacity 25 watts. Highest quality construction throughout — separate Alnico V tweeter driver, exclusive UNIVERSITY "W" shape Alnico V "woofer" magnet, special cone edge treatment for longer life, minimum distortion; and even the famous UNIVERSITY wide angle "Cobra" tweeter horn for uniform dispersion of the "highs." Variable attenuator adjusts "balance" to personal preference.



Every UNIVERSITY product is built to traditional standards of quality that have earned a world-wide reputation for absolute dependability. Highest quality materials, skillfully fabricated, result in unsurpassed performance and extra reliability. "Progressive Engineering" assures the latest design improvements in every piece of UNIVERSITY equipment.

WRITE FOR FREE
HI-FIDELITY
CATALOG TODAY

Fully explains the use and advantages of UNIVERSITY HI-FI equipment in easy to understand language. Covers the complete line, gives full application and installation details. Write Desk 29.



**UNIVERSITY
LOUDSPEAKERS • INC**

80 SO. KENSICO AVE., WHITE PLAINS, N. Y.



Tape Libraries
INCORPORATED

730 FIFTH AVENUE, NEW YORK 19, N. Y.
PLAZA 7-3091

AUTHORitatively Speaking

Continued from page 3

article on the Air-Coupler, page 22, we have tried to recapture some of the humor as well as the more important aspect of the work — the improvement of bass reproduction in a simple, inexpensive, and inconspicuous way.

As every Audio Fair visitor knows, Victor Brociner is best known for his loudspeaker enclosures. He became involved with pre-amplifiers and record compensators — about which he writes on page 31 — more or less by mistake. There wasn't much sense, he felt, in constructing a good enclosure for a speaker if the equipment preceding the speaker fell short of best possible reproduction. So he started work on a major link in the chain of equipment from phonograph record to loudspeaker, and designed a record compensator which would meet his rather severe requirements. So many of his friends and customers liked this unit that he re-designed it and made it available commercially. Thus his background and experience with the problem make him particularly qualified to tell readers why record compensators and preamplifiers are a must: if optimum reproduction from phonograph records is desired.

We are glad to report that regular contributor C. G. Burke is recuperating rapidly from a severe attack of audio-phobia.

For the past several months, he has been testing every imaginable type of audio equipment as preparation for writing a book. The resultant mess in his living room (pictured on page 37) and the everlasting noise (sorry, "music") almost cost him his health, his wife, and even the devotion of his three Great Danes. In spite of the commotion, he managed to prepare his excellent article on "Opera Buffa", beginning on page 33, and to review a large number of records for this issue.

Warning: please do not correspond with Mr. Burke. Leave him strictly alone. He has agreed to continue his series on the recorded works of the great composers with a report on the master of masters: Beethoven. He says he can have it ready for the Spring issue of HIGH-FIDELITY — *provided* he has the time. Since there are over 200 LP's in the Beethoven catalog as of November 1st, Burke is undertaking a monumental work, one which has never been done before. We want nothing to interfere with this project, even for a minute!

This item should start with a "Whereas, know all men by these presents, etc." because we are announcing in it our proposal that Alan C. Macy be a candidate for presidency of the Magnetic Tapeworm Society... or whatever the organization for tape recording addicts is called. As our readers will recall, he started out to write a short résumé of the art of tape recording, complete in one article. The subject proved so fascinating, and also so broad, that he spilled over into a second installment, which begins on page 56. Since reader reaction to the first article has been highly enthusiastic, we are glad to announce that Macy is still spilling: he will continue his series in a forthcoming issue.

New HIGH FIDELITY GUIDEBOOK

Full of solid information

Send for Yours Today

FREE!

TELLS ALL the things you want to know about Hi-Fi

HOW to get concert hall realism . . . in the home

WHAT makes a Hi-Fi System

HOW to select custom components with economy

SHOWS various installations

LISTS a complete range of famous-name Hi-Fi units




EVERY new enthusiast...every advance high-fidelitist...will want this interesting, helpful, illustrated GUIDEBOOK! It presents a wealth of factual, authoritative information on modern HIGH FIDELITY that's easy to understand. It shows the way to new musical enjoyment...from the simplest to the most elaborate system of custom components or ensembles to suit your taste and budget. Send for your FREE High Fidelity GUIDEBOOK today!

SELECT FROM FAMOUS-NAME COMPONENTS AT CONCORD: Altec Lansing • Audak • Bell Brooks • Browning • Electro-Voice • Espy Fairchild • General Electric • Garrard • Hall Hallicrafters • Jenson • Leak • McIntosh Meissner • Pickering • Precision • Radio Craftsmen Rek-O-Kut • RCA • Stephens Tru-Sonic University • Webster-Chicago • Wharfedale

CONCORD

RADIO CORPORATION

901 W. JACKSON BLVD. • CHICAGO 7

Pioneers in Hi-Fi for over 25 years

When in Chicago take advantage of our personalized Hi-Fi Salon service. Pictured above is a portion of the convenient Selector Rack that makes possible countless combinations of Hi-Fi components for critical listening and comparison.

SEND FOR FREE GUIDEBOOK NOW

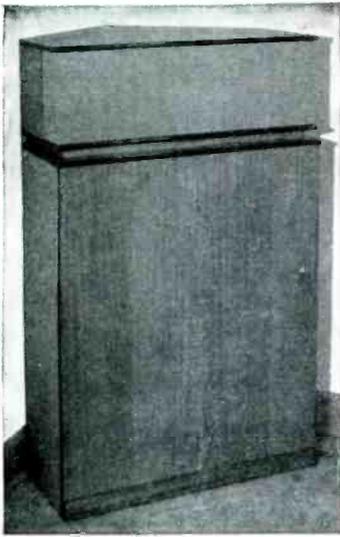
CONCORD RADIO CORP., Dept. BL-51
901 W. Jackson Blvd., Chicago 7, Ill.

Rush FREE High Fidelity Guidebook

Name _____

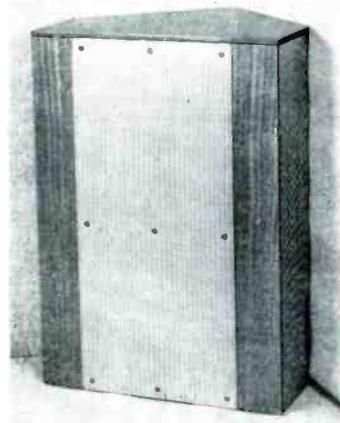
Address _____

City _____ Zone _____ State _____



KLIPSCHORN comprises 3 speakers with a tonal range from below the organ low-C to the ultrasonic range. Freedom from distortion and uniformity of response are achieved only by the Klipsch corner horn which offers such performance in a size ideal for homes. Klipschorns are complete with all components, rated at 50 watts, 16 ohms. Finest materials and craftsmanship assure longevity to match low obsolescence. Style 7 is finished to delight the most discriminating taste. Prices, \$516 to \$696.

REBEL is a corner horn, without driver, for back-loading 15 inch and 12 inch coaxial speakers. Rebel offers reduced distortion and an octave more bass than ordinary "baffles". Prices \$83 to \$156.



For name of nearest dealer and data, write

KLIPSCH & ASSOCIATES
Phones 7-6795 and 7-4538
Hope, Arkansas

Equipment Report



The Brociner Model A-100 preamplifier-equalizer is designed for use with magnetic cartridges and serves the purpose of 1) raising the output level of such cartridges sufficiently to drive an average amplifier to full output, and 2) compensating for deviations from flat frequency characteristics imposed on phonograph records at the time of their recording.¹

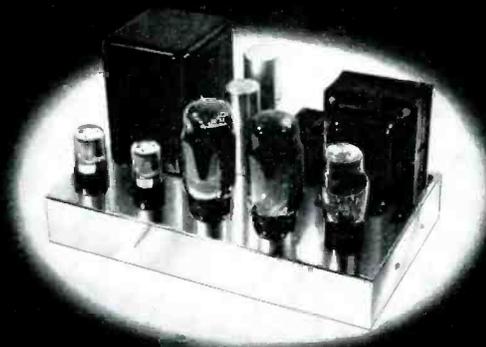
Two models are available. One draws its operating voltages through connections to

¹A description and explanation of the function and need for such preamplification and equalization is given in an article beginning on page 31 of this issue.

the amplifier: a power take-off plug is inserted under one of the output tubes such as a 6L6, in the power amplifier. The other model has a self-contained power supply. Since no AC on-off switch is provided, the self-powered model should be connected to the main AC switch for the amplifier, or plugged into the AC outlet on the back of the audio amplifier if such a connection is provided. Power requirements are 6.3 volts at 0.45 ampere and approximately 200 volts at 5 ma.

The connection for the pickup is a standard RMA jack. A 3-ft. shielded

MEET THE FINEST audio amplifier ever built, at any price. Its name: the **Craftsmen 500**, with the famous Williamson all-triode circuit. We had to invent a new word to describe its 99.99%* distortion-free performance. The word is **ULTRA-FIDELITY**. Hear the "500" and you'll know why.



C500 Amplifier Features

- * Freq. response: ± 0.1 db., 20 cps to 20,000 cps; ± 2 db., 5 cps to 100,000 cps.
- * Power response: 12 watts ± 2 db., 10 cps to 50,000 cps.
- * Total H Distortion: less than 0.1% at 10 watts, at mid-freq.
- * 0.01% of av. listening level below 1 watt.
- * Tube complement: (2) 6SN7GTA; (2) KT66 power output; 5V4G rectifier.

for information, write

THE RADIO **Craftsmen** INCORPORATED

Dept. H-10, 4401 N. Ravenswood Ave., Chicago 40, Ill.

cable is furnished for connection to the input of the power amplifier. Although the instruction sheet does not specify lengths to which this cable may be extended, the manufacturer advised us that the following lengths of cable can be used without causing a loss of more than 1 db. at 10,000 cycles.

RG 62 U coaxial cable 30 ft.
 RG 59 U coaxial cable 20 ft.
 Belden 8401 cable 15 ft.

Extension of cable to these lengths means that the unit may be mounted at the listening position, even though the main amplifier is near the speakers and, therefore, at some distance from the phonograph.

The lead from the preamplifier-compensator should be kept away from the AC power transformer; special care should be taken not to make a loop or partial loop around a power transformer, lest hum be picked up.

The amplifier is a three-stage unit, employing a special 12AY7 dual triode for the first two stages and a 6C4 for the output stage. The input tube, intended specifically for preamplifier service, has a low hum and noise level, and is non-microphonic. The gain of the amplifier is 100 times (40 db.). A gain control, adjustable by means of a screwdriver slot, is provided at the rear of the chassis so that the output can be adjusted to the level required for various pickups and amplifiers.

Four turnover positions are provided: 300, 500, and 800 cycles, and the special low-frequency curve used on Columbia and many other LP's. The roll-off control has six positions: from flat response to 20 db.

droop) at 10,000 cycles, in steps of 4 db. The 16-db. position corresponds to that used in recording Columbia LP records, and is also the NAB standard for transcriptions. The 12-db. droop position corresponds to the play-back characteristic recommended by the Audio Engineering Society.

Only one input connection is provided. For audio-philos who have more than one pickup, a rotary switch of the shorting type, such as the Mallory 3115-J, can be used. The selector arm of this switch should, of course, be connected to the preamplifier; as many different inputs as necessary can be wired to the contacts on the switch. To avoid any danger of hum pickup, it is advisable to mount the switch in a shielded box, and to connect together with a common wire the shields on input and output leads, grounding the common wire to the box at one point.

The Brociner preamplifier-equalizer is designed with an input load of 51,000 ohms. No additional loading is required for GE pickup cartridges. For Audax, an .0008 mfd. capacitor should be added in parallel with the two pickup wires. With Pickering cartridges, a 62,000-ohm resistor should be wired in parallel. Fairchild cartridges require the use of a matching transformer such as the UTC A-11 or the Peerless K-221-Q.

One relatively small mechanical feature affords special convenience in mounting the instrument. The escutcheon is attached to the chassis with four long bolts, and the two control shafts are extra long. This means that the chassis can be installed behind a panel up to 1/2-in. thick; the escutcheon and the control knobs can still be

Continued on page 88



You may own the finest pickup, amplifier and speaker that money can buy... yet you'll get poor reproduction if your TURNTABLE has excessive wow, hum or rumble!

REK-O-KUT

Manufacturers of Turntables for the Broadcast Industry

... offers a complete range of 12" Turntables, including models to match your individual amplification system and your individual pocketbook. Not every sound system requires the most expensive Turntable... your Turntable must be chosen to match your other equipment... Each REK-O-KUT Turntable Specification rates the DB Noise Level to enable your sound installation specialist to select the appropriate Turntable to match your other components. The quality and workmanship of every REK-O-KUT machine, from our most economically priced model to our highest priced professional job is identical... price differential is dependent solely upon the type of materials used.



MODEL LP-743

3-Speed 12" Turntable
 Induction type motor, designed for smooth, vibration-free operation. Instantaneous speed changes without stopping turntable or removing disc \$54.95 Net



MODEL CVS-12

All-Speed Continuous-Variable Turntable

Plays all records, 6" to 16" and broadcast transcriptions, not only at the three normal speeds, BUT AT ANY SPEED from 25 to 100 RPM. You play your records at the EXACT SPEED at which they were recorded, or at any variation of speed or pitch which gives you maximum pleasure. A "must" for serious music lovers, pro musicians, schools, dance studios, etc. \$84.95 Net

MODELS T-12H & T-43H

2-Speed 12" Turntables

The only 12" dual-speed turntables that meet the standards for speed regulation and WOW content specified by the National Association of Broadcasters. Recommended for use with ULTRA HIGH FIDELITY Amplifiers and Speaker Systems.

MODELS	MOTOR	SPEED	PRICE
T-12 H*	Hysteresis Synchronous	78-33%	\$119.95
T-43 H*	Hysteresis Synchronous	45-33%	\$119.95
T-12	4 Pole Induction	78-33%	\$84.95
T-43	4 Pole Induction	45-33%	\$84.95

*Delivery limited to short supply of Hysteresis motors.

See...hear...compare REK-O-KUT Turntables, Phonographs and Professional Disc Recorders at leading Music Stores, Audio-Visual Dealers and Radio Parts Jobbers... or write for latest, free Catalogue.

REK-O-KUT CO.
 38-01A Queens Blvd., Long Island City, N. Y.
 REPORT DIVISION: 456 Broadway, New York City, U. S. A.
 CANADA: ATLAS RADIO CORP., LTD., 500 King St. W., Toronto 28, Ontario

Ready Now!

Lafayette's "High Fidelity Guide"

New 1952 Edition

In these 32 pages devoted exclusively to high fidelity you will find such features as:

Contains a complete listing of all standard makes of audio equipment including such famous names as: Altec Lansing • Audax • Audio Development • Bell • Bogen • Brook • Browning • Clarkstan • Craftsmen • Electro-Voice • Espey • General Electric • Jensen • Jim Lansing • Leak • Livingston • Magnecord • Markel • Masco • Meissner • McIntosh • Pickering • Presto • RCA • Rek-O-Kut • H. H. Scott • Stephens • Thordarson • Uni-Mode • University • V-M • Webster-Chicago

- What is high fidelity
- What constitutes a high fidelity system
- The economical way to select components
- Ideas on where to install your hi-fi system
- Illustrations of typical wall installations
- Ready made cabinets for your current installation
- Complete packages shown for the budget-wise, as well as deluxe ensembles including TV

Famous for finest in high-fidelity radio for nearly 30 years. Visit High Fidelity Hall at any Lafayette Branch and compare the performance of any combination of hi-fi components on our High-Fidelity Selector Rack.

FOR YOUR FREE COPY MAIL THIS COUPON TODAY TO DEPT. WK

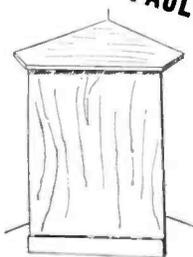
Name _____
 Address _____
 City _____ Zone _____ State _____

Lafayette 100 SIXTH AVE. • N. Y. 13
 RECTOR 2-8600
 DIV. OF RADIO WIRE TELEVISION, INC.

In N. Y. High Fidelity Hall is open Wed. till 9, Sat. till 5. Conveniently reached by 6th, 7th, 8th Ave. subways, Canal St. Station. Other High Fidelity Centers at 21 Central Ave., Newark and 110 Federal St., Boston.

**YOU'VE WAITED FOR THIS!
RADIO SHACK CORNER HORN**

licensed by
PAUL W. KLIPSCH



NET PRICE ONLY

\$132.50

Add \$15 for crating
for shipment

At last! A completely assembled folded corner horn enclosure at a price no higher than many 15" bass reflex cabinets! Ours alone! Licensed by Mr. Klipsch, under his original patent, when he was in Boston a short time ago. Built in Boston under rigid quality standards set up by Radio Shack's technical staff. Designed for 15" woofer and the utmost in low frequency response. Standard multi-plywood, stained dark mahogany brown. 45" H, 28" D, 38 1/2" W, 150 lbs. Radio Shack also supplies an optional complete speaker system.

RADIO SHACK

167 Washington St., Boston 8, Mass.

FREE!

Radio Shack's new 1952 audio and electronics parts catalog. 192 pages. Profusely illustrated. A "must" for audiophiles. Write for your copy today!

FIRST AND ONLY LOW-COST

**G. E. Magnetic Cartridge
PLAYBACK EQUALIZER**

ORDER BY MAIL TODAY



TYPE HL-1-6

PRICE \$11.95

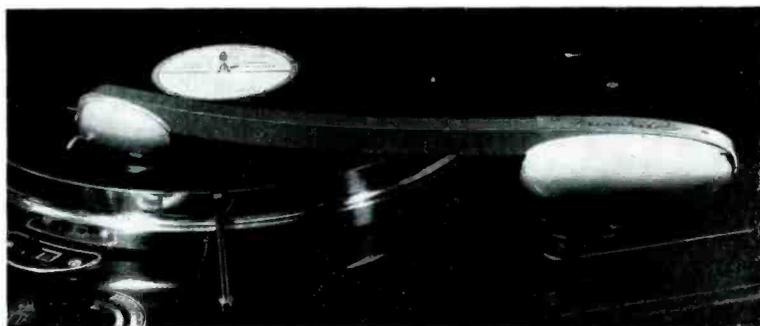
- For foreign, domestic discs
- For 78, 33 1/3, 45 rpm speeds
- A "must" for record lovers

Radio Shack's 6-step Playback Equalizer gives a professional touch to your audio system. Closely duplicates record manufacturers' original recording curve. Does what tone controls can't do! Designed for G.E. pickups using standard 500-cycle turnover preamp. Order now from Radio Shack Corp., exclusive national distributor. \$11.95.

RADIO SHACK

167 Washington St., Boston 8, Mass.

Equipment Report



The Fairchild phonograph arm pictured above is intended primarily for use by broadcast stations and recording studios, but it is finding its way into more and more custom installations where only the best is good enough. The arm, model 200, has two features which are particularly noteworthy. First is the cartridge turret which takes one to three cartridges. These are brought into position by turning the small lever at the extreme left tip of the arm, as seen in the illustration.

The turret head is specifically designed for Fairchild cartridges. With these cartridges in place, one turret position provides a weight of 6 to 8 grams for LP records; the other two positions provide a stylus force of 15 to 18 grams. If necessary, the

automatic stylus force adjustment can be disabled so that all three positions can be used with standard 18-gram pressure. It is also possible to adjust the LP cartridge pressure slightly by means of an adjustment screw located in the middle of the arm. In the photograph, this screw hole can be seen just above the point where the arm and the edge of the turntable intersect.

The arm can be used with other cartridges, but relocation of mounting holes, weight adjustment, and rearrangement of connecting pins makes such use unwise except under special circumstances. The other feature of the arm itself is the method by which it is supported: it floats in damping "goo" (fluid is not the right word; the material, called Damp-X, is not sticky but

Customized Elegance



Custom-Line UNI-MODE CABINETS

- Pre-cut for your radio, phono and TV components
- Decorator designed ● Superb finishes ● Sectionalized

If your distributor does not handle UNI-MODE, order direct from Russellcraft. Write for complete new catalog.

The **RUSSELLCRAFT** Company, Inc.

2633 WEST GRAND AVE. CHICAGO 12, ILL.

FORMERLY MFD. BY GRAND RAPIDS WOODCRAFT CORP.

it is decidedly un-fluid). The arm base is simply a shaft which can be adjusted for correct height. At the top of the shaft is a cone with its base up and apex down. On the arm proper is a metal ball, about an inch in diameter. When the unit is installed, the cone is filled with the viscous damping material and the ball set gently into it. The result is a floating ride, if we may call it that. The arm moves in any direction with equally little resistance. Most arms move only vertically and horizontally, but the Fairchild can even be twisted or rotated.

Use of this method of mounting makes for perfect tracking, but it also means that operating conditions must be perfect. For instance, we tried one LP record which had a small but sharp hump in it. The pickup went up the hump without trouble, but dropped back down slowly and tended to skip a groove. On the other hand, no similar trouble occurred with a bumpy 78 rpm. record, and an LP which was badly but gently warped was tracked without difficulty.

Another aspect of perfection is that the Fairchild arm rides so lightly that great care must be exercised to install correctly the wires which run from the head through the base plate, since the stiffness of these wires will cause the arm to tip, or make it skip grooves.

The overall length of the arm is 19 ins. (in a straight line; it is curved slightly,



as can be seen from the photograph), and the mounting distance from center of turntable to center post of arm base is 13 $\frac{3}{8}$ ins.

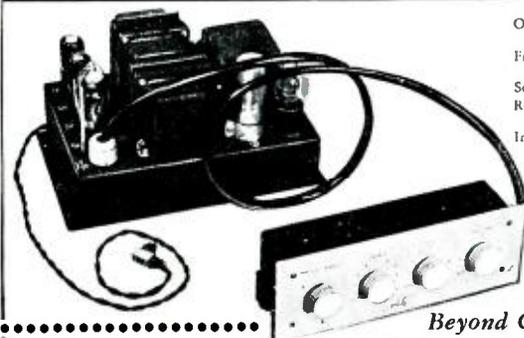
Fairchild cartridges

Fairchild manufactures four cartridges, any of which fit the arm described above. They can also be adapted to fit other arms, or Garrard or Webster changers. Technically, they are of the dynamic or moving coil design and are constant-velocity devices. Non-technically, the sound reproduction from phonograph records is extraordinarily clean, clear, and . . . well, the best word for it is "bell-like". They do not have the brightness or brittleness which characterizes some units, nor the softness of tone of others. Overall sound reproduction seems to be entirely free from peaks or resonances, and the frequency response range exceeds anything on phonograph records. This, as far as we are concerned, adds up to performance which justifies the relatively high price. The four cartridges are essentially the same except for radius of the diamond stylus. No. 210 is for microgroove (LP) records; 211 is for new 78's; 212 is designed for old 78's; 213 is for vertical transcription records.

All cartridges have the same output. This output is extremely low, in the neighborhood of 3 millivolts, requiring either a special preamplifier with an exceptional amount of gain, or a transformer wired between the cartridges and a standard preamplifier. For purposes of rough compari-

Continued on page 84

"towards perfection..."



Output: 10 watts at less than 1% distortion.
Frequency Response: 20 to 40,000 cps \pm 1 db.
Selector switch for phono and radio.
Remote control panel incorporating pre-amplifier.
Infinitely variable bass and treble controls.

Listen to Arrow's radio program — WABF, 9 to 10 every Friday night.

Beyond Comparison at \$99.50 NET

The MA10 has been designed and built by Lowthers of England specifically for the discriminating American audio-ophile, using standard parts and American tubes. As everything Arrow sells, it has undergone rigid laboratory tests. Results show its value to be unsurpassed . . . its reproduction to be far above any other amplifier in the 10 watt class . . . its stylish remote control unit to be ideal for custom-building.

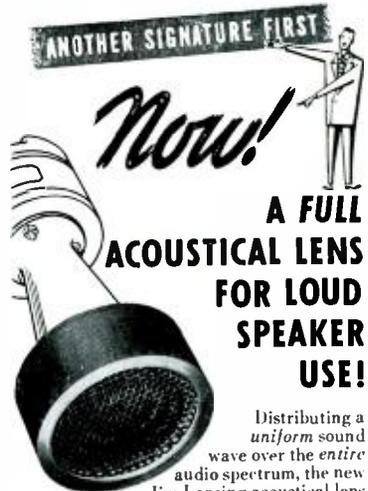
Arrow has in stock and on demonstration, in its large modern sound studio, a complete selection of fine high fidelity equipment of all manufacturers.

ARROW ELECTRONICS, INC.
82 CORTLANDT ST., NEW YORK 7, N. Y., DIGBY 9-4714

Write for catalogue #3-B



Beauty in Sound



ANOTHER SIGNATURE FIRST

Now!

A FULL ACOUSTICAL LENS FOR LOUD SPEAKER USE!

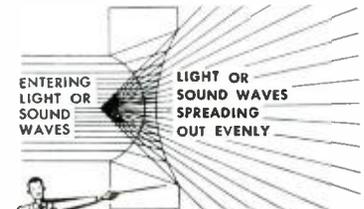
Distributing a uniform sound wave over the entire audio spectrum, the new Jim Lansing acoustical lens smooths out the high frequencies and gives them a mellowness that your ear will appreciate instantly. Unlike the multicellular horn, which performs well at some frequencies but beams or distributes very poorly at others, the new lens is not sensitive to frequency . . . because the band width is wider than the audio spectrum with which it is used. The new lens and horn is for use with the Jim Lansing #175 high frequency driver.

TRANSPARENCY CAN BE MEASURED!

Transparency or absorption in the new Jim Lansing acoustical lens is measured in the same way as it is in the optical lens — by index of refraction. The percentage of sound absorbed by the Jim Lansing acoustical lens is less than the percentage of light absorbed by the finest optical lens.

W-I-D-E DISTRIBUTION ANGLE!

The angle of distribution which is controlled by curvature and index of refraction can now be varied between wide limits . . . permitting the sound to be concentrated or diffused. The 175 D.I.I shown above (driver, lens and horn) distributes over a 90° solid angle.



A graphical diagram or ray tracing of the operation of the Jim Lansing acoustical negative lens showing focal point and diffusion angle as controlled by curvature and index of refraction.
Ask your audio dealer for demonstration of the new Jim Lansing acoustical lens today!

JAMES B. LANSING SOUND, INC.
2439 FLETCHER DRIVE
LOS ANGELES 39, CALIFORNIA
FIRST IN FINE SOUND

EXHIBITORS AT THE AUDIO FAIR

Acro Products Co., 369 Shurs Lane, Phila., Pa.
Output Transformers

Alpha Wire Corp., 430 Broadway, N. Y. C.
Wire and cable

Altec Lansing Corp., 161 Sixth Ave., N. Y. C.
9356 Santa Monica Blvd., Beverly Hills, Cal.
Power transformers and chokes, amplifier kits, microphones, amplifiers, preamplifiers, loudspeakers, FM-AM tuner

Amplex Electric Corp., Redwood City, Cal.
Portable, console, and rack mounted magnetic tape recording equipment

Amplifier Corp., 396 Broadway, N. Y. C.
Tape recorders, phono amplifiers, electrical test equipment

Audak Co., Inc., 500 Fifth Ave., N. Y. C.
Pickup cartridges and arms

Audio Devices, Inc., 444 Madison Ave., N. Y. C.
Recording discs, recording and playback points, magnetic recording tape and film

Audio Engineering Society, Box F, Oceanside, N. Y.

Audio Instrument Co., Inc., 133 W. 14th St., N. Y. C.
Bridgers, loggers, meters, intermodulation sets, midge condenser microphones, preamplifiers, ultra-speed recording systems

Audio Master Co., 341 Madison Ave., N. Y. C.
Recording equipment, microphones, playback machines

Audio & Video Products Corp., 730 5th Ave., N. Y. C.
High-quality audio components

A-V Tape Libraries Inc., 730 5th Ave., N. Y. C.
Tape recording and recording services, pre-recorded magnetic tape library of music

Bell Sound Systems, Inc., 555 Marion Rd., Columbus, Ohio — Amplifiers and tape recorders

Berlant Associates, 4917 W. Jefferson Blvd., Los Angeles, Cal. — Tape Recorders

David Bogen Co., Inc., 663 Broadway, N. Y. C.
Amplifiers, cabinets and enclosures

R. T. Bzok, 90 Montrose Ave., Buffalo, N. Y.
Loudspeakers

British Industries Corp., 164 Duane St., N. Y. C.
Garrard record changers and phonograph motors, Wharfedale speakers, Vitavox speakers, Leak "Point One" amplifiers, KT66 tubes

Brociner Electronics Lab., 1546 Second Ave., N. Y. C.
Corner reproducers, phonograph preamplifier-equalizer, square wave tester

Browning Labs., 750 Main St., Winchester, Mass.
FM-AM tuners

C & H Woodwork Co., 75 N. 11th St., Brooklyn, N. Y.
Radio-phonograph and television cabinets

Collins Audio Products Co., Mountaintop, N. J. (Mailing Address—Westfield, N. J.) — Fm tuners, FM-AM tuners, FM tuner kit

Cook Laboratories, R2, Stamford, Conn.
Recording cutters and heads, recording systems, "Sounds of Our Times" recordings

Cowan Publ. Corp., 67 W. 44th St., N. Y. C.
Technical publications

Danby Radio Corp., 100A S. 21st St., Phila., Pa.
Corner horn speaker systems, custom amplifier

The Doven Co., 191 Central Ave., Newark, N. J.
Attenuators, potentiometers, lab equipment

Duotone Co., Inc., Locust St., Keyport, N. J.
Magnetic recording tape, recording blanks, cutting sapphires, diamond replacement needles, phono accessories

Electronic Workshop, 351 Bleecker St., N. Y. C.
Custom Built radio-phonograph systems, A-20-5 audio amplifier

Electro-Voice, Inc., Buchanan, Mich.
Microphones, pickups, cartridges, loudspeakers, loudspeaker cabinets and enclosures, components, and TV boosters

Fisher Radio Corp., 41 E. 47th St., N. Y. C.
Preamplifiers, receivers and amplifiers

Gates Radio Co., Quincy, Ill.
Broadcast station studio control consoles of various types, remote amplifiers, etc.

General Electric Co., Electronics Park, Syracuse, N. Y. — Cartridges, loudspeakers, preamplifiers, tonearms, phono accessories

Gray Research & Development Co., 16 Arbor St., Hartford, Conn. — Transcription equipment

H. A. Hartley Co. Ltd., 152 Hammersmith Rd., London W.6, England — Speakers, box baffles, preamplifier, amplifier, audio components, and "Selected Record Catalogue"

High-Fidelity Magazine, Great Barrington, Mass.

Jensen Mfg. Co., 6601 S. Laramie Ave., Chicago, Ill.
Loudspeakers and accessories

Langevin Mfg. Corp., 37 W. 65th St., N. Y. C.
Amplifiers, power supplies, transformers

James B. Lansing Sound Inc., 2439 Fletcher Dr., Los Angeles, Cal. — Speakers and enclosures

Magnecord, Inc., 360 N. Michigan Ave., Chicago, Ill.
Professional tape recording equipment

Mark Simpson Mfg. Co., Inc., 32-28 49th St., Long Island City, N. Y.
Magnetic tape recorders, transcription players, amplifiers, sound systems

McIntosh Engineering Lab., 320 Water St., Binghamton, N. Y. — Audio amplifiers

Measurements Corp., Boonton, N. J.
Electronic test equipment

Maynard Electronics, Inc., 7608 So. Phillips Ave., Chicago, Ill. — Amplifiers, preamplifiers and electro-acoustic devices

Music Masters Co., 55 W. 47th St., N. Y., N. Y.
Phonograph record sales

Ohio State Univ., Acoustics Dept., Columbus, Ohio
Research and education, pulse-type audiometry and audiometers

Permotlux Corp., 4900 W. Grand Ave., Chicago, Ill.
Loudspeakers, headsets

Pfosthliel Chemical Co., 104 Lake View Ave., Waukegan, Ill. — Pickups and related accessories, preamplifiers, tonearms, cartridge holders, needles

Pickering and Co., Inc., Oceanside, N. Y.
Pickups, amplifiers, equalizers, arms, loudspeakers

Presto Recording Corp., P. O. Box 500, Hackensack, N. J. — Disc and tape recording and transcription equipment, amplifiers, and blank recording discs

The R-J Co., 10 West 86th St., N. Y., N. Y.
Speaker enclosures

Radio and Television News, Radio-Electronic Engineering, 366 Madison Ave., N. Y., N. Y.
Technical publications

Rodio Corp. of America, RCA Victor Div., Front & Cooper Sts., Camden, N. J. — Microphone, speaker, professional tape recorder, broadcast turntable, 16-mm magnetic projector

The Radio Craftsmen, Inc., 4401 N. Ravenswood Ave., Chicago, Ill. — AM-FM and TV tuners, amplifiers

Radio Magazines, Inc., 342 Madison Ave., N. Y. C.
Technical Publications

Radio-Music Corp., Port Chester, N. Y.
Pickups, broadcast reproducers, amplifiers, turntables, and pulse transformers

Raysons, Inc., 73 W. 11th St., Newark, N. J.
Magnetic tape recorders

Reeves Soundcraft Corp., 10 E. 52nd St., N. Y. C.
Recording discs, tape and film

Rek-O-Kut Co., 38-01 Queens Blvd., Long Island City, N. Y. — Recorders, variable and 3-speed phonographs, cutting mechanisms, transcription and recording turntables, record players

Hermon Hosmer Scott, Inc., 385 Putnam Ave., Cambridge, Mass. — Amplifiers, noise suppressors, preamplifiers, sound level meters, vibration meters, noise generators

Sonacraft Corp., 115 W. 45th St., N. Y. C.
Sound and recording equipment

Stephens Mfg. Corp., 8538 Warner Dr., Culver City, Cal. — Loudspeakers, microphones, speaker systems and components

Tech Labs., Inc., Bergen & Edsall Bldvs., Palisades Park, N. J. — Attenuators, potentiometers, switches, bridges, reverberation generator, and tape splicing block

The Tetrad Corp., 62 St. Mary St., Yonkers, N. Y.
Chicago and phonograph needles

Triad Transformer Mfg. Co., 2254 Sepulveda Blvd., Los Angeles, Cal. — Transformers, reactors, toroidal coils, amplifier kit

University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N. Y. — Speakers, speaker systems

U. S. Naval School of Aviation Medicine, Acoustic Lab., Naval Air Station, Pensacola, Fla.
Audiometric research, pulse type, relative to hearing losses due to noises, audiogrammetry

United Transformer Co., 150 Varick St., N. Y. C.
Transformers, amplifiers, kits and filters

Waveforms, Inc., 333 Sixth Ave., N. Y. C.
Amplifiers, audio oscillators, tuners, education equipment, speaker enclosure

Weathers Industries, 510 Richey Ave., West Collingwood, N. J. — Wide-range FM pickup

Mail Order Supply Houses

Dealers and Distributors

Arrow Electronics, Inc., 82 Cortlandt St., N. Y. C.

Federated Purchaser, Inc., 66 Dey St., N. Y. C.

Harrison Radio Corp., 225 Greenwich St., N. Y. C.

Harvey Radio Co., Inc., 103 W. 43rd St., N. Y. C.

Hudson Radio & Television Corp., 48 W. 48th St., N. Y. C.

Island Radio Distributors, Inc., 412 Fulton Ave., Hempstead, N. Y.

Lafayette Radio (Radio-Wire-Television), 100 Sixth Ave., N. Y. C.

Leonard Radio, Inc., 69 Cortlandt St., N. Y. C.

J. B. Smyth, 3440 Schute, Montreal, Canada

Sun Radio & Electronics Co., Inc., 122-124 Duane St., N. Y. C.

Terminal Radio Corp., 85 Cortlandt St., N. Y. C.

EQUIPMENT REPORT

Continued from page 83

son, it may be pointed out that G-E cartridges have 3 times the output of the Fairchild; Audak output is 6 to 7 times greater; and Pickering's is roughly 20 times greater.

In our installation, we used a transformer. This should be of the impedance matching variety such as the UTC A-11. The primary is connected to the cartridge, the secondary to the input of a standard preamplifier. Wires from the transformer to the preamplifier should be kept as short as possible;

Continued on page 85

FIRST
HAYDN'S MILITARY SYMPHONY (WL 5045)

THEN
RIMSKY-KORSAKOFF'S PIANO CONCERTO (WL 5068)

NOW!
PROKOFIEFF'S SCYTHIAN SUITE, OP. 20
LIEUTENANT KUIE SUITE, OP. 60
HERMANN SCHERCHEN
Conducts the Vienna Symphony Orchestra
in a performance that will make this record a collector's item (WL 5091)

THE FINEST ACHIEVEMENT YET IN HIGH FIDELITY!



EQUIPMENT REPORT

Continued from page 84

wires from the pickup to the transformer may be 3 to 4 feet long without introducing losses.

When using a transformer, hum pickup is a serious problem. With other installations, we have found that hum level may be noticeable but not objectionable as long as shielded wires are used between pickup and preamplifier, and between preamplifier and amplifier input. For test set-ups, we have never bothered to ground the phono motor, the amplifier chassis, or anything. But with the Fairchild and a transformer, we had to ground everything in sight, including the phono motor, transcription arm case, and even the amplifier chassis. Finally, we had to mount the transformer inside a completely enclosed and grounded metal box. With all this done, hum disappeared, but with any one of these precautions omitted, hum was decidedly noticeable and objectionable.

In spite of this particular problem, the final result of using a Fairchild cartridge is worth the trouble: sound reproduction from phonograph records is exceptional.

TRADER'S MARKETPLACE

Here's the place to buy, swap, or sell audio equipment. Rates are only 20¢ a word (including address) or \$20 an inch, and your advertisement will reach 20,000 to 40,000 audiophiles. Remittance must accompany copy and insertion instructions.

ATTENTION! WHY PAY MORE ???
AUDIOPHILES DISCOPHILES MUSIC LOVERS
 We specialize in that 30% segment of the general LP Catalog that can be considered by technical standards as high fidelity, high musical quality material at prices that are kind to your pocket book. That means mostly releases from the catalogs of London, Westminster, Columbia, Haydn Society, Handel Society, Bartok Society, Rachmaninoff Society, Urania, Vox, Renaissance, Period, Program, L'Oiseau Lyre, Stradivari, Philharmonia, Vanguard, Bach Guild, and A-440. Send \$25 in stamps or coins (refundable) and a self-addressed stamped envelope for details to:
SALISBURY GRAMAPHONE RECORD SALES & ELECTRONICS UNLIMITED.
 Dept. HF Box 172 Falls Village, Conn. Residents of Mass. and Conn. interested in custom installations are cordially invited to contact us.

CUSTOM WILLIAMSON AMPLIFIERS! Finest extracted components, power for pre-amp. Hi-Fi Hallcrafters AM, FM, SW chassis S-47-C. Perfect condition. Dr. Nicely, Kenton, Ohio.

Get our prices on **PICKERING EQUIPMENT!** Skalamera, 435 East 74th St., New York City.

Pickering Amplifier and Record Compensator, Audio Pacific Amplifier, Hickok 203PR Electronic Voltmeter, Heathkit Audio Generator and Impedance Bridge. Owner died without using. Donald Sampson, Central City, Nebraska.

FOR SALE! 6-ft. Air Coupler with 12-in. Jensen "Concert" speaker, \$39.75. Also 8-ft. Air Coupler, \$28.50. Both carefully built of 3/4-in. plywood to specifications in "High-Fidelity". Robert Gates, Montrose, New York.

THE AUDIO EXCHANGE buys and sells quality high fidelity sound systems and components. Guaranteed used and new equipment. Catalog, Department HF, 159-19 Hillside Avenue, Jamaica 32, New York. 0L8-0445.

HARVEY Features the Finest Brands



Magnecord Series 6 Recorders and Amplifiers

PT6-JA — Recorder and Amplifier . . . the only combination that offers such high professional quality at such a low price. Includes PT6-A Recorder plus Amplifier with low impedance microphone and bridging inputs, 10 watt audio amplifier with monitor, speaker and jack for external speaker, 600 ohms balanced line output terminal.

PT6-JAH — Magnecord Combination with high speed forward \$564.00

PT6-AH — Recorder with high speed forward \$316.00

PT6-J — Amplifier \$248.00

PT6-P — Lightweight Portable Amplifier, including a record playback remote amplifier and power supply for use with the **PT6-A** Recorder. \$462.00

McIntosh Amplifiers

We have McIntosh Amplifiers in stock for immediate delivery. Full information on request, or come in (if you're in town) for a demonstration.

20-W-2 — Amplifier \$149.50

50-W-2 — Amplifier \$249.50

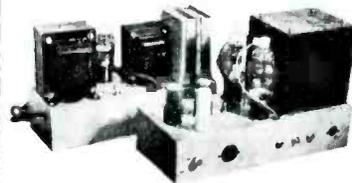
AE-2-A — Equalizer Pre-Amp \$ 74.50



Complete Line of **CANNON** Plugs and Connectors carried in stock for immediate delivery.

CANNON plugs have been standard equipment for more than 15 years wherever a high quality connector is required for low level sound transmissions or for general electrical and electronic use. You'll find them in quality microphones, sound systems, radio and TV stations, etc. **CANNON** is definitely a "must" for you. Write for literature and prices for connectors to fit your requirements.

Williamson HR-15 Amplifier Kit



The famous Williamson HR-15 amplifier circuit . . . now available with the original Partridge transformers built to Williamson's specifications. Build this kit in 3 hours or less, and enjoy sound of a quality you never heard before. The HR-15 is a 2-Chassis power amplifier for use with tuners or other front ends having own volume and tone controls. All American triodes, 2-6SN7GT, 2-807, or 6BG6G in PP output, 5V4G rectifier. Response — .5 db, 10-100,000 cycles. Output impedances 1.7 to 109 ohms in 8 steps. Absolute gain 70.8 db. of feedback around 4 stages and the output transformers. Kit is Complete with Tubes, Punched Chassis, Pre-wired Resistor Board, Sockets, Genuine Partridge Output Transformer, and All Necessary Parts \$75.00

HR-15T — A Williamson Kit with all **TRIAD TRANSFORMERS** . . . including power transformer, chokes and specially designed output transformer which is completely sealed in tar. — 2 db. 10-100,000 cps. Harmonic Distortion less than .1% — 10 watts output. Output impedances 4-8-16 ohms . . . \$69.50 Both HR-15 and HR-15T Kits available with KT-66 tubes at \$3.00 additional.

If it's GOOD...HARVEY has it!

HARVEY'S immensely popular **AUDIO-Torium** is a musical paradise for high fidelity sound enthusiasts. Here you can see, hear, enjoy the products of 59 leading manufacturers. And from our working display, we can instantly "custom match," for your direct comparison, any combination of components and equipments . . . from the least expensive to the "best in the world."

If you would like to receive future **HARVEY** sound equipment bulletins . . . or if you want detailed information on specific products . . . or if you want assistance in planning your own installations, please write to **DEPT. HF-3**. No obligation, of course.

VISIT THE
AUDIO-TORIUM

Come in and visit our new sound department . . . all these items and many more on working display at all times.

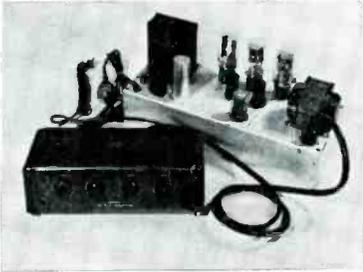


NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are Net, F. O. B., N. Y. C.

Island

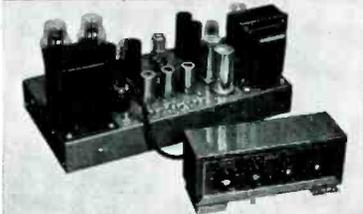
OFFERS YOU QUALITY UNITS FOR INSTALLATIONS OF BEAUTY

AMPLIFIERS



BROOK

Model 12A3, 10-watt, remote control cabinet with pre amplifier, channel selector, tone and volume controls. 3 inputs, 2 equalized for G.E., Pickering, and similar pickups. **\$198.00**



BELL 2145

All Triode with 100% Negative Feedback. Frequency Response:—20-30,000 cycles; plus or minus 0.25 db. Output 20 watts at less than 2% distortion. Six inputs; (2 radio, crystal, mic, G.E., and Pickering). Controls: Remote unit: Volume, Bass, Treble, and record equalizer switch. **\$175.52**



BELL 2122

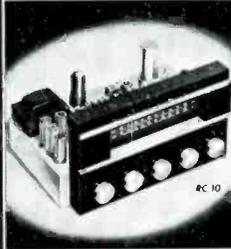
Medium priced, high fidelity, many important features. Inputs radio tuner, crystal pickup, 2 magnetic pick-ups (built in pre-amp). Bass and Treble controls, equalized inputs. Gain 74-110 db; output 10 watts; response plus or minus 3/4 db; 30-15,000 cycles. Complete with tubes. **\$49.45**



GARRARD RECORD CHANGER

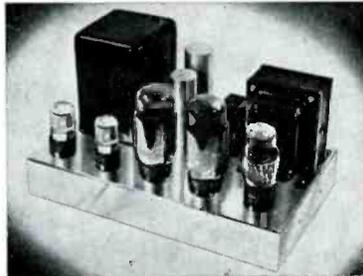
Distortion free reproduction! Built with watchlike precision, it accurately reproduces the original tonal quality of the original performance. Heavy motor and drive shaft guarantee consistent playing quality—even at critical low speeds—and eliminate wows and wavers. The exclusive Garrard tone arm mounting assures true-tangent tracking, prevents disturbing resonance. Where sensitive reluctance cartridges are used, there is no risk of objectionable hum because of the exclusive 4-pole motor and the steel plate welded on the top of the turntable, which acts as a shield. **\$39.00**

TUNERS



RADIO CRAFTSMEN RC-10

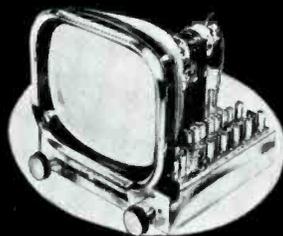
FM-AM tuner with built-in pre-amplifier compensated for G.E., Pickering and crystal phono cartridges. Continuously variable bass and treble controls with flat response from 20 to 20,000 cycles. Automatic frequency control entirely eliminates station drift. **\$131.50**



RADIO CRAFTSMAN 500

The new Craftsman 500 "ultra-fidelity" audio amplifier using the famous Williamson alltriode circuit. The chassis represents the ultimate in practically distortionless wide-range amplifiers.

HIGH FIDELITY
is here!



RADIO CRAFTSMAN RC-20

Here, at last, is a TV-FM high fidelity audio receiver, which in one chassis combines true high fidelity TV and FM reception! Has 5 watt push-pull hi fi audio system and coverage of FM band. Continuous type tuner and tuning eye permit one knob control of TV, FM, or Phono. Chassis finished in polished chrome. Come in and see this masterpiece.

SPEAKERS

ALTEC LANSING FLOOR CABINET

Altec's finest 15-inch duplex speaker for home or studio use. Reproduces entire audible range from 30 to 16,000 cps with spine-tingling, life-like clarity. Separate high frequency and low frequency speakers in one convenient unit. Signal capacity—30 watts. Input impedance 16 ohms. 15 1/2" diam., 11 1/8" depth. Supplied complete with N-1000B dividing network which correctly distributes high and low frequencies to each speaker section. **\$159.00**



605A — A distinguished furniture speaker console for 15" speakers. Rich mahogany or walnut finish. All interior joints screwed and glued to eliminate spurious rattles. 38" high, 30" wide, 16" deep. Wt. 150 lbs. **\$150.00**



ALTEC 400B

Altec dia-Cone, 8 inch. Recommended for applications where quality and small size go together. Delivers high output with excellent quality. Power capacity is 12 watts. dia. 8 1/4 inches, depth. 3 1/2 inches, voice coil dia.: 1 1/4 inches, voice coil impedance: 8 ohms. **\$22.50**

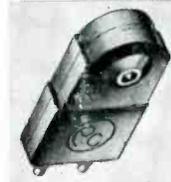


PERMOFLUX ROYAL EIGHT

Model 8T-8-1—the speaker that amazed them at the audio fair. It's new and we challenge it against any 12 inch speaker. Response is 50 to 12,000 cycles, and its power capacity is 8 watts. Very high efficiency with low distortion. 8 ohm voice coil. **\$13.50**

PICKERING CARTRIDGE

This cartridge mounts in practically any arm; gives professional quality to a home phonograph. Linear response to over 10,000 cps. Available with .003 sapphire at **\$9.90**



All prices are net, F.O.B., N.Y.C. and subject to change without notice.

Island
RADIO DISTRIBUTORS, INC.

412 FULTON AVE.
HEMPSTEAD, L. I.

ADVERTISING INDEX

Allied Radio Corp.	75
Altec Lansing Corp.	74
Ampex Electric Corp.	11
Arrow Electronics, Inc.	83
Audak Co.	2
Audio Devices, Inc.	67
A-V Tape Libraries, Inc.	78
Berlant Associates	68
Brociner Electronic Lab.	87
Brook Electronics, Inc.	8
Browning Laboratories, Inc.	65
Columbia Records	Back Cover
Concord Radio Corp.	79
Electronic Workshop	88
Electro-Voice, Inc.	63
Espey Mfg. Co., Inc.	87
Garrard Sales Corp.	5
General Apparatus Co.	76
General Electric Co.	12
Gray Mfg. Co.	10
Harvey Radio Co.	85
High-Fidelity Magazine	73
Hudson Radio & TV Corp.	71
Island Radio Distributors	86
Jensen Mfg. Co.	1
Klipsch & Associates	80
Lansing Sound Corp.	83
Leonard Radio, Inc.	77
Magnecord, Inc.	7
McIntosh Engineering Lab.	72
The Music Box	68
Newcomb Audio Pds. Co.	69
Permoflux Corp.	9
Pickering & Co., Inc.	72
Radio Craftsmen, Inc.	80
Radio Shack Corp.	82
Radio Wire Television, Inc.	81
Rek-O-Kut Co.	81
Russellcraft Co., Inc.	82
Salisbury Record Sales	85
Howard W. Sams & Co., Inc.	76
Herman Hosmer Scott, Inc.	70
Stephens Mfg. Co.	66
Sun Radio & Electronics Co.	88
Terminal Radio Corp.	
Inside Back Cover	
Traders Marketplace	85
University Loudspeakers, Inc.	78
Voice and Vision, Inc.	78
Webster Chicago Corp.	
Inside Front Cover	
Westminster Records	84
Zenith Radio Corp.	6



Literature describing Brociner radio-phonographs, the Corner Reproducer and other components will be sent you on request.



**PREAMPLIFIER
EQUALIZER**
for finest phonograph reproduction



Highest quality radio-phonographs complete with cabinet from \$506

BROCINER ELECTRONICS LABORATORY

1546 Second Avenue, New York 28, N. Y.

ATTENTION! AUDIOPHILES*

*People who enjoy the entertainment provided by fine audio reproduction.

NOW YOU CAN AFFORD HIGH QUALITY PERFORMANCE AT MODERATE PRICES BY SELECTING AN ESPEY AM-FM CHASSIS OR TUNER. CUSTOM BUILT MODELS FOR ALL APPLICATIONS.

The NEW ESPEY model 511-B

FEATURES

1. AC Superheterodyne AM-FM Receiver.
2. Improved Frequency Modulation Circuit, Drift Compensated.
3. 12 tubes plus rectifier, and electronic Tuning Indicator and Pre-Amp. Tubes.
4. 4 dual purpose tubes.
5. Treble Tone control.
6. 6-gang tuning condenser.
7. Full-range bass tone control.
8. High Fidelity AM-FM Reception.
9. Automatic volume control.
10. 10 watts (max.) Push-Pull Beam Power Audio Output.
11. 12-inch PM speaker with Alnico V Magnet.
12. Indirectly illuminated Slide Rule Dial.
13. Smooth, flywheel tuning.
14. Antenna for AM and folded dipole antenna for FM Reception.
15. Provision for external antennas.
16. Wired for phonograph operation with switch for crystal or reluctance pick-up.
17. Multi-tap output trans., 4-8-500 ohms.
18. Licensed by RCA and Hazeltine.
19. Subject to RMA warranty, registered code symbol 2-174.

Makers of fine radios since 1928.

ESPEY TEL. TRAFALGAR 4-7000
MANUFACTURING COMPANY, INC.
528 EAST 72nd STREET, NEW YORK 21, N. Y.



SPECIFICATIONS

Supplied ready to operate, complete with tubes, antennas, speaker and all necessary hardware for mounting in a table, cabinet or console, including escutcheon. Power consumption—105 watts.

Chassis Dimensions: 13 1/2" wide x 8 1/2" high x 10" deep.

Net Weight: 17 pounds each.

Sold through your favorite parts distributor.

WRITE FOR CATALOGUE HF-11
CONTAINING PRICES AND COMPLETE
DETAILS OF ALL MODELS

in every phase of custom building—

the criterion

cabinetry design
audio engineering
custom service

the electronic workshop



bleecker at tenth
new york city 14

oregon 5-2631

custom builder's brochure upon request

EQUIPMENT REPORT

Continued from page 81

mounted on the *front* of the panel. Audiophiles who have tried to detach the panels on some audio equipment, so that the markings and knobs could be transferred to the front of their especially-built cabinets, will appreciate this feature.

Here is the latest information on recording characteristic curves for the different makes of LP records, as listed by Brociner:

	Frequency Turnover	Frequency Roll-off
Columbia	LP	16
London	LP	16-20
RCA Victor	800	12
Bertok	300	12
Capitol	300	12
Decca	LP	16
Haydn	LP	16
Mercury	300	12
Westminster	LP	16
Manufacturer	Low	High

All things considered, we like the Brociner preamplifier very much indeed. We find that it is carefully designed and well made. There is no audible hum. Its equalization characteristics are sufficiently flexible to meet the compensation needs of almost any record. It provides adequate amplification, even with low-level pickups, such as the GE. We like the removable panel and the extra length to the panel screws and the control shafts.

²Uses the AES curve: actually 400-cycle turnover and 12-db. pre-emphasis at 10,000 cycles.

³Some at 12.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933 Of High-Fidelity, published quarterly at Great Barrington, Massachusetts, for November 15, 1951

State of Massachusetts,
County of Berkshire, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Milton B. Sleeper, who having been duly sworn according to law, deposes and says that he is the publisher of the High-Fidelity Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Milton B. Sleeper, Monterey, Massachusetts; Editor, Charles Fowler, So. Egremont, Massachusetts; Managing Editor, none; Business Manager, none.

2. That the owner is: Audiocom, Inc., Great Barrington, Massachusetts.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: Ethel V. Sleeper, Milton B. Sleeper, and Charles Fowler.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) Milton B. Sleeper
Sworn to and subscribed before me this Fifteenth day of November, 1951
(Seal) Lillian Bendross, Notary Public
Commission expires July 1, 1954.

A Guide To Better Music

Sun Radio's Original
"Audio Equipment Handbook"

FREE
1952 Edition

* Most Widely Read
* Most Widely Imitated
* Most Widely Requested

Again SUN RADIO brings you a new edition of this valuable handbook acclaimed by thousands of Music Lovers as the "Bible" for high-fidelity home music reproduction.

132 pages of down-to-earth information on "How To" assemble, install or improve music reproducing equipment in the home. Clear, non-technical text written for the layman. New Ideas -- New Methods -- New Systems. Write today to Dept. F for your Free Copy.

Sun Radio
& ELECTRONICS CO., INC.
122-124 DUANE ST. • NEW YORK 7, N. Y.
BARclay 7-1840

Open Daily 9-6, Sat. 9-4:30

In Every Way, You Get SOUND VALUE at **TERMINAL**, the Headquarters for New York's Audio Fans!

RCA 15" DUO-CONE SPEAKER

with full weight ALNICO V magnet
This full-size 15" RCA loudspeaker provides the listener with full depth of bass and clear natural upper register. The unique magnetic structure and Duo-Cone arrangement with two voice coils accounts for its smooth frequency response from 40 to 12,000 cycles. Automatic frequency control entirely eliminates station drift. Weighs 15 lbs. RCA 51551.

29⁹⁵
NET

RADIO CRAFTSMEN RC-10 FM-AM TUNER with Built-in Preamp

Compensated for G.E., Pickering and crystal phono cartridges. Continuously variable bass and treble controls with flat response from 20 to 20,000 cycles. Automatic frequency control entirely eliminates station drift.

131⁵⁰
Net

RC-2 Wide Range Amplifier

Companion unit for the RC-10 AM-FM tuner, or any high fidelity application. Over 10 watts output with less than 1% distortion. 20 to 20,000 cycles frequency response.

42⁹⁰
Net

NEW! Model A-800 INPUT AMPLIFIER

Here in one compact unit is a four-stage preamplifier with inputs for fine wide-range phono cartridges such as G.E., Pickering and Collaro; radio tuner input and crystal cartridge. Has separate bass and treble tone controls. Especially designed for high quality amplifier power stages, such as the famous Williamson.

37⁵⁰
Net

UTC-WILLIAMSON Amplifier Kits

Incomparable audio reproduction in an easy-to-build style! Chassis are drilled and punched for all components. Only UTC's famous linear standard transformers used in audio section. Wired sample on demonstration in our Sound Department. Chassis and transformer

44¹⁰
Net

kit priced at
Instruction manual 25¢

GARRARD "Triumph" RC-80 RECORD CHANGER

The Garrard RC-80 fully automatic record changer is distinguished by its watch-like construction, fastidiously machined and finished. Concert quality reproduction for all records—33 $\frac{1}{3}$, 45 and 78 rpm—regardless of diameter (7" — 10" — 12") or size of spindle hole. Shuts off automatically after last record is played. 15 $\frac{1}{2}$ " W, 13 $\frac{1}{2}$ " D; requires 5 $\frac{1}{4}$ " clearance above, 3 $\frac{1}{2}$ " clearance below base. Supplied complete with mounting hardware, 2 plug-in shells (less cartridges) and mounting template.

39⁸⁰
NET



- RC-80C—Same as above, but equipped with turnover dual crystal cartridge. **44.90**
- RC-80PD—With special matched pair Pickering cartridges equipped with laboratory ground diamond styli for years of finest reproduction. **64.70**
- RC-80PS—With matched pair Pickering cartridges using sapphire styli. **100.70**
- RC-80R2—With standard Audak polyphase pick-up head, equipped with two sapphire styli. **64.70**
- RC-80L6—With precision Audak polyphase studio head equipped with two sapphire styli. **56.85**
- RC-80GED—With pair of G.E. variable reluctance cartridges incorporating precision diamond styli. **63.73**
- RC-80GE—With pair of G.E. variable reluctance cartridges equipped with sapphire styli. **79.66**
- RC-80GES—Equipped with G.E. RPX-050 sapphire double-needle cartridge for standard and microgroove. **51.44**

VISIT
TERMINAL'S
FAMOUS
SOUND
DEPARTMENT!

PRICES
SUBJECT TO
AUTHORIZED
CHANGES

PERMOFLUX Royal Blue 8" PM Speaker

Model 8T-8-1. The magnificent speaker that amazed visitors at the Audio Fair! Response is 50 to 12,000 cps, 8 watts. Efficiency high, distortion low! 8" diameter, 8 ohm voice coil.

13²³
Net

UNIVERSITY 6201 12-inch Coaxial Speaker

Full-range 25 watt coaxial speaker, 45 to 15,000 cps. Complete with 2000 cycle cross-over network and high frequency attenuator. A wonderful buy!

44¹⁰
Net

TERMINAL'S new UTILITY KORNER-KABINETS

Terminal's Korner-Kabinets will make an amazing improvement in the reproduction of any loudspeaker. The full size enclosed reflex chamber uses the walls of the room as a gigantic horn extension for enhanced bass response. Sturdy construction of $\frac{1}{2}$ " thick plywood throughout, properly reinforced to eliminate resonance and give true tone. Unfinished exterior, ready for painting. Supplied with movable speaker mounting board, sound absorbing pads and hardware.

- KK-8 For 8" speakers. 24" high, 32" across, 23" each side. **18.00**
 - KK-12 For 12" speakers. 36" high, 32" across, 23" each side. **21.00**
- Also available for 15" speakers

All equipment furnished for operation on 105-120 volts, 60 cycles AC.

FREE!

Sylvania stroboscope to test the speed of your phono turntable! Sorry, no mail or phone orders on this item!

Have you heard of Terminal's P.D.Q.? Send for Terminal's P.D.Q. Bulletin!

Terminal Radio Corp.

85 CORTLANDT STREET, NEW YORK 7, N. Y.

Worth 4-3311



AUDIO ENGINEERING SOCIETY DEMONSTRATIONS!

Mr. R. D. Darrell selected the following Columbia Records as part of a special group of LP records containing musical and technical qualities especially useful in ear-testing frequency, transient, and technical

Masterpieces by Ellington

Duke Ellington and his Orchestra ML 4418
Listen to: The Tattooed Bride, side 2

Schumann-Brahms Recital

Gyorgy Sandor (piano) ML 4375
Listen to: Papillons, side 1

Music of Irving Berlin

(Say It With Music; Remember; Blue Skies; Top Hat, White Tie and Tails; How Deep Is The Ocean; This Is The Army; Oh, How I Hate To Get Up In The Morning; Soft Lights and Sweet Music; What'll I Do; Always; The Song Is Ended; The Piccolino; Cheek To Cheek; White Christmas; The Girl That I Marry; Say It Isn't So; Mandy; Give Me Your Tired, Your Poor; God Bless America).
 Andre Kostelanetz and his Orchestra ML 4314
Listen to: Mandy, side 2

Age of Anxiety (Bernstein)

Leonard Bernstein conducting the Philharmonic-Symphony Orchestra of New York, Lukas Foss (piano) ML 4325
Listen to: Masques, side 2

Concerto in G Minor (Poulenc)

E. Power Biggs, Organ and Columbia Symphony Orchestra conducted by Richard Burgin ML 4329
Listen to: 32 ft. pedal tones

Carmen-Suite (Bizet). Capriccio Italien, Op. 45

("Italian Caprice") (Tchaikovsky). Sir Thomas Beecham, Bart., conducting the Columbia Symphony Orchestra ML 4287
Listen to: Carmen, Bands 6 and 7

Twilight Concert—No. 1

Artur Rodzinski cond. the Columbia Symphony Orch. with Leonard Pennario (piano) and Martha Lipton (mezzo-soprano) ML 4311
Listen to: William Tell and Rachmaninoff, side 1

Have you heard Columbia's sensational TATI-TATI? Ask your dealer for a demonstration of this amazing HIGH FIDELITY recording by Werner Janssen and the Columbia Symphony Orch.

qualities, and distortion characteristics of sound systems. They were demonstrated at the September meeting of the Audio Engineering Society:



FREE RECORD TO AUDIOPHILES

If you would like to "audition" two superb examples of HIGH FIDELITY recordings, we will mail you a free 7" LP record (33 1/3 RPM) containing excerpts from two new Columbia releases. This offer is limited and may be withdrawn at any time without notice.

Columbia Records, Inc.
 1473 Barnum Avenue
 Bridgeport 8, Conn.

Please send me the free LP record for Audiophiles.

Name _____

Street _____

City _____ Zone _____ State _____

COLUMBIA RECORDS

The World's largest library of long playing records

The exclusive trade-mark of Columbia Long Playing Records—symbol of highest quality. Look for it!
 Trade-Marks "Columbia," "Masterworks," ,  Reg. U. S. Pat. Off. Marcus Registradas