PUBLISHED BY high fidelity MAGAZINE

Price $1

ICD

stereo

1962 EDITION

THE WHY AND HOW OF FM MULTIPLEX

Now You Can Pull
Stereo Out of the Air

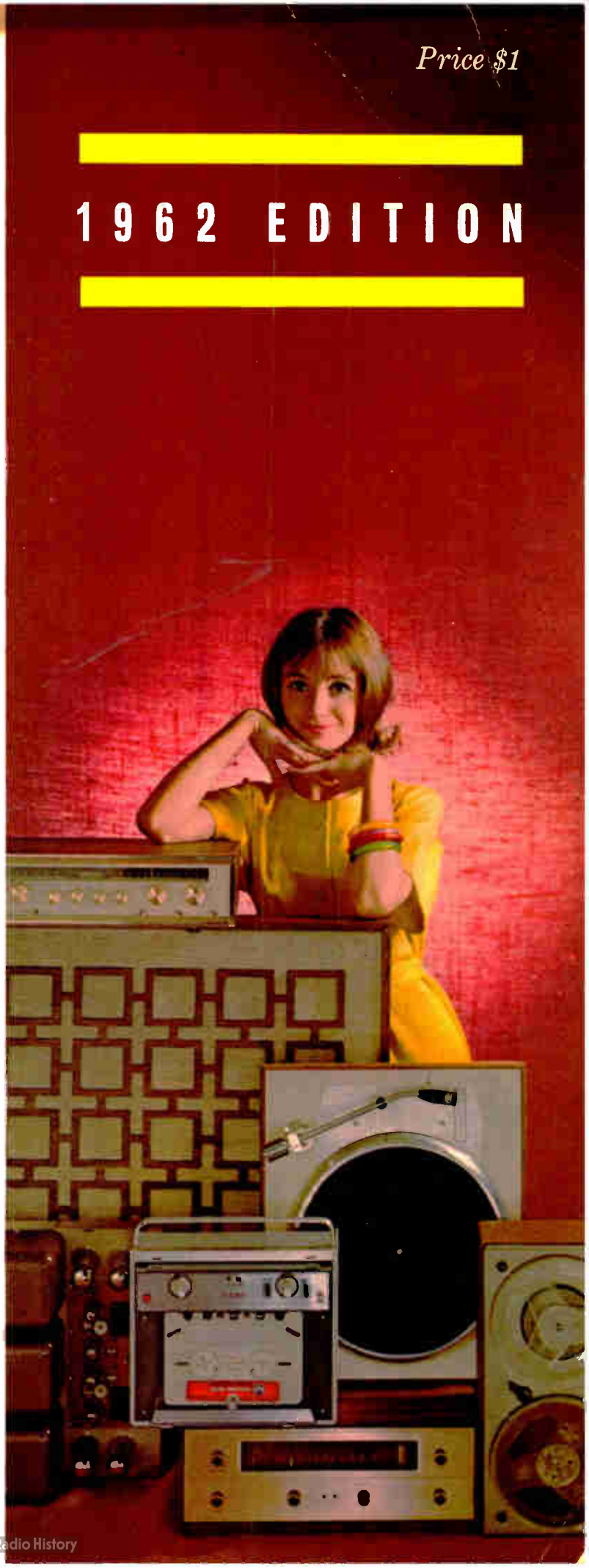
SOUND ARRANGEMENTS

Make Your Stereo System Look
as Good as It Sounds

NEW DIRECTIONS IN STEREO SPEAKERS

Thinner, Bigger,
Smaller, Wider—and Why

PLUS Latest Stereo Equipment
Tape Recording: It's Bigger than Ever
Best Stereo Records of the Year
Tips for Stereo Shoppers



McIntosh is the best

Only McIntosh amplifiers will deliver the full advertised power* at the lowest harmonic distortion of any currently available nationally advertised amplifiers in the McIntosh power class, at all frequencies, 20 cycles through 20,000 cycles.

We challenge any other manufacturer to prove that his power amplifier in the McIntosh power class, will deliver full advertised power at all frequencies, 20 cycles through 20,000 cycles at less than 0.5% harmonic distortion.

Any impartial testing person or organization can reach these same conclusions when reputable test instruments and procedures are used.

To assure the continued highest quality and performance, every McIntosh amplifier is measured by the use of these quality test instruments:

1. Hewlett Packard #206A Signal Generator.
2. Hewlett Packard #330B Distortion Analyser.
3. Tektronic #502 Dual Beam Oscilloscope.
4. Non Inductive Load Resistor.

Careful, diligent research, meaningful design considerations and meticulous manufacturing produces the highest quality equipment. When you buy McIntosh—you know you are buying **the** best. Only McIntosh is **the** best.

McIntosh LABORATORY, INC.
2 CHAMBERS STREET, BINGHAMTON, N. Y.
Phone—Area Code 607-723-5491

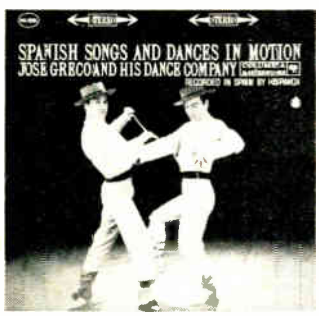
*Continuous power as measured by the square of the RMS output voltage, divided by the resistance of the non-inductive load resistor.

THE STEREO COLLECTOR'S CHOICE

good music plus the fastest-moving sound

PHILADELPHIA CLASSIC

A connoisseur's classic in high fidelity,
the Ormandy-Philadelphia performance of
Berlioz' fireworks-for-orchestra
now explodes in stereo.

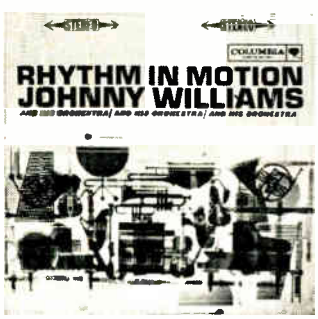


SPANISH IN STEREO

With staccato stamping of feet
and fiery flamenco songs,
José Greco's ballet company
sets the stereo microphones ablaze.

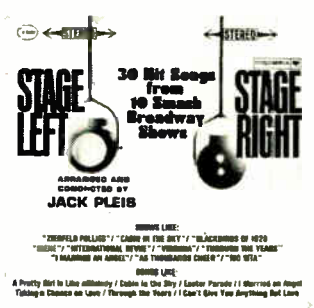
ANDRE IN WONDERLAND

Lustrous new wide-angle stereo
from a famous soundmaster—
Andre Kostelanetz.
Lavish orchestral treatment of hit tunes,
punctuated with percussion.



LIGHT AND FANTASTIC

A bright new arranging talent—the "Checkmate" TV score
composer Johnny Williams, and his witty,
whimsical instrumental sound effects...
the battery includes bongos, triangles, tubas,
trumpets and screaming woodwinds.



BROADWAY: STAGED FOR STEREO

A Broadway kaleidoscope—
high-stepping medleys—
staged from left to right.

VOICES IN MOTION

A new departure—the Voices in Motion chorus is
custom-built for stereo...
songs and voices rise, criss-cross,
blend for warmly beguiling listening.

IS ON COLUMBIA RECORDS

Matchless Monaural, too.

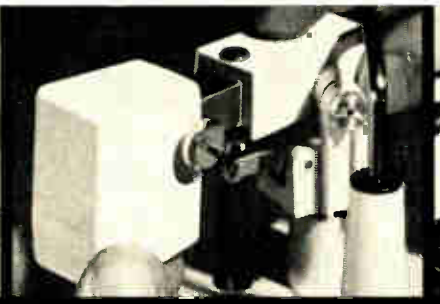
CIRCLE 13 ON READER-SERVICE CARD

Which stereo automatics suit you best?

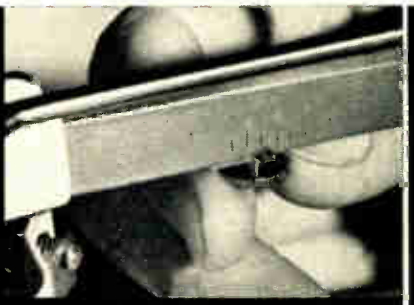
1 GARRARD LABORATORY SERIES TYPE A AUTOMATIC TURNTABLE

Here, in this most desired of all record players, Garrard has combined a dynamically-balanced tone arm; a heavy full-size turntable; a laboratory-balanced precision motor...plus the convenience of the world's finest automatic record changing mechanism (to use when you desire). Each is a precision device comparable to professional equipment of the kind, which up to now, you would have had to buy separately. $79.50

Garrard's Type A Automatic Turntable gives you a true dynamically-balanced tone arm, with the extremely important, heavy adjustable counterweight.

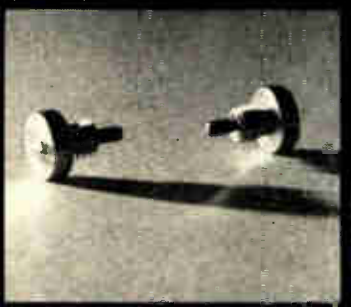


Thus, to adjust the stylus tracking force, you simply move the counterweight until the arm is in perfect balance, at zero pressure.



Then, the scale built into the arm enables you to set the lightest tracking force prescribed for any cartridge, even those labelled "professional."

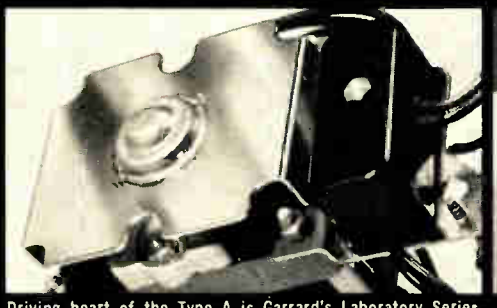
Once balanced and set, the Type A tone arm will track perfectly each side of the stereo groove, even if the record player is intentionally tilted or the record warped.



Perfect performance also requires a minimum of swing friction...guaranteed by the pair of needle pivots holding the arm.

Another important feature is Type A's non-magnetic turntable...heavy-cast, full-sized, and balanced. Weight: 6 lbs.

Turntable is an exclusive sandwich design, (a) drive turntable inside; (b) heavy, polished, cast metal turntable outside and (c) a resilient foam barrier between.



Driving heart of the Type A is Garrard's Laboratory Series motor with top and bottom shielded by specially designed plates, eliminating any possibility of magnetic hum.

Garrard's exclusive pusher platform record changing mechanism is foolproof...gives the Type A the tremendous convenience of automatic play.

2 AT6 AUTOMATIC TURNTABLE

Garrard now provides all the professional features and performance expected by the most knowledgeable and critical listeners, in a new automatic turntable so compact in size that it will suit virtually any music system. Model AT6 includes a new dynamically-balanced, counter-weight adjusted tubular tone arm; over-sized weighted turntable; the double shielded Laboratory Series motor and, as you want it, single play or the luxury of automatic intermix operation. $54.50

3 AUTO SLIM AUTOMATIC MANUAL INTERMIX CHANGER

This is Garrard's newest and most compact automatic, only 6¼" in total height...designed for small space and low budgets—yet it is a Garrard through and through. The Autoslim features a non-resonant one-piece die-cast tone arm, completely separate manual and automatic controls, and Garrard's 4-pole shaded motor. Its appearance is strikingly simple, with the precise lock of engineering excellence. Yet the Autoslim is priced at only $39.50.

For information regarding Garrard's complete line of automatic turntables, changers, and manual players, write Dept. GY-1391, Garrard Sales Corporation, Port Washington, N.Y.

CIRCLE 11 ON READER-SERVICE CARD

stereo

1962 EDITION

On the Cover: High-fidelity components, with or without an attractive young lady, can be arranged in an attractive composition. And that is all that our cover photograph attempts to prove. Representative pieces of stereo equipment shown are: Fairchild's turntable, tone arm, and cartridge, Fisher Radio's stereo tuner, Bell Sound's tape cartridge player, Acro Products' stereo power amplifier, Sherwood's stereo receiver, Rek-O-Kut/Audax's speaker, and, finally, the Tandberg tape recorder.

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Telephone: Hollywood 9-6239
George Kelley

Cover photo by Bernard Lawrence: model's skirt courtesy Corduroy Corner

Getting the Most Out of Your

Stereo Equipment

Whether you are a compleat stereophile with a fully integrated sound system, or a relative neophite just starting into hi-fi, the *fidelity of sound reproduction from your equipment can be no greater than the quality and sound content of the record being played*

That's why COMMAND records are the overwhelming choice of discriminating, knowledgeable people who desire and demand the finest in recorded sound. COMMAND . . . world leader in recorded sound, provides you with the ultimate in musical enjoyment . . sound so pure, full and honest that COMMAND records are *used by leading manufacturers of stereo and hi-fi equipment to demonstrate the greatest potential of their equipment!*

Beginning with the now famous PERSUASIVE and PROVOCATIVE PERCUSSION series, COMMAND launched a new concept in sound reproduction. Overnight the COMMAND label skyrocketed to the top of the industry. Critics were the first to recognize that "Stereo didn't make COMMAND; *COMMAND made Stereo!*" COMMAND has indeed delivered what others have only promised . . . the true musical excitement of stereo.

And, to maintain their uncontested leadership, COMMAND painstakingly *perfected the unbelievable world of 35/MM Sound . . . the miraculous new method of capturing the living essence of pristine sound.*

Recording original masters on 35 millimeter magnetic tape represents a *major* "breakthrough" in the history of recorded musical sound . . . not only in the popular field but also in the more critical, highly demanding world of classical music.

The result is a milestone on the road to absolute perfection in recorded sound. For the very first time you will hear sound that is completely liberated . . . sound that is totally free . . . with no mechanical restrictions — performances that are an unprecedented combination of musical brilliance and startlingly real, completely unlimited sound reproduction.

Discover for yourself why COMMAND is truly the World Leader in recorded sound. Let COMMAND help you deliver the true potential of your high fidelity stereo equipment. COMMAND delivers what it promises — *the ultimate in musical enjoyment.*

"GETTING THE MOST OUT OF YOUR STEREO EQUIPMENT"

STEREO SELECTIONS

Also available in Monaural

PERSUASIVE PERCUSSION
THE DIXIE REBELS
THE MILLION DOLLAR SOUND
Vol. 2 — THE MILLION DOLLAR SOUND
THE PRIVATE LIFE OF A PRIVATE EYE
PROVOCATIVE PERCUSSION
MR. BIG
PERSUASIVE PERCUSSION — Vol. II
BONGOS
PROVOCATIVE PERCUSSION — Vol. II
PROVOCATIVE PIANO
BONGOS/FLUTES/GUITARS
TWO PIANOS AND TWENTY VOICES
PERTINENT PERCUSSION CHA CHAS
THE PERSUASIVE TROMBONE OF URBIE GREEN
ROMAN GUITAR
PERSUASIVE PERCUSSION — Vol. III
BIG, BOLD AND BRASSY
TEMPESTUOUS TRUMPET
REEDS AND PERCUSSION
PROVOCATIVE PERCUSSION — Vol. III
FAR AWAY PLACES
FOLK SONGS
PROVOCATIVE PIANO — Vol. II
THE DIXIE REBELS — Vol. II
THE COMMAND STEREO "CHECK OUT" RECORD

35/MM ALBUMS

Original masters recorded on 35mm magnetic tape.

STEREO/35MM — Enoch Light and His Orch. at Carnegie Hall/1961

BRAHMS — SYMPHONY NO. 2
Steinberg — Pittsburgh Symphony

PICTURES AT AN EXHIBITION —
Vandernoot — Paris Conservatoire Orchestra

CAPRICCIO ESPAGNOL / CAPRICCIO ITALIEN
Vandernoot — Conservatoire Orchestra
Dervaux — Colonne Symphony

RAVEL — DAPHNIS ET CHLOE, SUITE NO. 2
Dervaux — Colonne Symphony

RACHMANINOFF — SYMPHONY NO. 2
Steinberg — Pittsburgh Symphony

CIRCLE 14 ON READER-SERVICE CARD

YOU ARE LOOKING AT 3 OF THE WORLD'S FINEST STEREO COMPONENTS

(all in 1 compact unit!)

1 AM-FM Stereo Multiplex Tuner

2 65-Watt Stereo Amplifier

3 Master Audio Control & Preamplifier

Simply connect two loudspeaker systems to the FISHER 800-B Stereo Receiver—and you have a completely integrated stereo installation that fits anywhere, ready to play! Despite the remarkable saving of space, you will enjoy the highest order of performance: 0.9 microvolt sensitivity for distortion-free FM-Stereo Multiplex reception; advanced wide-band circuitry on both FM and AM; 65 watts music power output. The exclusive FISHER STEREO BEAM tells at a glance whether an FM station is broadcasting in stereo. You also get typical FISHER 'extras' such as the separate AM and FM tuning indicators and a center-channel output connection for an optional third speaker. The FISHER 800-B is indeed the only way you can have stereo in moderate space, at moderate cost—without the slightest compromise in quality! **Price $429.50***. The FISHER 500-B, similar to the 800-B but without the AM tuner, **$359.50***

USE THIS COUPON FOR FURTHER INFORMATION
Fisher Radio Corporation
21-53 44th Drive, Long Island City 1, N. Y.

Please send me the following Fisher literature without charge:

☐ Specifications on the Fisher 800-B and 500-B.

☐ The 1962 Fisher Handbook—a 40-page illustrated reference guide and component catalogue for custom stereo installations.

Name_____

Address_____

City_____ Zone____ State_____

HF11R1

THE FISHER 800-B

*Walnut or mahogany cabinet $24.95; prices slightly higher in the Far West. EXPORT: Telesco International Corp., 171 Madison Ave., N. Y. 16, N. Y. In Canada: Tri-Tel Associates, Ltd.

CIRCLE 20 ON READER-SERVICE CARD

HOW TO BUY YOUR FIRST (OR YOUR LAST) SPEAKER SYSTEM

If you demand magnificent sound . . . undistorted bass to beyond the limits of audibility—if you demand superb cabinetry and decor flexibility (with five interchangeable grille frames that snap on and off to match *any* decor) . . . then consider the unique University Medallion XII 12" Three-Way Speaker System. Medallion owners *stay* Medallion owners. Let's look inside the Medallion and see why.

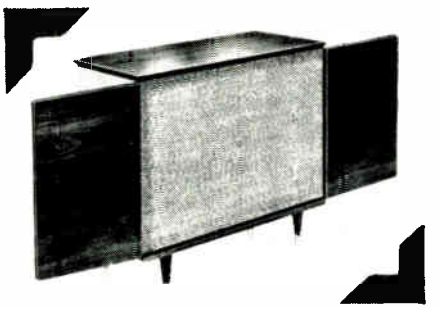
Integrated within its precisely-matched cabinet are three superlative speaker components: the 12" high compliance woofer that delivers bass frequencies down to the very threshold of feeling; a newly-engineered 8" speaker to assure you of all-important mid-range *impact;* and the Sphericon super tweeter for highs unlimited. Result: virtually uniform response

compare UNIVERSITY (in every price category) against all other brands

—smooth and rich—from *28 to 40,000 cps* (±2db at 22,000 cps). And at your fingertips, network controls to balance the Medallion sound to match the acoustics of your room—*any* room.

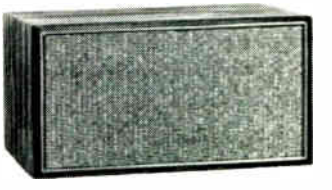
Amplifier requirements? Any amplifier capable of delivering a modest ten clean watts. Medallion dimensions? Only 24" x 17" x 11¾" deep. Available with or without base—for use as highboy or lowboy. Finishes? Walnut, oiled walnut, fruitwood, mahogany *and* unfinished for custom installations. And the Medallion is the world's *only* system with "select-a-style" snap-on grilles. Want to change your decor at some later date? The Medallion stays where it is—all you change is the grille! In Contemporary, Italian or French Provincial, Colonial and Swedish Modern. Medallion prices start at $139.95, without grille. Grilles from $9.95. Base, $14.95.

Write for University's "Informal Guide to Component High Fidelity," Desk PA-11 University Loudspeakers, Inc., White Plains, New York.



For a solution to a *really* difficult space problem, investigate the TMS-2 *single* cabinet stereo speaker system.

CIRCLE 41 ON READER-SERVICE CARD



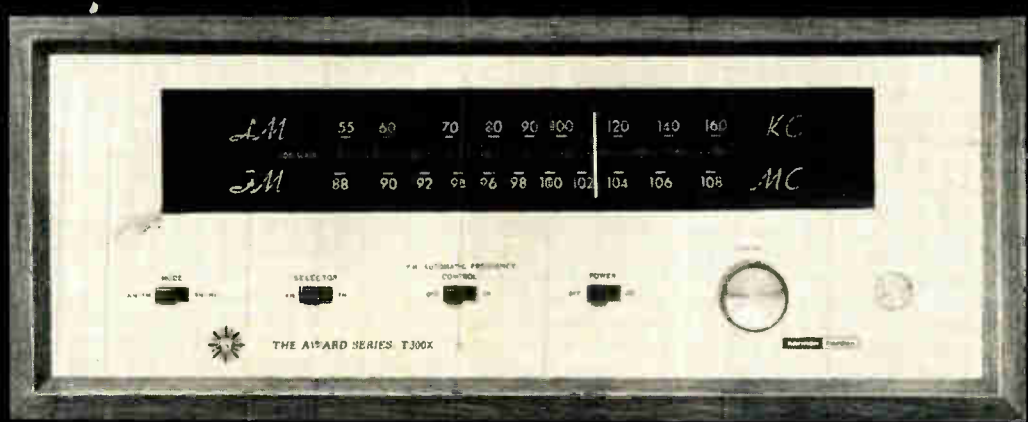
For bookshelf speaker systems with astounding 'big system' sound, look into University's RRL speaker systems.

UNIVERSITY

A Division of Ling-Temco-Vought, Inc.

TIMELESS BEAUTY AND THE SOUND OF TRUTH

The new T300X Award Tuner does not need a multiplex adapter



The T300X, AM/FM tuner, does not need a multiplex adapter. It has one. Right where it belongs—built-in. On the chassis and out of sight. The T300X is completely ready to receive multiplex (FM Stereo) broadcasts *now*.

What is the significance of multiplex? It represents a major technological advance in the technique of broadcasting. Now, for the first time, you can enjoy all of the color and genuine excitement of stereo with the fidelity that only FM can provide. And what a wonderful opportunity it presents for taping stereo selections right off the air.

The T300X is a striking example of Harman-Kardon's engineering leadership in the development of instruments for multiplex reception. It is designed with a wide-band Foster-Seeley discriminator and a 6BN6 limiter to insure freedom from distortion and noise. A total of 4 IF stages guarantee greater sensitivity. Automatic Frequency Control (AFC) with regulated voltage supply maintains oscillator stability regardless of line voltage variations. The T300X boasts superior impulse noise rejection plus uniform limiting and output at all signals. Here is a solid performer, rock stable and ideal for multiplex reception.

The T300X takes its place in the Award Series alongside the classic F500X tuner shown below. The F500X is a completely integrated professional FM Stereo tuner. Like the T300X the new F500X is ready to receive FM Stereo broadcasts now. It is also available with its FM Stereo section removed. This model—the F500—provides superb FM reception and it can be readily converted to stereo at any time. It has space on its chassis to accommodate the MX500 wide-band, plug-in multiplex adapter.

Either tuner will provide outstanding performance with the Award amplifiers on the opposite page.

The T300X, AM/FM stereo multiplex tuner, is $149.95; the F500X integrated FM stereo tuner—$169.90; the F500 FM/multiplex tuner—$129.95. The MX500 multiplex adapter for use with the F500—$39.95. Optional enclosures, which fit all tuners, include the CX50 (metal)—$12.95 and the WW50 (walnut)—$29.95. Prices are slightly higher in the West.

For complete information on the Award Series and other fine Harman-Kardon products write to Dept. ST-62, Harman-Kardon, Plainview, N. Y.

harman kardon

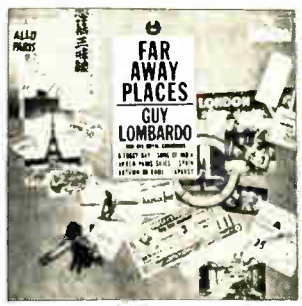
the world weighs 5 ounces...!

DANCE TIME IN STEREO

YOU STEPPED OUT OF A DREAM. Romantic favorites played in the famous dance tempos of JAN GARBER and his orchestra. *Just In Time, June In January, Time On My Hands, A Fine Romance,* and others.
DL 74143

SAMMY KAYE salutes the great songs . . . the ones he didn't play, the first time around. *To Each His Own, Heartaches, I'll Never Smile Again, Moonlight Cocktail, Got A Date With An Angel, Good Night Sweetheart,* and others. DL 74154

The lush, provocatively singing sound of Gypsy violins . . . interpreted by WAYNE KING and his orchestra. *Golden Earrings, Dark Eyes, Play Gypsies-Dance Gypsies, A Thousand Violins,* and many others. DL 74128



Discover the enchantment of *Far Away Places* through the magic of GUY LOMBARDO's ever-popular music. *Under Paris Skies, Hawaiian Wedding Song, A Foggy Day In London Town, April In Portugal,* and others. DL 74149

Wonderland is the password BERT KAEMPFERT'S world of orchestral sound. Dance to *Now and Forever, Unchained Melody, Sleepy Lagoon,* and others. DL 74161

Sorrento goes Latin! Popular Italian melodies in favorite Latin rhythms by the IRVING FIELDS TRIO — *Sorrento Cha Cha, Volare,* and many others. DL 74175

STARS IN STEREO

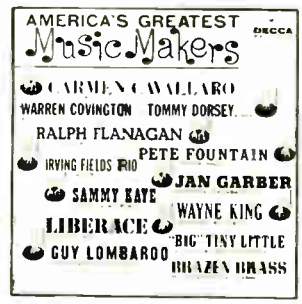
Swinging French Favorites New Orleans' own PETE FOUNTAIN. *I Love Paris, Comme Ci Comme Ca, Autumn Leaves,* and beaucoup others. CRL 757378

The versatile EARL GRANT at the organ. A performance of dazzling improvisation; a sound of startling depth. *Ebb Tide, Misty,* and many others. DL 74165

Golden moments at the organ. LENNY DEE plays the favorites . . . in sparkling Stereo. *April In Paris, Tico Tico, Tequila, Mr. Lucky, Honky Tonk,* and many others. DL 74112

LEOPOLD STOKOWSKI conducting the Symphony Of The Air. Brahms' *Serenade No. 1 in D Major, Op. 11.* An inspired performance — magnificent in sound and breathtaking in scope.
DL 710031

"BIG" TINY LITTLE covers a world of music, sound, and geography with his famous Honky Tonk piano, a Dixieland group and a Hammond organ. *California Here I Come, Dixie, Asia Minor,* and all points East, North, West and South.
CRL 757386



The greatest names in popular music play your dancing and listening favorites . . . GUY LOMBARDO, CARMEN CAVALLARO, PETE FOUNTAIN, SAMMY KAYE, LIBERACE, RALPH FLANAGAN, "BIG" TINY LITTLE, IRVING FIELDS TRIO, WARREN COVINGTON, WAYNE KING, Henry Jerome's BRAZEN BRASS, and JAN GARBER. DL 74126

DECCA® RECORDS

CORAL® RECORDS
A subsidiary of Decca Records, Inc.

CIRCLE 16 ON READER-SERVICE CARD

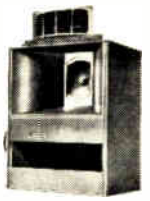
WIDEST SELECTION IN THE WORLD... ALTEC STEREO HIGH FIDELITY COMPONENTS

ALTEC SPEAKER SYSTEMS

ALTEC 838A "CARMEL" SPEAKER SYSTEM is a full-size two-way bass reflex system with guaranteed 30-22,000 cycle frequency range. Large enough to reproduce the lowest audible frequencies, the "Carmel" is sufficiently compact to be practical in most living rooms as a matched pair for stereo. Contains professional-type speaker components listed in chart below as system 10.
PRICE: $297.00

ALTEC 837A "AVALON" SPEAKER SYSTEM is housed in a cabinet identical to 838A. Contains speakers listed as system 7 in chart below.
PRICE: $246.00

ALTEC A-7 "VOICE OF THE THEATRE" ® SPEAKER SYSTEM is the smallest of the famous Altec professional systems used by most major theatres throughout the world. Features guaranteed 35-22,000 cycle frequency range. Contains professional speaker components listed in chart below as system 8.
PRICE: $299.40



ALTEC 834A "MONTEREY" SPEAKER SYSTEM — the giant of the compacts — contains speakers listed in chart below as system 2. Guaranteed frequency range 40-22,000 cycles.
PRICE: $174.00 finished
$169.00 unfinished

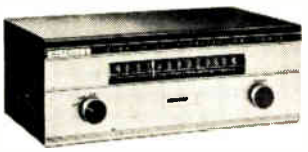
ALTEC 835B "MONTEREY, JR." SPEAKER SYSTEM is a smaller version of the 834A "Monterey" with speakers listed in chart below as system 1.
PRICE: $89.50 finished; $84.00 unfinished

ALTEC 836A "LIDO" SPEAKER SYSTEM is a beautifully styled bookcase system with well balanced tonal quality.
PRICE: $125.00

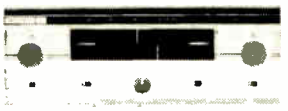
ALTEC TUNERS & AMPLIFIERS

ALTEC 707 "FOUR-IN-ONE" STEREO CENTER — four hi fi components in one slim-line package: AM tuner, FM tuner, dual channel preamplifier, dual channel amplifier, stereo or mono. Facilities for tape machine, tape deck, record player, multiplex. Output for center stereo speaker plus auxiliary speakers.
PRICE: $387.00

NEW ALTEC 359A "STEREOPLEX" ADAPTER makes it easy to enjoy FM stereo multiplex when used with Altec Tuners and Amplifiers. Controls for stereo reception are located conveniently on the front panels of the Altec Tuner and Amplifier systems. Incorporates a Stereo Monitor that lights automatically as stereo signal is received.
PRICE: $89.50



ALTEC 312A FM TUNER is stable and highly sensitive for excellent FM or FM stereo multiplex reception.
PRICE: $111.00



ALTEC 309A AM/FM STEREO TUNER provides four modes of reception: FM stereo multiplex, AM/FM stereo, monophonic AM or FM. Each mode is easily selected at the control panel.
PRICE: $216.00

ALTEC 353A STEREO AMPLIFIER-PREAMPLIFIER is a dual channel power and control center with 14 stereo or mono inputs, 6 outputs for tape machine, tape deck, AM and FM tuners, FM multiplex, TV, high or low level record player, two microphones. A matricing network is provided for center stereo speaker and for driving auxiliary speakers.
PRICE: $225.00

BUILD YOUR OWN ENCLOSURE...

ALTEC TWO-WAY SPEAKER COMPONENT SYSTEMS

(See Chart for Suggested Systems)

ALTEC LOW FREQUENCY SPEAKER COMPONENTS

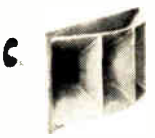
ALTEC 803B BASS SPEAKER for reproduction of low frequencies from 30 to 1,600 cycles. 15" diameter.
PRICE: $69.50

ALTEC 414A BASS SPEAKER is the 12" equivalent of the 803B. 30-3,000 cycle range.
PRICE: $54.00

ALTEC 402B BASS SPEAKER is a compact 8" "woofer" with 40-10,000 cycle range.
PRICE: $19.50

ALTEC HIGH FREQUENCY SPEAKER COMPONENTS

ALTEC 804A DRIVER provides high frequency reproduction beyond the range of human hearing (to 22,000 cycles). Must be used with Altec sectoral horns and proper dividing network, see chart.
PRICE: $63.00



ALTEC 511B SECTORAL HORN mounts on 804A Driver to provide 500-22,000 cycle frequency range.
PRICE: $39.00

ALTEC 811B SECTORAL HORN provides 800-22,000 cycle frequency range when used with 804A Driver.
PRICE: $30.00

ALTEC HIGH FREQUENCY SPEAKERS

ALTEC 2000B SPEAKER supplies frequency range 1,500 to 18,000 cycles. Includes built-in crossover network.
PRICE: $15.00

ALTEC 3000B SPEAKER combines a driver element and fiberglass sectoral horn in one compact package that delivers 3,000 to 22,000 cycle frequency range.
PRICE: $42.00 not including network

ALTEC SELF-CONTAINED TWO-WAY SPEAKER SYSTEMS

ALTEC 605A "DUPLEX" SPEAKER is famous as the finest single-frame reproducer in the world. Contains two mechanically and electrically independent speakers within a single 15" frame. Features remarkable frequency range from 20 to 22,000 cycles.
PRICE: $177.00 including network

Other Altec "Duplex" Speakers: 601C "Duplex", 12" . . . $120.00
602C "Duplex", 15" . . . $143.00

YOUR GUIDE TO 12 CUSTOM ALTEC TWO-WAY SPEAKER COMPONENT SYSTEMS

	ALTEC LOW FREQUENCY SPEAKERS	ALTEC HIGH FREQUENCY SPEAKERS	DIVIDING NETWORK	SYSTEM CROSSOVER FREQUENCY	TOTAL SYSTEM PRICE
1.	402B	2000B	Built-in	2,000 cycles	$ 34.50
2.	2-402B	3000B	N-3000E ($22.50)	3,000 cycles	$103.50
3.	414A	3000B	N-3000E ($22.50)	3,000 cycles	$118.50
4.	601C	DUPLEX	Included	3,000 cycles	$120.00
5.	602C	DUPLEX	Included	3,000 cycles	$143.00
6.	605A	DUPLEX	Included	1,600 cycles	$177.00
7.	414A	804A w/811B	N-800E ($46.50)	800 cycles	$193.50
8.	803B	804A w/811B	N-800E ($46.50)	800 cycles	$209.00
9.	803B	804A w/511B	N-500D ($60.00)	500 cycles	$231.50
10.	2-414A	804A w/811B	N-800E ($46.50)	800 cycles	$247.50
11.	2-803B	804A w/811B	N-800E ($46.50)	800 cycles	$278.50
12.	2-803B	804A w/511B	N-500D ($60.00)	500 cycles	$301.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

FREE! HOW TO BUILD YOUR OWN ENCLOSURES, COMPLETE WITH PLANS AND IDEAS... SEND COUPON RIGHT AWAY!

ALTEC LANSING CORPORATION

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A Subsidiary of Ling-Temco-Vought, Inc.
1515 S. Manchester Ave., Anaheim, Calif. New York - Los Angeles

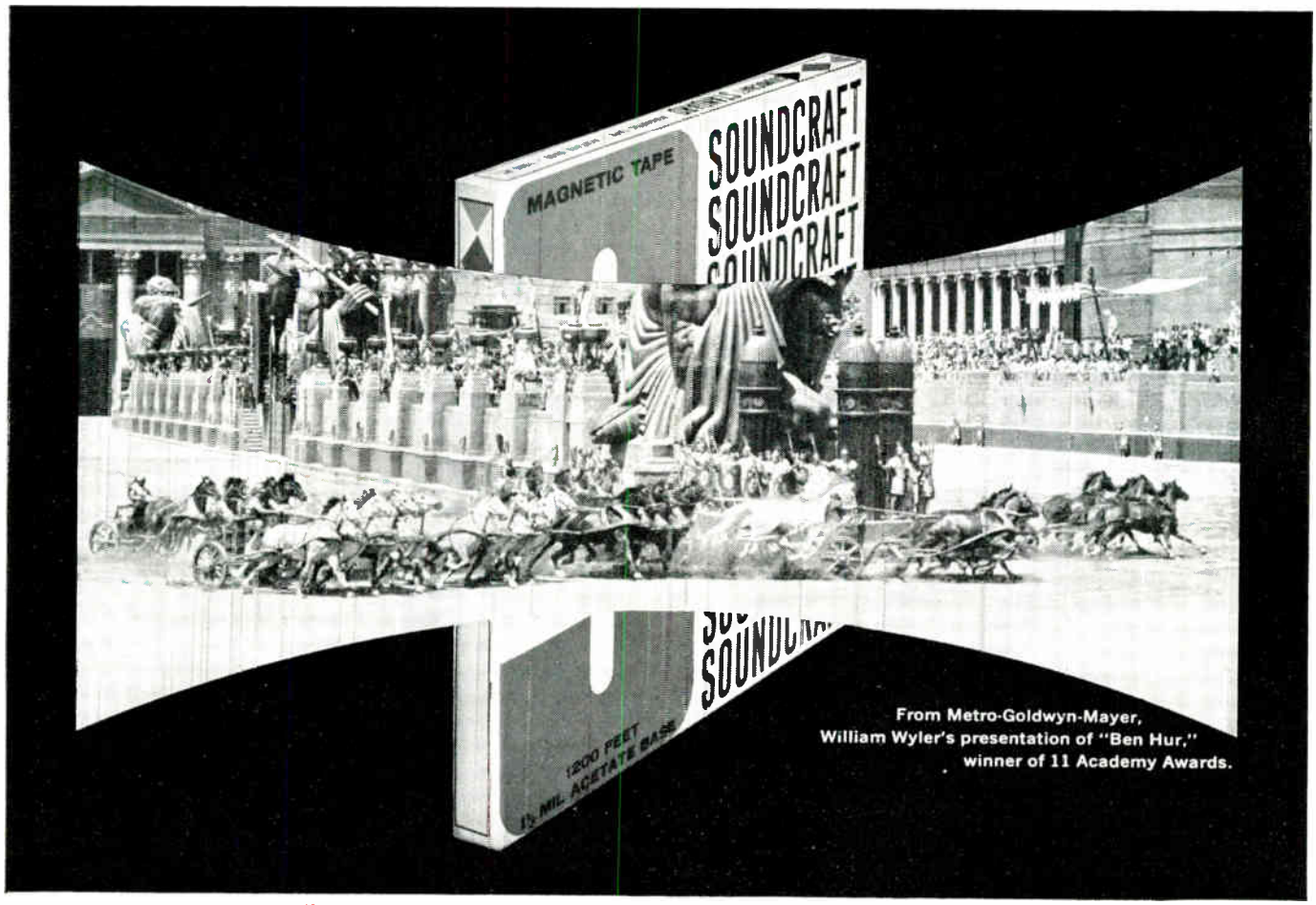
Please rush your FREE brochure "Loudspeaker Enclosures — Their Design and Use" *and complete new Altec Stereo Catalog!*

NAME _____
ADDRESS _____
CITY _____ STATE _____

HI

CIRCLE 3 ON READER-SERVICE CARD

IF YOU BELIEVE THAT ALL RECORDING TAPES ARE THE SAME... READ THESE FACTS ABOUT SOUNDCRAFT TAPES!



IT'S SOUNDCRAFT IN THE GREAT MOTION PICTURES

The course of the motion picture industry was revolutionized by the application of magnetic stripes on films! This was a Soundcraft achievement—the famous Magna-Stripe process which has made possible the brilliant stereo sound tracks of great MGM (Camera 65), Cinemascope and Todd-AO productions. For this contribution, Soundcraft received The Academy Award — the coveted "Oscar" — first and only tape manufacturer ever so honored. Soundcraft achievement in magnetic recording never stops.

SOUNDCRAFT WAS FIRST TO OFFER YOU:

- Mylar® based tapes for longer tape life, longer play.
- Plasticizer-free oxide to prevent chipping or flaking.
- Micropolished mirror-smooth tape surface to preserve the "highs" and minimize recorder head wear.
- FA-4 frequency adjusted formulation to capture the full dynamic range of sounds.

Superior performance is yours to enjoy on every reel of Soundcraft Tape you buy, and at no extra cost. Buy The Best—Buy Soundcraft Tapes!

REEVES SOUNDCRAFT CORP.

Main Office: Great Pasture Road, Danbury, Connecticut
New York: 10 E. 52nd Street ■ Chicago: 28 E. Jackson Blvd.
Los Angeles: 342 North LaBrea ■ Toronto: 700 Weston Road

R-159

®DU PONT T.M.

CIRCLE 33 ON READER-SERVICE CARD

SINGULAR, INDEED

. . . one the alpha, one the omega; both by Westminster—and without both, even the most extensive Stereo library is decidedly lacking.

ELECTRONICS: MUSIC TO THE BALLET. Never available until now, this historic sonic innovation is Remi Gassman's electronic ballet, created without orchestra and danced by the New York City Ballet under the direction of George Balanchine in its 1961 premiere. Unlike anything you have heard before, this is electronic music that goes far beyond the usual limitation of nature sounds and musical instruments. This is the *art* of music emancipated from human limitations . . . lifted to new horizons where the ear hears sounds as never before. Music created by Gassman in collaboration with Oskar Sala in his electronic sound studio.
XWN 18962 (Mono) $4.98—WST 14143 (Stereo) $5.98

TESTING TESTING TESTING: Not a "sampler", but a precise testing tool, containing material not available on any other record. Created by Westminster to provide sound engineers, technicians, and stereophiles a definitive check on stereo equipment and a guide to corrective measures. You can accurately check—and correct—frequency response, separation, dynamic range, channel phrasing, turntable wow and flutter and stylus tracking. Tests include: (1) Frequency tones, to check with frequency response apparatus; (2) Frequency tones cut to the Fletcher-Munson curve, let you detect variations by ear; (3) Musical and non-musical examples, allow you to judge reproduction, check technical facets by ear. Music was conceived and composed for this recording alone. SRX $5.98

COLLECTORS: Send for your catalog of the complete Westminster collection—library for perfectionists the world over. Write Dept S-HEA.

Westminster®

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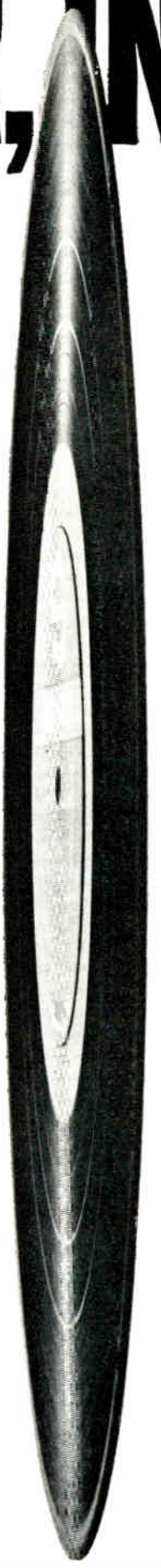
IS THE SELECTIVE LISTENER
WESTMINSTER RECORDING CO., INC.
A SUBSIDIARY OF AM-PAR CORP., 1501 BROADWAY, NEW YORK 36



CIRCLE 42 ON READER-SERVICE CARD

You've waited 10 years for all that's in this picture

For the first time in your life, you see here a complete stereo home entertainment center of perfectly matching components, all by the same maker.

It is what stereophiles have been seeking for 10 years, ever since Bell introduced the world's first stereo amplifier . . . a fully integrated system consisting of the latest models of the famous Bell stereo tape transport, Bell combination stereo amplifier and stereo tuner (on one chassis), and matching Bell 3-way speakers. (Separate Bell stereo amplifiers and stereo tuners are available, if preferred or wanted to match a Bell amplifier or tuner you now own.)

Every one of these components may be had in a choice of two or more models, all in the same styling and surprisingly reasonable in price. This means you can completely plan your ideal music system and where you want to put it, make an immediate start with one or more of the components, and add the other matching components later.

Actually, you need only the components shown above, with second matching speaker, to enjoy every source of stereo with the finest sound reproduction attainable today . . . professional quality playback *and* recording with tape: FM, AM and stereo broadcasts including *multiplex reception with new Bell adapter*, and stereo and monaural records played with your present turntable or any new one you wish to add.

Before you invest further in stereo, have your Bell dealer show you the many advanced features which only an integrated Bell system offers *in entirety*. Or write us direct for complete illustrated catalog.

Bell SOUND DIVISION

Thompson Ramo Wooldridge Inc., 6325 Huntley Road, Columbus 24, Ohio
In Canada: Thompson Products Ltd., St. Catharines, Ontario

CIRCLE 43 ON READER-SERVICE CARD

Wharfedale

COMMANDING NEW SYSTEMS

We are pleased to present the new W40 Achromatic—Wharfedale's remarkable ultra-compact two-speaker system. This is a full range instrument built around a newly developed 8½ inch low frequency driver with an extremely high flux density magnet; and Wharfedale's outstanding 5 inch tweeter. Its size (24" x 12" x 10"), and its unobtrusive, clean, modern design, make W40 the ideal speaker system to fit "anywhere," providing the greatest enjoyment of music in today's modern apartments, the den of a country home, or in larger rooms.

True Wood $79.50, Unfinished $69.50

NEW W40

The inert sand filled panel (exclusive in all Wharfedale systems), damps all vibrations, eliminates false resonances. The speakers perform with the enclosure as a single unit. The full range of sound is exceptionally smooth; transient response in bass and treble is exceptionally clean. A perfectly pure "Achromatic" musical image is achieved without acoustical coloration.

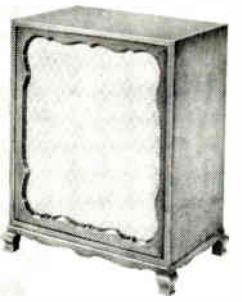
Achromatic speaker systems are available in enclosures skillfully executed in true wood veneers: Oiled Walnut, Polished Walnut, Mahogany. (Provincial Style in Fruitwood, only.) Unfinished utility models in Sanded Birch Hardwood do not have curved molding or dividers.

NEW W60PR

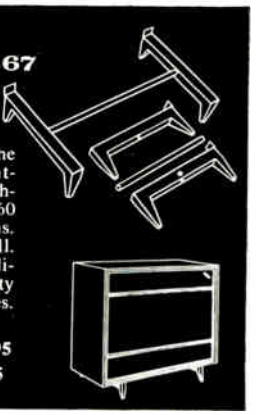
Wharfedale has combined the excellence of W60 and W70 reproduction with handsomely crafted pieces of period furniture. We are sure you will welcome the addition of these authentic Provincial designs in genuine Fruitwood to the Achromatic Series.

$134.50 $189.50

NEW W70PR



NEW B67



The new B67, the Universal Mounting Base—in matching woods—for W60 and W70 systems. Simple to install. An effective addition to the beauty of these enclosures.

Utility Model $8.95
True Wood $9.95

The W60 and the W70 continue to provide the distinguished performance which has won phenomenal acclaim for all the speakers in the Wharfedale Achromatic Series. The decorator designed cabinets will complement modern decor . . . look "at home," anywhere.

W60

True Wood $116.50, Unfinished $101.50

True Wood $164.50, Unfinished $146.50

W70

Mail Coupon Dept. WY-21
British Industries Corp.,
Port Washington, N.Y.

Please send me literature regarding the Wharfedale Achromatic Series.

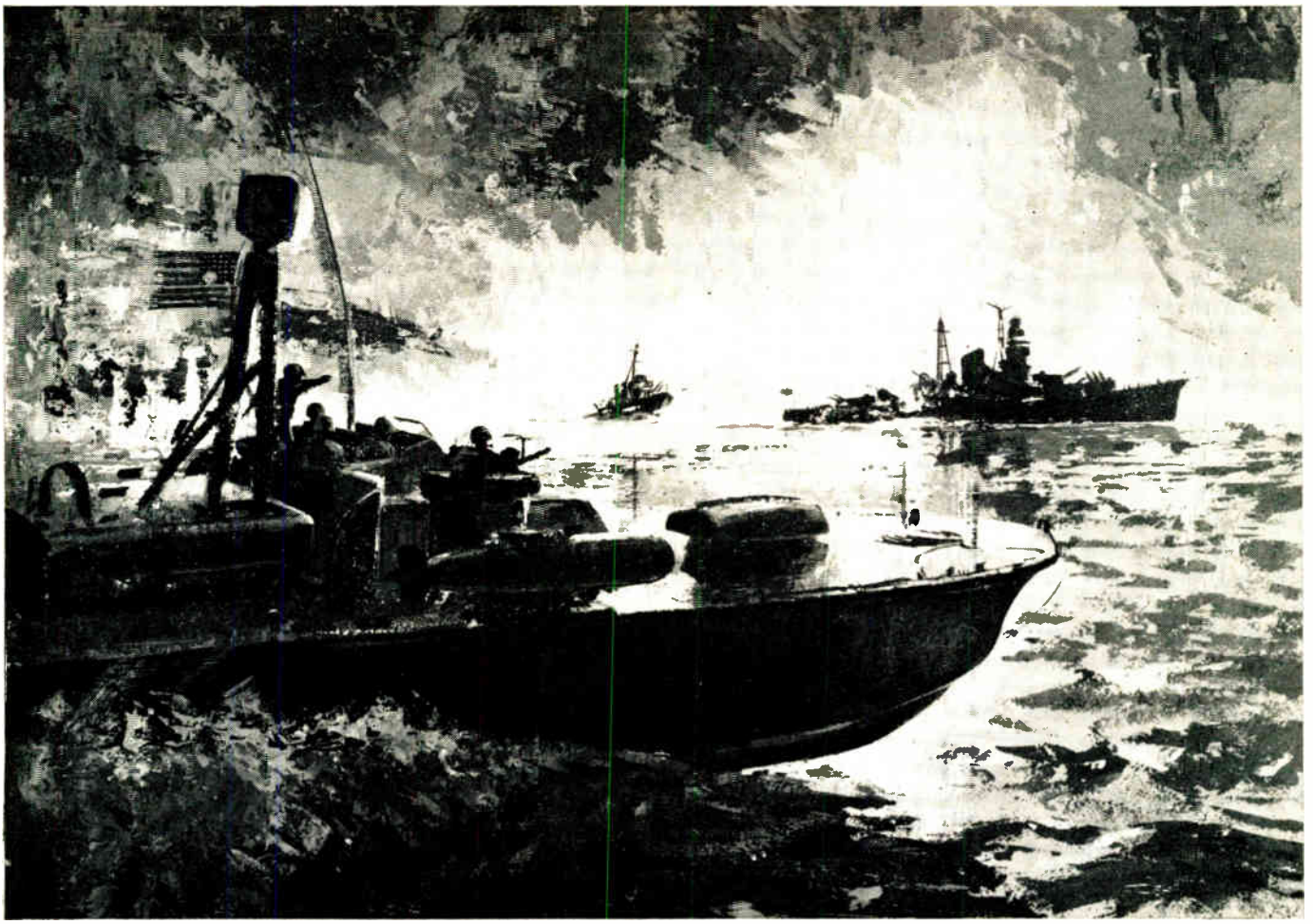
*Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

Wharfedale, a division of British Industries Corp., Port Washington, N.Y.

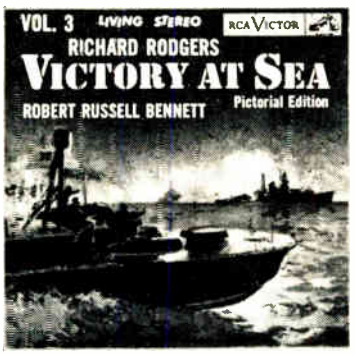
CIRCLE 12 ON READER-SERVICE CARD



Produced in cooperation with the United States Navy

The Most Spectacular Sound Album of All Time!

VOLUME III OF VICTORY AT SEA



Hear the roaring 16- and 8-inch guns from U. S. battleships and heavy cruisers, AA batteries, screaming kami kazes, submarine crash dives, torpedo attacks, all the blistering cacophony of battle. These tumultuous **authentic** sounds of sea warfare add dramatic impact to Richard Rodgers' award-winning TV score. It's an ear-filling display of recording techniques that will put your rig to the test. Now, for the first time on records, are 6 of the most memorable musical episodes from the great TV series plus a "Symphonic Scenario" based on the fundamental themes.

Included in the de luxe package, at no extra cost, is a 16-page book of dramatic naval-action photos of World War II plus notes on all musical sequences. A great recorded memento of historic, courage filled days.

OTHER NEW RCA VICTOR RELEASES YOU'LL WANT TO OWN:

Ravel: Daphnis and Chloe — Munch/Boston Symph. Orch. ● Schubert: "Unfinished" Symphony and Symphony No. 5 — Reiner/Chicago Symph. Orch. ● Hearts in Three-Quarter Time — Fiedler/Boston Pops ● Beethoven: "Emperor" Concerto — Van Cliburn; Reiner/Chicago Symph. Orch. ● The Immortal Victor Herbert — Robert Shaw Chorale and Orch. ● The Sound of Stokowski and Wagner — Stokowski/Symphony of the Air and Chorus ● Puccini: Highlights from "Turandot" — Nilsson, Tebaldi, Bjoerling, Tozzi; Leinsdorf, Cond. ● Wagner: The Flying Dutchman — London, Rysanek, Tozzi, Liebl, Lewis, Elias; Dorati, Cond. ● The Vagabond King — Mario Lanza ● Verdi: Highlights from "La Traviata" — Moffo, Tucker, Merrill

ALL IN LIVING STEREO OR MONAURAL HI-FI.

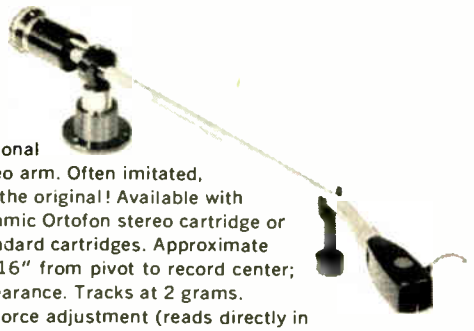
THE WORLD'S GREATEST ARTISTS ARE ON

RCA VICTOR

Trademarks ® RADIO CORPORATION OF AMERICA

CIRCLE 32 ON READER-SERVICE CARD

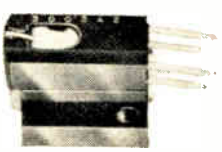
NEW!...for the first time in the U. S.! 3 superlative stereo arms and a cartridge by ORTOFON...world famous Danish makers of studio recording equipment!



FINEST! Professional RMG309, 16" stereo arm. Often imitated, but nothing equals the original! Available with plug-in, electrodynamic Ortofon stereo cartridge or with shell to fit standard cartridges. Approximate dimensions: 12 3/16" from pivot to record center; requires 3" rear clearance. Tracks at 2 grams. Micrometer stylus force adjustment (reads directly in grams). Adjustable height over mounting plate. Statically balanced by counterweight with spring controlled stylus force (no leveling required). Rubber damping between arm and counterweight . . . $59.95 net.

PERFECTION! Ortofon SMG212, 12" stereo arm. Takes Ortofon or any standard stereo cartridge. Tracks at 2 grams. Special arm shape makes turntable leveling unnecessary; turntable may be up to 30° out of level before tracking difficulties arise. Ball bearings on both horizontal and vertical pivots. Adjustable height above mounting plate. Unique counterweight adjustment can be easily and quickly calibrated, without tools or gauges, to read stylus force in grams for any cartridge . . . approximate dimensions: 8⅜" pivot to record center; 3¼" rear clearance (maximum for heaviest cartridges) . . . $29.95 net.

ECONOMICAL! Ortofon SKG212 12" stereo arm. A renowned Ortofon arm with true economy. Takes Ortofon or standard stereo cartridges. Adjustable, user-calibrated counterweight shows stylus force directly in grams (same as on SMG212 above). Approximate dimensions: 8⅜" from pivot to record center; 3¼" rear clearance (maximum for heaviest cartridges). A truly superb performer . . . only $19.95 net.



MIRACULOUS! You'll have to hear it to believe it! New, sealed-into-shell Ortofon electrodynamic stereo cartridge, with built-in transformers, plugs into any Ortofon arm above. Also available without shell for other arms. 2 gram tracking. 20-20,000 cps response. 20-25 db channel separation. Extremely high compliance: 10 x 10^{-6} centimeter per dyne. IM distortion practically immeasurable, even on highest recorded levels. Equivalent mass at stylus point: 1 milligram . . . $49.95 net.

WORLD FAMOUS STUDIO EQUIPMENT **Ortofon**

NEW!...3 new, 8-lb, 12" THORENS turntables now supplement fabulous TD-124!

MATCHLESS TD-124! 11 lb. table with exclusive clutch . . . all four speeds . . . illuminated strobe, with variable speed control (± 3%) . . . completely silent dual-belt drive. . . . Many more exclusive features. $99.75 net. Optional base $10.00.

NEW TD-121! Single-speed version of TD-124 brings you maximum performance with economy . . . standard in 33⅓, can be set for 16, 45 or 78 rpm . . . 8 lb., 12" non-magnetic table. Variable speed control (± 3%) . . . micrometer leveling screws. $80.00 net. Optional base $10.00.

NEW TD-135! Four-speed transcription turntable with integral professional arm . . . ends installation worries . . . assures finest tracking. Variable speed control (± 3%) . . . 8 lb., 12" table . . . precision built motor. $99.75 net. Optional base $6.00.

NEW TD-111! Still more economy with superb Thorens performance! Single-speed, 8 lb., 12" non-magnetic table with precision idler-and-belt-type drive for isolation of motor vibrations. Self-lubricating bearings . . . variable speed control. $60.00 net. Optional base $10.00. 1.e

THORENS FAMOUS HI-FI COMPONENTS

Divisions of ELPA Marketing Industries, New Hyde Park, New York

CIRCLE 40 ON READER-SERVICE CARD

NEW RCA-7868 NOVAR POWER PENTODE OFFERS OUTSTANDING DESIGN ADVANTAGES

With this new tube RCA brings all the advantages of novar design to high-fidelity circuitry.

RCA-7868 is a high-perveance 9-pin novar power pentode for output stages of hi-fi audio amplifiers, phonographs and radio receivers. You'll get up to 44 watts of power output from a pair of them in Class AB_1 push-pull service in audio amplifiers.

RCA-7868 is the first hi-fi tube type in RCA's new novar line of large, all-glass 9-pin receiving tubes. Its cost to you is less than that of any equivalent tube regardless of base configuration.

RCA-7868 has all the advantages of novar design, the *only* all-glass, integral-base receiving tube design to offer:

Larger internal lead diameter—for strong cage support and high thermal conductivity for very effective heat dissipation.

Wider spacing between pins (0.172")—to minimize the possibility of voltage breakdown; hence greater reliability.

Pin length of 0.335"—for firm retention of tube in socket.

Pin circle diameter of 0.687"—large enough to permit use of both T9 and T12 envelopes.

RCA Dark Heater—found exclusively in RCA receiving tubes... additional assurance of reliability.

RCA 7868 has two base-pin connections each for grids #1 and 2; special radiator on siderods of grid #2 assures cooler operation.

Take full advantage of this major contribution to audio technology. See your RCA Field Representative for full details...or write: Commercial Engineering, Section K-107-DE RCA Electron Tube Division, Harrison, N. J.

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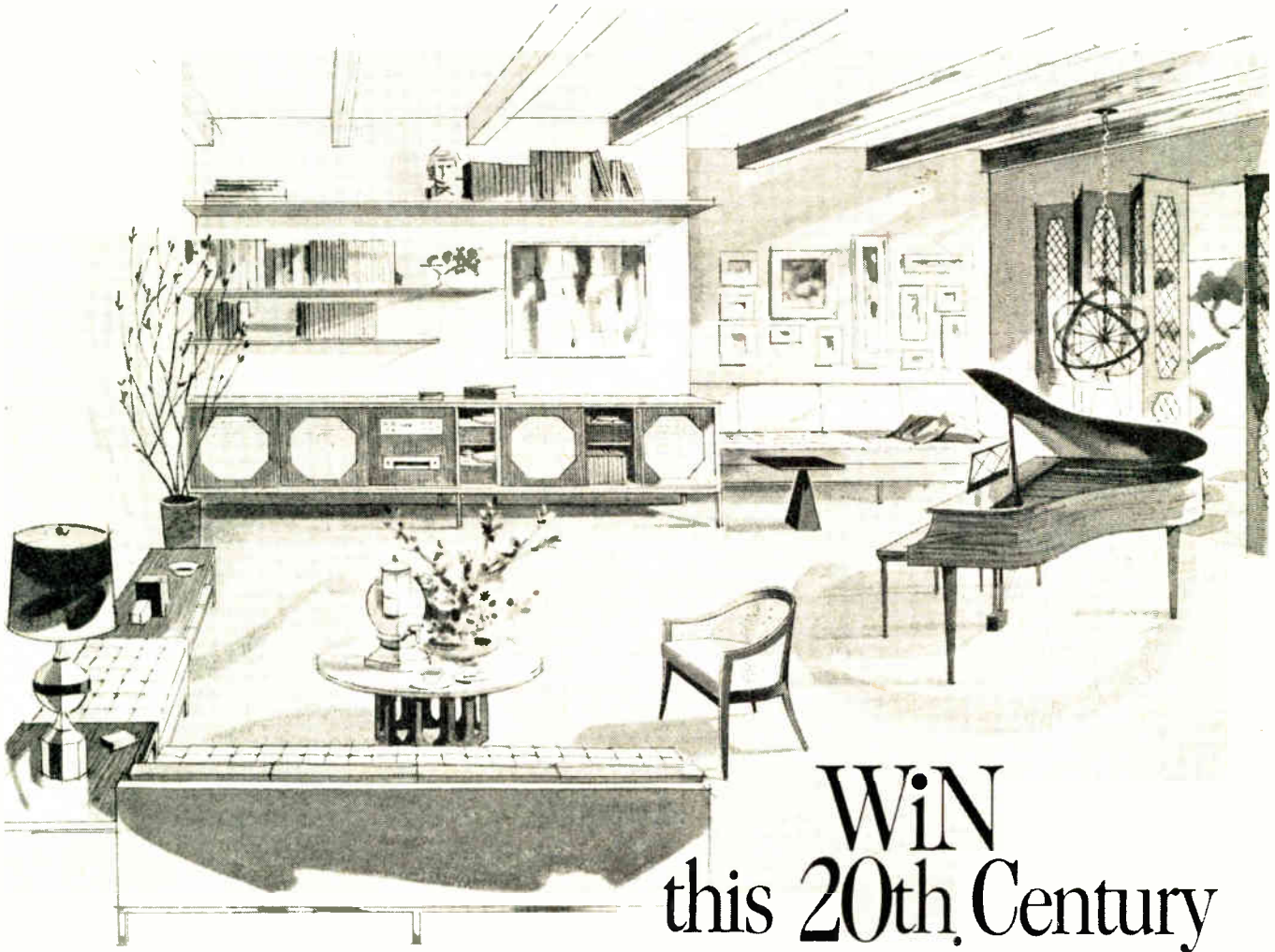

WiN this 20th Century music room

designed by Marion Heuer...
furniture by Harvey Probber... superb hi-fi/stereo with source of sound by Shure... piano by Baldwin... carpeting by V'Soske

. . . fabrics by Boris Kroll, hi-fi/stereo amplifiers and preamplifier by Marantz, automatic turntable by Garrard, turntable by Thorens, speaker systems by Acoustic Research, FM/AM Multiplex tuner by Sherwood, tape player by Ampex, Stereo Dynetic Phono Cartridge and Tone Arm by Shure, PLUS $5,000 cash to add a new room to your home or remodel an existing room from original plans by internationally renowned interior designer Marion Heuer, A.I.D.

A veritable plethora of prizes!

All this to introduce you to the breathtaking sound (and elegant appearance) inherent to modern component stereo in general, and the new Shure M33 and M77 Stereo Dynetic Phono Cartridges in particular.

No purchase is required; you simply listen to a Shure cartridge demonstration at your hi-fi dealer's showroom and describe your reaction to its singular sound re-creation qualities (in 25 words or less). If your statement wins (we don't expect an overabundance of entries, so your chances are rather good), you can begin building your music room. Should the winner have purchased a Shure cartridge as a result of the demonstration (a consummation devoutly to be wished), a magnificent $1,000 RCA Victor stereo record library will also be supplied, as are all other awards, by Shure Brothers, Inc., 222 Hartrey Avenue, Evanston, Illinois. Details and entry blanks at Hi Fi dealers only. Contest ends February 28th, 1962.

announcing the new
SHURE *Stereo Dynetic*®

M33 and M77 SERIES HIGH FIDELITY PHONOGRAPH CARTRIDGES

Outstanding achievement in superior sound re-creation. Ultra-light tracking pressure, rugged, high compliance, easy-to-replace stylus; highest fidelity response; specially shielded against hum. M33 for 1-3 gm. tracking, $36.50; M77 for 3-5 gm. tracking, $27.50.

CIRCLE 37 ON READER-SERVICE CARD

FM MULTIPLEX STEREO

TRANSISTORIZED 4-TRACK STEREO TAPE DECK RP100
Completely assembled, wired and tested. **$399.95**

Semi-kit includes a completely assembled and tested transport, electronics in kit form. **$299.95**

Luggage-type Carrying Case—$29.95
Standard 19-inch Rack Mount—$9.95

A top quality stereo tape recorder permits you to build a stereo tape library of your favorite music at low cost. As your musical interests change, you may record the new music that interests you at no additional cost.

Perfected 4-track stereo/mono recording, 4 & 2 track playback. True high fidelity transistor electronics, individual for record & playback, plus separate record & playback heads permitting off-the-tape monitor. 2 recording level meters, mixing, mic & level controls, switched sound-on-sound recording. Electrodynamically braked supply & take-up reel motors; hysteresis synchronous capstan motor. Individual solenoids for pinch-roller & tape lifters. All-electric, interlocked push-button transport control & interlocked safety "record" pushbutton. Precision tape guidance & sweep loading — no pressure pads. No slurring or tape bounce problems. Digital turns counter. Vertical or horizontal mounting. Modular plug-in construction. An original, exclusive EICO product designed & manufactured in U.S.A. (patents pending).

FM-AM STEREO TUNER ST96
Kit $89.95 **Wired $129.95**
Includes Metal Cover and FET

70-WATT INTEGRATED STEREO AMPLIFIER ST70
Kit $94.95 Includes Metal Cover Wired $149.95
40-WATT INTEGRATED STEREO AMPLIFIER ST40
Kit $79.95 Includes Metal Cover Wired $129.95

ST96: FM and AM stereo tuners on one compact chassis. Easy-to-assemble: prewired, prealigned RF and IF stages for AM and FM. Exclusive precision prewired EYETRONIC® tuning on both AM and FM.

FM TUNER: Switched AFC (Automatic Frequency Control). Sensitivity: 1.5uv for 20db quieting. Frequency Response: 20-15,000 cps ±1db. Multiplex-ready: Regular and MX outputs built in.

AM TUNER: Switched "wide" and "narrow" bandpass. High Q filter eliminates 10 kc whistle. Sensitivity: 3uv for 1.0V output at 20db S/N ratio. Frequency Response: 20-9,000 cps ("wide"), 20-4,500 cps ("narrow").

BOTH AMPLIFIERS: Complete stereo centers plus two excellent power amplifiers. Accept, control, and amplify signals from any stereo or mono source.

ST70: Cathode-coupled phase inverter circuitry preceded by a direct-coupled voltage amplifier. Harmonic Distortion: less than 1% from 25-20,000 cps within 1 db of 70 watts. Frequency Response: ±½db 10-50,000 cps.

ST40: Highly stable Williamson-type power amplifiers. Harmonic Distortion: less than 1% from 40-20,000 cps within 1 db of 40 watts. Frequency Response: ±½ db 12-25,000 cps.

(Patent Pending)

NEW FM MULTIPLEX AUTODAPTOR MX99
Kit $39.95
Wired $64.95
An original EICO contribution to the art of FM Multiplex reception.

Designed for all EICO FM equipment (HFT90, HFT92, ST96) and any other component quality, wide-band FM tuners having multiplex outputs, the new MX99 incorporates the best features of both matrixing and sampling techniques. It is free of phase-distorting filters and provides the required, or better-than-required, suppression of all spurious signals including SCA (67kc) background music carrier, reinserted 38kc sub-carrier, 19kc pilot carrier and all harmonics thereof. This is very important for high quality tape recording, where spurious signals can beat against the tape recorder bias oscillator and result in audible spurious tones in a recording. This adaptor will synchronize with any usable output from the FM tuner and will demodulate without significant distortion tuner outputs as high as 7 volts peak-to-peak (2.5 volts RMS).

The MX99 is self-powered, provides entirely automatic stereo/mono operation and includes low impedance cathode follower outputs to permit long lines. An indicator lamp turns on when the station selected is broadcasting multiplex stereo. A separation of 35db between channels is typical across the entire audio spectrum. An over-all gain of unity is provided from input to output on both stereo and mono.

EICO, 3300 N. Blvd., L.I.C. 1, N. Y. SY-62
☐ Send free 32-page catalog & dealer's name
☐ Send new 36-page **Guidebook to HI-FI** for which I enclose 25¢ for postage & handling.

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Over 2 MILLION EICO instruments in use.
Most EICO Dealers offer budget terms.
Add 5% in West.

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EICO®

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CIRCLE 18 ON READER-SERVICE CARD

At last! A quick, simple, positive way to check speaker phasing...

NEW RCA SOUND-POWERED PHASE CHECKER

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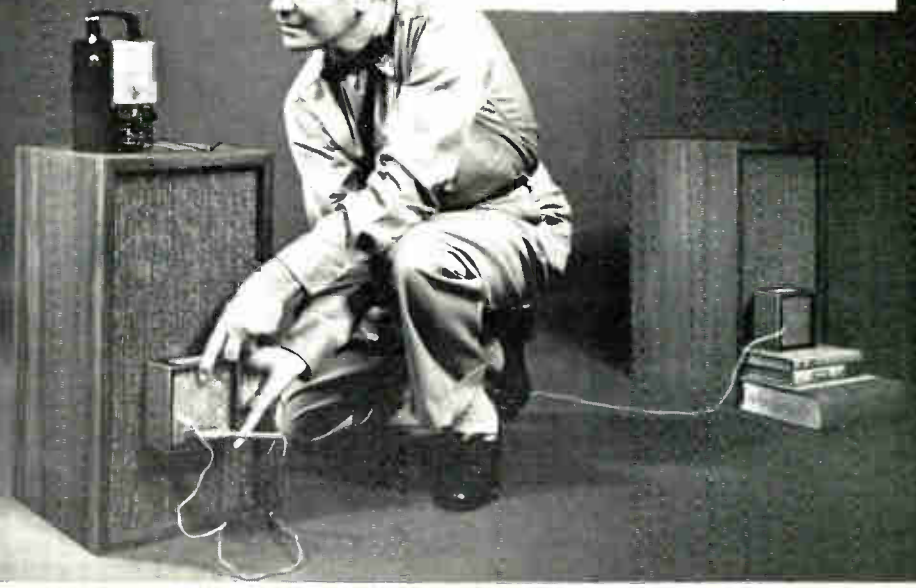

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MOSAIC OF MUSIC

Those who pretend to scoff at moves toward ever higher fidelity in home sound reproduction are fond of posing this question—"Who wants the Boston Symphony Orchestra in the living room?" To our way of thinking, it is significant that the question can be raised at all. In pre-stereo and pre-high fidelity days, one would hardly think true concert hall realism possible at home. It was almost beyond imagination. Today, with stereo's help, a home music system easily approximates—indeed, in the minds of some, it surpasses—what we might hear at Carnegie or The Academy of Music.

In the year ahead, stereo reproduction will be more accessible than ever through stereo-FM (multiplex) broadcasting. And tape recordists can easily make home-grown, full-dimensional recordings with any one of a wide variety of new stereo-equipped tape recorders.

If stereo has brought new pleasures to music listeners, it has also brought a mild degree of complexity to the organization of sound equipment in the home. The placement of speakers for best effect, the integration of a tape player or recorder into the total system, the choice of new, highly refined components—all these and more are important to the creation of a higher level of listening enjoyment. This journal has a distinct major purpose: to define and simplify these complexities. In so doing, we aim at bringing to an ever widening audience the joys of what one astute listener calls a mosaic of sound along the wall of the listening room.

Who wants the Boston Symphony Orchestra in the living room? We do. And we hope that you do also.

MULTIPLEX
IN THE MARKETPLACE

For the person who wants the best in stereo-FM, multiplex can be a many-faceted thing. Herewith, a number of considerations for the shopper.

By Joseph Marshall

On April 17, 1961 the Federal Communications Commission authorized a system of broadcasting called "multiplexing"—an electronic technique which permits an FM station to transmit the two channels of a stereophonic program—and on June 1, WGFM in Schenectady and WEFM in Chicago sent out the first stereo programs by this new method. Thus began a new era in broadcasting which is expected to be as revolutionary for radio as the stereo disc was for record reproduction. By 1962 multiplex stereo broadcasts will be available to listeners equipped with suitable receivers in most of the great metropolitan centers. Recent reports indicate that within a year about twenty per cent of this country's FM stations will be broadcasting a goodly proportion of their programs by this means, most FM tuners and receivers will include circuitry for the reception of multiplex stereo, and listening to radio programs in stereo will be commonplace.

Like all revolutions, this one will bring its share of problems—to broadcasters, to designers and manufacturers of receiving equipment, and to the listener and the recording industry. Fortunately, although one cannot foresee all the problems and all the solutions, at this point it appears that adaptation to stereocasting will be far simpler, less confusing, and less costly than the change to stereo discs.

To begin with, the listener unequipped for stereo reception has no problem at all—he will be able to receive all monophonic and stereo FM programs on his present tuner, although he will hear them monophonically only. Monophonic reception will simply include the content of *both* channels. This is a great improvement over the simulcast method of stereo broadcasting whereby one channel is transmitted over an AM station and the other over an FM station, and the listener hears but one channel. In other words, the approved system is completely *compatible* for both stereo equipment and monophonic equipment. Indeed, this compatibility raises most of the problems.

Transmitting two programs over one transmitter is neither difficult nor new. In military and commercial communication networks several independ-

Top to bottom: The Fisher FM-200-B is a complete FM tuner with multiplex built in ($299.50). Earlier Fisher models are multiplex-adaptable with the MPX-100 directly beneath the tuner ($109.50). Both have Fisher's Stereo Beacon which lights signal and automatically switches on stereo-FM programs. The Sherwood S-8000, with its array of controls, is an FM-multiplex receiver, powered with a pair of 32-watt amplifiers ($299.50). Sherwood's S3MX multiplex adapter ($69.50) has its own power supply.

ent programs are broadcast simultaneously on a single transmission. Many FM stations have been broadcasting two programs for years—one heard on home FM receivers and the other heard only on special receivers leased or sold to stores, restaurants, doctors' offices, etc. This is accomplished, so to speak, by hitching one or more subcarriers to the main transmitter carrier—rather like hauling one or more loaded motor trucks on a railroad flat car. Placing the right channel of a stereo program on one carrier and the left on a subcarrier would present few problems, but it would have one definite drawback: those who own a normal receiver would hear only one of the channels being broadcast and would be cheated of a significant portion of the program.

To achieve compatibility, the two channels of a stereo program are simultaneously added and subtracted by a process called "matrixing" to provide one signal which is the sum of both channels (A+B) and another which is the difference between the two channels (A–B). Such electronic addition and subtraction is accomplished simply by exploiting the fact that two in-phase alternating currents add, while two out-of-phase currents subtract. The sum, or A+B signal, is used to modulate the main transmitter carrier, while the difference, or A–B signal, is used to modulate a subcarrier. The nonstereo receiver detects on the main carrier and therefore delivers at its output only the A+B signal: i.e., monophonic content only. The stereo tuner, however, has additional elements, in which both the main carrier and subcarrier are detected and unscrambled into the original stereo channels by adding and subtracting them once more. In algebra you will recall that (A+B) + (A–B) equals 2A; while (A+B) – (A–B) equals 2B. By using the correct circuitry for working out this algebra, the stereo tuner re-creates the original stereo program.

It is very important to note, however, that this process of electronic addition and subtraction is truly arithmetical—in the sense that, for example, 4+2 always equals 6, and 4–2 equals 2—only when the two signals are exactly in phase or exactly 180 degrees out of phase. If the phase differences are not exactly zero or 180 degrees, it is quite possible in electronic mathematics for 4+2 to come out 5, and 4–2 to come out 3, or some other incorrect number. In terms of our stereo signal, it is possible, if phase relationships are changed, that the A+B signal intended for the monophonic listener will have less than the sum of the information in both channels; and it is equally possible that the stereo listener, instead of getting the original A and B channels, will get odd mixtures of both with impaired stereo effect and high distortion.

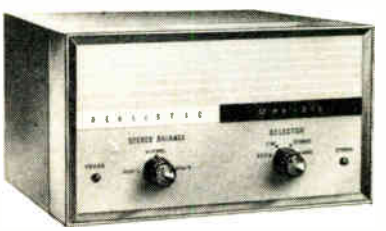
In the Zenith-GE system approved by the FCC the need for maintaining proper phasing is extremely necessary because the complicated mixture of modulation methods results in *interleaving* the two carriers. In effect, the A+B carrier and the A–B carrier are alternately switched in and out of the transmission at a rate of 38,000 times a second—at any given instant only one carrier is being transmitted. This procedure makes it possible to employ full transmitter power for each carrier, whereas if both were broadcast simultaneously, transmitter power would have to be divided between them and each would suffer loss in signal strength. This interleaving, however, also depends very largely on phase relationships. If the phase relationships are disturbed, there will be a mixing of the two carriers in the interleaving process with unpleasant effects similar to those that result from errors in matrixing. It is therefore vital in multiplex stereocasting and reception to maintain the original phase relationships fairly rigidly. This is, of course, much easier said than done and most of the problems of multiplexing are related to unwanted changes in phase.

For example, some stereo recordings do not maintain precise phase relationships between channels. Most of today's stereo discs are first recorded on three independent channels and then pieced or "edited" from dozens or even scores of short "takes." It is not easy when cutting and splicing these "takes" to make sure that the phase relationships between the two channels are exactly those that existed originally. Most recording engineers have simply disregarded phase relationships in editing. Although such phase differences certainly lessen stereo effect even in home playback of stereo recordings, they will have more serious consequences in stereocasting. Presumably, record manufacturers will henceforth pay more attention to maintaining phase relationships and there will be an added benefit from stereocasting in the form of better stereo records for everybody.

The problems of broadcasters need not concern us further. While conversion of stations to stereocasting will be somewhat delayed because of the very high quality of the equipment needed—which takes time both to design and manufacture—we can assume happy solutions will be forthcoming.

Of particular interest to the listener will be the design of stereo tuners. The quality of tuners will be even more important for stereo than it has been for monophonic reception. Good FM stereo will not come cheap. To be sure, it will be possible to obtain some degree of stereo effect by simple and inexpensive means, and mass-produced "stereo hi-fi" radios will undoubtedly become available for as little as $39.95. There will also be stereo multiplex adapters (or converters) for present FM radios and tuners, using one or two tubes, quite possibly for as little as $19.95. Their performance will be on the same level as that of the $39.95 stereo hi-fi's. Those of us interested in obtaining the most faithful reproduc-

Top to bottom: H. H. Scott also has an FM tuner with built-in multiplex, the Model 350. The unit directly below is a complete AM-FM stereo receiver Model 399 ($399.95) adaptable to stereo-FM with the addition of the 335 adapter directly beneath it ($99.95). The 335 converts any H. H. Scott wideband tuner to multiplex. The two units at bottom are Realistic's STA-7 stereo FM multiplex receiver and MPX-215 Multiplex Adapter ($39.95 wired; $29.95, kit). The receiver is powered at 12 watts per channel.



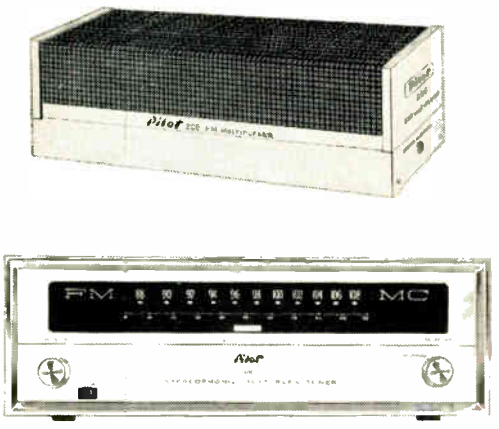
tion of stereo broadcasts must, however, be prepared to pay a minimum of 50 per cent more for a good stereo tuner than we now pay for a monophonic one, and up to $100 for a stereo converter or adapter. The stereo converter, whether it is an independent unit or an integral part of the tuner, has a big job to do and the complicated method of multiplex modulation requires complex circuitry and great precision to do the job well. Simpler circuitry will no doubt eventually be developed, and it is quite probable that within a few years stereo tuners will cost little, if anything, more than present monophonic tuners. Meanwhile, for those who already have a stereo high-fidelity system, the cost of an adapter or stereo tuner, and in some instances a better antenna installation, is the only expenditure that has to be made to enjoy stereo broadcasts.

At present there are two different ways of unscrambling the multiplex stereo signal. One uses the matrixing method of addition and subtraction mentioned earlier. The other, favored by Scott, inverts the interleaving process by alternately switching the received signal between two detectors—one responds to the A channel, the other responds to the B channel, in precise synchronization with the interleaving at the transmitter. Either method involves several stages of processing the signal, precise maintenance of phase relationships, and synchronization with the transmitter. Therefore, in both cases the quality of reproduction will depend largely on the quality of the receiving equipment. Although proponents of each system tout its advantages, it appears that, at this moment at least, either can yield satisfactory results if carefully designed.

Some other aspects of receiver design will assume a greater importance for stereo. The multiplexed stereo signal is broader than the monophonic signal and requires a wider bandwidth in the receiver. If the bandwidth is too narrow, there will be a shift in phasing with resultant distortion and inferior stereo separation. Theoretically, the monophonic FM signal demands a bandwidth of 240 kc for lowest distortion. Theoretically, distortionless multiplex reception calls for a bandwidth of around 270 kc. Most of today's tuners have a bandwidth ranging between 150 and 225 at 3 or 6 db down. They provide satisfactory reception on most signals, however, because in FM reception the effective bandwidth of a receiver is much wider for a strong signal than for a weak signal. Thus the tuner with a 150-kc bandwidth may offer well over 240 kc of bandwidth to a very strong local station. In locations where the signal strength is very high such a tuner may even provide satisfactory reception of multiplex signals.

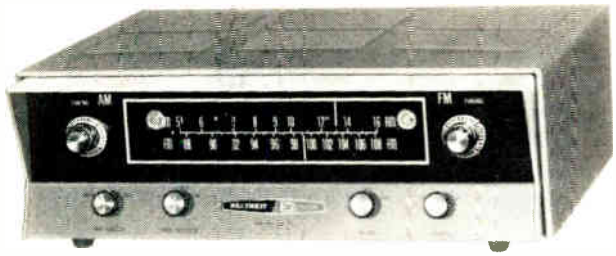
The weak signal, however, faces the narrowest portion of the receiver bandwidth. Hence relatively narrow bandwidth results in distortion and degraded stereo separation on weak signals—a situation especially troublesome in areas where the field strength of stations is low. This state of affairs is further compounded by the fact that the field strength of the A-B portion of the FM signal, which contains the stereo information, is considerably lower than that of the main carrier.

Consequently, the A-B component will face a narrower bandwidth than the main carrier with the A+B information. In effect, the range of a station will be only two-thirds as great for the stereo broadcast as it now is for a monophonic broadcast. The main carriers of a multiplex transmission will also be slightly weaker—about 90 per cent of the strength of the same station broadcasting a monophonic program. Therefore, for good stereo reception in weak signal areas, tuner bandwidth needs to be wider than for acceptable reception of present monophonic signals. (It should be noted however, that if present tuner bandwidth is wide enough to provide good reception of monophonic



Top: Pilot's Model 200 FM Multiplexer ($79.95) and (below) Model 380 multiplex tuner ($169.50).

Top: Lafayette's AM-FM receiver LA-225 ($174.95). TEC's FM tuner (bottom) has multiplex built in.



Top to bottom: Monarch's ST-640 stereo tuner has provision for multiplex. Leak's "Trough Line II" FM tuner ($149.00) is multiplex-adaptable. Heathkit's AJ-11 AM/FM tuner is budget-priced in kit form at $69.95 and has a multiplex output jack.

Top to bottom: DeWald's P-400 multiplex adapter is designed for wide and medium band tuners. Their Model R 1104 has multiplex built in. McIntosh's MR-66 AM/FM tuner with multiplex built in is a de luxe unit with a $325.00 price tag.

signals, it will provide just about as good *monophonic* reception of multiplex transmissions.)

While we can expect future tuners to have wider bandwidths, fortunately many current tuners have a bandwidth wide enough to provide acceptable stereo reception and therefore are worth converting with an adapter. Since multiplex stereocasting has been expected for some years now, receiver bandwidths have been widened in anticipation. Most high quality tuners introduced during the past year have bandwidths of 200 kc or better. Because a wider bandwidth is difficult to achieve and to maintain it is quite probable that Dynamic Sideband Regulation or DSR, now used in Knight and the latest Sherwood tuners, will be more widely employed. By compressing the deviation, DSR makes it possible to squeeze a wide-band signal without deformation through a channel too narrow for it.

Wide bandwidth is important for stereo reception not only in the radio frequency portion of the tuner but also in the detector and audio portions. The monophonic tuner deals only with frequencies within the standard audio band (between 20 and 15,000 cycles). The multiplex stereo tuner, however, must handle frequencies all the way out to 53,000 cycles. Any slope in the high end will result in phase shifts which will degrade the separation. It is calculated that for good separation of the two stereo channels frequency response of the tuner must be essentially flat between 50 and 53,000 cycles and the phase shift must not exceed 3 degrees. Up to now a tolerance of 1 db has been permissible in frequency response, and phase shift has received little, if any, consideration. Wide-band detectors have a decided advantage for stereo not only because their response is flatter but also because they will make tuning less critical. For, to make sure that phase shifts are minimized, stereo tuners will have to be tuned more carefully. The requirement for flat response, free of phase shifts, is the factor

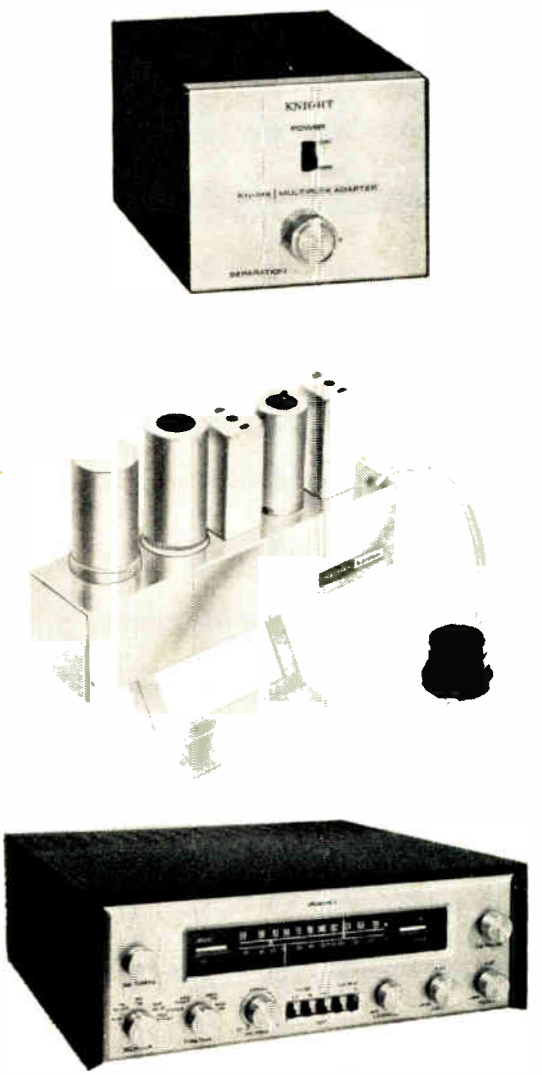
that will make conversion of some present tuners difficult or critical. The connection of the adapter to the present tuner has to be made at a point where the response is flattest, and the network used to connect adapter to tuner will have to be carefully matched. Even the length of shielded cable from adapter to tuner may have to be rigidly controlled to maintain a flat response. All manufacturers, of course, design their adapters to match their tuners. When buying an adapter, the safe thing is to buy the adapter made specifically for the tuner. Some adapters may be usable with tuners of other makes *if* modifications either in the tuner or the adapter are made, but this is a job for a technician who knows exactly what he is doing.

In view of the fact that the signal strength of the stereo portion of multiplex transmissions is lower, receiver sensitivity will be more important than ever. In far fringe areas, where currently FM stations are barely receivable with the most sensitive tuners and high gain antennas, stereo reception may not be possible at all, though monophonic reception of stereo programs may be satisfactory. Higher sensitivity will be needed in all but the primary area of an FM station's transmitting range, and even here it may be necessary to upgrade performance by installing better antennas.

Fortunately, with current tubes and circuitry it is possible to approach very closely the theoretical limits of practical sensitivity. We now have at least a half dozen tuners with IHFM sensitivity of 2 microvolts or better, and two or three with sensitivities close to 1 microvolt. Actually, like the ability of many current passenger cars to travel at speeds upward of 120 mph, such sensitivity may be superfluous for high-fidelity reception. Generally speaking, the weakest signal capable of providing high-fidelity reception will have an average value of around 5 microvolts. Weaker signals fade into the noise too often even on the most sensitive tuners. Some tuners with sensitivities of 4 microvolts will provide as complete quieting and equally low distortion of the 5-microvolt signal. Hence, the 1- or 2-microvolt receiver, though it may make possible the logging of more weak stations, may not actually bring in any more stations with true high-fidelity quality. Sensitivity, in fact, may be a poor bargain for stereo reception if it is obtained by narrowing the bandwidth; even if it does improve monophonic reception, it may give worse reception of stereo than a less sensitive tuner with wider bandwidth.

Clearly, multiplex stereo is going to complicate the process of designing, producing, and, of course, choosing a tuner. Present standards of rating sensitivity will not necessarily give an adequate indication of performance with stereo signals. It is very likely that new standards, including one of sensitivity with multiplex signals, will be developed and adapted. Meanwhile, in choosing a multiplex stereo tuner, the safest criterion will be actual performance with available multiplex signals in a given locality. Some measure of probable performance can be obtained from the rating and specifications: look for the best combination of IHFM sensitivity, bandwidth of 200 kc or better (with or without DSR), steep limiting on 5-microvolt signals, and wide-band detectors. Tuners with built-in circuitry for multiplex reception are already reaching the market, and practically all 1962 models will be of this type.

The immediate problem for those who already have an investment in a good FM tuner is whether to convert it with an adapter or to buy a new tuner with integral facilities for multiplex reception. Though any tuner can be converted, not all will



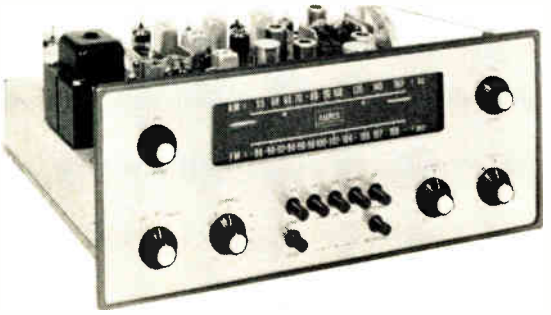
Top to bottom: Knight's self-powered multiplex adapter ($44.50), Harman-Kardon's MX-600 adapter for building into existing units ($49.95), and Grommes AM/FM-multiplex receiver.

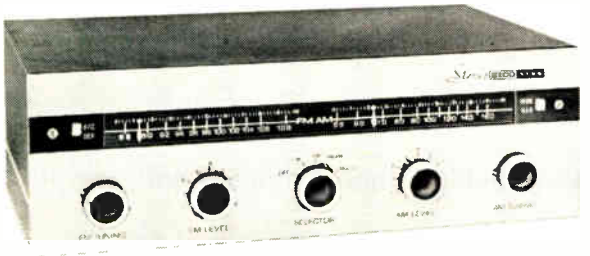
Clockwise from top: EICO's MX99 multiplex adapter ($39.95, kit; $64.95, wired), Karg's crystal-controlled XT-1A/MX tuner ($274.50), Bogen's RP40A AM/FM-multiplex receiver ($399.95), and the Dynatuner with provision for a multiplex adapter ($79.95, kit: $119.95, wired).

provide satisfactory results. The problem is simplest in the local or primary area where the signal strength of a station is high. Since the effective bandwidth of any FM tuner is wider for strong signals than for weak signals, even a tuner with a relatively narrow bandwidth may provide acceptable reception where signals are strong enough to provide complete saturation of the limiters. Here is a rough rule of thumb: if in your location the stations produce a very wide swing on the tuning meter or indicator of your tuner and are heard without excessive distortion, you have fair assurance that the addition of an adapter will give good results.

In areas where signal strengths are weaker, the bandwidth of your present tuner is the key to your decision. Any tuner with a bandwidth of 175 to 225 kc at 3 or 6 db down is worth converting. The bandwidth is given in the specifications. When no specs are available, there are some other clues to bandwidth. Generally speaking, tuners with high IHFM sensitivity (5 microvolts or better) have wide bandwidths. Distortion is a large factor in IHFM sensitivity measurement. Low distortion presumes a wide bandwidth, and therefore high IHFM sensitivity usually implies a wide bandwidth. In any event, high sensitivity will provide greater limiting and therefore a wider effective bandwidth on a given signal. The reception of very weak signals on your present tuner provides a clue to the bandwidth. If very weak signals are receivable without excessive distortion, even though with a good deal of noise, the tuner has wide bandwidth. On the other hand, if weak signals are distorted, even though there is some quieting of noise, the bandwidth is narrow. If even strong stations are distorted, the bandwidth is too narrow to justify conversion even in local areas. This is true even if the stations are guilty of overmodulation. Tuners with wide bandwidths

Top to bottom: Altec Lansing's 707A AM/FM receiver is multiplex adaptable. The Ampex 550 Stereo Center ($275) combines AM/FM, provides multiplex output. EICO's ST96 uses a multiplex adapter ($129.95, wired; $89.95, kit).





and wide-band detectors will receive even overmodulated signals with acceptably low distortion, whereas a tuner which produces distortion with an overmodulated monophonic signal probably will not be able to handle without distortion the wider bandwidth of a multiplex stereo signal—particularly since, in an effort to extend their range, many stations may overmodulate their multiplex broadcasts.

As we have already pointed out, the best way to convert is with the adapter designed specifically for the tuner in question, even if the cost is higher than that of a "universal" adapter. While it is true that practically any adapter can be fitted to practically any tuner, in most cases some internal modifications of tuner or adapter, or both, will be necessary. This may be costly and may not yield as good performance. For those with the necessary skill and ability, the technical press will undoubtedly have articles on various conversions. But the ordinary listener will usually save money and obtain greater assurance of good performance by using adapters designed for his tuner. In most cases, he can install these himself without difficulty.

The antenna will be a far more important factor in multiplex than it has been in mono reception. For one thing, it will offer a partial solution for the problem of lower signal strength. The simplest way to increase the strength of the signal delivered to the tuner is by increasing the initial gain furnished by the antenna. Furthermore, this higher input signal lowers the noise threshold of any receiver, providing greater quieting and, therefore, a far better signal-to-noise ratio with a given signal. Thus, antenna gain can improve the over-all sensitivity and compensate at least partially for the relatively inferior signal-to-noise ratio that may characterize some multiplex stereo signals.

Even when high gain is not needed directional antennas can minimize phase distortion from multipath reception. This may be desirable in cities, as well as in remote areas, because buildings, like mountains and hills, can reflect signals and thus produce multi-path reception. A directional antenna can be oriented to favor the direct signal and attenuate the reflected ones.

Many people have given little attention to the FM antenna, even in fringe areas. There are a number of FM antennas on the market with gains ranging all the way up to 4 or 5 times. Undoubtedly more will become available. Many present TV antennas, but not all, will provide respectable gains on the FM band, and it is always worthwhile to try the TV antenna before investing in a special FM antenna. When a TV antenna is shared with FM, it is preferable to use a switch to shift the

antenna from TV to FM, rather than a "two-set coupler." The coupler divides the signal and therefore only half is available for either TV or FM. A switch will provide the full benefits of the antenna for both.

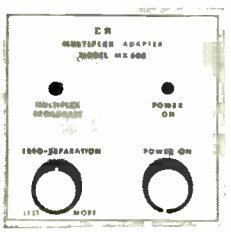
Boosters may also find greater application for FM reception, especially in the fringe areas. Several FM boosters are now available, and very likely more will be placed on the market. The new boosters using frame-grid tubes achieve a very good noise figure and will improve the effective sensitivity of most tuners. Many TV boosters and "distribution amplifiers" cover the FM band as well as the TV band. These will not provide as much gain or as good a noise figure in the FM band as a booster designed specifically for the FM band, and they are not as good for the most difficult situations. But they will provide excellent results in the intermediate locations and have the virtue of simplifying the installation. In very difficult situations a combination like the Winegard FM Powrtron antenna, with its self-contained booster, may offer a solution for reception of multiplex signals.

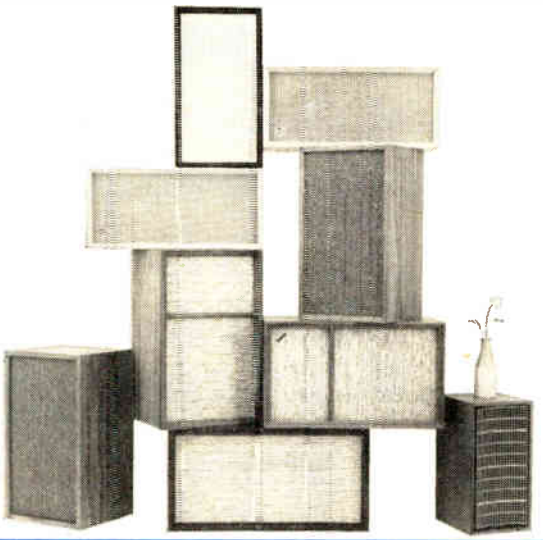
There are expectations in the broadcast industry that stereo multiplex will raise radio closer to the level of TV as an entertainment medium and result in a considerable increase in the number of FM stations, particularly in areas where they are now scarce. Except in the very large metropolitan centers there is still room in the FM band for hundreds of additional stations. As the blank spots are filled in, the problems of reception will diminish, always presuming that the increase in stations is not carried to such a *reductio ad absurdum* as now exists in the standard broadcast band.

The prospect of regular stereophonic broadcasts over a greater number of stations is an appealing one, but it is not entirely without dangers. The resurgence of the FM broadcast band in the past two or three years has provided a haven for the refugees from some of the banalities of TV. Especially gratifying has been the fact that a good portion of the resurgence has been in "good music" and programs more sophisticated than those available either on TV or the standard broadcast band. Stereo FM could bring new experiences and dimensions in live coverage of many aspects of our life. Stereo recordings of such ceremonials as the Queen's Birthday Salute, or of such events as sports car races, not to mention opera and plays, give some hint of possibilities stereocasting could exploit.

But despite the problems involved, FM stereocasting promises to open wider the door to everyday enjoyment of stereo reproduction in the home. The market for stereo systems will undoubtedly widen with the availability of radio programs in stereo. This in turn should increase the proportion of time devoted to stereo broadcasts, and, we all hope, should improve all sources of stereo programming, from stereo records to live broadcasts of actual events.

Top to bottom: Bogen's PX60 multiplex adapter is self-powered ($69.50). Eric's MX-600D ($59.95) affords extra amplification. Paco's ST-45 tuner adapts to multiplex ($84.95, kit; $134.95, wired), Crosby's MX-101 adapter features dimension control that adjusts from "mono" to "extended stereo."





SOUND ARRANGEMENTS

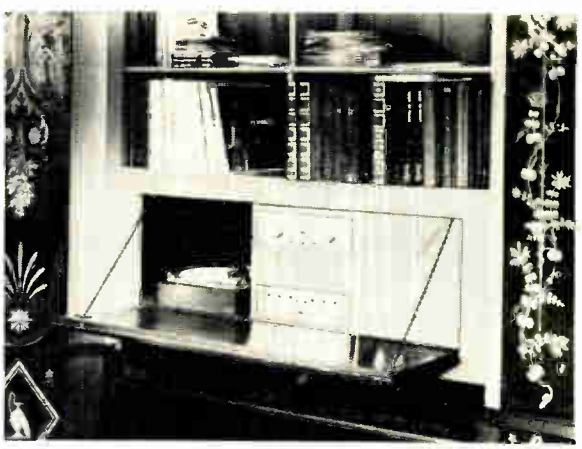
COMPONENT HIGH FIDELITY'S MAJOR JOB IS THE REPRODUCTION OF WIDE-RANGE, UNDISTORTED SOUND. BUT THERE IS A BONUS FOR THE OWNER—FLEXIBILITY OF ARRANGEMENT. BUILD IT IN, PUT IT IN A CABINET, PLACE SPEAKERS WHERE THEY SOUND BEST. PICTURED HERE ARE A WIDE VARIETY OF INSTALLATION IDEAS.

Stereo is kicking up a fuss at one end of American living rooms.

Over the years most families acquired one form of home entertainment after another—radio, television, phonograph, and FM tuner, perhaps a tape recorder. The high-fidelity devotee almost certainly had a music system comprised of separate components—and with the coming of stereo their number almost doubled (remember that early cry of two of almost everything). Eventually, put-upon housewives protested against the nests of wires and electronic gear that some husbands assembled in the living room in the cause of better sound reproduction, and beleaguered spouses took to camouflage. Equipment was encased in pieces of furniture —perhaps a Suburban Original, planned jointly on the back of

This nine-foot cabinet was constructed in walnut by Russell Clancy (who authored "The Joys of Shopping for Stereo" in this issue). Controls are mounted on the top deck; the main deck contains (right to left) Thorens' TD 124 turntable, with Grado Lab Series arm and ADC cartridge, the Rek-O-Kut B-12H turntable with Grado arm and Lab Series cartridge, a switching panel—mostly of AC switches, and an Ampex 960 tape recorder. The lower deck houses eight Marantz 30 watt amplifiers. Four of these feed five ranges of speakers on each stereo channel with the limited signals they receive from electronic crossovers. Also included are McIntosh tuner (far left, top deck) and Knight TV audio tuner (switch panel, main deck).

This custom-designed cabinet houses H. H. Scott tuner and amplifier, Fairchild turntable arm and cartridge, and EMI speakers. The cabinet, from New York City's Hi-Fi Exchange, is more than eight feet in length.



The entire installation, exclusive of speakers, is secreted behind a drop-leaf panel. Speakers are bookshelf types which can be placed virtually anywhere in the room. United Audio changer is used with H. H. Scott stereo tuner and amplifier.

This handsome fruitwood cabinet is a complete musical entertainment center. Its electronic heart is the H. H. Scott 399 stereo receiver. Other components are the Garrard changer and a pair of Wharfedale 12FSAL speakers.

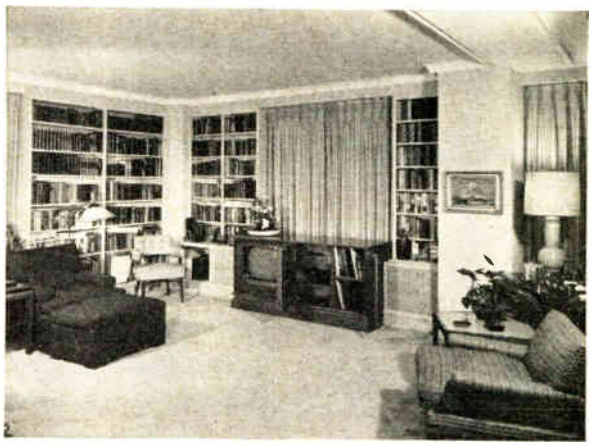
an old envelope by the husband and the local lumberyard operator, or Grandmother's old credenza rescued from the attic. The revolution was under way—and now it's in full swing, with everyone joining in.

Among more recent entrants to the field are professional decorators and while their contributions may lack the homey touches of the do-it-yourselfer, the decorative prospects are somewhat more exciting. Within ten years, many of our more carefully planned homes will have complete "home entertainment centers"—as much a concession to common sense, aesthetic values, and comfort as today's efficiency kitchens. Within ten years? The more forward-looking among high fidelitarians already have achieved, to a degree, this exalted stage.

In actual fact, far from resulting in a deplorable aesthetic clutter, component high fidelity lends itself, often excitingly, to the creation of visually pleasing music-and-entertainment centers. The word "component" is the key; flexibility of arrangement is the important factor. Instead of wrapping furniture around each entertainment facility and offering the buyer a package, high-fidelity component manufacturers offer just the essential part: amplifier, radio tuner, TV tuner, tape deck, turntable, speakers (both with and without cabinets). High fidelity-in-parts has a special advantage for the person who wants the best in stereo. For, if the components come totally packaged, the sound is necessarily and arbitrarily fixed by the way the speakers were placed

A touch of decorator drama is imparted by "floating" the cabinet along one wall. This walnut cabinet is over ten feet long, houses Fisher's X101 amplifier and 101R tuner, Garrard RC88 changer, Jensen H223F speakers.

A TV set joins the high fidelity electronics in a compact solid cabinet. Speakers (by J. B. Lansing) are built into the bottom of the bookcase units flanking the equipment cabinet. Fisher TA800 receiver, Garrard changer are used.

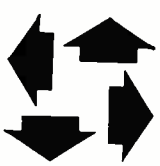


in the cabinet. For reasons of economy and competitive pricing of the enclosed stereo system, they may be too close together. Few are spaced more than six feet apart; good stereo requires, in most instances, speaker separation of from eight to ten feet.

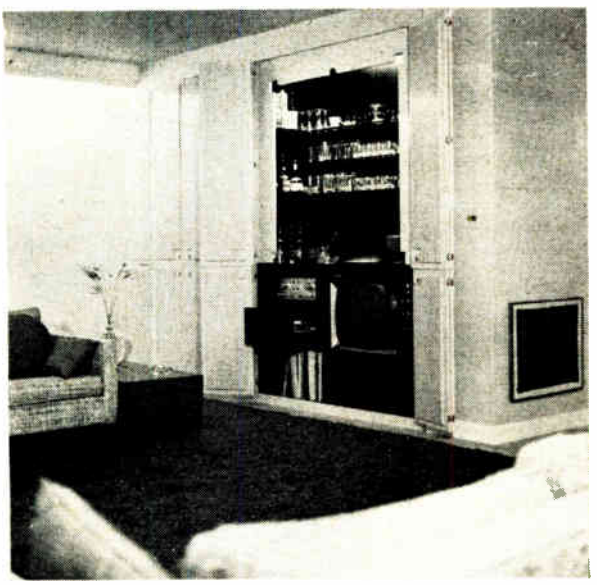
INSTALLER PROBLEMS

Every installation presents a unique set of problems but, because of the flexibility inherent in component high fidelity, they are relatively easy to solve. A typical and frequent problem is—what to do with the television set. Since TV has to be seen as well as heard, it seems to demand fairly prominent and central placement in most installations. This dictates to a degree the placement of the other components. Decorators have overcome this difficulty by securing the TV receiver with a hinged assembly that permits swinging the TV unit out from the installation to the angle desired for best viewing. Caution must naturally be observed in building a frame sturdy enough to carry the receiver's weight.

Often the room itself presents the biggest problem. One decorator was faced with the problem of a relatively small study. The addition of a complete stereo high-fidelity system seemed inappropriate until he reasoned that the closet wasn't serving its original purpose—that of clothes storage. The components were therefore mounted on a vertical panel, cut to fit the closet opening. Tambour doors were added in front to finish off the job. Small bookshelf speakers were completely adequate for the room's size and took little of the limited space available.



Decorator Nancy Chase planned this built-in system with an eye to beauty and utility. The high fidelity TV unit is surmounted by a refreshment bar complete with glasswear. All components, including the television set, slide forward for easy access in servicing (see illustration at right). AR speakers rest on floor behind drapes. An H. H. Scott receiver and Garrard changer complete the system. New York's Hi-Fi Exchange installed it.



The way a room is used may present problems. But, again, the flexibility of component high fidelity makes them rather easy to solve. Consider the case of a rather large living room with huge doors opening into an adjoining dining room. The logical place to put the eight-foot stereo high-fidelity cabinet was against the doors since this access to the dining room was used only when entertaining large groups. But what could be done about the long cabinet when a party took place? The decorator hit upon a very happy solution: instead of an eight-foot cabinet, two identical fours, to be parted when the doors were opened and brought together at all other times.

If a small room offers specific problems, so does a large room—most often with regard to the ideal placement of loudspeakers. One decorator, for example, found that virtually every arrangement in a particular room resulted in too wide separation of the two speakers. He finally hit upon a unique solution. He had originally placed the speakers on either side of a fireplace and found the separation to be too great. Since the fireplace was never used, however, he hid a *third* speaker inside of it. Voila! Perfect diffusion of sound.

Often the problem of the decorator and the audio installation man can bring forth entirely new installation concepts. This was the case when a decorator/audio team tackled the redesign and decoration of a fashionable and very expensive apartment. The apartment was literally reduced to the *outside* walls and completely new interior walls planned. The client was eager for a "cost-no-object" high-

Often a stereo component system can have a "built-in" appearance without a wall being torn apart. A case in point is the system shown at right. Here, an unused doorway provided a perfect place for Allied Radio to install components (Fisher 90-R tuner, 400 preamp, two 100 amplifiers. Garrard's RC-88 changer with Pickering 371 cartridge, and three Tannoy DCL 12-in. speakers.

(Below, left). A shelf unit to the left of the fireplace was used by Allied Radio to house H. H. Scott's 222 amplifier, 320 tuner, and Garrard RC-88 changer. The RCA Victor Color TV swings out from the shelf unit. Two J. B. Lansing D123 speakers are mounted in the adjacent wall and can be seen near the top of the paneling.

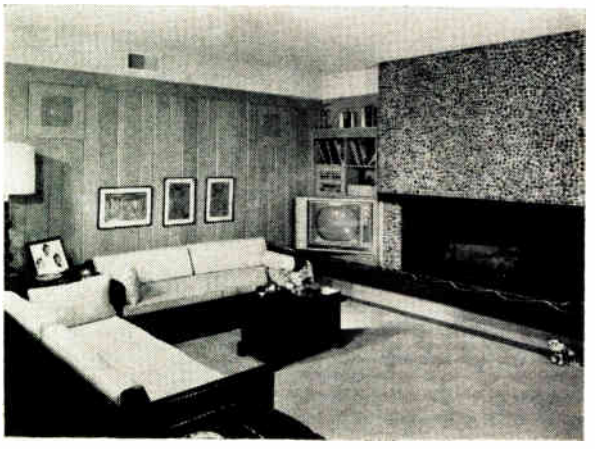
(Below, right). The fireplace is flanked by video and audio entertainment units. The audio section at right consists of H. H. Scott's 299 amplifier and 320 tuner with the Garrard RC88 changer and J. B. Lansing D131 speakers.

fidelity system. He also wanted the loudspeakers placed in the new paneled walls at one end of the library. The wall at the end, however, was designed to curve gracefully from one side of the room to the other. Thus, lines drawn through the axes of the speakers would cross at a point one-third down the length and in front of the main listening room's area.

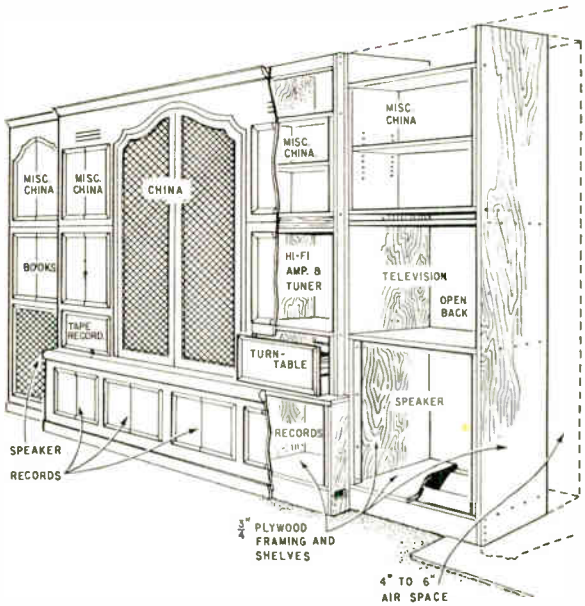
The audio half of the team regarded this type of installation as suspect and incapable of delivering optimum stereo sound. In the past, he had rigorously followed the common practice of placing the speaker flat against the wall on either side of the room. If the speakers were toed-in, would not the sound from the left speaker be heard on the right-hand side of the room, and vice versa? It would seem so. But since the client was adamant on the speakers being placed as he wished, the audio specialist experimented before positioning the speakers in the wall. He was amazed. Not only was the stereo effect completely fine but it was more effective over a larger room area than he had ever experienced before.

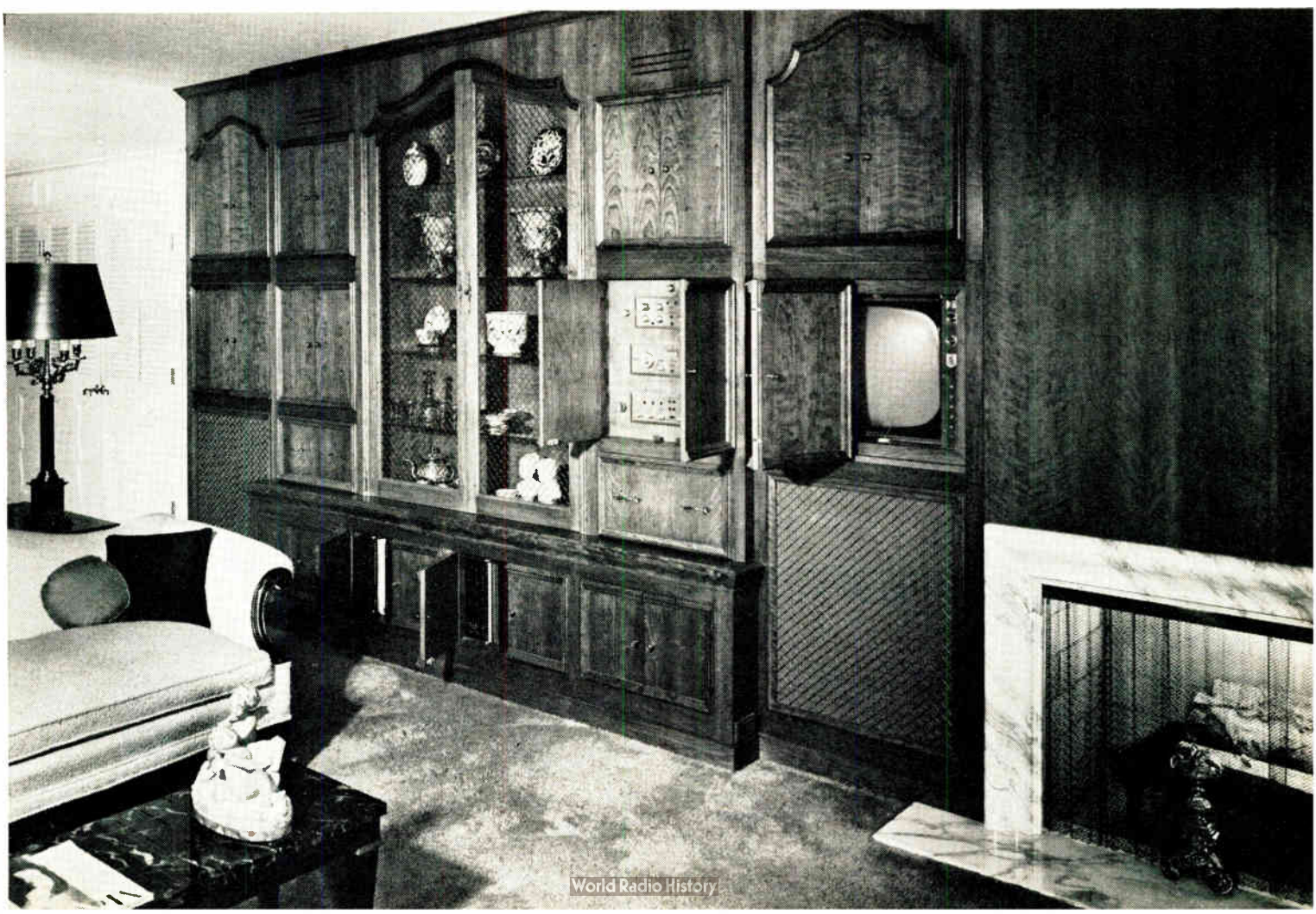
"I'm an engineer and I've been in this business a long time," he told us, "and I can honestly say that I do not know *why* this happens. The important thing is that it *does* happen. I've used the same principle in other installations and I find that it has worked every time."

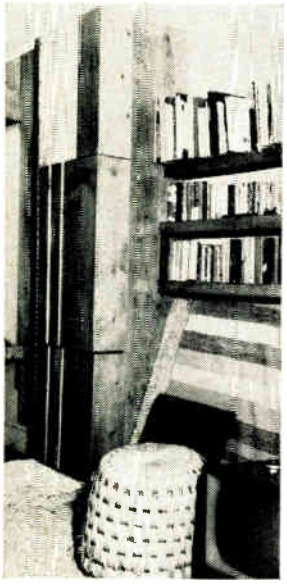
Personal attitudes have much to do with the way

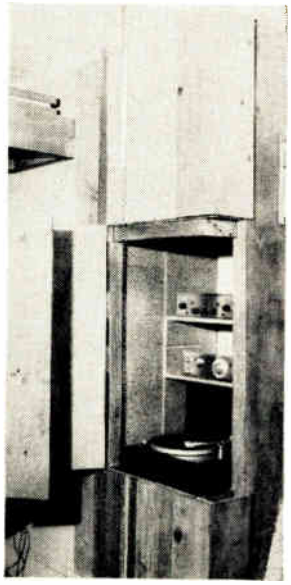


The drawing at right shows how the handsome music wall below is compartmented to serve many uses. Before construction of the unit, the area next to the fireplace was an unused recess. The wall above the fireplace opening was paneled to match the cabinetry. (Photo and drawing courtesy of Popular Home Magazine, U. S. Gypsum Company.)









The illustrations at left show closed and open views of the same installation. The cabinet is actually an extension of the wall behind it. All components are housed in a minimum of space; one EMI speaker reposes in the upper compartment. Designed by architect Dees Porch for New Yorker cartoonist Franklin Modell, the installation was made by Hi-Fi Exchange (New York City).

More an array of components than an installation, the equipment illustrated below at left represents the electronic furnishing of a music room. The only object that does not either produce or aid the production of sound is a comfortable couch (not shown).

The orderly component assembly below at right is owned by Candid Records' Robert Altshuler. A unique feature of the installation is the easy accessibility of the record collection housed, from the waist-high counter to the ceiling, on sturdy shelves.

an individual, or a decorator employed by the individual, will use components in a decorator scheme. The home entertainment center, like any other element in room décor, should reflect these attitudes. There are decorators (the less important ones, in our opinion) who try to impose their notions of room décor upon a home with little regard for the way the home is used—"lived in" might be a better expression—by the occupants. The good decorator will give careful consideration to the kind of people he is serving and be guided accordingly.

To a person whose tastes run to period furniture, stark modern lines in an entertainment center have no place. The natural and appropriate installation mode is be the creation of a cabinet or paneled wall that will not be incongruous with the rest of the décor. At the opposite end of the scale there is the person whose taste runs to "high fidelity for high fidelity's sake." This attitude holds that high-fidelity equipment is intrinsically handsome and should be displayed for what it is. One such individual, whose living room is literally dominated by a 12-foot equipment cabinet, is as articulate as he is reasonable about his high-fidelity installation.

"You wouldn't try to disguise a grand piano as a Louis Quinze sofa, would you?" he asked. "My high-fidelity equipment provides just as much musical enjoyment to me as a piano does to others. I wouldn't think of trying to hide it."

Seems like a reasonable point-of-view.

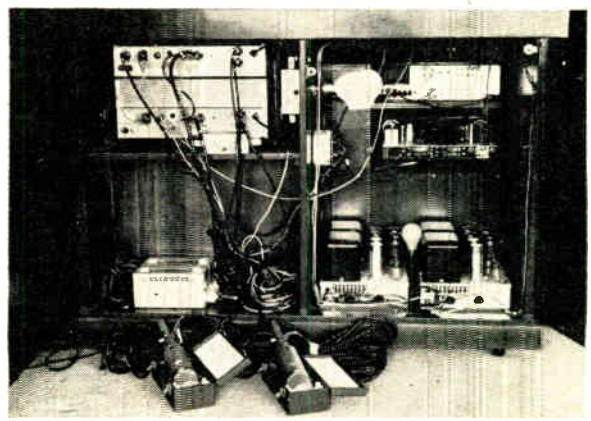
HOW TO WRAP A LOT OF WATTS IN WALNUT

A recording studio in the living room! "Why not!", asks Audio Fidelity's Sidney Frey. Readers might well echo Frey's reply after inspecting the photographs at right. The handsome cabinet was custom-built to the disc-maker's specifications. Constructed entirely of 3/4 inch plywood with a walnut veneer, the unit takes up little space more than average radio-phonograph console (although it is somewhat deeper). And, while not everyone would want a system quite as elaborate, the design does point a direction for encasing a plentiful supply of watts in walnut cabinetry.

Simple lines of the walnut cabinet are enhanced by the cane front doors. Since the doors are necessarily wide, they were custom-constructed to slip back into the sides of the cabinet.

This is literally a professional recording studio as well as home entertainment center. Right hand side of cabinet contains Ampex 351-2 tape recorder (removeable for on-location taping). Electronic section on left hand side is MacIntosh's AM-FM tuner, stereo preamplifier, and, not shown, a pair of 60-watt amplifiers. Thorens' TD-124 turntable, Rek-O-Kut arm. Shure M-3 cartridge complete system.

Cabinet opens from the back in the same way as the front. Shown here are a pair of Telefunken U-47 microphones, connected to special power supply, for high quality home recording. Cabinet slides out from wall on heavy-duty casters for occasional checking and servicing. Right hand door is vented and equipped with a fan for drawing off heat.



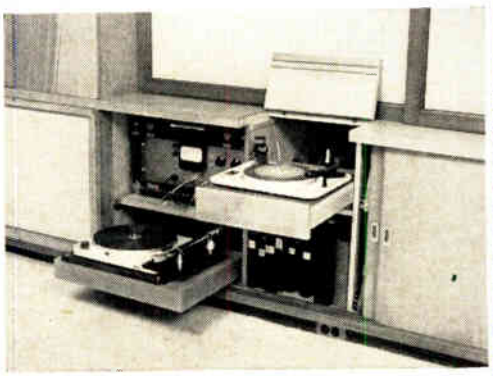
MUSIC WALL FOR A MUSICIAN

What sort of installation may be found in the home of a serious musician? Conductor Alfred Wallenstein offers one answer. His installation, including a valuable library of scores, records, and tapes, ranges along an entire wall. Too large to be photographed in its entirety, the unique installation's design is suggested by the simple colored outline below. Large (four by eight feet) panels slide easily and noiselessly along a hip-high shelf for access to the conductor's library. Some components (tape recorder and record players) are located below the shelf behind smaller sliding panels. High fidelity electronics are to be found in the extreme left-hand section. More than an entertainment center, Mr. Wallenstein's music wall is an effective tool for editing recordings.

When the Fleetwood television tuner recedes (on sliding drawer behind hinged doors) the Scott 331 AM-FM tuner and 229 stereophonic control amplifier are the only components to be seen. Below the television tuner, its separate speaker system—a 15-inch Stephens with auxiliary tweeter—is housed in a bass reflex cabinet.

The conductor does homework. Master tapes from the recording studio are subjected to a thorough hearing on the Ampex 745. The conductor checks the recording against the score for possible—though improbable—discrepancies. Most listening effort at this stage of record making is devoted to keeping stereo channels in careful balance to produce maximum dimensions and directionality.

The lovely antique cherry secretary is one of the Wallensteins' most highly prized possessions. Its beautiful lines contrast with the austere simplicity of the stereo speakers flanking it. The enclosures contain 15-inch Tannoy speakers and were constructed for Mr. Wallenstein by Pye engineers while he was recording in England.



In addition to the Scott tuner, three other program sources are available to the conductor—Ampex 745 tape recorder, Thorens TD 124 turntable with Rek-O-Kut arm and Fairchild SM-1 cartridge, and Garrard changer. All three units are mounted on sturdy sliding drawers and kept dust-free behind a sliding panel. Note the "flip-top" counter over the Garrard changer giving "headroom" to record stack.

While listening to a tape playback, Mr. Wallenstein often consults a symphonic score from his vast (20,628 parts, scores, vocal parts) reference library. High shelves are reached by using a handsome, leather-treaded set of steps (below, left). The counter-to-ceiling sliding doors are made of ¾-inch plywood panels, framed in natural cherry and covered with attractive, yet inexpensive, monk's cloth fabric. The fabric is not only

decorative but has sound-absorbing qualities as well. Unadorned, the sliding doors would give the room unnatural, too-bright acoustics. The conductor, moreso than others, needs concert-hall realism.

THE AMPLIFIER:

By Donald C. Hoefler

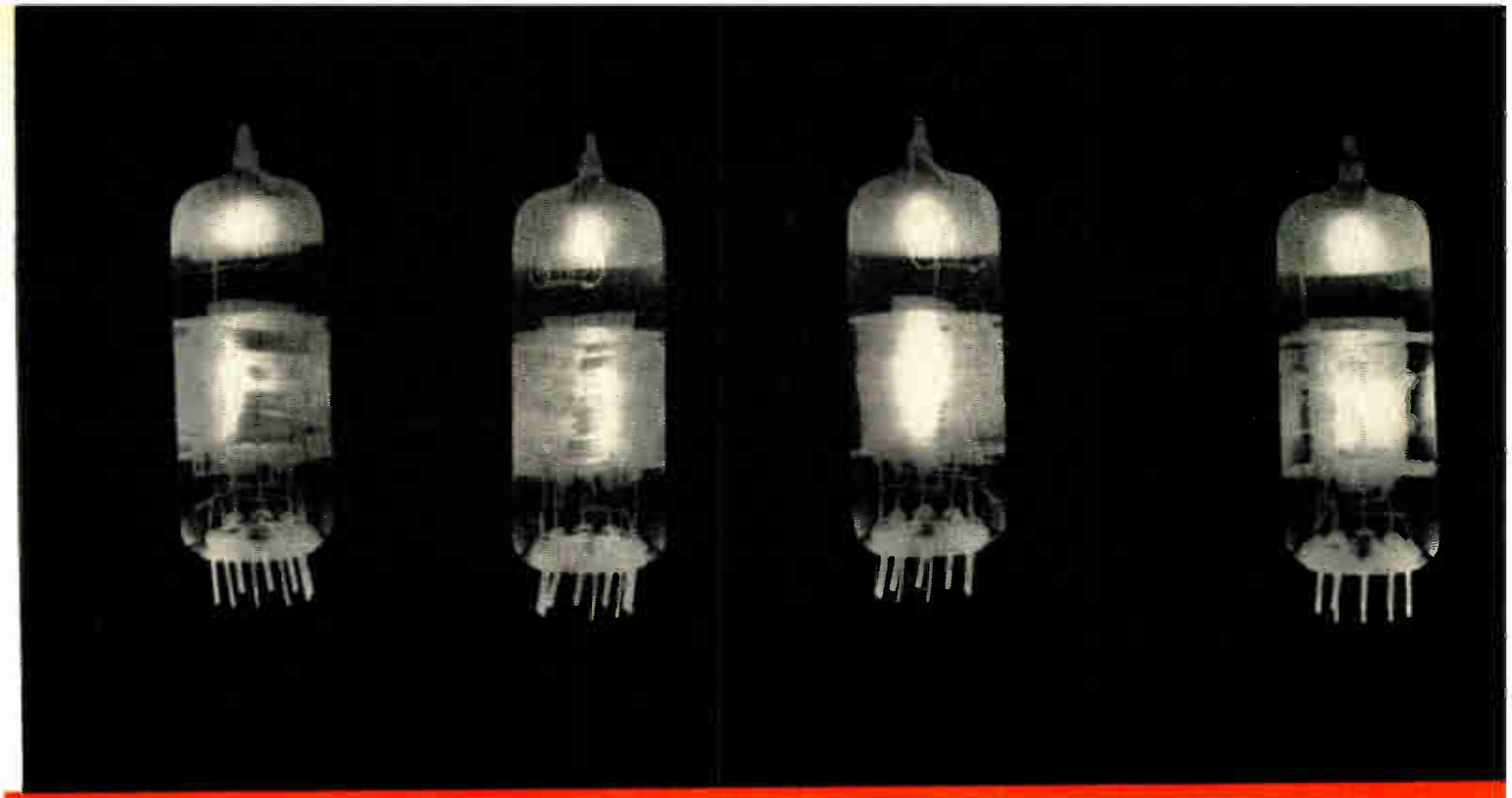
With manufacturers packing more it is fair to ask: how many answers—along with other

THE FINAL ELECTRONIC LINKS in the twin chains of a stereo system are the power amplifiers, which step up the feeble voltages from program sources and release them as powerful signals to drive the loudspeaker systems. These amplifiers can be exceedingly simple, or highly complex, depending on how many jobs they must do. In its simplest form, a power amplifier does nothing more than convert small voltage to big power for the speaker. In its most elaborate variant it comprises all of the electronics of the stereo system, including preamplifiers, tuner, switches, and controls.

We'll discuss the pros and cons of these two types of amplifier construction, but first let's get to the question which invariably bewilders the neophyte—and not without good reason. With the wide variety of "midgets," "compacts," standards, and "supers" on the market, he can't be blamed for wondering, *How much power do I need?*

In stereo as in automobiles, the choice is pretty much up to you. It depends on your personal tastes, your listening conditions, and your pocketbook. And, as with cars, where reserve power that's almost never used means better performance at low and medium powers, the very same is true in stereo.

Whether you use a so-called stereo amplifier—actually two identical amplifiers mounted on a common chassis sharing the same power supply—or



STEREO POWERHOUSE

and more power into stereo amplifiers, watts do I need? Here are pertinent amplifier design considerations.

whether you use two completely independent amplifiers, remember that the two amplifiers are doing just about the same job in terms of power that is done by a single amplifier in a monophonic system. Now let's see just what that job is.

When you attend a live concert, about the loudest sounds you will ever hear from an orchestra, playing fortissimo, will measure around 100 decibels, or db (see box). In stereo terms, this means that each of the two speaker systems would have to deliver about 50 db of sound to match the concert hall volume of the orchestra.

But you are a most unusual listener if in reproduced music you demand such a sound level. The average person prefers a level of 75 to 80 db, while more demanding listeners, such as musicians, sound engineers, and audiophiles prefer about 10 db more. Let us say you are in the latter category, and like to hear a peak music level of about 90 db. And let's assume you listen in a fair-sized living room, say 12 by 20 feet, with 8-foot ceiling. The volume of your listening room is then slightly under 2,000 cubic feet. Now look at Table I for some rather astonishing figures. To produce, in this room, a sound level only 10 db under a full orchestra playing fortissimo, your loudspeakers need together deliver only three-hundredths of a watt!

These figures are somewhat misleading, it is true,

WHAT YOU SHOULD KNOW ABOUT AMPLIFIER POWER

Power is described by the engineer as "the rate of doing work." As there are varieties of work, so there are different kinds of power. In audio work we are concerned with only two types, ELECTRICAL *and* ACOUSTICAL.

Electric power is the invisible force we use when we plug a cord into a wall receptacle. It is comprised of electrons coursing through a wire—and being driven through a loudspeaker motor by the output circuit of an amplifier. The power rating of an amplifier therefore tells how much electric power it can deliver with good fidelity to a loudspeaker.

Acoustic power is, very simply, sound—the thing we hear. It is the vibration of air particles, or changes in air pressure. The loudspeaker is really an electrically driven air pump, which takes electric power from the amplifier and generates acoustic power in the listening room.

WATTS *are one form of expression for the amount of power. Everyone is familiar with the wattage ratings of light bulbs, but note that while light bulb ratings tell how much power the unit* takes *from the lines, power amplifier ratings tell how much power the unit can* give *to the loudspeaker.*

DECIBELS *are somewhat trickier since they can be either relative or absolute. In one sense the decibel is an absolute measure of power level, just like the watt. But for some uses the decibel is a more convenient unit, because it takes into consideration the unique responses of the human ear. Thus 0 decibel (db) is about the lowest sound power the average person can hear, and 130 db is the level where sound intensity begins to cause pain.*

In another sense the decibel is the ratio between two sound levels. Thus a change in level of 3 db is about the smallest difference the average person can detect, while 1 db is the smallest detectable by the trained ear. The decibel is therefore a sort of measuring stick, made up of very tiny units, each exactly the same size to the listener.

The difference in the two types of db is usually clear from the context. If we say that the noise level of a passing subway train is 100 db, this is obviously an absolute value. But if we say the noise of that train is only 30 db below the pain threshold (130 db), then we are speaking in relative terms.

The audio man often speaks of the listening level in a room in terms of absolute db, while the gain of an amplifier (difference between output and input levels) is a relative value, but also expressed in db. since they do not take into account the considerable sound absorption qualities of the furnishings in that room. So, to be on the safe side, let's multiply our three-hundredths of a watt by ten. We now have a peak power requirement of only 0.3 watt. Yet we hear of stereo amplifiers rated at 20, 50, 60, or more watts for each channel. How come?

Much of the reason for this discrepancy can be attributed to the loudspeaker—a component well known for its very low efficiency in converting the electrical power from the amplifier into audible sound. While a horn speaker may be around 50 per cent efficient, most cone types are between 1 and 7 per cent efficient.

As an example, suppose your speakers have an efficiency of 3 per cent. Then to get an acoustic output of 0.3 watt you would have to deliver to the speakers a total of 10 watts, or 5 watts per channel. From this it would seem that a pair of 5-watt amplifiers should be good enough for high-fidelity stereo. It would seem so, but it is probably not true.

The difficulty is that amplifier power ratings are somewhat subjective, and the degree of fidelity of the rated watts of a given unit must also be considered. Therefore, although it should not be so in principle, power rating of an amplifier is one measure of its fidelity. The assumption is that a stereo amplifier rated at, say, 50 watts per channel will deliver a much cleaner 5 watts per channel than the amplifier rated at 5 watts.

Now to be specific. I would suggest that you regard 20 watts per channel as your standard. If you are willing to compromise a little, you can move downward to the compact or midget class to perhaps 15, but probably not less than 10, watts per channel. Should you wish to go into the limousine class of ultra-high-fidelity, get just as many watts above 20 as your budget will allow.

Among other amplifier ratings you will inevitably encounter *frequency response*. This simply states the unit's ability to reproduce—at a level well below its rated power output—everything you can hear. Ideally, perhaps, an amplifier should be able to handle everything from zero cycles per second to infinity, with no deviation whatever. As a practical matter, however, your hearing encompasses the range from about 20 to 16,000 cycles per second, and any amplifier which can handle all of that *cleanly* is reasonably adequate. Many good amplifiers today are rated at 20 to 20,000 cps, with a deviation of no more than plus-or-minus 1 db.

Illustrated at right are: Realistic's BA-210 140-watt stereo amplifier. 2) Bell's Carillon stereo control amplifier with 60 watts each channel. 3) Grommes' Model 250K 60-watt amplifier. 4) Citation II 120-watt stereo unit ($159.95, kit). 5) Knight's 60-watt stereo amplifier kit.

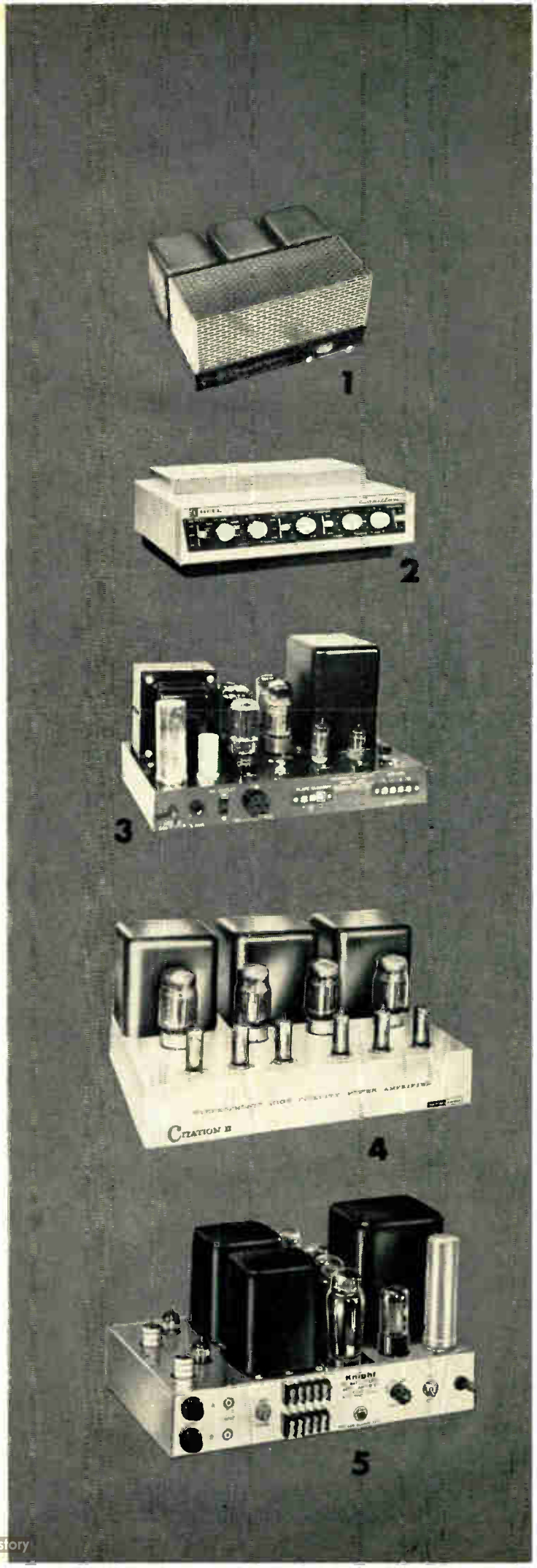
Another bench mark you are sure to see is *distortion*. This specification indicates the amount the reproduced sound differs from the original. The more serious forms of distortion occur when more tones than a single pure one are fed through the system simultaneously. This is, unhappily, the normal condition in music reproduction, because music generally comprises chords of tones plus their harmonics, the combination making up a very complex waveform.

Under these conditions the amplifier generates some *intermodulation* distortion, which is the addition of spurious sum-and-difference combination tones to those sounds actually made by the performers. Students of music are familiar with a similar phenomenon occurring in the ear, but here the combinations are called subjective tones. The amplifier, however, is supposed to be completely objective, not subjective. It is not expected to add any tonal coloration or comment of its own.

Unfortunately no amplifier has yet reached that state of perfection. All of them intrude their own personalities somewhat on the signals passing through them. The less they do so, the better they are, and the higher the fidelity. Total distortion of all types in good amplifiers today can be well under 5 per cent, and the best amplifiers will be able to hold intermodulation distortion to less than 1 per cent.

The other important standard of amplifier performance is *transient response*. This is the ability of the unit to reproduce the steep waveforms produced at the moment a tone is attacked. When a musician tongues a mouthpiece, hits a drum, or bows, plucks, or hammers a string, very sharp peaks are produced for a brief instant. These steep instantaneous waves are extremely difficult to reproduce, and the amplifier which can do so is said to have low transient distortion. This distortion is usually described in terms of what happens to the shape of a square wave when it passes through an amplifier, the waveform being observed on an oscilloscope. Thus you will often see among an amplifier's specifications a statement such as the following: Transient Response: 20 to 20,000 cycles with negligible square wave distortion. No visible rounding or overshoots at any frequency below 10 kc.

But despite the wonders of modern electronic instruments, your own ears are still the best sound-measuring instruments of all—in evaluating any amplifier you should rate it ultimately in terms of what you hear. For transient response, listen carefully to music containing many sharp attacks: staccato, pizzi-



6) TEC's all transistor stereo control amplifier Model S-15. 7) Marantz's Model 7 stereo console preamplifier ($264.00). 8) H. H. Scott's "Stereomaster" control amplifier ($159.95, kit). 9) McIntosh's C-20 stereo preamplifier.

cato, and sforzando passages. These should all be completely clean, without any hash or ringing.

No amplifier yet designed is completely noise-free—all generate small amounts of hum, hiss, and other types of background noise. The skilled designer does everything possible to minimize these annoyances, by careful shielding, choice of low-noise tubes and resistors, and by noise-reduction circuitry. A good amplifier today has a noise level 60 db or more below the peak program level—a noise level practically inaudible under any listening condition.

When amplifiers, preamplifiers, tuner, and controls are all mounted on a common chassis, and share a common power supply, the total cost is almost always less than that of the equivalent combination purchased separately. This arrangement also makes for ease of installation and operation.

Perhaps the greatest disadvantage of the all-in-one combination is its size. With the large and bulky transformers required in the power and output circuits, plus the additional space requirements of a two-channel stereo system, the resulting array can be quite unwieldy. This arrangement also poses serious design problems, particularly with respect to the prevention of undesirable interaction between components. While there are some multipurpose units which perform as well as individual components, the possibilty of trouble is always something to bear in mind.

At present there is a definite trend among manufacturers of popular-priced equipment towards multipurpose construction. But at least one maker of luxury and semiprofessional equipment is going in precisely the opposite direction, with plans to de-emphasize the multipurpose design in favor of separate quality components. So here again, the final decision of what is right for you must rest on your own taste and judgment.

When all of the electronics is on one chassis, then, of course, all of the stereo controls become a part of the unit. The multiplicity of controls can be very confusing to the newcomer, especially since many of them serve minor functional purposes. We'll try to describe most of those you are likely to encounter, but if your equipment doesn't have all those mentioned, don't fret. You may even be better off.

The first control is the function selector switch. This switch simply determines which signal source you will hear—tuner, tape, phono, or some outside

10) the Quad 22 control center, and, 11) the Quad II power amplifier. 12) Heathkit's AA-40 stereo power amplifier. 13) The Fisher X-1000 stereo control center. 14) the Pilot Model 264 stereo power amplifier.

source such as microphone or TV audio. The control sometimes also selects the amount of preamplification needed, if any, and the amount of fixed tone control (compensation or equalization), if any.

Recordings, both tape and disc, require some adjustment in the frequency response of the system, to offset changes made for technical reasons in the original recording. Before standardization of recording characteristics, the function switch also provided a choice of several such characteristics. However, all records made in this country for the past several years, and this includes all stereo records, have been made to the RIAA standard for disc and the NAB standard for tape, so the old compensation selector is now obsolescent, except, of course, for one's older records and tapes.

The function switch also often has a monophonic position, which permits the playing of monophonic material through both stereo channels simultaneously.

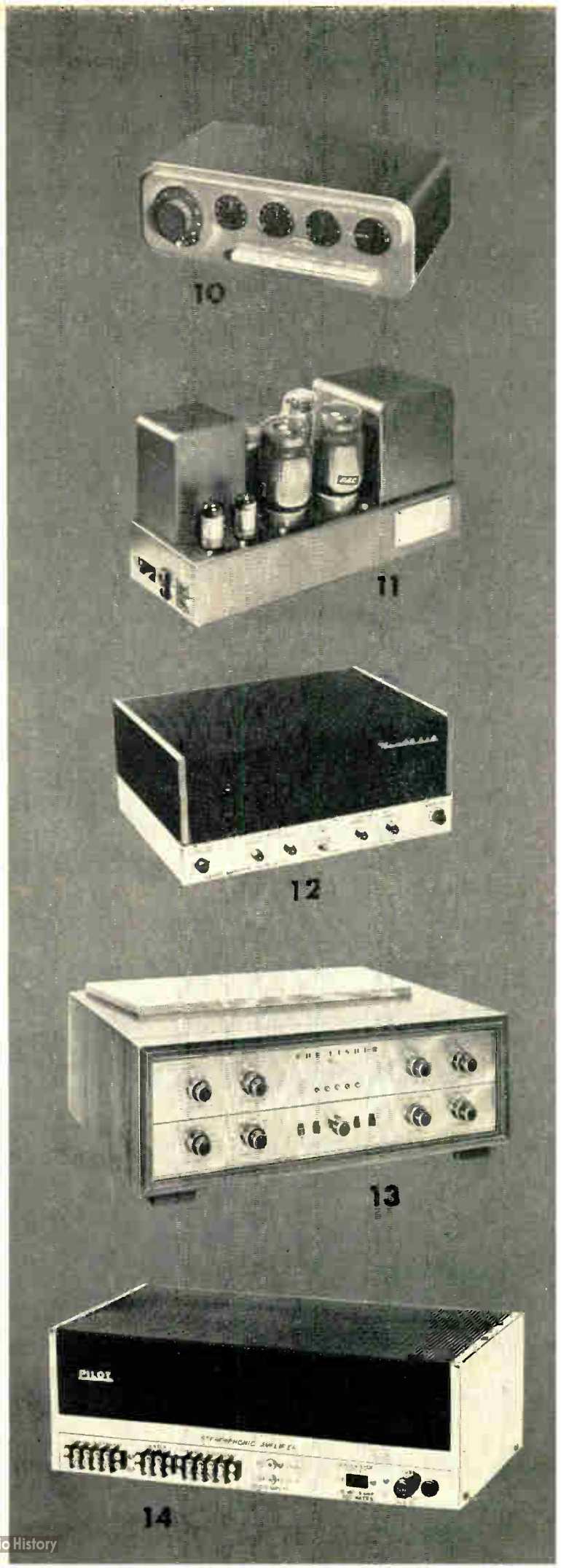
A reverse switch permits interchanging channels, so that the right side comes out of the left speaker, and vice versa. This is sometimes useful when the loudspeakers are not identical, but for the most part it is simply a plaything.

The phase switch insures that both signals are delivered to the speakers in such a way as to move their cones in the same direction at the same time. If the speakers are connected correctly in the first place, the switch has little practical use.

The most important controls are the volume control and the tone control. For high-fidelity components these are more complex than those on non-high-fidelity instruments, and more complex yet for stereo than for monophonic equipment.

Tone controls are necessary to compensate for listening room acoustics, for system deficiencies, and for personal taste. With them it should be possible to control the treble and bass ranges of the spectrum separately, and boost or decrease either or both.

Volume controls for high fidelity become technically more sophisticated when they appear as loudness controls. The principle here is the fact that human hearing is relatively less sensitive to the extreme bass and treble sounds at low volume levels. So if you play back the 100-db peaks of a symphony orchestra at 90 db or less, you will hear less extreme bass and less extreme treble than you would have heard at the original performance. The loudness control compensates for this hearing difference—automatically as you adjust the volume—by boosting

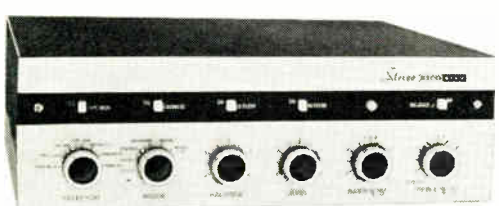


bass and treble at the lower levels. Most amplifiers offer a choice in operation of straight volume control or tone-compensated loudness control.

Because of stereo's two channels the use of these controls becomes more complex. Sometimes you will want to adjust the tone or volume of one channel independently from the other, while at other times you will want the adjustment to apply to both channels equally and simultaneously. Now through some sort of friction or clutch arrangement it is usually possible to have this versatility.

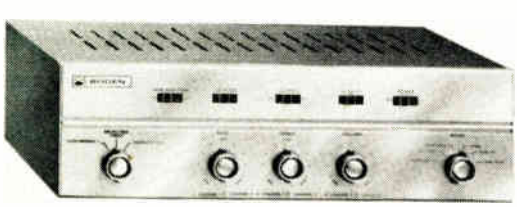
Selector switches usually permit cutting in and out of rumble and scratch filters. The rumble filter reduces noise generated in the bass region by some turntables, while the scratch filter reduces hiss due to noisy records or radio disturbances. Neither filter is a good substitute for adequate equipment and program sources, but there are times when they can come in very handy.

But whether many controls or few, whether simple or complex, whether multipurpose or basic, your stereo amplifier has the power of turning tiny signals into aural pleasure.



EICO's ST-40 stereo control amplifier

Pacotronics' SA-40 stereo control amplifier



Bogen's AP200 stereo control amplifier

Lafayette's KT-600A stereo control amplifier

Leak's "Point One" stereo amplifier

Altec-Lansing's 353A stereo control amplifier

KITS FOR FUN AND SAVINGS

KITS FOR FUN AND SAVINGS

Since a large part of the cost of any manufactured product goes for labor—and the stereo power amplifier is no exception—you can save that cost by providing your own labor.

But, you say, I'm not an engineer or technician. No matter. If you can read, and if you have the audiophile's determination, that's all you need.

In choosing a power amplifier kit, you simply follow the same principles described here for factory-built equipment. You need have no reservations, as you can find the same quality of design and materials in kits. In fact, several manufacturers now offer identical components in kit and ready-made forms.

Instruction manuals now represent some of the finest how-to-do-it writing you can find. Before getting you into the actual handiwork, they usually present a technical description of the equipment, its theory of operation, and the design philosophy involved. If you are technically inclined, you will enjoy every word of it. If not, a lot of this introductory matter may be over your head. But don't worry. Almost everyone else is in the same state as you, and none of this has very much to do with the practical procedures actually involved in building the kit.

When you get to the step-by-step instructions, don't blanch. Remember that it may take several dozen words to describe an operation that takes five seconds to perform. Read the instruction, follow it, check it off, and you'll surprise yourself with your accomplishments.

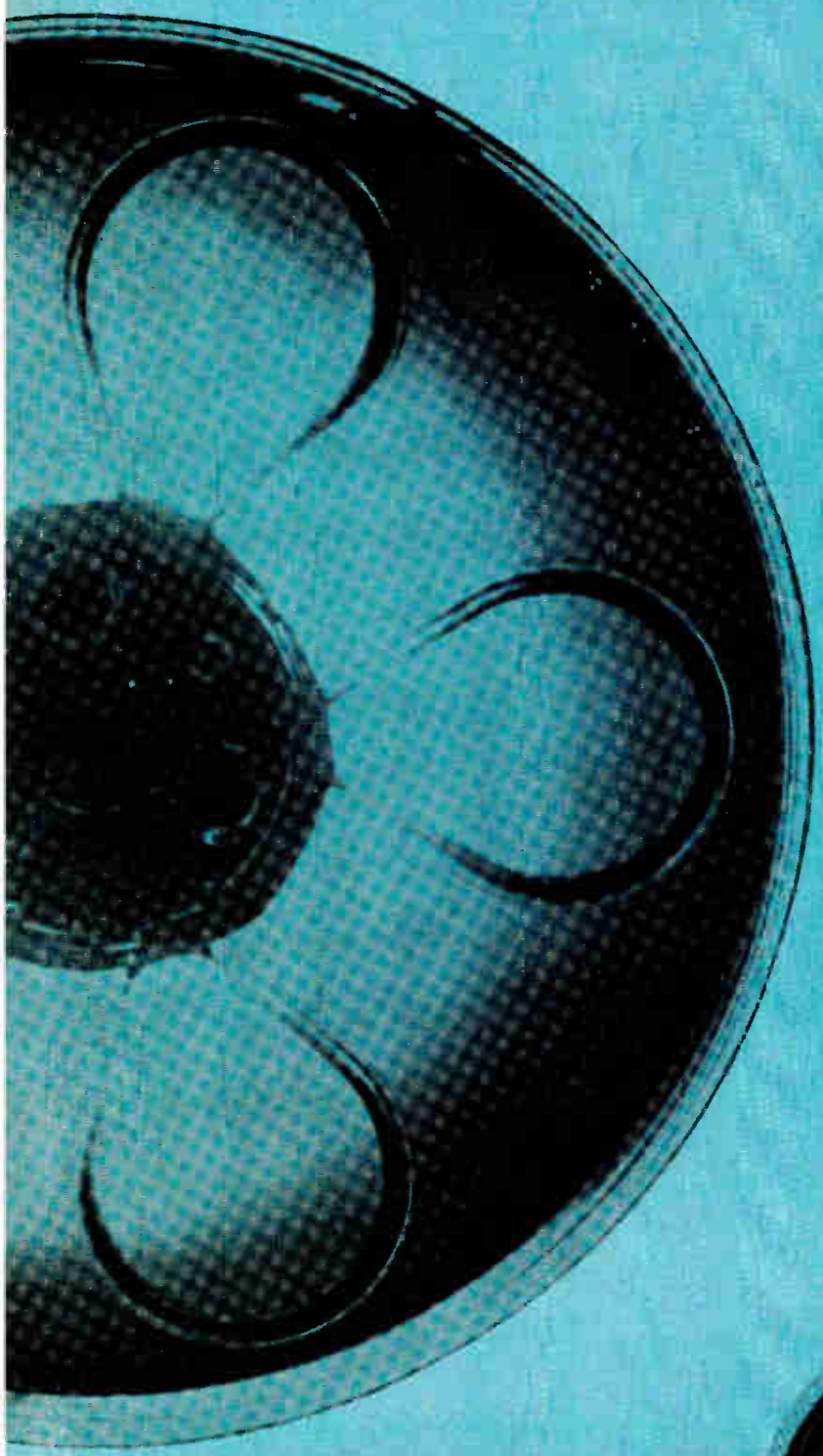
There are two simple rules which should be emblazoned in foot-high letters on the wall over every kit builder's workbench. If you observe these two simple rules, you can't go wrong.

First, TAKE YOUR TIME. *This is easier said than done. In the beginning, you are anxious to get past the mounting of switches and hardware, and into the electronic assembly which shows results. Midway, you may be bored, and anxious just to get it over with. Towards the end, you can't wait to fire it up and see what happens.*

But take it easy. Too much speed often has dire results: this is how the brackets get on backwards; this is how tube sockets face the wrong way; this is how filter capacitors get shorted to ground; this is how you connect to pin 3 instead of pin 4. And every one of those mistakes has to be corrected. In electronics there is no room for error. So remember that haste really does make waste, and take time to do it right the first time.

Second, WATCH YOUR SOLDERING. *This is the only specialized knowledge you must have for kit assembly. You will be making possibly several hundred connections, all of which must be soldered. The art of soldering is not difficult, but it is exacting. Your instruction book will tell you all about it, and you must not deviate from the rules. By far the greatest number of kit failures are due to poor soldering, which is to say carelessness.*

If you will follow instructions carefully, and keep these two rules always in mind, you will soon have a high-fidelity component of which you can be proud, and at a rock-bottom price.



TAPE'S

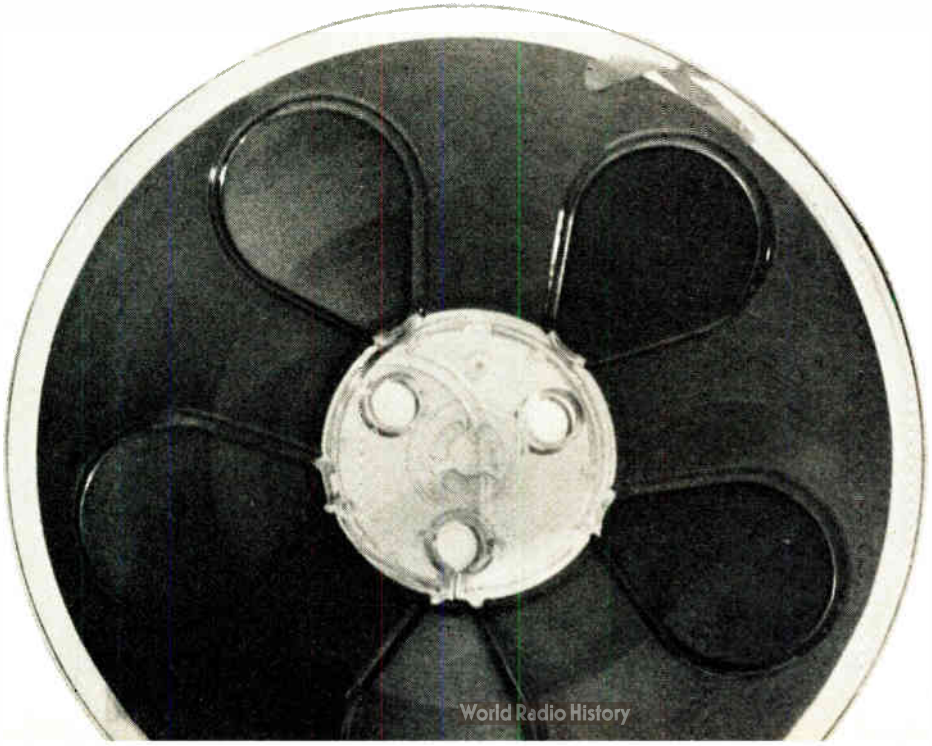
Home recording

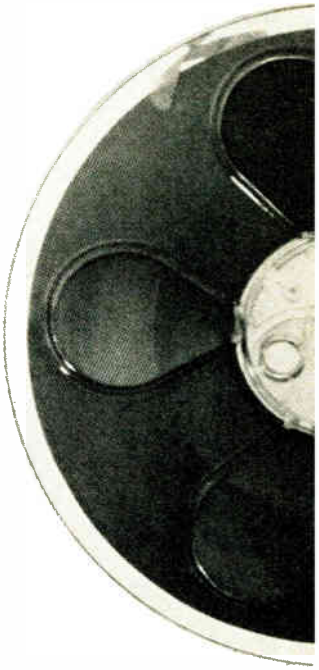
NEW ERA BEGINS

takes on a shimmering, new dimension as the nation's broadcasters set plans to deliver stereo over the FM air.

by Ralph Freas

Whether you're an old hand at tape recording or are just getting started, several important developments of the past year are worth your attention. First, 1961 saw the start of stereo-FM (multiplex) broadcasting, projecting an era of taping full-frequency stereo recordings off the air. Second, a number of manufacturers turned to the production of player-only units—tape turntables, really. Third, while the production of cartridge recorders was marked by no adventurous designs, Bell Sound and RCA Victor maintained their positions in this field with new models of their previous machines—handsomer, tidier, and more compact. Each of these developments—and others—point to greatly increased recorder use, the spinning of thousands of miles of magnetic tape for the music listening and recording pleasures of several



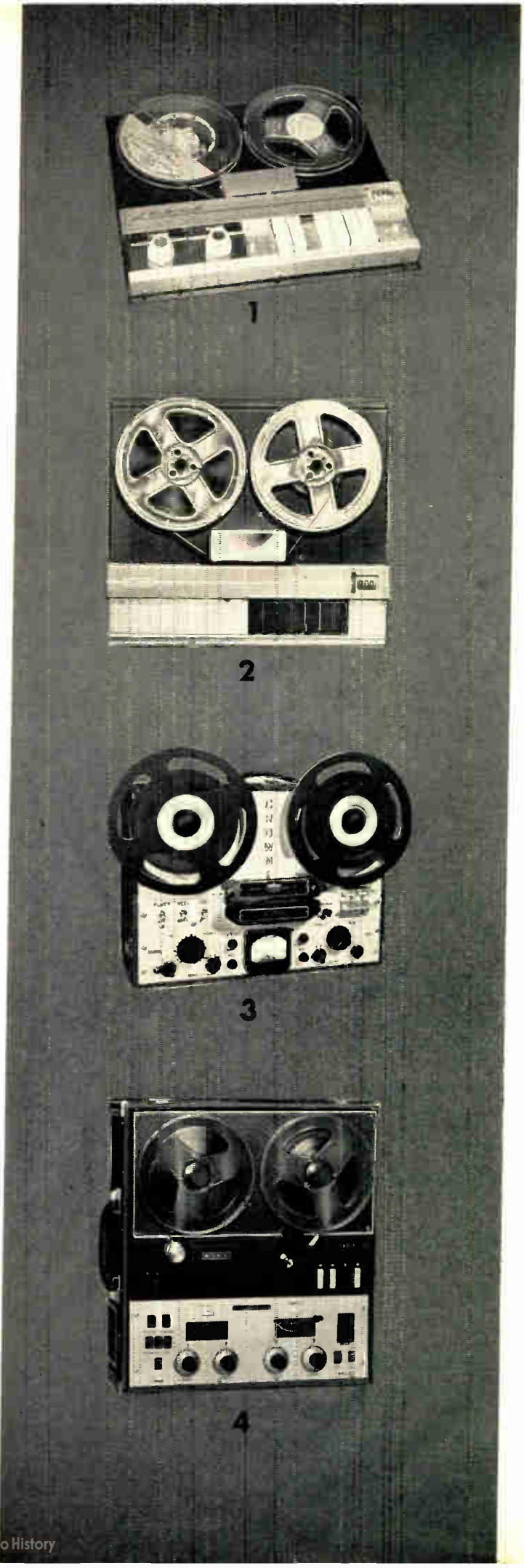


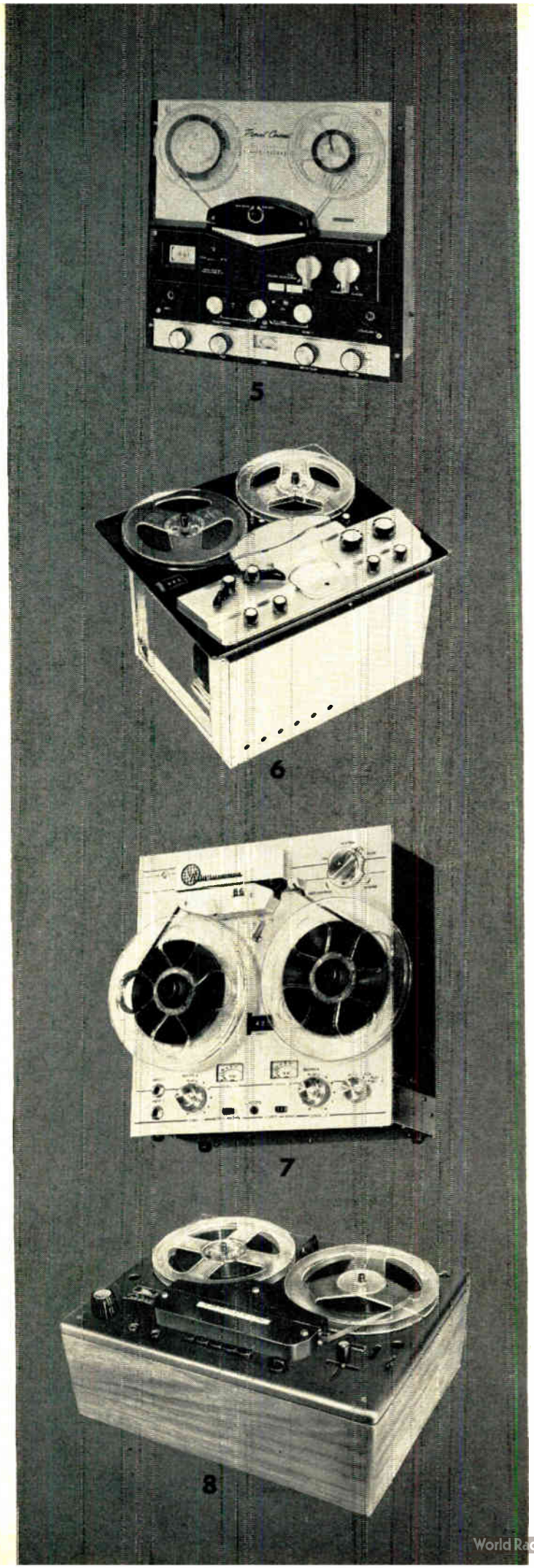
million recorded tape buffs and recorder owners. As early as last June we tape-recorded stereo-FM broadcasts from a station about eighty miles distant (WGFM, Schenectady, N. Y.). It's worth mentioning here because this was our first experience with what is likely to be a major preoccupation of most recorder owners for some time to come. For our recordings, we used a Roberts 990 stereo recorder connected to the tape output of our Dyna preamplifier. The signal was fed to the preamplifier from a Scott LT-10 tuner (which we built from a kit), and the multiplex adapter was also Scott's.

The results were excellent; no mistake, this was home-recorded stereo with a capital "S." The recordings, if anything, were "too stereo." The separation was very pronounced, a condition that will undoubtedly right itself after the broadcast engineers become accustomed to putting stereo signals on the air.

During the first summer week that WGFM was on the air with stereocasts, we could have made as many as fourteen hours of stereo tapes. Most of the programs were popular and light classical, with some original-cast Broadway shows tossed in for good measure. Although not all the program material was the kind we cared to keep permanently, recording all of it was no great loss since the tape could be reused for other recordings.

The important point is that, while making a stereo recording is as simple as making any other recording off the air, it's considerably more thrilling in playback. We did have to boost the volume a bit on the subcarrier (second) channel, but to call this a difficulty would be to overstate matters. Our normal practice with the Roberts 990 is to set both channels at a dial setting of seven. In recording stereo-FM the second channel gain was boosted only a quarter of a notch, to seven-and-a-quarter. We were guided in setting the level by the VU meters as well as by the actual sound from our loudspeakers. One VU meter was consistently just a bit higher than the other. The quarter-of-a-notch





Illustrated at left are: 1) Bell's T-333 ($199.95). 2) Knight's KN-4000 ($132.50). 3) Crown's professional Model 800. 4) Sony Superscope's transistorized Model 777 ($725.00). 5) Webcor's Regent-Coronet ($219.95). 6) Heathkit's AD-40 ($179.95). 7) Viking's Model 86 "Stereo Compact" ($297.50). 8) Tandberg's Model 6 ($498.00).

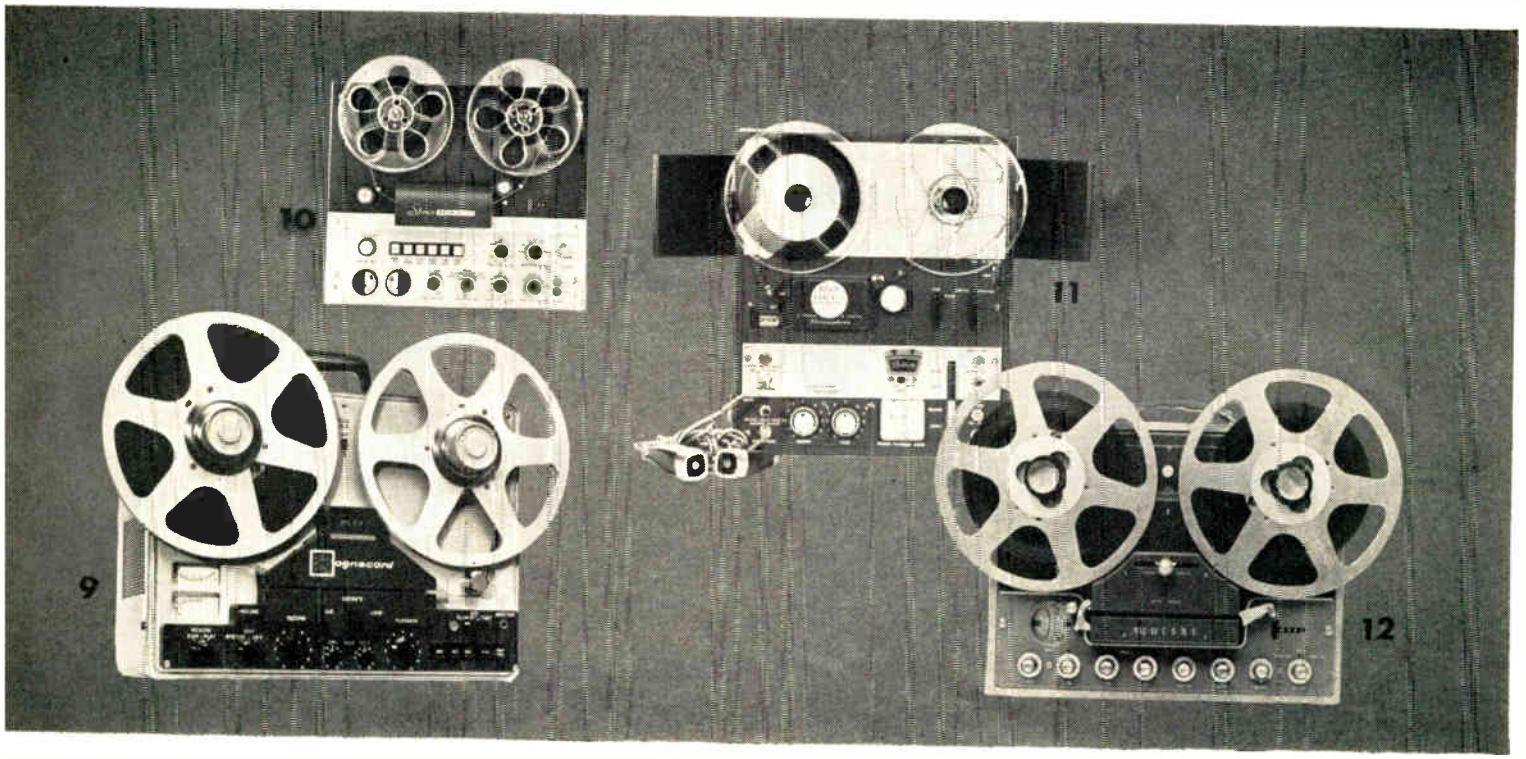
adjustment compensated for the difference on the meters as well as the speakers. The difference in signal strength, by the way, is more noticeable when the listener is using monitor earphones.

While the new possibilities for making your own tape recordings are the most dramatic aspect of recent developments, the "playback-only" instruments mentioned above have intensified interest in the tape medium as a program source. These "tape turntables" of course serve to complement an existing high-fidelity system (some people think they are indispensable to it), and they can also function as a companion to a recorder for duplicating tapes.

As a program source, the tape player has a wide variety of recorded tapes to draw upon. Virtually every major record manufacturer and many small ones produce four-track stereo tapes. And, since the player has no record head-with-electronics, it can be produced for considerably less money than its record-playback counterpart—particularly important if you are thinking of buying a unit in the "over $500" class but plan to use it only for playback. The saving could amount to half the cost of the recorder.

The new tape players are generally available in two models: one has the playback head and tape transport only; the other has, in addition, a built-in preamplifier at extra cost. The less expensive unit can be connected to the preamplifier stage of a high-fidelity system and work perfectly well. In some systems, however, better performance will result with the model which includes a preamplifier designed by the recorder manufacturer to function with the playback head he uses.

Ampex, for example, produces two players: the one with tape transport and playback heads sells for $199.50; and the preamplifier model sells for $249.50. The newest tape players to come along, from American Concertone, are the Galaxy 201 and 201a at $84.50 and $159.50 (the 201a has a built-in preamp). Tandberg's Model 65 is a stereo playback deck at $199.50 to which plug-in preamplifiers can be added later if desired.



For some time, of course, basic decks have been available from various manufacturers. The purchaser selects the heads and electronics to suit the functions he most wants. Thus, the purchaser of Bell Sound's T-300 series tape deck, for example, can have it in a variety of ways (monophonic record-playback, 2-track stereo record-playback, 4-track stereo record-playback, 4-track stereo playback only, etc.).

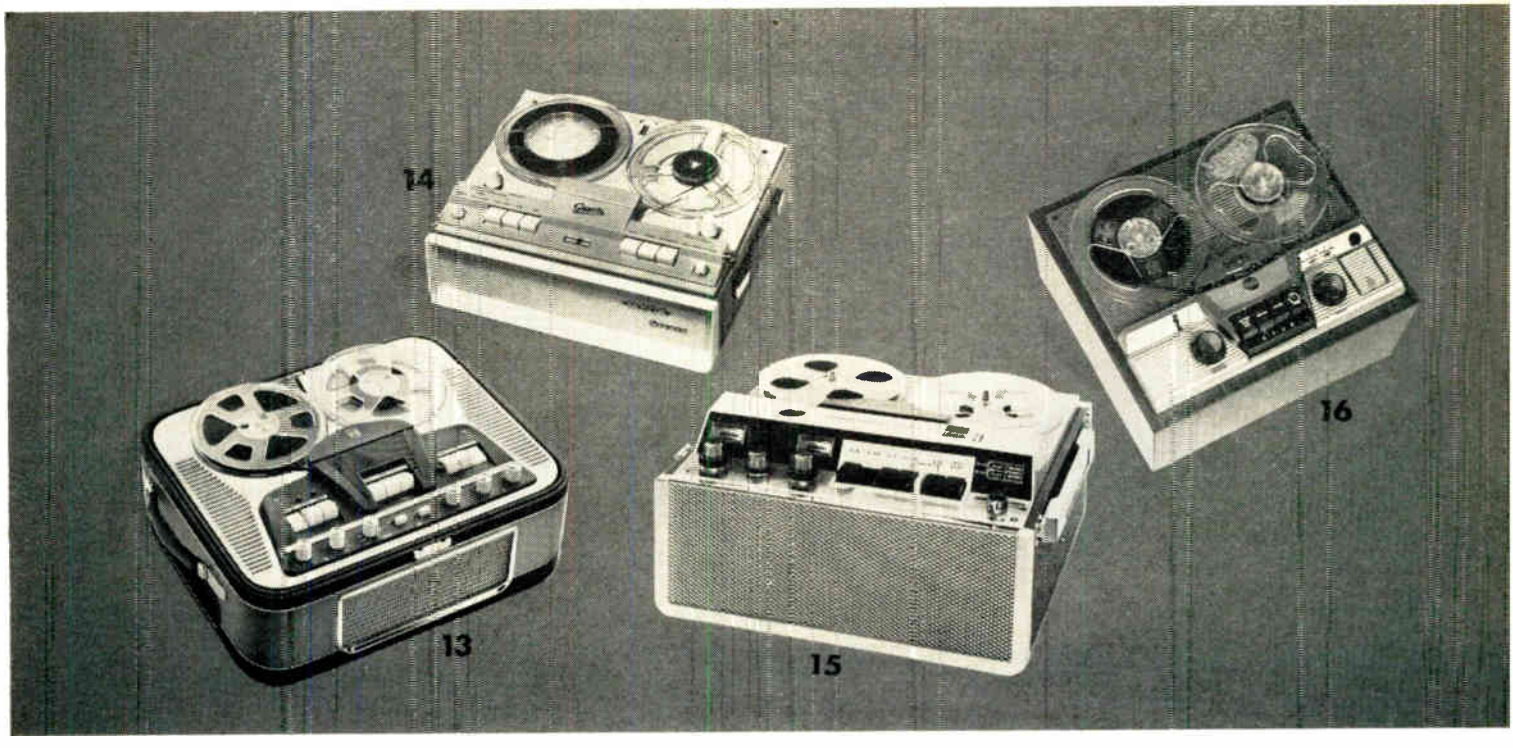
What advantages has a tape player over its disc counterpart? The chief advantages are these: durability of the recording, and lack of surface noise. With minimum care a tape recording will preserve its recorded message indefinitely; high frequencies and low frequencies alike maintain their quality after repeated playings. Dust—and resultant deterioration in sound—can accumulate on capstan, rollers, and heads over a long period of time, but an occasional (and easily performed) cleaning remedies this condition immediately. The disadvantages are generally thought to be higher cost and less handling ease.

Can tape achieve higher fidelity, most people want to know? This depends on several factors, including the tape itself and the quality of the components with which it is used. On a very fine high-fidelity system, I myself could not discern any difference in an A-B test between a disc and tape recording of the same program material. On a system of much lower fidelity, the quality of the recording was noticeably different; the tape sounded better.

Anyone who has listened to a radio or television program and thought "I'd like to have a recording of *that*" would be wise to keep a recorder on-the-ready. But whether you are interested mainly in making your own tape recordings or in listening to prerecorded tapes, you will want to integrate your recorder into your entire music system in a way pleasing to the eye. The photographs accompanying this article illustrate various possibilities that are both convenient and attractive.

The most common ways of installing a recorder are three: on a sliding drawer, vertical "rack-mounting," and placing it in the "well" of a lift-top cabinet. Each has advantages. The sliding-drawer and lift-top cabinet mountings protect the recorder from dust and present a neat appearance. Bear in mind, however, that some recorders (including "portables") may weigh thirty pounds or more—a circumstance that has special relevance for sliding-drawer mounting. The heavier the recorder, the shorter the distance the recorder will be able to slide out. Not only will great pressure be exerted on the slides but the entire cabinet assembly will feel the force of the weight. A word of caution: if the recorder is mounted on slides, allow sufficient space above the unit so that the reels and controls are accessible when the recorder is pulled out as little as fourteen inches.

Vertical rack-mounting on a shelf or in a cabinet has an obvious simple virtue. One can determine at a glance how much tape has run and how far the unrecorded tape has to travel. Some recorders do



not give optimum performance in this position (consult your instruction booklet), and most require the use of rubber reel-holders to keep the reels firmly in place. Rack-mounting does give the installation a slick, professional look.

If you own, or plan to buy, a portable recorder in a luggage-type carrying case, the lift-top cabinet installation has a specific advantage. The entire recorder in its case may be placed in the cabinet and little additional space for the carrying case is required. Then, if a recording opportunity outside the home presents itself, the connections to the rest of the music system are simply unplugged and you are ready to go. A handsomer built-in appearance is possible if the recorder is removed from its case and placed in the "well" so that only the top plate is visible. Some recorder manufacturers provide a template for cutting the "well" to the exact size required to accommodate the mechanics and electronics of the recorder, and some make the removal of the recorder from its case very easy. One popular model, for example, is held securely in its case with only four screws.

So much for physical placement. What is the best way to integrate a recorder electrically? Most newcomers to tape recording do what seems quite natural in recording off the air. They simply place the microphone in front of a loudspeaker and pick up whatever comes out—in addition to any random noise in the room, trucks passing in front of the house, etc. After more or less disappointing results, the newcomer discovers that he can attach a patch cord to the voice-coil terminals of the speaker. This

9) Magnecord's 748 "Olympian". 10) EICO's transistor Model RP-100K ($299.95, kit). Roberts' Model 1040 ($299.50). 12) Newcomb's SM-310. 13) Norelco's "Continental 400" ($299.95). 14) Graetz's M50K. 15) Concord's "Stereophonic 880". 16) Harting's Model HM-4.

may sound technical and a bit complex, but it's almost as simple as plugging in a microphone into the recorder. Some manufacturers supply patch cords as standard equipment; otherwise, the home recordist can buy them for very little money at an audio or radio repair shop.

Within a component high-fidelity system, however, there may be several possible "tap-off" points. Generally, the best place to tap off is the point closest to the signal source. The farther a signal travels through the high-fidelity system, the greater is the chance of the signal being degraded. The most logical tap-off point for most people will be the preamplifier, since most preamplifiers have a "tape out" receptacle on the back of the chassis. And this is true whether the preamplifier is separate or integrated with an amplifier and/or tuner.

One final word on integrating a recorder. Once the recorder is built in, there will be no loss of recording opportunities. Have the recording level preset and keep a reel of tape threaded through the machine. Then, when opportunity comes, simply turn a switch and the recording is yours for the taking. Let's say that you have integrated your tape recorder into a high-fidelity system which includes a multi-

plex adapter or a stereo FM receiver with multiplex built in. Your local FM station has set a stereo broadcast for the evening that you want to preserve on tape. What kind of tape will you use?

Someone once called magnetic tape "a piece of rusty cellophane." The description is apt. Magnetic tape consists of ferrous oxide (that's rust) coated on a plastic backing (something like cellophane). Unlike rust, however, the ferrous oxide coating of magnetic tape is precisely even and smooth to guarantee precisely even and smooth recording quality. Currently, two kinds of backing are used; cellulose acetate and polyester ("Mylar"). Cellulose acetate has been used for some time and is still used for most home recording. The polyester type is stronger,

17) Revere's T-11-4 tape deck. 18) Monarch's portable stereo recorder. 19) Ampex's Model 934 stereo tape player ($199.50). 20) Concertone's Model 508 recorder ($520.00). 21) Realistic's "Dauphine" recorder. 22) V-M's self-contained stereo portable. 23) Realistic's stereo 770 deck.

less affected by temperature and humidity, and also a bit more expensive. Despite the additional cost, it is steadily growing in use and finding many devotees among home recordists.

The strength of polyester permits coating on a thinner backing and allows the manufacturer to put more tape on a reel than he could with the acetate backing. Thus, a seven-inch reel of acetate-backed tape (1½-mil thickness) will contain 1,200 feet of tape, while the same reel size can hold 1,800 feet of polyester-backed tape (1-mil thickness)—a fifty per cent increase in the length of the tape for about seventy-five per cent more money. Acetate-backed tapes are also available in 1-mil thicknesses, and polyester-backed tapes can be had in ½-mil thick-

nesses. The most common tapes are, however, the 1½-mil acetate and the 1-mil polyester. In terms of stereo playing and recording time, 1,200 feet will enable you to make a one-hour recording (four-track at 7.5 inches per second) and 1,800 feet will allow an hour and a half.

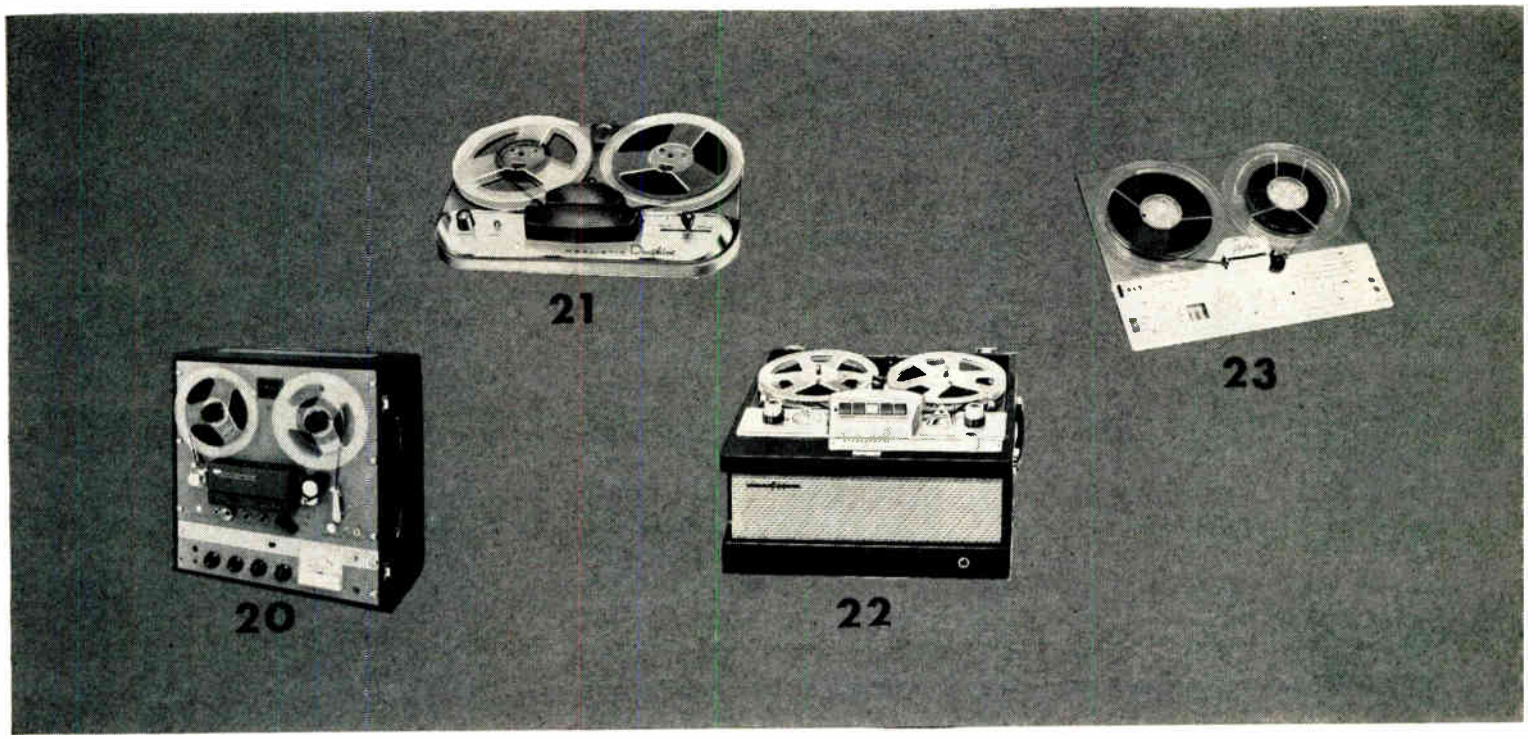
Tape on reels and the threading of it through a recorder is regarded as somewhat suspect by the less nimble-fingered. Actually, as anyone who has owned a recorder knows, threading a tape is a simple task. Do it two or three times and you can do it blindfolded. But ours is a nation that always looks for a still easier way of doing things, and much thought has been given to the development of a tape magazine, or cartridge, that will play automatically on being placed in a recorder.

More than two years ago, RCA produced and marketed a cartridge tape player. Other manufacturers, with the single exception of Bell Sound Systems, took a "wait and see" attitude and continued to produce reel-to-reel machines. Since the industry did not rush in to produce the cartridge players, the attention they received from the general public was less than sensational. But RCA and Bell Sound seem convinced that the cartridge player will find many buyers, and this year both firms are again producing new models. They are smaller, lower in cost, and can handle small reels as well as the cartridges for which they were designed.

A distinctly different type of cartridge has been developed by CBS Laboratories and Minnesota Mining and Manufacturing Company. It represents a complete departure from all other tape recorder/player systems. About ⅜ inches thick and less than four inches square, the cartridge proved itself in demonstrations as an effective sound reproducer. At this writing the 3M people have scheduled the cartridge and its player for introduction "sometime later this year."

Magnetic tape can handle a great number of complex signals to do a variety of jobs simultaneously. In the foreseeable future, a recorder may be used to activate various household appliances since anything that works electrically can be set going by magnetically recorded signals. Conceivably, most household chores could be tape-operated—from washing clothes to making coffee. Already, tape recorders are used to answer telephones and take messages. Compared to what it may eventually do, recording and playing back music stereophonically is one of a tape recorder's more elementary functions. This it does superbly well.

Stereo sound in the home got its start on magnetic tape. Indeed, had not tape blazed the trail, stereo-for-everyone might still be just a fond hope in the hearts of pioneering audio engineers. Instead, it's the most compelling kind of music listening and, with stereo-FM broadcasting a reality, one can now produce stereo recordings—on tape—at home.



BY RUSSELL CLANCY

THE JOYS OF *Shopping for Stereo*

Rather than a chore, the purchase of a component stereo system can be an adventure in entertainment electronics. That's the belief of our author, a seasoned stereo shopper who herewith lays down a few beginner's ground rules.

Perhaps nowhere in the marketplace is there a product offered for sale that the potential customer understands less about than high-fidelity equipment, and, at the same time, there are few purchases he makes on a more subjective basis. Those who refuse to be intimidated by the technological mysteries will find, however, that while learning about this delicate and precise machinery makes many demands upon them, it also offers great rewards. The intellect and the emotions, patience and courage —not to speak of the physiological responses of the ear and brain—are all actively engaged in putting together a component music system as they are in the fullest appreciation of music itself. The ultimate authority in this process must therefore necessarily be you—but preferably a reasonably informed you.

Now, it may not be crucial to understand a negative feedback circuit but it *is* helpful to know that such a thing exists and that it should exist in that amplifier you're fondly turning over in your mind. Here is the exception that proves the rule: a little knowledge is not necessarily a dangerous thing.

But, you say, there's the rub—where to get information and in a form intelligible to a mind that did not grow to maturity at the Massachusetts Institute of Technology. Well, the fact is that such information is readily available from a number of sources. Your instruction usually begins when you first step over the threshold of an audio store and turn, trusting, to the salesman. Components salesmen are usually devoted to and intimately acquainted with their product, and from an ethical standpoint, their personal fidelity is generally high. Few are importunate and most assume the role of friendly counsellor—although not entirely without a touch of in-group snobbery, which is, perhaps, understandable.

Realizing that he is dealing with a very personal matter, the good audio salesman seeks by simple, thorough indoctrination and demonstration to equip his customer to make his own decision—never to make it for him. Jim Carroll, one of New York City's most helpful and therefore most sought after audio authorities, was a good example. He used to be on the staff of Harvey Radio, and a half hour with him was like sitting in on a fine lecture. He devised an ingenious procedure for assisting buyers to assist themselves in selecting that most subjective of all components: the loudspeaker. He asked that they make a second trip to the store and that they bring with them one or two close friends or members of the family. At this rendezvous, Carroll put his little group in front of a microphone and recorded the familiar voices. He then played back the tape on the speakers under consideration and asked his prospect to select the unit on which the voices sounded most *natural*. He had learned that the uneducated ear cannot spot true naturalness in musical sounds but that it can do so in a flash with a well-known speaking voice. Jim says he can't remember having had a speaker returned.

It is through exposing one's self to authorities like Carroll or Anton Schmidt, also of Harvey's, or Harold Weinberg of Korvette's and others in various parts of the country that the novice begins to acquire reliable information and to break through the audio sound barrier. A large percentage of the sales personnel in the better audio stores are audio experts. Almost *all* of them are audio enthusiasts who go home at night to their own fine rigs and they enjoy "audio talk" as much as anyone.

Actually, there is much homework that can and should be done before entering into a transaction for keeps. Reference matter: audio catalogues, magazines like HIGH FIDELITY and, best of all, the well-known "man who owns one."

The catalogue is the bible of many sound enthusiasts. I always keep three of them (Allied Radio, Harvey, and Lafayette) in the night table drawer for random nocturnal browsings. I find them frequently as absorbing as a good novel and often more stimulating. Many of the larger stores throughout the country publish these annual catalogues, which contain pictures, descriptions, sales blurbs, specifications, *and* prices of a representative line of components. In leafing through these pages, one can quietly and calmly survey the field and at least gain familiarity with model names and price ranges.

There are also fringe benefits in the catalogues: sections of these remarkable little volumes are devoted to such items as time switches, photo-electric cells, power tools, and test equipment (gad, the romance of oscilloscopes and VTVMs!). What a joy it is to romp, via these pages, through the occult world of solenoids, socket turrets, powerstats, and high temperature bathtub capacitors!

As for the audio magazines, here is a magnificent world of information, "how-to" articles, audio test reports on current equipment, *and the ads*. The ads in a high-fidelity periodical are every bit as interesting and informative as the editorial content, and they often match their Madison Avenue prose with cold specifications. Each of these is accompanied by an invitation to write the manufacturer for a brochure giving further details.

"The man who owns one" is perhaps the best all-around source of sound advice on sound. High-fidelity people are wonderful people, bound together by deep common interests and problems into a sort of fraternity. (Hi Phi?) They delight in sharing tales of their audio joys and consternations. It is no trick at all to get one of them to expound on any subject or to listen sympathetically to your vexations. Further, if this initiate does nothing else, he can lead you to the "right" store and the best salesman in that store. He should be consulted and he can be found everywhere.

Then there are some pretty reliable rules of thumb, among which is something like "the best equipment usually has the highest price tag." However, the converse is not always true: there are overpriced, highly advertised numbers which are substandard and easily outrated by many lower-priced products. But it is generally true that to get the best you must be prepared to make a capital investment.

Shopping is simplified by master control panels that permit switching from one set of components to another. This "master console" is used by Harmony House, New York City audio outlet, and was designed and constructed by them.

The reason for the relatively high cost of audio equipment is not a matter of high markup or overhead. It is simply this: the best components have the best parts, the best workmanship, and the most painstaking preshipping testing.

My own system, which has evolved over a ten-year period from a very modest start, now has this kind of expensive quality and there is really a big, comforting difference. Among the upper-cost-bracket components are Marantz amplifiers and controls and, in buying each of these, I have always been impressed by the inspired appeal on the shipping carton: "Please Handle with Tender, Loving Care!" This has struck me as an extension of this company's state of mind as it babies every terminal lug and resistor all the way along its production line. One of the end results is that a product of this firm requires about as much service as a sundial.

There are, of course, many moderately priced systems which deliver a very high degree of fidelity, and some of them may meet the requirements of the individual better than costlier equipment. For people with limited budgets (and some courage) kits often offer excellent values both in money and in experience. Most anyone with patience and a working knowledge of English can put together any component he wishes from a kit and thereby enjoy the plusses of a new hobby and a better understanding of the intricate insides of his new toy. Many kits are of good quality, and some of them are outstanding.

As calm and dispassionate as you may try to be when you reach the Big Moment of Decision, you may find yourself to some extent the victim of excitement and fatigue. There is a certain amount of bustle in any retail store, and people are not usually forced to make decisions of such a critical nature while standing on their feet (chairs would help!). It is a good policy never to buy a system or even a single component unless you can do so on approval. Most of the better stores will permit this. What you hear on a given Monday will not necessarily sound the same on the following Thursday under different conditions and in different surroundings.

At home and relaxed is the place for *really* evaluating. It is important to live with your precious purchase for two or three days before passing the final judgment.

Finally, there is one other side of high-fidelity shopping that is often agonizing and frequently humiliating: the shopping for PARTS. Parts are objects you need when you want to go it a little on your own—installing a few switches or VU meters or replacing a fuse or a tube or doing any kind of expanding or servicing. Parts departments are the most lucrative in the high-fidelity store. In the merchandising of wire and cable, transformers, condensers, potentiometers, and all the rest is the real margin of profit for the dealer. Consequently, you would naturally expect a measure of efficiency and some relish for a good day's work.

But this is not so. These counters seem always to be crowded and after waiting and waiting and waiting for your turn (again, alas, on your feet) you usually encounter a superior individual who strikes you as not caring if he *ever* sees a grid dip meter or a miniature phenolic switch again in his lifetime. When you approach this ordeal you are usually a little shaky as to just exactly what you want and as you nervously try to communicate, searching for the exact professional jargon, and as the scowl comes over the otherwise impassive features of your adversary, you are tempted to forget the whole thing and walk out. It is further disconcerting to find that the salesman is frequently totally unfamiliar with the article even when you are able to identify it by code, rank, and serial number—that he does not have it in stock. To accumulate any sizable number of assorted parts it is often necessary to make the rounds of two or three different stores. This sort of thing is usually the burden of the advanced audio enthusiast only, however; if he assumes it, it's his own fault.

But the buying of high-fidelity equipment is, after all, something like courting a pretty girl. You are attracted at first by superficial characteristics. You seek to become better acquainted, and as you do so, the finer qualities shine through. Then there is nothing left to do but get married and live happily ever after.

Check list of information and things to take with you when shopping for equipment

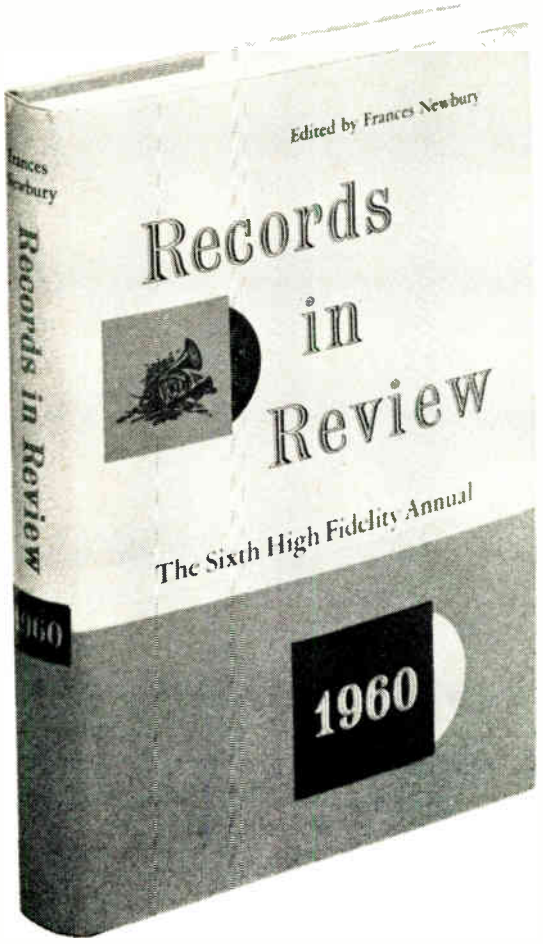
1. A SKETCH *showing the layout of your proposed listening room. This should include the following:*
   a. Size and proportions of room, including height of ceiling.
   b. Location of windows and doors, particularly doors usually left open.
   c. Location of bookcases and fireplace.
   d. Location and description of heavy pieces of furniture.

2. A BUDGET. *If you are really smitten with the disease of audiosis, be prepared to go beyond any such budget after you look and listen. However, it will be helpful to decide on a basic round number of dollars, like $400, $600, $1,500, or on up. Keep in mind the fact that it is possible to start modestly and improve and expand later. It is usually possible to sell or trade your used components for 40% to 50% of their original net cost and apply this to replacements.*

3. YOUR SPOUSE. *You've got it made if you have a partner who shares your designs on music and will become emotionally involved in the transaction. By all means take her (or him) along.*

4. INFORMATION *as to what existing furniture or facilities you can use to accommodate the new components. Bookcases or commodes are fine for most of this hardware. Closets are fashionable for amplifiers or even the entire system, exclusive of speakers.*

LIMITED QUANTITIES ONLY



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Haste has no place in speaker selection. Like fine wine, the savored by the listener. And, with new designs that seduce the

Undoubtedly some of the most exciting stereo news at the present time is loudspeaker news. Several important trends in design—some brand-new, others improved revivals—promise to fulfill the traditional requirements for good high-fidelity sound reproduction and the new needs by stereo. In all of them, the chief ingredient is imagination.

Today there is a welcome profusion of new speaker systems on the market. The majority, as in the past, are designed for the average-to-small living room in which most of us do our listening, but this is not to say that smallness is the main or only criterion. Designers are now aware that compactness is not the only—or always the best—way to produce good sound in a small room. Consequently there is a new emphasis on utilizing existing space in a variety of hitherto unthought-of ways.

One of the most interesting and significant of the new trends is the increasing use of reflected sound. Since the normal complement of living-room furniture often is a sound barrier between speaker and listener, many designers are now trying to get the sound from a speaker *around and over* these obstructions. A common technique aims the speaker up towards the ceiling or out towards the walls, breaking up the speaker's normally compressed

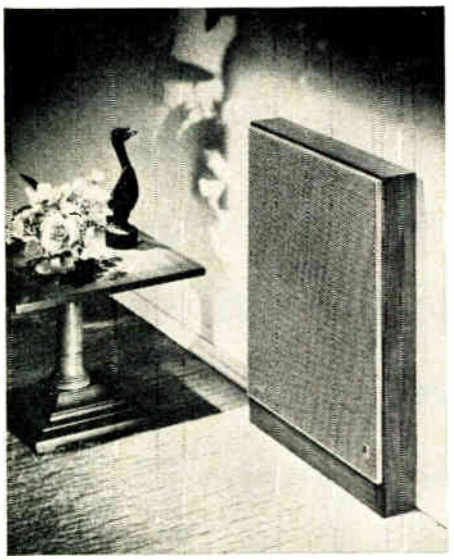
subtle qualities of a loudspeaker system are to be sampled and eye as well as the ear, deliberation takes even more time.

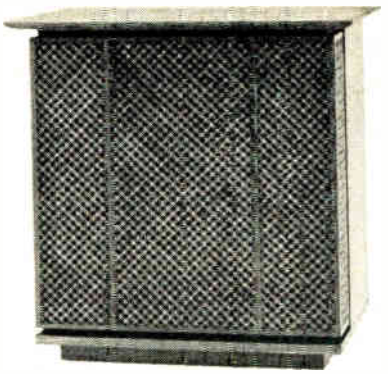
"beam" of sound into a broad pattern that covers the room like a canopy.

It has taken three years to make the virtues of indirect radiation convincing. For inevitably omnidirectional diffusion of sound sacrifices some of stereo's spectacular directional effects—a loss not taken lightly by listeners for whom stereo *is* directionality. But a growing number of audiophiles have come to prize the depth, spaciousness, and detail of stereo more than its Ping-pong effects. Furthermore, the broad spread of "indirect stereo" sacrifices only the extremes of stereo separation—violins are still unmistakably on the listener's left, cellos on the right.

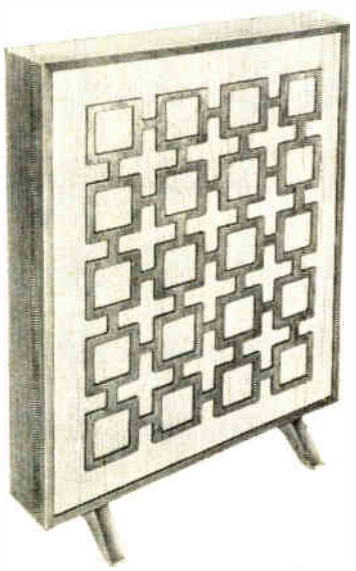
Along with an ability to circumvent the normal obstacles in a listening room, reflected sound has another important advantage. Its widespread distribution of sound makes almost any seating position a good one. Although the whole question of seating arrangements for stereo has proven to be less critical than was assumed two years ago, there is no denying that indirect stereo comes close to eliminating the problem completely.

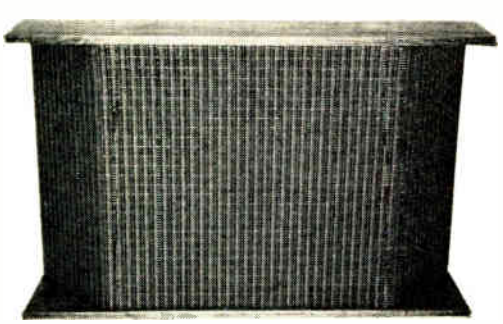
The newest of the indirect radiators is Harman-Kardon's Citation X, a design with several notable features. Not the least is its use of a *horn* for bass, the first new instance of horn loading since the





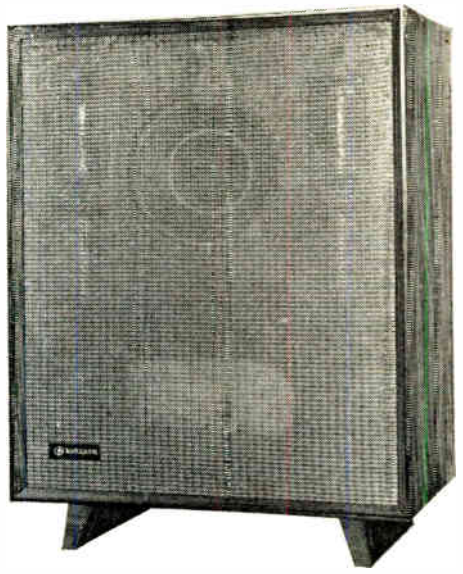
Above: Jensen's "3-P" ($139.50) has five speakers, is little more than 3½-in. deep. Above, right: J. B. Lansing's "Apollo" cabinet handles any of the firm's speakers through the use of special adapter kits. Right: Bozak's "Urban" design encloses the firm's B-302A three-way system. Shown here is the C-305U matching equipment cabinet ($185.00). Below: Rek-O-Kut/Audax's "Sonoteer" five-speaker system ($79.95). Front-panel grille is oil-rubbed walnut. Cabinet is only four-in. deep. Bottom of page: The polycoustic PC-28K ($176.31) is built from a kit, contains twenty-two six-in. speakers. Unit is almost 30-in. high, more than 40-in. wide.

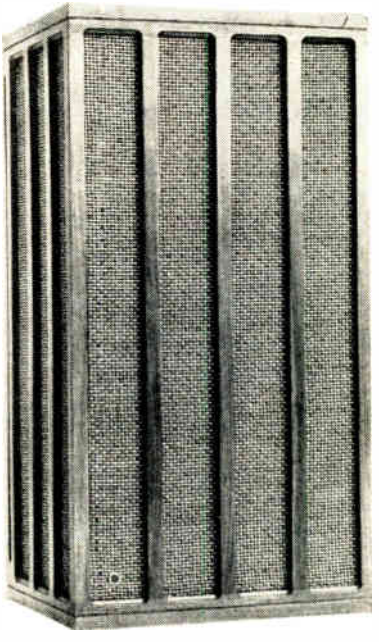




appearance, over three years ago, of J. B. Lansing's Ranger Paragon. The use of a horn-loaded enclosure was prompted in part by the Citation's special driver unit, made to specifications by Lowther of England. Like all Lowthers, the driver is an interesting and potent combination of a relatively small dual cone and a comparatively large magnetic assembly, and it's designed specifically for a horn. Pointed upwards in the Citation system, it scatters high and midrange frequencies up and out over a room; for bass, its back radiation is channeled downward through a *pair* of conical horns with the sound exiting near the floor through a pair of slots which supply additional loading on the speaker's already well-damped cone.

Other indirect radiators differ from the Citation in their use of one cabinet for *both* stereo channels. But the actual housing of the pair of speaker systems is all they share in common. Radio Frequency Laboratories (RFL) offers a whole line of indirect radiators, in sizes that range from bookshelf to mammoth, and each is designed to scatter sound *out and back* towards the walls of a room. In appearance there is little indication that they are speaker systems at all—the speakers as such are completely unrecognizable to anyone facing the enclosure.



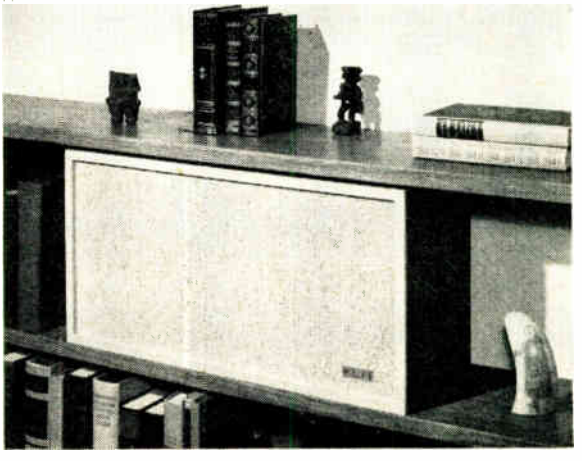


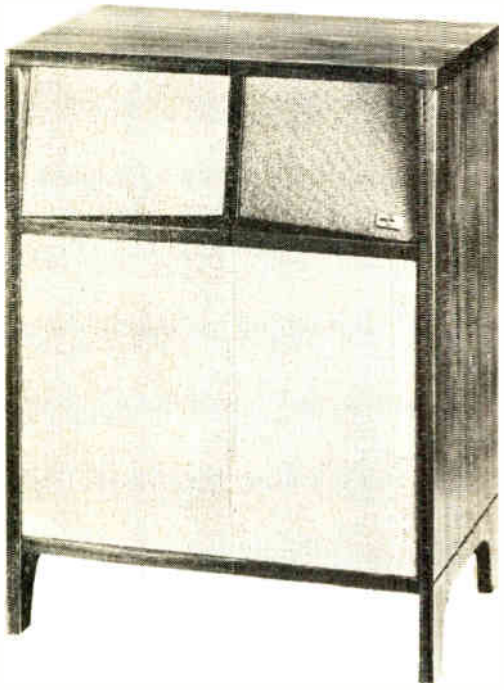
Above: Monarch's six element system—Model SP-100 ($79.95)—combines four electrostatic elements with large, low resonance cone. Above, right: Leonhardt's LH-190 is an ornamental unit dispersing full-range sound ($85.00). Unit is 24½-in. high. Right: The Crosby/Integrand ($480.00) is an integrated amplifier-speaker system which aims at canceling distortion electronically. Below, right: the KLH Model Ten ($96.00) is, in the manufacturer's words, "a true bookshelf unit" —smaller than most. This is KLH's first speaker system with the ducted-port design for reinforcing bass.

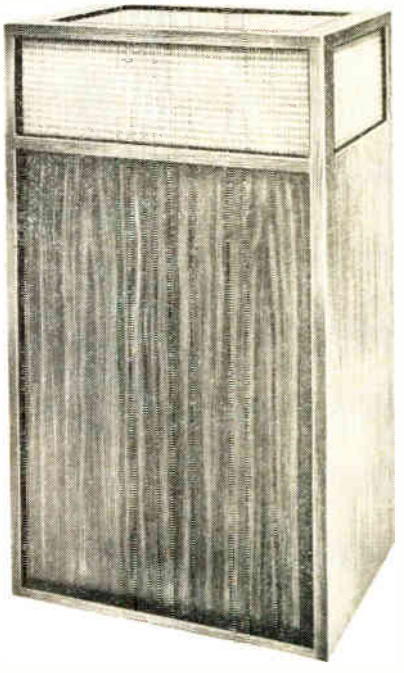
Two other indirect radiators, the Bozak B-304 and the University TMS-2, use adjustable doors on their cabinets to direct sound in the pattern desired by the listener. The B-304 is a straightforward combination of two of Bozak's highly respected B-302 systems. The TMS-2, however, uses a single woofer, fitted with two voice coils, to provide bass for both stereo channels.

At the opposite pole of design, but equally important to many listeners, are the "thin-line" speakers. The designers of thin-line systems are intent on using available living-room space to the best advantage, and the results of their efforts fit astonishingly well with the average living-room décor. As the name implies, the thin-line systems are shallow in depth—incredibly so by traditional speaker standards. Three or four inches deep, they fit unobtrusively behind draperies or stand with very unspeakerlike aplomb out in the open, looking like almost anything but what they are. The newest development here is the *true* bookshelf speaker, shallow enough to tuck comfortably into almost any existing shelfspace.

The first of the thin-line speakers, Advanced Acoustics' Bi-Phonic Coupler, can still claim after almost two years the most radical design and appearance of all. The woofer of this system is a rectangular *board* which replaces the usual speaker cone, and it has no enclosure, as such, at all. The board is attached directly to a voice coil and radiates completely on its own, with no help from its "cabinet." From the front, it appears to be a solid sheet of wood; the small metal tweeter near one corner looks more like an emblem than a speaker.







Above, left: The Janszen Z-300 speaker system from Neshaminy Electronic Corp. combines an 11-in. cone speaker with a pair of electrostatic elements in the cabinet as shown ($199.75). Above: The Citation X speaker system is an indirect radiator system which uses a horn for bass. Price: $250.00.

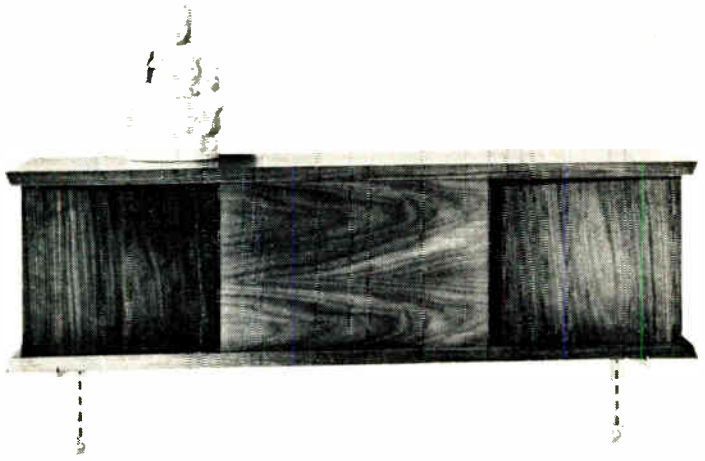
The rest of the current slim-line systems, made by Audax, Jensen, and KLH (other companies are planning to follow suit shortly), use conventional speakers. But carefully contrived techniques have gone into their design. All of them use low resonance woofers with long cone-travel to prevent the small volume of their enclosures from substantially hindering bass response. And part of the slimness of the enclosures is due to new magnetic assemblies which focus their strength in a smaller area and allow the depth of the speakers themselves to be drastically reduced. As for their over-all appearance, the veteran audiophile may note with pleasure that they *look* like speakers, their chic slimness notwithstanding.

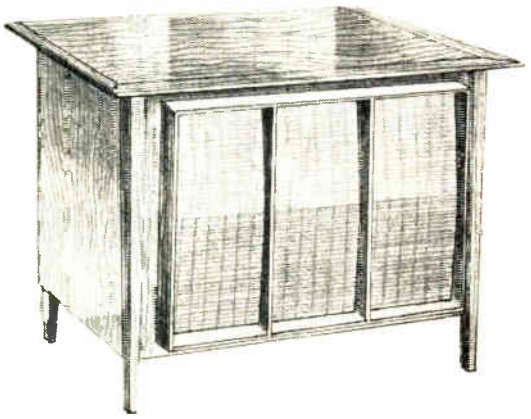
If one has the impression at this point that every manufacturer is intent on slipping his speakers, more or less unobtrusively, into a room, let's consider the surprising resurgence of big speaker systems. Not only have the older big speakers been regaining popularity, but they have been joined recently by three new entries. Not for a moment could any of the giant systems, new or old, pretend to be anything but what they are. They reveal their function at first glance, and they completely dominate all but the largest of living rooms.

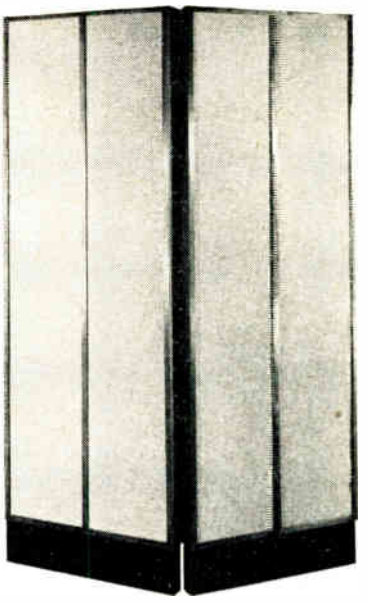
Obviously, the big systems offer a significant return for their financial demands and spatial requirements. They attempt to approach the intangible but fascinating level of "perfection." Whether any speaker system can exactly duplicate the sound of a ninety-piece orchestra in full cry is a question that won't be answered this year—or for many to come. Some systems, however, now come close enough to that goal to find a steady, appreciative audience.

Of the new giant systems, the most radical in design is KLH's Model Nine, which appeared a year ago. Standing some six feet high and resembling a room divider screen, the Model Nine is the first *full-range* electrostatic system marketed by an American company. It is actually a *pair* of full-range systems which the owner can join or separate. And the room divider analogy is apt; since the Model Nine radiates equally from front and back, it would seem to offer its best performance when placed in the middle of a large room.

More conventional—and very impressive in appearance—is Electro-Voice's Patrician 700. Although previous E-V systems have borne the Patrician title, the 700 is new in virtually every respect. It incorporates an unchallenged monarch of woofers, a thirty-inch speaker that does its job so well that the folded-horn cabinet design of previous Patricians is no







Above, left: Radio Frequency Laboratories (RFL) offers six different indirect radiators in various sizes and furniture styles. Shown here is the "Metropolitan" ($225.00). Left: The grille in front of this University speaker system is a "snap-on" selected from several styles. Speakers too are selected by the user from University's extensive line. Above: The KLH-9 is a unique, full-range electrostatic which radiates sound from both the front and back.

longer necessary or feasible. The frequency range above 100 cps is handled by three speakers, two of them new, and the complete system stands over five feet high and weighs 350 pounds.

Another giant is J. B. Lansing's Olympus system. It incorporates a new fifteen-inch woofer—the first Lansing unit to be designed for a big infinite baffle enclosure—and a horn-loaded driver for midrange and highs, itself bigger than many woofers. The Olympus designers have contrived an exceptionally beautiful cabinet with wooden fretwork replacing the usual grille cloth.

By now, it should be clear that the real trend of all speakers is towards diversity—greater flexibility for coping with all varieties of listening requirements. But what about the trends among listeners? How have *we* learned to cope with the demands of stereo?

We have learned several important things. At the top of the list is the fact that *precise* matching of speakers for stereo is not as important as we once believed. As long as two speakers don't exhibit markedly different response characteristics, they can be teamed without undue worry about such matters as "instrument wander" between them. Their efficiencies can be matched by a preamp's balance control or an external speaker volume control (L-pad). Caution is important and random matching unsuccessful, but there is no reason to trade in a favorite old speaker without first trying to match it with a speaker of similar characteristics (preferably from the same manufacturer).

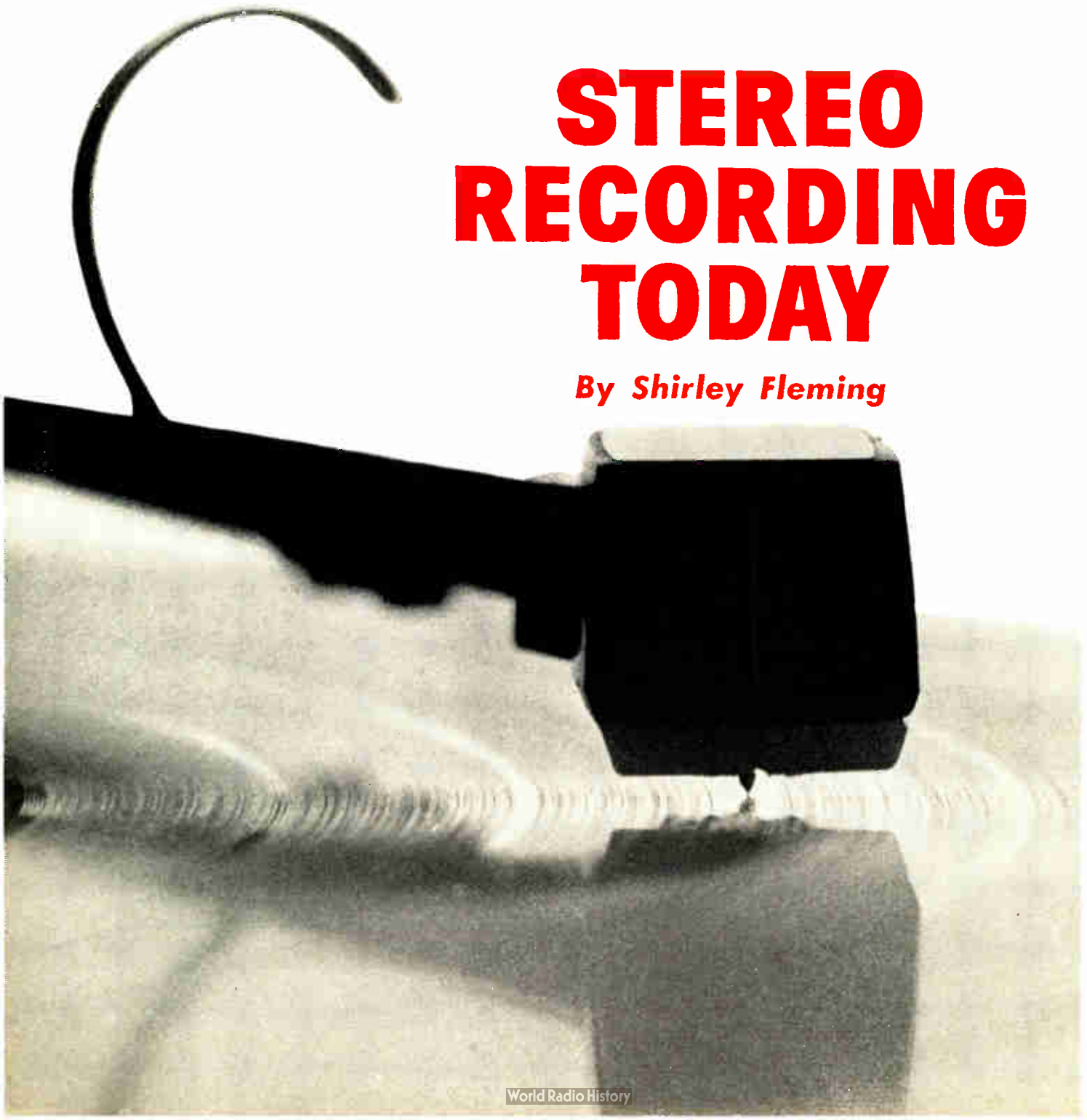
We have learned too how to cope with apparent deficiencies in our listening environment. For many of us, the simple expedient of placing speakers at a healthy distance from the usual seating area can widen the area of maximum stereo effect. For this reason, one of the shorter walls in a listening room is usually the best place to locate speakers. And, when the spacing is feasible, placement of speakers in room corners can often aid both their stereo impact and their over-all sound. There is no magic formula, however, and experimentation is still the order of the day. We have fortunately learned to avoid irrevocable arrangements—such as the building of speakers into walls without some attempt at advance appraisal.

As for the "hole-in-the-middle," a third "center channel" speaker can fill it or a pair of speakers moved a bit closer together can turn the trick. So also can learning to recognize when speakers are out of phase—instead of blaming the concomitant thin, uncertain sound on excessive separation.

In short, what has happened is that a good number of us have stopped treating stereo in the abstract and have started to live with it. For those who haven't, the number and variety of new speaker systems now available may point the way. All are calculated to swell the ranks of ardent stereophiles.

STEREO RECORDING TODAY

By Shirley Fleming

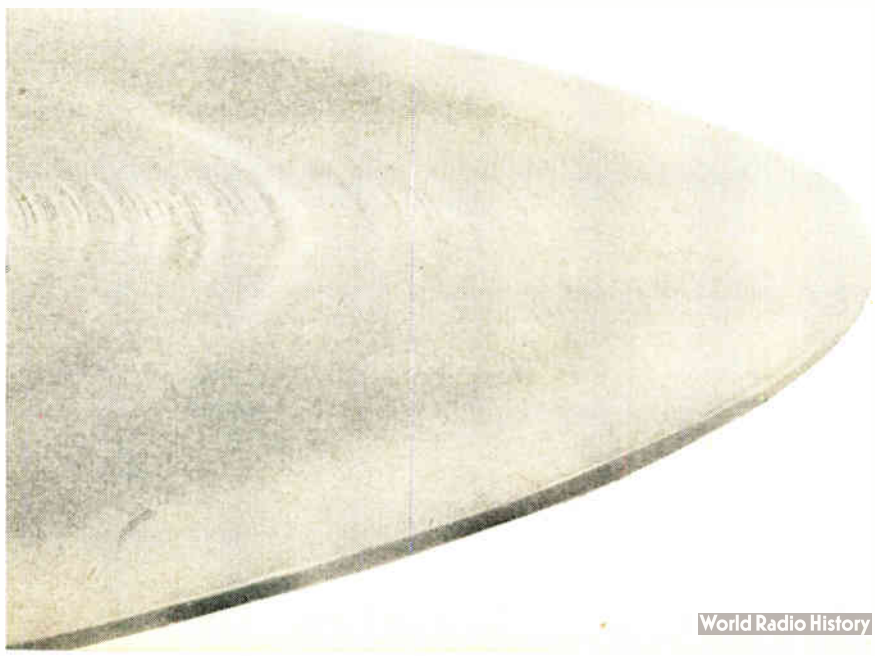


How well has stereo fulfilled its promise of sonic splendor? Has art been compromised by engineering —or is the opposite true? What exotic new aural experience has stereo achieved?

SCIENTIFIC AND POLITICAL revolutions share a number of common characteristics: in both cases, there are bound to be casualties, and there is likely to be a disgruntled minority simmering for awhile after peace has been declared. There is almost sure to be, too, a time of uncertainty and experimentation once the dust has settled. But a scientific revolution has two great advantages over the bloodier sort—the casualties, if they're worth resuscitating at all, can be restored to life, and the future (as the leaders promise all along) invariably *is* rosier.

Which brings us to the New Order established a little over three years ago by the advent of stereo. When stereo burst upon us, there was both joy and dismay among the music-loving citizenry. "Concert hall realism" was the motto on the front-line banners. A cry of liberation, indeed—but inevitably there were protests. Was recorded music to be split unnaturally into two channels with a hole in the middle? Was the listener to be chained to his chair at a point precisely equidistant from a pair of speakers and compelled to stare relentlessly at a point of nothingness between them? Was the new technique to cast into limbo all the fine old performances that monophonic recording had given us?

From our present vantage point we can see that these forebodings were largely unfounded. The hole in the middle is filled by recording techniques that result in a spread of sound rather than a crude left-right separation. The smooth distribution of sound makes absurd the notion of the listener having to sit immovably at the apex of a self-imposed triangle. As for monophonic records, they seem actually improved in sound when played back on stereo equipment; and in fact they are also susceptible to being reëngineered into a close imitation of true stereo, as RCA Victor has demonstrated with three Toscanini recordings, and Capitol with the first volume of its Beecham-Haydn symphonies. Stereo, in the meantime, has given birth to a brand-new category of recordings—the sonic spectaculars—which have created some astonishing effects within the past year. Each one is something of a *tour de force*. But they



Sounds of the opera: top left, an offstage horn for Tristan *takes cue by closed-circuit TV, while at bottom right, distant hunting horns are recorded in a separate studio. The gentleman at top right impersonates a burbling coffee machine for* Die Fledermaus, *while at lower left, cold water on a hot iron provides steam for the same opera.*

represent only one achievement of a flourishing science, and the time seems opportune to take note of some of the others, and to consider, with postrevolutionary calm, just what the difficulties and challenges have been.

The past three years have proved that nothing in regard to stereo can be taken for granted—not even a definition of its purpose. Take, for example, the objective of "concert hall realism"—seemingly a goal no one could quarrel with. Yet no sooner do we settle comfortably upon this criterion than Leopold Stokowski, the most sound-conscious of celebrated conductors, raises his white-maned head in refutation. "Concert hall sound," he said in a recent interview ("Conversations with Stokowski" by Robert C. Marsh, HIGH FIDELITY, April 1961), "is a completely meaningless criterion for music heard in the home. . . . No two concert halls sound the same in any way. I am not even certain that the way we hear in a concert hall is the best and only way to listen." Suppose we insist that we are perfectly satisfied—indeed, grateful for the opportunity —to listen to music reproduced as it sounds in the concert hall. But as it sounds to whom? To the listener sitting in the front row of the balcony? Or to the man in the middle of the center section downstairs? Or as it sounds to the oboe player, surrounded by instruments? Or to the conductor on the podium (the *only* place to hear music, a conductor acquaintance of mine insists)? There is no neat, decisive answer to this question—there are too many variables, not the least of which is listener preference.

If "concert hall realism" fails us, then, as a complete definition of stereo's achievement, how can we best describe what stereo offers? A professional violinist put it most simply, not long ago: "Listening to stereo gives me a sense of relief. After the crowding together of all the sounds at one source, in a monophonic record, there is a wonderful ease and spaciousness in stereo. Comparing them reminds me of water being forced through a pipe—when you enlarge the pipe, or rather, install two pipes, the force lessens and everything is more relaxed."

Ease and spaciousness of sound. To this end stereo aims, and all its special attributes—depth, directionality, movement, breadth of separation—are determined by this ultimate goal. "Stereo is simply a tool," says an RCA recording director. "It has to be used with good taste."

It is at this point that the challenges of stereo recording really come into focus. For the kind of ease and spaciousness and the kind of directionality proper for one musical medium may not be appropriate for another. The sense of spaciousness desirable in a recording of an opera would be totally out of place in a recording of a string quartet, and the solid scoring of a Brahms symphony demands recording treatment quite different from that of a baroque concerto. And there are times when what the musician wants and what the engineer wants do not coincide. Then it is that science and art must get together and, perhaps, compromise.

Let us get down to case histories. Stokowski, during his years as conductor of the Philadelphia Orchestra, professed a great fondness for the acoustics of the Academy of Music; when he returned to Philadelphia for his first stereo recording project there, he was disconcerted to find that Columbia Records was moving him into a hotel ballroom for the session. Why? he wanted to know. Better separation, was the reply. The Maestro was mollified.

Another incident which comes to mind has a different ending. When in 1958 Van Cliburn undertook to record the Tchaikovsky First Piano Concerto for RCA Victor in the ballroom of New York's Manhattan Center, he was surrounded by screens which, designed to cut down reverberation and aid separation, also isolated him from the orchestra and interfered with his view of the conductor. Things went badly from the start, and after nearly a full day of unsuccessful tapings the session was called off. A few days later Victor tried again, this time in Carnegie Hall (not a perfect acoustical setting for recording) and Cliburn, at home on a familiar stage with the musicians close around him and no screens to interfere, gave a great performance.

Compromises need not always be so drastic. Max Goberman, who has been engaged in conducting Vivaldi and Corelli in stereo (for the Library of Recorded Masterpieces), tells of a simple solution to the problem of taping a Corelli concerto grosso in such a way that the solo group (two violins and a cello) remains distinct from the string orchestra. No question of sharp left-right directionality was involved here, because the normal seating of the baroque orchestra places the solo instruments in the center. When the first take, made with the usual seating arrangements, was played back, it was found that, though the solo group was perfectly centered, it tended to melt in with the rest of the strings. Goberman thereupon placed the group *behind* the orchestra with the center microphone covering it at fairly close range. The result was a beautifully distinct solo section which sounds, on the record, slightly *forward* of the orchestra and unmistakably separate. A natural sound was achieved by an unnatural seating arrangement—an arrangement that cannot be imagined in hearing the finished disc.

There are times, too, when the music lends itself to unorthodox seating. When Arthur Fiedler recorded the Gershwin Piano Concerto in F for RCA Victor in the spring of 1961, the percussion was divided into three sections: kettledrums on the left channel, cymbals in the middle, snare drums on the right. Gershwin might never have envisoned such a scheme, but it is hard to believe that he would have been perturbed by it.

The concept of naturalness—of letting the music itself determine the way stereo will be utilized—is dominant in classical recording today as never before. Where the score demands separation, it can be achieved, and amply. Columbia's recording of Vivaldi's Concertos for Two Violins and Orchestra (with Stern, Oistrakh, and the Philadelphia Orchestra) is a perfect illustration; such works are made to order for left-right placement of the soloists and Columbia gives this aspect full play. Bach's Sixth *Brandenburg* Concerto with two solo violas, on the other hand, does not lend itself to left-right treatment in spite of first appearances. The two violas, throughout the first movement, are locked in the tightest of canons, an eighth note apart, and the performers must stand close enough together to pick up split-second cues from each other. The work, to say nothing of the players' nerves, would fall apart if wide separation were attempted in live performance. In view of this, the forthcoming Library of Recorded Masterpieces version foregoes the temptation to station the violas left and right merely for the sake of "stereophonic" effect.

It is opera, of course, which more than any other form of serious music permits the fullest and most dramatic use of stereo techniques. But here too there are matters of taste and appropriateness involved. The stage action of *Tristan und Isolde*, for example, is limited even in the theatre by the libretto itself. Left-right movement is secondary; but depth is a factor. In London's recent and well-praised *Tristan* (Nilsson, Resnick, Uhl, Krause), the first in stereo, the engineers departed from the customary manner of recording opera which puts the singers well out in front of the orchestra. London's singers are above and behind, as they would be in the opera house; the listener is seated almost at the brink of the orchestra pit, and the expanded dimensions of stereo accommodate the orchestral detail with no loss of clarity from the stage. Other operas are naturals for stereo. Mozart would undoubtedly have enjoyed to the hilt the theatrical possibilities of the technique: Angel's *Marriage of Figaro* (Schwarzkopf, Moffo, Cossotto, Wächter, Taddei) moves characters back and forth across stage, and the final scramble in the garden, with Figaro and Susanna hidden on opposite sides and the rest of the cast distributed in suitable states of quandary in between, is an example of stereo opera at its most effective. Another notably successful opera-in-three-dimensions is London's recent *Fledermaus* (Gueden, Resnik, Kmentt, Wächter), which creates some lively illusions of both distance and direction.

The spaciousness of stereo sound, so obviously consonant with opera, might first appear to be largely wasted in the narrower confines of chamber music: the fact that one's speakers are twelve feet apart, the argument might run, is no reason for disrupting the classical compactness of a string quartet whose outer instruments are no more than five or six feet apart. But this argument overlooks one aspect of stereo recording, and a crucial one at that—the function of the all-important center recording track. With the proper placement of microphones—a technique well in hand today—the center microphone will capture the cohesive, homogenous quartet sound while the left and right microphones account for the separation of the violins from the cello and viola. When the three tracks are merged into two, with the center

divided evenly between left and right, the spacing in playback sounds precisely the same as on stage, and the conversational exchange among instruments, one of the delights of the quartet medium, is wonderfully sharpened. The recent Budapest performances of Beethoven Op. 59, Op. 74, and Op. 95 on Columbia is a case in point. So too is the Deutsche Grammophon set of the Brahms Piano Quartets performed by the Quartetto di Roma, in which the violin appears slightly to the left, the piano in the center, and the viola and cello to the right.

Above: The Budapest Quartet (with clarinetist David Oppenheim) find three microphones adequate for their chamber group. Below: The microphone placement used by Igor Stravinsky in recording chorus and orchestra is a complex that requires engineering skill and time.

A curious side light to the stereo quartet question may be mentioned here if only to prove that recording engineers can never rest on their laurels. Elliot Carter, in his Pulitzer Prize-winning Quartet No. 2, indicated that the work should be performed with the players sitting in a straight line (or almost straight) in order to clarify the densely woven texture of the music. Although it took Mr. Carter and the Victor recording director some time to persuade the Juilliard Quartet to sit this way, with the microphones lined up before them, the arrangement proved so successful that the Quartet decided to use it in public performance of the work the very next day. (It turned out, incidentally, to be made to order for stereo.)

Left-right separations and the distinct placement of instruments, the two unique properties of stereo which are used to broad effect in opera and more subtly in chamber music, arrive at open, workable middle ground in the realm of pure orchestral music. Whatever the seating plan of the orchestra, and whatever the character of the music at hand, the stereo recording can transmit the spatial elements which are heard to some degree in the concert hall. Whether it is the Concertgebouw or the Boston Symphony, both of which seat violas on the outside, or the New York Philharmonic with its cellos on the outside, or whether it is an orchestra which puts first and second violins on opposite sides to catch the questions and answers in a Haydn symphony, the placement is accounted for in the broad span of two-track reproduction. The effect is rather like listening to music from one massive speaker ten feet long. And the result, particularly in a complexly scored work, is to clarify the entire pattern of sound.

In contemporary music particularly, this sharp focus is an asset—a fact which Stravinsky well knew when he conducted *Pétrouchka* and *Rite of Spring* recently for Columbia. There is never, in these scores, any excess weight or wasted timbre: each instrument is meant to be heard in its own right, not simply as reinforcing the melodic part of another section of the orchestra. For this end stereo was made, and Stravinsky's own attitude towards recording, a Columbia official relates, has changed noticeably in the past three years. At one time the subject did not greatly interest him (though he had recorded many of his works in monophony some years ago), but now his enthusiasm for stereo is keen. Another great musical figure who, since the coming of stereo, has overcome a natural disinclination towards electronic and mechanical devices of any kind is Bruno Walter. His re-recording in stereo, at the age of eighty-five, of the orchestral music of Beethoven and Brahms (for Columbia) is his greatest endorsement.

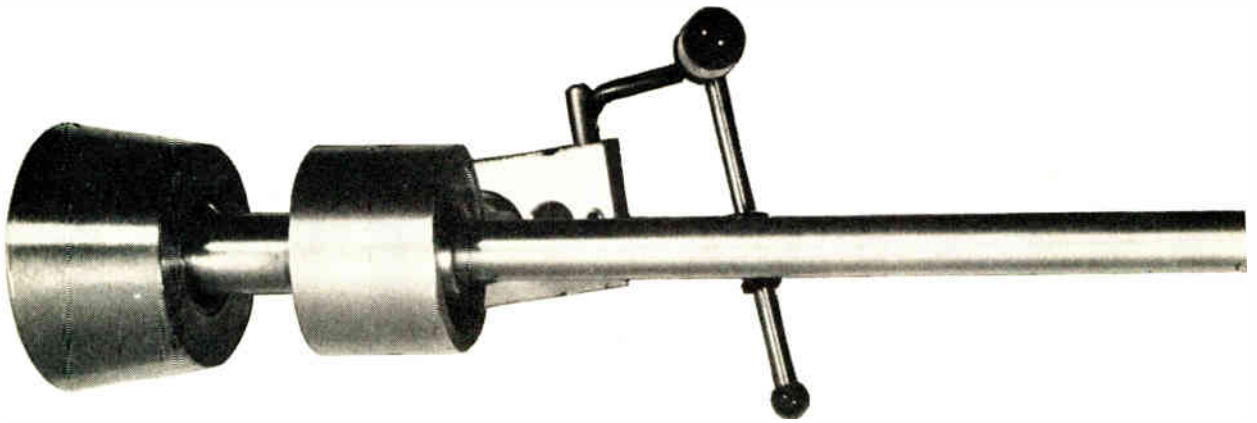
We come now to the newest product of the new science, the stereo spectacular. There is essentially only one difference in recording serious music and entertainment music: in the first, stereo is a means; in the second, it can be the end—in any sense of the word one prefers. There are no traditions to

bind, no history to dictate, and little fear of composers turning over in their graves. Whether one chooses to listen to four vibraphones spread between speakers, or a single trumpet skittering from channel to channel, whether one wishes to hear a dog barking in one corner of the room while his master whistles in the other, or a charge of Confederate cavalry pounding across a Pennsylvania meadow—it is all to be had. At present count four wars have come musically—and monumentally—to life, three of them on Mercury: Tchaikovsky's *1812* Overture with live cannon fire recorded left and right was the first to make recording history over a year ago: *Wellington's Victory* (Beethoven) has followed, with formidable firing between French and English; the latest is a series of recordings of Civil War music played on original instruments, with impressive sonic interludes from cavalry, caissons, and assorted artillery. RCA Victor has turned its microphones to World War II, and for the Rogers score *Victory at Sea*, Volume 3, has added dive bombers, jungle fighting, submarines crash diving, and the sound of torpedoes fired underwater. Less bellicose but scarcely quieter is the RCA Victor new Handel *Royal Fireworks* music recorded by Stokowski with the prescribed orchestral complement of twenty-four oboes and twelve bassoons—in addition to the explosions of genuine fireworks taped on the banks of the Hudson River, compliments of Macy's.

Some of the most eye-opening records of the year have boasted music designed especially for stereo. The RCA Stereo Action series ("the sound your eyes can follow") occasionally makes use of an intriguing trick which involves recording the solo instrument separately, then cutting the tape into proper lengths and splicing snippets into the master. This produces one of the most mobile solo trumpets anyone is likely to hear, achieved by 778 splices in a number called *Kiss of Fire* (the album is titled "Futura"). No less stereophonic but slightly more stable is Enoch Light's phenomenally successful Command percussion series (both "Persuasive" and "Provocative") in which each instrument is so sharply delineated you feel like stepping around them when you cross the room. Audio Fidelity achieves the same effect with a greater variety of instruments in the "Doctored for Super Stereo" set, which includes every style of music imaginable, from jazz to cha-cha-cha.

The stereophonic revolution, unlike most, has gained a great deal for us and lost us nothing. It has been an adventurous time for everyone concerned, and one thing would be hard to deny: the rosy future is now.

Right: Pursuit of unusual sounds takes record companies into strange surroundings. This is Audio Fidelity's Sidney Frey taping the sounds of the bullfight. Below: In recording the London version of Otello *(1961), conductor von Karajan is literally surrounded by cast, chorus and orchestra. Below, right: one of the sonic delights of the London* Otello *is the timpani and thundersheet used in Act I.*

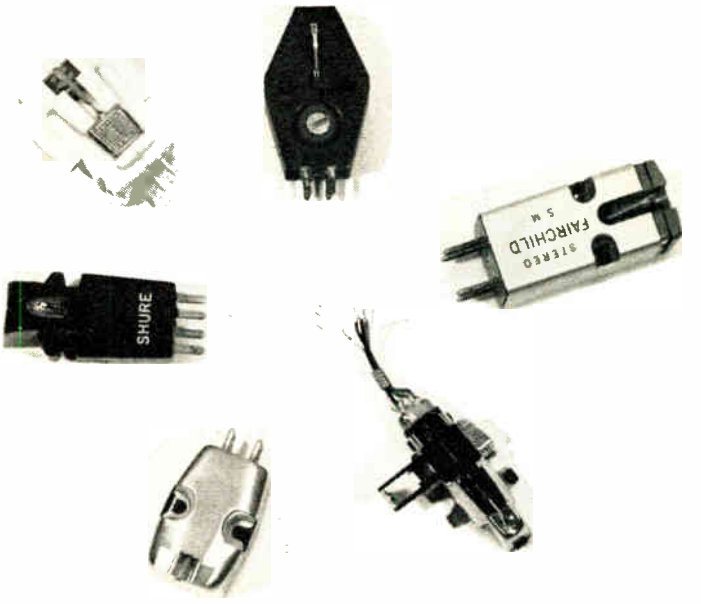


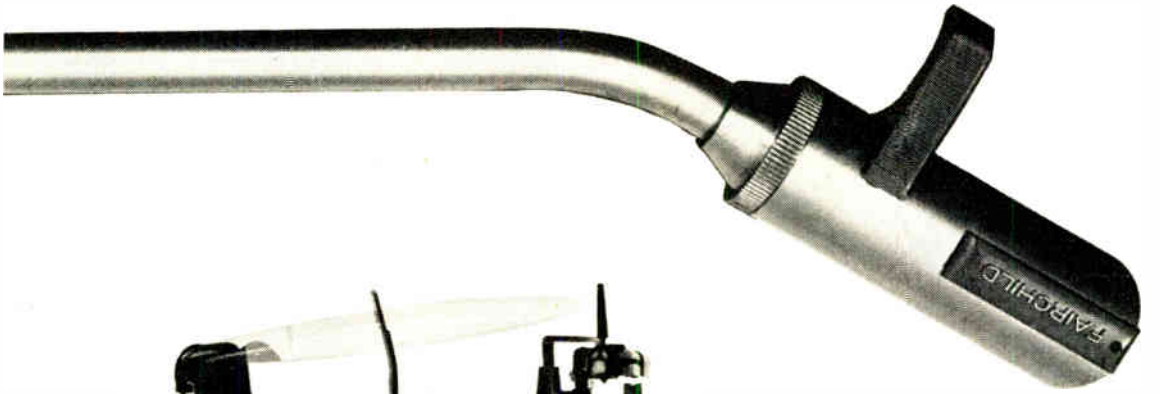
WIGGLE INTO VOLTAGE

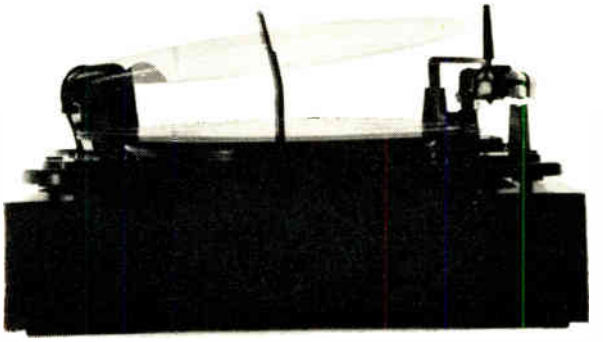
INITIALLY, RECORD REPRODUCTION IS MECHANICAL MOTION—MOTION THAT HAS TO BE TRANSLATED BACK INTO ELECTRICAL ENERGY AND LABELED "NO ARTIFICIAL COLORING ADDED." DOUBLY DIFFICULT WITH STEREO DISCS, THE TASK IS EASED MORE THAN SOMEWHAT WITH TODAY'S TONE ARMS, CARTRIDGES, TURNTABLES, AND CHANGERS.

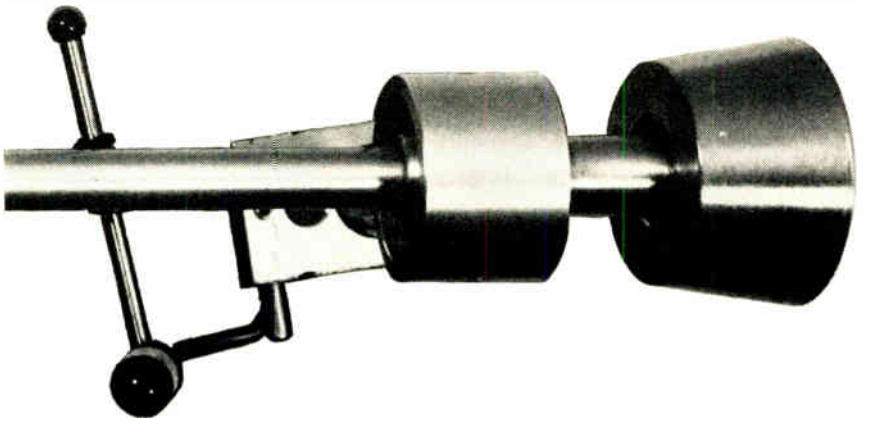
BY CHARLES TEPFER

Most people regard the stereo high-fidelity record playing system as another electronic wonder, and yet actually some of the most critical components of such a system are not electronic but mechanical. The tone arm, turntable or record changer, and yes, even to a large extent the cartridge, are a collection of mechanical linkages with one job to perform—to convert wiggles on plastic records to voltages. What we want is to hear music reproduced as it was recorded, with nothing either added or dissipated; and designers of high-fidelity components have to a large extent made this possible.









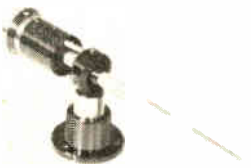
Fairchild's 440 turntable comes in factory-wired or in kit form. The kit, less arm and cartridge, is $55.

A cueing device is built into EMI's arm and cartridge.

Fairchild's SM-2 cartridge, with low mass, tracks at 2.5 grams.

Special connections for monophonic play are a feature of this London-Scott arm and cartridge.

"Anti-skating" is featured in Fairchild's 500A arm.



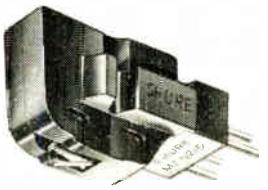
Ortofon's 16-in. tone arm (Model RMG 309) has a micrometer stylus force adjustment ($59.95).

Soon after stereo was introduced, however, it became apparent that the finest monophonic record-playing components were not adequate for the new records. First, of course, stereo records are different: each wall of the groove contains music for one channel only. The stereo cartridge must respond to each side of the groove and keep the signals separate. And beyond this, it is necessary to reduce mechanical vibrations in *all* directions in the arm and turntable, not just in the lateral plane, where the monophonic cartridge is sensitive. To do this, designers of stereo high-fidelity components in some cases adopted techniques that were used during monophonic days only by the purists. At the same time, they refined new designs to a point not thought possible for use outside the laboratory or studio.

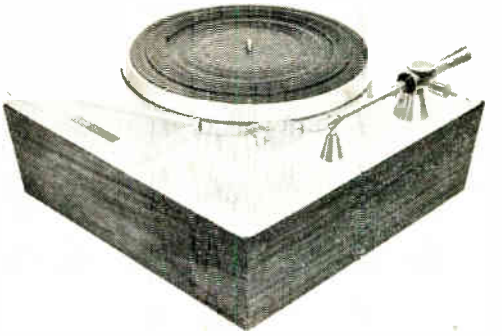
THE CARTRIDGE

Whatever the type of record-playing equipment—manual turntable or automatic record changer—the response of the system rides with the cartridge. The newest stereo cartridges are superb. Many employ the moving-magnet principle. Used to a limited extent in monophonic reproducers, this design has really come into its own for stereo. The reason is not hard to understand.

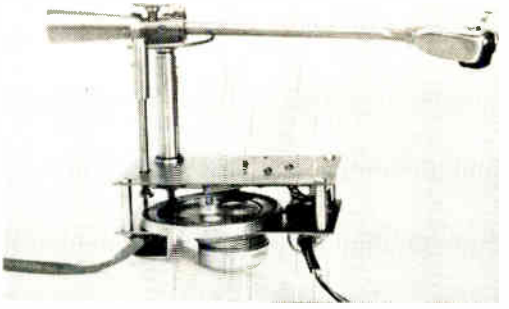
Magnetic stereo cartridges are miniature electric generators with three important elements: a magnetic field and two sets of coils, one for each channel. If the coils are kept stationary, then the magnet must move to generate a current in them. On the other hand, if the magnet is held still, the coils must be moved. In either case, the moving element which



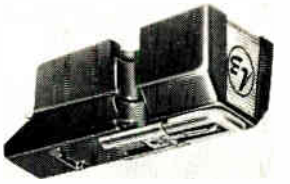
Shure's M7-N21D cartridge.



A plastic belt drives Rek-O-Kut's N33H turntable.



Rek-O-Kut's "Auto Poise" converts a turntable into an automatic player. A press of a button activates the arm, shuts off the unit at end of record ($49.95).



Electro-Voice's 31M7 ceramic has output equal to some magnetics.

is linked directly to the stylus must be made as light as possible to allow the needle to follow the most minute as well as the most abrupt wiggles in the record grooves. But this isn't all: since the signal for one channel must maintain a high degree of separation from the other within the cartridge if stereophonic reproduction is to be realized, it is easier to maintain adequate separation with stationary coils which can be placed in any type of configuration and isolated from each other within the body of the cartridge. This accounts to a large measure for the preponderance of moving-magnet pickups for stereo. This is not to say that moving-coil pickups cannot insure adequate separation. They can—it is just a little harder for them to do so. In any case, the moving-magnet pickup has one advantage not to be overlooked: the stylus assembly is very simple and, when worn or broken, may be replaced by the owner himself. Many moving-coil cartridges must be returned to the factory for stylus replacement.

The steady improvement in cartridges of all types has resulted mainly from more care in their construction and the use of lower resonant and more compliant stylus supports. The best of the newest cartridges (such as the ADC-1, Shure M7D with N21D stylus, Empire 108, and Pickering 380) guarantee 20 to 30 db of right- and left-channel signal separation for the complete audible frequency range with tracking forces below 2 grams.

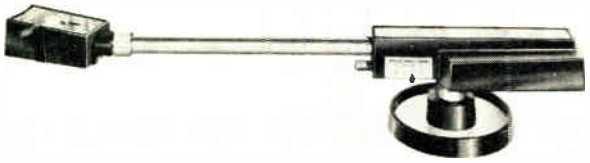
These same refinements have been applied to ceramic cartridges with good results. The newest Sonotone 9TSDV "Velocitone" and the Electro-Voice Model 21MD-7 cartridges, for example, have a compliance comparable to that of many magnetic units and will track most records at about 2 grams pressure. Most ceramic units now come with built-in or easily attached equalizers for converting the output of the cartridge to match the RIAA response characteristic, allowing them to be used with the magnetic phono inputs on high-fidelity preamps. These cartridges, however, have a higher voltage output than magnetic types and the input gain control of the preamp has to be turned down to avoid overloading. Channel separation is not as uniform over the complete audible frequency range as in the better magnetic cartridges, but ceramics cost less.

TONE ARMS

As spectacular as cartridge improvements have been, the advances made in tone arm design are no less remarkable. "Dynamic balancing," "anti-skating," and a host of other terms are the banners under which the new tone arms march. Do these terms connote real improvements or are they merely advertising gimmicks?

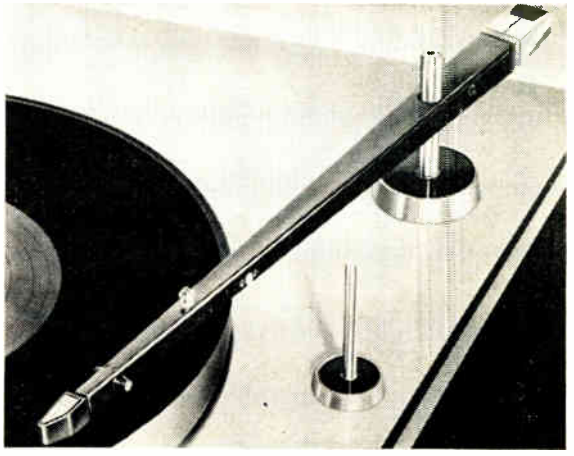
People who track down and remove loud rattles from their cars are often faced with the frustrating experience of having to live with many minor noises thereafter—noises that until then were masked by the big rattles. And so it is with tone arms. As the materials from which they are made and the general shape and suspension of the arms have been im-

ESL begins turntable production with the Model T200 ($49.95). It is shown here with the S2000 arm, Dust Bug.



Shure's "Professional" (above) and Dynetic (right) tone arms are available in both 12-in. and 16-in. models.

The sliding ring on Knight's arm (above) provides one to four grams pressure with any cartridge ($19.95).



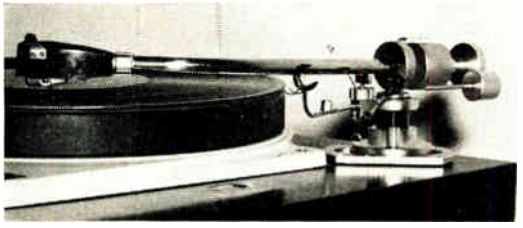
proved, the big annoyances such as audible arm resonance and excessive tracking distortion have been minimized. In their stead have come new causes for alarm: the minute friction between the stylus and outer wall of the record groove interferes with the ability of the stylus to follow exactly the information on that wall. This information corresponds to the right channel of the stereo program. As a result, the right channel is slightly distorted. To minimize this frictional force, called "skating," Fairchild incorporates a spring in the tone arm support of its Model 500 tone arms. This spring applies a torque of 0.8 grams in a counterclockwise direction.

Other tone arm manufacturers seek to overcome such minimal distortion by another technique. First, the arm and cartridge combination is balanced in every direction so that despite turntable tilt the stylus is freely suspended above the record groove as if the tone arm did not exist at all. Then, by means of a spring, the arm is made to push the stylus into the groove at the optimum tracking force, usually between 1 and 2 grams. By thus "dynamically balancing" all external forces on the stylus and then imposing upon it a single controlled force in one direction, the stylus is effectively isolated from all other forces upon it except for the modulations in the record groove. Tone arms of this type are the Empire 98, Dynaco TA-12 and TA-16, and Electro-Sonic Lab's S2000.

One sometimes gets the impression that to tone arm designers all the world must resemble the tilted room in the amusement park fun house—why else would they make arms that will track records on turntables demonstrated at outlandish angles or even upside down? It is simple enough to balance a turntable so that it is level and does not impose any undesirable force on the tone arm. But the new arms which feature adjustments for vertical and lateral balance also overcome the problem of warped records. Whether the adjustments involve the addition of an outboard device like the Rek-O-Kut "Omnibalance" or are built in does not really matter because such adjustments will not be made very often. Initially, the adjustment is made when a cartridge is inserted in an arm. After that a simple check at infrequent intervals will establish the balance of the tone arm. These adjustments seek, in effect, to customize the independent arm-cartridge combination; and if test results be the guide, they are remarkably successful, so much so that the universal tone arm and separate cartridge combination has stood its ground in the assault made upon it by the integrated arm-cartridge design.

In integrated units, the arm is designed only for the cartridge with which it is sold. No adjustments to accommodate the arm to the cartridge are necessary although, in some models, the arm must be adjusted for balance during installation. Integrated units have

Above: Lafayette's PK-449 turntable and arm ($49.50). Below: SME 3009 tone arm with bias adjuster. Above, right: Dynaco's B & O integrated tone arm and cartridge ($49.95). Right: Benjamin Electronics' "Miracord" changer ($99.50). Below, right: The Pickering-Stanton "Unipoise" arm and cartridge ($54.00).



the advantage that the cartridge is either mounted to the arm in the factory or both parts are so made that they fit together in only one way; there is little chance for error. At this point, it is a standoff between the universal arm-cartridge combinations and the integrated units.

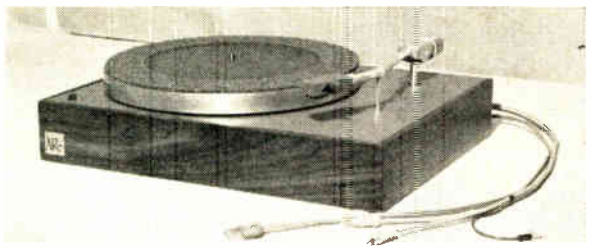
TURNTABLES

No such standoff exists in the realm of turntables; here there is definitely a trend towards belt-driven types. Belt-driven tables were used in professional recording studios for many years and the Components Corp. was a pioneer in making them available to early high-fidelity purists. Such units, however, did not take hold until turntable kits came along.

Manufacturing and assembling a high-quality turntable is a critical business; the parts must match each other with close tolerances, and there must be many tests during assembly to ascertain that the finished unit measures up to specifications. Many turntable manufacturers were torn between their desire to maintain high quality control for their units and the pressure to enter the growing kit market in high-fidelity components. The solution finally arrived wrapped in a neat package tied with a ribbon, but in this case it was the ribbon that counted. Instead of using idler wheel assemblies and speed change mechanisms that had to maintain exact relationships to each other and to the motor shaft, the kit makers utilized a closed fabric belt running around the motor shaft and then around the outer rim of the turntable. The speed depends upon the diameter of the motor shaft at the place where the belt makes contact with it. A simple mechanism keeps the belt under constant tension. Such kits proved simple to assemble and excellent in operation.

Turntable manufacturers were overcome with their own ingenuity and quickly adopted this system for their factory-assembled units too. The belts are now often made of rather exotic materials to afford greater strength, less stretching with time (a fault of the early units), and quieter decoupling between the motor and the turntable. The latest Rek-O-Kut stereo tables, for example, use belts made of polyurethene which does not pass rumble-causing vibrations from the motor to the turntable. There are variations in belt drives, each designer following his own path towards maximum rumble isolation and minimum speed variation. Most use a single continuous belt; some use two belts with an idler to transfer the driving torque of one belt to the other. By means of the belt and associated refinements, one manufacturer has been able to refine his turntable to a rumble of 59 db below average level of the record. His best previous figure with an idler type drive was 57 db.

Much is made of the weight and balance of the turntable and, up to a point, this is as it should be



Acoustic Research's "AR Turntable," complete with arm, base, and cables, is priced at $54 (less cartridge).

when the turntable acts as a flywheel to smooth out minute irregularities in speed. But one manufacturer has shown that the opposite approach (making use of an extremely stable, clock-type small motor, a rim-driving soft rubber idler, and a light aluminum turntable) can also give minimum speed fluctuation and rumble. For a long time the disadvantage of this design was the slowing down of the turntable if the arm applied a pressure of more than 2 grams to it. Now, with the spate of new arm-cartridge combinations operating at 1 to 2 grams, this Weathers turntable has attracted new interest.

Whichever type of turntable is used, low tracking forces make isolation of the table and arm mounting board more important than ever. Any vibration in the room may jostle the arm if the mounting board is not separated from its cabinet by springs and damping material. Small puny springs will not do; this job calls for upholstery-type springs under the four corners of the mounting board with heavy cotton or Fiberglas batting between the coils.

RECORD CHANGERS

Until just recently, many of the points discussed in this article could not have applied to record changers. Record changers were then thought of as a convenience but not capable of providing quiet rotation, accurate tracking, constant speed, and the high compliance needed for stereo high-fidelity reproduction. The case against them hinged on the fact that it was necessary for the arm to activate or be linked to the record-changing mechanism. As long as this was so, the arm could not be a completely free agent. It takes a certain amount of pressure for the arm to trip the changing mechanism at the end of a record, and as a result, the recommended tracking pressure for most changer arms was 5 to 8 grams. In addition, the compliance of the cartridge used in a record changer could not be too high because the arm would thus not be able to trip the changer. Isolation between the tone arm and the turntable was never possible as long as a changer mechanism linked one to the other.

At least two recent changers have made giant strides towards eliminating these objections. The new Garrard Type A and the Miracord Studio series are called "automatic turntables," rather than record changers, by their manufacturers. The Garrard unit uses its conventional changer mechanism with a new motor, turntable, and arm. Each motor undergoes laboratory check to assure minimum rumble. The counterbalanced arm will work well with cartridges requiring tracking pressures of 2 to 4 grams, and the heavy dynamically balanced turntable minimizes speed variations.

The Miracord Studio H model features a hysteresis synchronous motor for minimum speed variations, i.e., flutter and wow. It incorporates a dynamically balanced, heavy (seven pounds) turntable, and a balanced arm but with one important difference. The arm has absolutely no connection with the changer mechanism during the record playing.

Other changer manufacturers are planning additional refinements and modifications in their machines. One problem yet to be solved is how to keep the stylus always perpendicular to the record groove when the cartridge must be at a different height for each record on a stack.

Obviously, each component in the front end of a stereo high-fidelity record playing system is critical. Here the smallest signals in the system originate; here all the glorious sound—as well as the horrors of distortion and hum—also originates. New components go a long way towards furnishing the sound and minimizing the noise. To help them do their job, the careful owner might occasionally check things over. Once adjusted for the cartridge, turntable, and environmental conditions, the tone arm need be checked only at infrequent intervals. Once the speed of the turntable is verified with a strobe disc, it may be rechecked about once a month, or whenever the listener suspects that the pitch of a recorded piece of music may be incorrect. A diamond stylus should be inspected about twice a year, unless the listener has reason to suspect that it is worn or broken. A strobe disc and stylus pressure gauge are two accessories that are a must. A stylus brush and some form of record cleaner should also be high on the priority list.

Garrard's "Type A" is termed an "automatic turntable," plays all speeds and is priced at $79.50.

A Short Guide to Stereo-FM Broadcasting

More than 30 per cent of the nation's broadcasters plan to fill the airwaves with dual-channel signals during the year ahead. A surprising number—considering the short time the new multiplexing system has been with us—already transmit stereophonically.

In the FM station listing on this and the following pages, no attempt is made to show specifically when individual stations will be stereocasting. In many cases, the stations' program directors are not themselves certain of the exact date. But, by checking the right-hand column after the station's call letters, the reader will find an answer to the question, "Are you now, or do you plan within the next year, to broadcast stereophonically by multiplex?" (If no answer is given, the FM station either has no plans or did not participate in our survey.)

CITY	CALL	FREQ MC	Plan to MPX
ALABAMA			
Albertville	WAVU	105.1	
Alexander City	WRFS	106.1	
Andalusia	WCTA	98.1	
Anniston	WHMA	100.5	
Athens	WJOF	104.3	
Birmingham	WAPI	99.5	
	WBRC	106.9	
	WCRT	96.5	Yes
	WSFM	93.7	Yes
Clanton	WKLF	100.9	
Cullman	WFMH	101.1	
Decatur	WHOS	102.1	Yes
Homewood	WJLN	104.7	
Huntsville	WARH	99.1	
	WNDA	92.9	
Mobile	WKRG	99.9	
Montgomery	WFMI	98.9	
Sylacauga	WMLS	98.3	Yes
Tuscaloosa	WTBC	95.7	
	WUOA	91.7	
ALASKA			
Anchorage	KBYR	102.1	Yes
	KTVA	105.5	
ARIZONA			
Globe	KWJB	100.3	
Mesa	KBUZ	104.7	
Phoenix	KOOL	94.5	
	KTAR	98.7	Yes
	KELE	95.5	
	KFAC	88.5	
	KEBJ	103.5	
	KITH	101.3	
	KYEW	93.3	
Tempe	KUPD	97.9	Yes
Tucson	KTAP	96.1	
	KFMM	99.5	Yes
ARKANSAS			
Blytheville	KLCN	96.1	
Forrest City	KXJK	93.5	
Jonesboro	KPTM	101.9	
	KASU	91.9	
Little Rock	KFMA	103.7	
	KMMK	94.1	Yes
Mammoth Spring	KAMS	103.9	
Osceola	KOSE	98.1	
Pine Bluff	KOTN	92.3	
Siloam Springs	KUOA	105.7	Yes
CALIFORNIA			
Alameda	KJAZ	92.7	Yes
Anaheim	KEZE	95.9	
Arcata	KHSC	90.5	No
Arlington	KNFP	89.7	
Auburn	KAFI	101.1	
Bakersfield	KERN	94.1	—
	KGEE	96.5	
	KLYD	96.5	
	KQXR	101.5	
Berkeley	KRE	102.9	
	KPFB	89.3	
	KPFA	94.1	Yes
Beverly Hills	KLFM	105.5	
	KCBH	98.7	Yes
Bijou	KHVR	99.9	
Claremont	KSPC	88.9	
El Cajon	KUFM	93.3	
Eureka	KRED	96.3	
Fremont	KHYD	104.9	Yes
Fresno	KARM	101.9	
	KMJ	97.9	No
	KRFM	93.7	
	KMER	104.7	
	KXQR	102.7	
Garden Grove	KGGK	94.3	Yes
Glendale	KUTE	101.9	
	KFMU	97.1	
Hayward	KBBM	101.7	
Indio	KCHV	93.7	Yes
Inglewaod	KTYM	103.9	
Lancaster	KANT	107.9	
Lodi	KCVR	97.7	
Long Beach	KFOX	102.3	
	KLON	88.1	
	KNOB	97.9	

CITY	CALL	FREQ MC	Plan to MPX
Los Altos	KPGM	97.7	
Los Angeles	KABC	95.5	
	KPOL	93.9	
	KFAC	92.3	No
	KGLA	103.5	
	KFMU	97.1	Yes
	KHOF	99.5	Yes
	KHJ	101.1	
	KLAC	102.7	No
	KNX	93.1	No
	KMLA	100.3	Yes
	KRKD	96.3	
	KBIQ	104.3	
	KBMS	105.9	
	KXLU	89.1	
	KUSC	91.5	No
	KBCA	105.1	
	KRHM	94.7	Yes
	KCMI	88.5	
	KBBI	107.5	Yes
Morysville	KMYC	99.9	
Modesto	KTRB	104.1	
	KBEE	103.3	
Mountain View	KFJC	88.5	
Newport Beach	KAJS	103.1	
Oceanside	KUDE	102.1	
Ontario	KASK	93.5	No
Oxnard	KAAR	104.7	
Polm Springs	KPSR	100.7	
Pasadena	KPCS	89.3	
	KPFK	90.7	
Redlands	KCAL	96.7	No
Redondo Beach	KAPP	93.5	
Redwood City	KCUF	107.7	
Riverside	KACE	92.7	
	KDUO	97.5	Yes
	KPLI	99.1	
Sacramento	KCRA	96.1	
	KHIQ	105.1	
	KFBK	92.5	
	KXOA	107.9	
	KEBR	100.5	No
	KSFM	96.9	
	KJML	106.5	Yes
	KXRQ	98.5	
Salinas	KSBW	102.5	
Son Bernardino	KFMW	99.9	
	KVCR	91.9	
San Diego	KFMB	100.7	Yes
	KFSD	94.1	No
	KGB	101.5	Yes
	KBBW	102.5	
	KEBS	89.5	
	KITT	105.3	Yes
	KJLM	98.1	
	KLRO	94.9	Yes
	KPRI	106.5	Yes
	KSDS	88.3	
	KFMX	96.5	
	KSEA	97.3	
San Fernando	KVFM	94.3	Yes
	KSFV	106.3	
Son Francisco	KFRC	106.1	
	KGO	103.7	No
	KNBC	99.7	No
	KCBS	98.9	No
	KRON	96.5	
	KYA	93.3	
	KAFE	98.1	Yes
	KQBY	95.7	No
	KBCO	105.3	
	KSFX	90.1	No
	KALW	91.7	
	KEAR	97.3	No
	KSFR	94.9	
	KBAY	104.5	
	KHIP	106.9	
	KPEN	101.3	Yes
	KDFC	102.1	
San Jose	KEEN	100.3	
	KSJO	92.3	Yes
	KRPM	98.5	
San Luis Obispo	KVEC	93.3	
	KATY	96.1	No
San Mateo	KCSM	90.9	
Sonta Ana	KWIZ	96.7	Yes
	KFIL	106.3	

CITY	CALL	FREQ MC	Plan to MPX
Santa Borbara	KDB	93.7	
	KRCW	97.5	Yes
	KGUD	99.9	
	KMUZ	103.3	
Santa Maria	KEYM	99.1	Yes
	KSMA	102.5	
Santa Monica	KCRW	89.9	
	KSRF	103.1	
Sierra Madre	KMAX	107.1	Yes
Stockton	KWG	105.7	No
	KSTN	107.3	Yes
	KCVN	91.3	No
Ventura	KVEN	100.7	Yes
Ventura-Oxnard	KUDU	95.1	
Visalia	KONG	92.9	Yes
Walnut Creek	KWME	92.1	
West Covina	KDWC	98.3	
Woodlond	KATT	102.5	
COLORADO			
Boulder	KRNW	97.3	Yes
Colorado Springs	KVOR	92.9	
	KFMH	96.5	Yes
	KSHS	90.5	
	KRCC	91.3	
Cortez	KZFM	94.1	
Denver	KALH	101.3	
	KFML	98.5	
	KLIR	100.3	Yes
	KTGM	105.1	Yes
	KOA	103.5	Yes
	KDEN	99.5	Yes
	KRKY	102.1	
Grond Junction	KREX	92.3	No
Manitou Springs	KCMS	102.7	
CONNECTICUT			
Bridgeport	WJZZ	99.9	
Brookfield	WGHF	95.1	Yes
Danbury	WLAD	98.3	
Hamden	WDDE	101.3	
	WDFE	.....	Yes
Hartford	WDRC	102.9	
	WHCN	105.9	Yes
	WTIC	96.5	Yes
	WCCC	106.9	
	WRTC	89.3	
	WFNQ	93.7	
Manchester	WINF	107.9	
Meriden	WBMI	95.7	No
New Haven	WNHC	99.1	No
	WYBC	94.3	Yes
Stamford	WSTC	96.7	
Storrs	WHUS	90.5	No
Waterbury	WATR	92.5	
	WWCO	104.1	Yes
DELAWARE			
Dover	WDOV	94.7	No
Wilmington	WDEL	93.7	Yes
	WJBR	99.5	Yes
DISTRICT OF COLUMBIA			
Washington	WFAN	100.3	
	WMAL	107.3	
	WOL	98.7	No
	WGMS	103.5	Yes
	WRC	93.9	
	WAMU	88.5	Yes
	WTOP	96.3	
	WWDC	101.1	Yes
	WGTB	90.1	
	WASH	97.1	
FLORIDA			
Corol Gobles	WVCG	105.1	Yes
Daytona Beoch	WNDB	94.5	Yes
Fort Lauderdale	WFLM	105.9	Yes
	WWIL	103.5	Yes
	WMFP	100.7	No
Fort Pierce	WIRA	95.5	
	WARN	98.7	No
Gainesville	WRUF	104.1	Yes
Jacksonville	WJAX	95.1	
	WZFM	96.9	
	WMBR	96.1	Yes
Miami	WGBS	96.3	
	WCKR	97.3	

CITY	CALL	FREQ MC	Plan to MPX
	new	99.1	
	WINZ	99.9	
	WMET	93.9	
	WWPB	101.5	Yes
	WTHS	91.7	
Miami Beach	WKAT	93.1	
Ocala	WMOP	93.7	
Orlando	WDBO	92.3	No
	WHOO	96.5	Yes
	WKIS	100.3	
Palm Beach	WQXT	97.9	No
Pensacola	WPEX	91.1	Yes
St. Petersburg	WVST	105.9	
	WTCX	99.5	Yes
Sarasota	WYAK	102.5	
Tallahassee	WFSU	91.5	No
Tampa	WDAE	100.7	Yes
	WTUN	88.9	
	new	103.3	
	WFLA	93.3	Yes
	WPKM	104.7	
Winter Park	WPRK	91.5	
GEORGIA			
Athens	WGAU	102.5	
Atlanta	WPLO	103.3	
	WSB	98.5	Yes
	WABE	90.1	
	WGKA	92.9	Yes
	WDJK	94.1	
Augusta	WBBQ	103.7	
	WAUG	105.7	
Avondale Estates	WAVQ	94.9	No
Columbus	WRBL	93.3	Yes
Gainesville	WDUN	103.9	
La Grange	WLAG	104.1	
Macon	WMAZ	99.1	
	WNEX	96.9	
Marietta	WBIE	101.5	No
	WKLS	96.1	Yes
Newnan	WCOH	96.7	
Savannah	WTOC	97.3	
Toccoa	WLET	106.1	
HAWAII			
Honolulu	KPOI	97.5	
	KVOK	88.1	No
	KEFW	96.3	
Kaimuki	KAIM	95.5	Yes
IDAHO			
Boise	KBOI	97.9	
	KBFI	99.9	
Caldwell	KBGN	94.1	Yes
Lewiston (Clarkson, Wash.)	KOZE	96.7	No
ILLINOIS			
Anna	WRAJ	92.7	
Arlington Heights	WNWC	92.7	
Aurora	WMRO	95.1	
	WKKD	95.9	No
Bloomington	WJBC	101.5	No
Carbondale	WSIU	91.9	No
Carmi	WROY	97.3	
Champaign	WDWS	97.5	
Chicago	WBBM	96.3	No
	WENR	94.7	
	WJJD	104.3	
	WFMF	100.3	Yes
	WMAQ	101.1	
	WMBI	90.1	
	WSBC	93.1	
	WDHF	95.5	
	WKFM	103.5	Yes
	WBEZ	91.5	
	WFMT	98.7	Yes
	WEFM	99.5	Yes
	WCLM	101.9	No
	WNIB	97.1	
	WEBH	93.9	
	WFMQ	107.5	Yes
	WUCB	89.1	
Cicero	WEHS	97.9	
Decatur	WSOY	102.9	Yes
De Kalb	WNIC	91.1	
East St. Louis	WAMV	101.1	
Effingham	WSEI	95.7	
Elgin	WRMN	94.3	
	WEPS	90.9	
	WELG	103.9	
Elmwood Park	WXFM	105.9	Yes
Evanston	WEAW	105.1	
	WNUR	89.3	
Glen Ellyn	WELF	107.1	Yes
Harrisburg	WEBQ	99.9	No
Highland Park	new	103.1	
Jacksonville	WLDS	100.5	No
Joliet	WJOL	96.7	
	WJAP	93.5	
Kewanee	WKSD	91.9	No
Litchfield	WSMI	106.1	
Macomb	WWKS	91.3	
Mattoon	WLBH	96.9	Yes
Mt. Carmel	WVMC	101.1	
	WSAB	94.9	No
Mt. Vernon	WMIX	94.1	No
Oak Park	WOPA	102.7	
Olney	WVLN	92.9	
Paris	WPRS	98.3	Yes
Park Forest	WRHS	88.1	
Park Ridge	WMTH	88.5	
Peoria	WMBD	92.5	No
Quincy	WTAD	99.5	
	WGEM	105.1	No
Rockford	WROK	97.5	
Rock Island	WHBF	98.9	Yes
Skokie	new	98.3	
Springfield	WTAX	103.7	
Taylorville	WGGM	95.1	
Urbana	WILL	90.9	No
Waukegan	WEFA	102.3	
Winnetka	WNTH	88.1	No
INDIANA			
Anderson	WCBC	97.9	
Bloomington	WTTV	92.3	Yes
Columbus	WCSI	101.5	
Connersville	WCNB	100.3	No
Crawfordsville	WBBS	106.3	
Elkhart	WTRC	100.7	
	WCMR	104.7	
Evansville	WIKY	104.1	
	WPSR	90.7	No
	WEVC	91.5	
Fort Wayne	WPTH	95.1	Yes
Franklin	WFCI	89.3	
Gary	WGVE	88.1	
Goshen	WGCS	91.1	
Greencastle	WGRE	91.7	
Hammond	WYCA	92.3	No
Hartford City	WHCI	91.9	No
Huntington	WVSH	91.9	
Indianapolis	new	105.7	
	WFBM	94.7	
	WIBC	93.1	No
	WISH	107.9	
	WFMS	95.5	Yes
	WIAN	90.1	
	WAJC	104.5	Yes
Jasper	WITZ	104.7	
Madison	WORX	96.7	
Marion	WMRI	106.9	
Muncie	WMUN	104.1	
	WWHI	91.5	
	WBST	90.7	No
New Albany	WNAS	88.1	
New Castle	WCTW	102.5	
Princeton	WRAY	98.1	
Richmond	WKBV	106.5	
	WGLM	96.1	Yes
Salem	WSLM	98.9	Yes
Seymour	WJCD	93.7	
South Bend	WETL	91.9	
Terre Haute	WTHI	99.9	
	WVTS	100.7	
Wabash	WSKS	91.3	
Warsaw	WRSW	107.3	
Washington	WFML	106.5	
W. Lafayette	WBAA	99.1	Yes
IOWA			
Ames	WOI	90.1	
Boone	KFGQ	99.3	
Cedar Falls	KTCF	88.1	

CITY	CALL	FREQ MC	Plan to MPX
Clinton	KROS	96.1	
Davenport	WOC	103.7	
Des Moines	KSO	98.5	
	WHO	100.3	Yes
	KDPS	88.1	No
	KDMI	97.3	No
Dubuque	WDBQ	103.3	
Iowa City	KSUI	91.7	
Mason City	KGLO	101.1	
Muscatine	KWPC	99.7	
Pella	KCUI	89.1	
Sioux City	KDVR	97.9	Yes
Storm Lake	KAYL	101.5	
Waverly	KWAR	89.1	
KANSAS			
Emporia	KSTE	88.7	No
Kansas City	KCJC	98.1	Yes
Lawrence	KANU	91.5	
Manhattan	KSDB	88.1	
Newton	KJRG	92.1	
Ottawa	KTJO	88.1	Yes
Parsons	KPPS	91.1	
Salina	KAFM	99.9	Yes
Topeka	KTOP	100.3	
Wichita	KBBL	94.5	
	KFH	100.3	
	KMUW	89.1	
	KCMB	107.3	
KENTUCKY			
Ashland	WCMI	93.7	
Central City	WNES	101.9	
Fulton	WFUL	104.9	
Glasgow	WGGC	95.1	
Hazard	WKIC	94.1	
Henderson	WSON	99.5	No
Hopkinsville	WRLX	98.7	
	WKOF	100.3	Yes
Lexington	WLAP	94.5	
	WBKY	91.3	
Louisville	WFPK	91.9	
	WFPL	89.3	
	WLVL	97.5	Yes
Madisonville	WFMW	93.9	
Mayfield	WNGO	94.7	No
Owensboro	WOMI	92.5	Yes
	WVJS	96.1	Yes
Paducah	WKYB	93.3	
	WPAD	96.9	No
LOUISIANA			
Alexandria	KALB	96.9	No
Baton Rouge	WJBO	98.1	
Monroe	KMLB	104.1	
New Orleans	WDSU	105.3	
	WRCM	97.1	
	WWMT	95.7	Yes
Shreveport	KRMD	101.1	
	KWKH	94.5	—
	KBCL	96.5	
MAINE			
Augusta	WFAU	101.3	No
Bangor	WABI	97.1	
Brunswick	WCME	98.9	Yes
	WBOR	91.1	
Caribou	WFST	97.7	Yes
Lewiston	WCOU	93.9	Yes
	WRJR	91.5	Yes
Portland	WLOB	97.9	No
MARYLAND			
Annapolis	WXTC	107.9	Yes
	WNAV	99.1	
Baltimore	WBAL	97.9	No
	WCAO	102.7	
	WCBM	106.5	
	WBJC	88.1	No
	WITH	104.3	Yes
	WYOU	92.3	
	WRBS	95.1	Yes
	WFMM	93.1	Yes
	WAQE	101.9	Yes
Bethesda	WJMD	94.7	
	WGMS	103.5	
	WHFS	102.3	
Cumberland	WTBO	106.1	
	WCUM	102.9	
Frederick	WFMD	99.9	
Hagerstown	WJEJ	104.7	
	WARK	106.9	
Havre de Grace	WASA	103.7	
Morningside	WPGC	95.5	Yes
Silver Spring	WGAY	99.5	
Takoma Park	WGTS	91.9	
Westminster	WTTR	100.7	
MASSACHUSETTS			
Amherst	WMUA	91.1	
	WAMF	89.5	
	WFCR	88.5	
Boston	WBZ	106.7	
	WCOP	100.7	
	WEEI	103.3	
	WHDH	94.5	No
	WBUR	90.9	Yes
	WRKO	98.5	
	WERS	88.9	
	WBCN	104.1	Yes
	WXHR	96.9	
Brockton	WBET	97.7	Yes
Brookline	WBOS	92.9	
Cambridge	WTBS	88.1	
	WGBH	89.7	
	WHRB	95.3	
Fitchburg	WFGM	104.7	
Framingham	WKOX	105.7	Yes
Greenfield	WHAI	98.3	Yes
Haverhill	WHAV	92.5	
Lawrence	WCAP	93.7	
Lowell	WLLH	99.5	
Lynn	WUPY	105.3	
Medford	WISK	107.9	
New Bedford	WNBH	98.1	Yes
	WBSM	97.3	Yes
Plymouth	WPLM	99.1	
South Hadley	WMHC	90.7	
Springfield	WHYN	93.1	
	WMAS	94.7	No
	WEDK	91.7	
	WSCB	89.9	
Waltham	WCRB	102.5	
West Yarmouth	WOCB	94.3	No
Williamstown	WCFM	91.3	No
Winchester	WHSR	91.9	
Worcester	WAAB	107.3	
	WTAG	96.1	
MICHIGAN			
Allen Park	new	98.3	
Ann Arbor	WUOM	91.7	
Bay City	WBCM	96.1	No
	WNEM	102.5	
Benton Harbor	WHFB	99.9	No
Cadillac	WWTV	92.9	No
Coldwater	WTVB	98.5	No
Dearborn	WKMH	100.3	No
Detroit	WJBK	93.1	
	WABX	99.5	
	WMZK	97.9	No
	WQTI	107.5	
	WJR	96.3	Yes
	WWJ	97.1	
	WXYZ	101.1	
	WFME	98.7	
	WDTR	90.9	
	WDTM	106.7	
	WQRS	105.1	
	WDET	101.9	Yes
	WMUZ	103.5	
	WOMC	104.3	
	WHFI	94.7	
	WCHD	105.9	
	WLDM	95.5	Yes
	WIPE	92.3	
East Lansing	WKAR	90.5	Yes
	WSWM	99.1	Yes
Flint	WFBE	95.1	
Grand Rapids	WFUR	102.9	
	WJEF	93.7	No
	WLAV	96.9	Yes
	WMAX	101.3	Yes
Highland Park	WHPR	88.1	

CITY	CALL	FREQ MC	Plan to MPX
Holland	WJBL	94.5	
Inkster	WCHB	.....	No
Interlochen	WGYA	103.1	
Jackson	WBBC	94.1	
Kalamazoo	WMCR	102.1	
Lansing	WJIM	97.5	
	WMRT	100.7	
Mt. Clemens	WBRB	102.7	
Royal Oak	WOAK	89.3	
Saginaw	WSAM	98.1	Yes
Sturgis	WSTR	103.1	
MINNESOTA			
Brainerd	KLIZ	95.9	No
Duluth	KUMD	89.1	
Mankato	KYSM	103.5	
Minneapolis-St. Paul	WLOL	99.5	Yes
	WAYL	96.1	Yes
	KWFM	97.1	
	KNOF	95.3	
	KTIS	98.5	Yes
	WPBC	101.3	Yes
	KFMV	100.3	
St. Cloud	KFAM	104.7	
Worthington	KWOA	94.9	
MISSISSIPPI			
Jackson	WJDX	102.9	No
Laurel	WNSL	100.3	
MISSOURI			
Clayton	KFUO	99.1	
Crestwood	KSHE	94.7	Yes
Joplin	KSYN	92.5	Yes
Kansas City	KCMO	94.9	
	KISA	99.7	No
	WDAF	102.1	
	KCMK	93.3	No
	KCUR	89.3	No
	KTSR	90.1	
	KXTR	96.5	
	KBEY	104.3	
Kennett	KBOA	98.9	
Poplar Bluff	KWOC	94.5	No
St. Louis	KMOX	103.3	
	KADI	96.5	Yes
	KSTL	98.1	Yes
	KWIX	102.5	
	KANG	106.9	
	WIL	92.3	
	KSLH	91.5	
	KEMO	104.1	
	KCFM	93.7	Yes
	KPLR	97.3	
Springfield	KTTS	94.7	No
West Plains	KWPM	93.9	
NEBRASKA			
Kearney-Holdrege	KHOL	98.9	
Lincoln	KFMQ	95.3	Yes
Omaha	KFAB	99.9	
	KQAL	94.1	Yes
	WOW	92.3	Yes
	KOIL	96.1	
Scottsbluff	KNEB	94.1	No
NEVADA			
Las Vegas	KRAM	100.5	
Reno	KNEV	95.5	
NEW HAMPSHIRE			
Berlin	WMOU	103.7	
Claremont	WTSV	106.1	
Manchester	WKBR	95.7	
Mount Washington	WMTW	94.9	Yes
Nashua	WOTW	106.3	
Rochester	WWNH	.....	
NEW JERSEY			
Asbury Park	WJLK	94.3	No
Atlantic City	WRNJ	95.1	
	WOSJ	103.7	
Bridgeton	WSNJ	107.7	
Camden	WKDN	106.9	No
Dover	WDHA	105.5	
East Orange	WFMU	91.1	
Eatontown	WHTG	105.5	Yes

CITY	CALL	FREQ MC	Plan to MPX
Fair Lawn	WRBI	105.5	
Hackettstown	WNTI	91.1	
Long Branch	WRLB	107.1	Yes
Newark	WNTA	94.7	Yes
	WVNJ	100.3	
	WBGO	88.3	
New Brunswick	WCTC	98.3	
Newton	WNNJ	103.7	
Paterson	WPAT	93.1	Yes
Princeton	WPRB	103.5	
Red Bank	WFHA	106.3	Yes
South Orange	WSOU	89.5	Yes
Trenton	WTOA	97.5	
Wildwood	WCMC	100.7	
Zarephath	WAWZ	99.1	
NEW MEXICO			
Albuquerque	KDEF	94.1	Yes
	KANW	89.1	
	KHFM	96.3	Yes
	KPAT	99.5	
Aztec	KNDE	94.9	
Los Alamos	KRSN	98.5	Yes
Roswell	KBIM	97.1	Yes
NEW YORK			
Albany	WAMC	90.3	No
Auburn	WMBO	96.1	
Babylon	WTFM	103.5	
	WBAB	102.3	
Batavia	WBTA	.....	
Binghamton	WKOP	99.1	
	WNBF	98.1	
Buffalo	WBEN	102.5	
	WBUF	92.9	
	WEBR	94.5	
	WGR	96.9	Yes
	WWOL	104.1	
	WBFO	88.7	
Central Square	WCSQ	89.3	
Cherry Valley	WRRC	101.9	
Corning	WCLI	106.1	
Cortland	WKRT	99.9	Yes
Depew	new	93.7	
De Ruyter	WRRD	105.1	
Elmira	WECW	88.1	
Floral Park	WSHS	90.3	No
Fulton	WOSC	104.7	
Garden City	WLIR	92.7	Yes
Hempstead	WHLI	98.3	Yes
	WVHC	88.7	Yes
Hornell	WWHG	105.3	
Ithaca	WHCU	97.3	
	WVBR	93.5	Yes
	WICB	91.7	
	WRRA	103.7	
Jamestown	WJTN	93.3	Yes
Kenmore	WYSL	103.3	
Massena	WMSA	105.3	
Mount Kisco	WRNW	107.1	Yes
New Rochelle	WVOX	93.5	No
New York City	WCBS	101.1	
	WEVD	97.9	No
	WABC	95.5	
	WNBC	97.1	No
	WNEW	102.7	
	WNYC	93.9	
	WHOM	92.3	Yes
	WOR	98.7	
	WRVR	106.7	
	WQXR	96.3	Yes
	WBAI	99.5	
	WKCR	89.9	
	WBFM	101.9	
	WNYE	91.5	
	WNCN	104.3	Yes
	WFUV	90.7	Yes
Niagara Falls	WHLD	98.5	Yes
Olean	WHDL	95.7	
Patchogue	WALK	97.5	Yes
	WPAC	106.1	
Peekskill	WLNA	100.7	
Plattsburg	WEAV	99.9	
Poughkeepsie	WKIP	104.7	
Rochester	WHFM	98.9	Yes
	WRVM	100.5	
	WBBF	101.3	
	WROC	97.9	No

CITY	CALL	FREQ MC	Plan to MPX
	WIRQ	90.0	
	WCMF	96.5	
Schenectady	WGFM	99.5	Yes
S. Bristol	WRRE	95.1	
Springville	WSPE	88.1	
Syracuse	WHEN	102.9	
	WSYR	94.5	
	WONO	100.9	
	WDDS	93.1	
	WAER	88.1	Yes
Troy	WRPI	91.5	
	WFLY	92.5	
Utica	WRUN	104.3	
Wethersfield	WRRL	105.7	
White Plains	WFAS	103.9	
Woodside	WRFM	105.1	
NORTH CAROLINA			
Albemarle	WABZ	100.9	
Asheboro	WGWR	92.3	Yes
Asheville	WLOS	99.9	
Burlington-Graham	WBBB	101.1	Yes
	WBAG	93.9	
Chapel Hill	WUNC	91.5	
Charlotte	WSOC	103.5	
	WYFM	104.7	
Concord	WEGO	97.9	
Durham	WDNC	105.1	No
Elkin	WIFM	100.9	No
Fayetteville	WFNC	98.1	
Forest City	WBBO	93.3	Yes
	WAGY	105.3	
Gastonia	WGNC	101.9	
Goldsboro	WEQR	96.9	
Greensboro	WMDE	98.7	Yes
	WGPS	89.9	
Greenville	WWWS	91.3	
Henderson	WHNC	92.5	
Hendersonville	WHKP	102.5	
Hickory	WHKY	102.9	
High Point	WHPE	95.5	
	WMFR	99.5	
	WNOS	100.3	Yes
	WHPS	89.3	
Laurinburg	WEWO	96.5	
Leaksville	WLOE	94.5	
Lexington	WBUY	94.3	Yes
Lumberton	WTSB	95.7	
Marion	WMIT	106.9	Yes
North Wilkesboro	WKBC	97.3	
Raleigh	WPTF	94.7	Yes
	WRAL	101.5	
	WKIX	96.1	
Reidsville	WREV	102.1	
Rocky Mount	WEED	92.1	No
	WFMA	100.7	
Roxboro	WRXO	96.7	
Salisbury	WSTP	106.5	No
Sanford	WWGP	105.5	
Shelby	WOHS	96.1	
Statesville	WFMX	105.7	
	WDBM	96.9	Yes
Tarboro	WCPS	104.3	
Thomasville	WTNC	98.3	No
Wilmington	WPRV	93.9	
Wilson	WVOT	106.1	
Winston-Salem	WAIR	93.1	No
	WFBS	88.1	
	WSJS	104.1	
	WYFS	107.5	Yes
OHIO			
Akron	WAKR	97.5	
	WCUE	96.5	
	WAPS	89.1	
Alliance	WFAH	101.7	
Ashland	WNCO	101.3	
Ashtabula	WREO	97.1	
Athens	WOUB	91.5	
Barberton	WDBN	94.9	Yes
Bellaire	WOMP	100.5	
Berea	WBWC	88.3	
Bowling Green	WBGU	88.1	No
Canton	WCNO	106.9	Yes
	WHBC	94.1	Yes
Celina	WMER	94.3	Yes
Chillicothe	new	93.3	
Cincinnati	WCPO	105.1	No
	new	93.3	
	WKRC	101.9	
	WOIO	98.5	
	WSAI	102.7	Yes
	WAEF	104.3	
	WGUC	90.9	
	WFFM	101.1	
	WZIP	92.5	No
Cleveland	WGAR	99.5	Yes
	WHK	100.7	Yes
	WABQ	106.5	No
	WJW	104.1	
	WDGO	95.5	
	KYW	105.7	
	WNOB	107.9	
	WDOK	102.1	
	WBOE	90.3	
	WCRF	103.3	
	WERE	98.5	
Cleveland Heights	WCUY	92.3	No
Columbus	WBNS	97.1	
	WCOL	92.3	
	WTVN	96.3	Yes
	WOSU	89.7	Yes
	WCEB	90.5	
	WVKO	94.7	No
Dayton	WHIO	99.1	Yes
	WIFE	104.7	
	WAVI	107.7	
Delaware	WSLN	91.1	
East Liverpool	WOHI	104.3	No
Eaton	WCTM	92.9	
Elyria	WEOL	107.3	No
Findlay	WFIN	100.5	
Fostoria	WFOB	96.7	Yes
Fremont	WFRO	99.3	
Granville	WDUB	91.3	
Hamilton	WHOH	103.5	
	WFOL	94.9	
	WQMS	96.5	Yes
Hillsboro	WSRW	98.1	
Kent	WKSU	88.1	
Kettering	new	99.9	
Lancaster	WHOK	95.5	
Lima	WIMA	102.1	
Marietta	WCMO	89.3	No
Marion	WMRN	106.9	
Miamisburg	WFCJ	93.9	Yes
Middletown	WPFB	105.9	Yes
Mount Vernon	WMVO	93.7	
Newark	WCLT	100.3	
New Concord	new	91.1	
Oxford	WMUB	88.5	Yes
	WOXR	97.7	Yes
Piqua	WPTW	95.7	
Portsmouth	WPAY	104.1	Yes
Salem	WSOM	105.1	Yes
Sandusky	WLEC	102.7	
Springfield	WBLY	103.9	
Steubenville	WSTV	103.5	
Toledo	WSPD	101.5	
	WTRT	99.9	
	WTOL	104.7	
	WMHE	92.5	
	WTDS	91.3	
Westerville	WOBN	91.5	
Wooster	WWST	104.5	
Worthington-Columbus	WRFD	97.9	Yes
Yellow Springs	WYSO	91.5	No
Youngstown	WKBN	98.9	
	WRED	101.1	No
	WBBW	93.3	No
OKLAHOMA			
Durant	KSEO	107.3	
Norman	WNAD	90.9	
Oklahoma City	KYFM	98.9	Yes
	KZOM	96.9	
	KEFM	94.7	
	KIOO	100.5	Yes
	KOKH	88.9	No
	new	101.9	
	KJEM	102.7	Yes
Stillwater	KSPI	93.9	Yes
	KOSU	91.7	Yes

CITY	CALL	FREQ MC	Plan to MPX
Tulso	KAKC	99.5	
	KOGM	92.9	
	KWGS	89.5	No
	KIHI	95.5	No
	KOCW	97.5	
OREGON			
Eugene	KUGN	99.1	
	KFMY	97.9	Yes
	KRVM	91.9	
	KWAX	91.9	No
Gronts Poss	KGPO	96.9	
Medford	KBOY	95.3	Yes
Oretech	KTEC	88.1	
Portlond	KPOJ	98.7	
	KGMG	95.5	
	KMCP	102.7	
	KEX	92.3	
	KOIN	101.1	
	KQFM	100.3	
	KPFM	97.1	Yes
	KRRC	89.3	
	KFMC	99.5	
Springfield-Eugene	KEED	93.1	Yes
PENNSYLVANIA			
Allentown	WAEB	104.1	Yes
	WFMZ	100.7	No
Altoono	WFBG	98.1	No
	WVAM	100.1	Yes
Beover Falls	WBVP	106.7	
Bethlehem	WGPA	95.1	
Bloomsburg	WHLM	106.5	
Boyertown	WBYO	107.5	
Broddock	WLOA	96.9	
Butler	WBUT	97.7	No
Corlisle	WHYL	102.3	
Chombersburg	WCHA	95.1	
DuBois	WCED	102.1	
Eoston	WEST	105.7	
	WEEX	99.9	Yes
Erie	WERC	99.9	Yes
Horrisburg	WHP	97.3	Yes
Hovertown	WHHS	89.3	
Hozleton	WAZL	97.9	
Jenkintown	WIBF	103.9	
Johnstown	WARD	92.1	
	WJAC	95.5	Yes
Loncoster	WGAL	101.3	
	WLAN	96.9	Yes
	WDAC	94.5	
Lebonon	WLBR	100.1	Yes
Levittown-Foirless Hills	WBCB	100.1	Yes
Meodville	WMGW	100.3	No
Medio	WXUR	100.3	
Montrose	WPEL	96.5	No
Oil City	WDJR	98.5	No
Polmyro	WJWR	92.1	
Philodelphio	WCAU	98.1	
	WDAS	105.3	
	WFIL	102.1	Yes
	WHAT	96.5	Yes
	WIBG	94.1	
	WIP	93.3	No
	WPBS	98.9	
	WPEN	102.9	
	WQAL	106.1	
	WHYY	90.9	
	WXPN	88.9	
	WFLN	96.7	Yes
	WPWT	91.7	No
	WRTI	90.1	
	WIFI	92.5	
	WPCA	104.5	Yes
Pittsburgh	KDKA	92.9	No
	WPGH	104.7	
	WCAE	96.1	
	WJAS	99.7	
	WINE	107.9	
	WPIT	101.5	
	WWSW	94.5	
	WKJF	93.7	Yes
	WDUQ	91.5	No
	WAZZ	105.9	Yes
Pottsville	WPPA	101.9	
Red Lion	WGCB	96.1	Yes
Scronton	WGBI	101.3	
	WUSV	89.9	Yes
Shoron	WPIC	102.9	
Stote College	WDFM	91.1	Yes
Sunbury	WKOK	94.1	
Towondo	WTTC	92.7	
Worren	WRRN	92.3	
Woshington	WJPA	104.3	
Woynesboro	WAYZ	101.5	
Wilkes-Borre	WBRE	98.5	
	WYZZ	103.3	
Williomsport	WRAK	102.7	
	WLYC	105.1	No
York	WNOW	105.7	No
York-Honover	WYCR	98.5	Yes
RHODE ISLAND			
Cronston	WLOV	99.9	
Providence	WPJB	105.1	Yes
	WHIM	94.1	
	WPRO	92.3	
	WXCN	101.5	
	WPFM	95.5	Yes
Worwick	WDJD	107.7	
Westerly	WERI	103.7	
Woonsocket	WWON	106.3	
SOUTH CAROLINA			
Anderson	WCAC	101.1	
Chorleston	WCSC	96.9	
	WTMA	95.1	Yes
Clemson	WSBF	88.1	
Columbio	WCOS	97.9	No
	WNOK	104.7	
	WUSC	89.9	
Dillon	WDSC	92.9	Yes
Greenville	WESC	92.5	—
	WFBC	93.7	
	WMUU	94.5	
Lourens	WLBG	100.5	
Seneco	WSNW	98.1	
Sportonburg	WSPA	98.9	
TENNESSEE			
Bristol	WOPI	96.9	Yes
Chottonoogo	WDOD	96.5	Yes
	WLOM	106.5	Yes
Collegedole	WSMC	88.1	
Gollotin	WFMG	104.5	No
Greeneville	WGRV	94.9	Yes
Jockson	WTJS	104.1	
Johnson City	WJHL	100.7	
Kingsport	WKPT	98.5	
Knoxville	WBIR	93.3	
	WKCS	91.1	
	WUOT	91.9	
Memphis	WDIA	102.7	
	WMCF	99.7	No
	WMPS	97.1	No
	WQMM	95.5	
Noshville	WSIX	97.9	Yes
	WFMB	105.9	
Sevierville	WSEV	102.1	
TEXAS			
Abilene	KFMN	99.3	No
Amorillo	KGNC	93.1	
Austin	KTBC	93.7	Yes
	KHFI	98.3	No
	KAZZ	95.5	
	KUT	90.7	No
Beoumont	KRIC	97.5	
Brownwood	KHPC	88.1	
Cleburne	KCLE	94.9	
Corpus Christi	KMFM	95.5	No
Dollos	KIXL	104.5	
	KOST	98.7	
	KRLD	92.5	
	WFAA	97.9	Yes
	KCPA	94.1	
	WRR	101.1	
	KVTT	91.7	
	KNER	88.1	
	new	106.9	
	KSFM	105.3	
	KQRO	102.9	
	KPSD	105.3	

CITY	CALL	FREQ MC	Plan to MPX
Denton	KDNT	106.1	
Diboll	KSPL	95.5	Yes
Dumos	KDDD	95.3	
El Paso	KHMS	94.7	Yes
	KVOF	88.5	
Fort Worth	KFJZ	97.1	
	WBAP	96.3	No
	KFMF	102.1	
Gainesville	KGAF	94.5	Yes
Horlingen	KELT	94.5	Yes
Highlond Park	KVIL	103.7	
Hillsboro	KHBR	102.5	
Houston	new	105.7	
	KTRH	101.1	
	KXYZ	96.5	
	KODA	.....	Yes
	KRBE	104.1	
	KQUE	102.9	
	KROW	100.3	
	KHGM	99.1	
	KJSB	93.7	
	KFMK	97.9	
	KUHF	91.3	No
	KARO	94.5	
	KHUL	95.7	Yes
Lubbock	KRKH	93.7	Yes
	KTXT	91.9	
	KBFM	96.3	Yes
Midlond	KNFM	92.3	Yes
Nacogdoches	KELS	100.1	
Odessa	KWMO	99.1	Yes
	KQIP	96.9	
Pampa	KBMF	100.3	Yes
Ploinview	KVOP	97.3	
	KHBL	88.1	
Port Arthur	KFMP	93.3	Yes
San Antonio	KISS	99.5	
	KITY	92.9	No
	KAKI	98.1	
	KEEZ	97.3	Yes
Taylor	KTAE	.....	
Texarkana	KCMC	98.1	
Waco	WACO	99.9	
	KEFC	95.5	Yes
Waxohachie	KBEC	93.5	
UTAH			
Logan	KVSC	88.1	
Provo	KBYU	88.9	Yes
Solt Lake City	KCPX	98.7	
	KSL	100.3	No
	KLUB	97.1	Yes
	KUER	90.1	
VIRGINIA			
Arlington	WAVA	105.1	
Charlottesville	WINA	95.3	
	WTJU	91.3	Yes
	WCCV	97.5	No
Crewe	WSVS	104.7	No
Fredericksburg	WFVA	101.5	Yes
Gretna	WMNA	103.3	
Hampton	WVEC	101.3	
Harrisonburg	WSVA	100.7	Yes
	WEMC	91.7	No
Lynchburg	WWOD	100.1	
Marion	WMEV	93.9	
Martinsville	WMVA	96.3	Yes
Newport News	WGH	97.3	
Norfolk	WMTI	91.5	
	WRVC	102.5	Yes
	WYFI	99.7	
Portsmouth	WAVY	96.9	
Richmond	WCOD	98.1	Yes
	WRNL	102.1	Yes
	WRVA	94.5	Yes
	WRFK	102.9	
Roonoke	WDBJ	94.9	No
	WLRJ	92.3	
	WSLS	99.1	Yes
South Boston	WHLF	97.5	
South Norfolk	WFOS	90.5	
Staunton	WSGM	93.5	
Williomsburg	WBCI	96.5	No
	WCWM	89.1	
Winchester	WRFL	92.5	No
Woodbridge	WBVA	105.9	

CITY	CALL	FREQ MC	Plan to MPX
WASHINGTON			
Bellingham	new	104.3	
	KGMI	92.9	
Edmonds	KGFM	105.3	
Lynden	KLYN	106.5	Yes
Opportunity	KZUN	96.1	No
Seattle	KING	98.1	Yes
	KIRO	100.7	
	KZAM	92.5	
	KOL	94.1	Yes
	KPRN	102.5	
	KMCS	98.9	
	KETO	101.5	Yes
	new	106.9	
	KISW	99.9	Yes
	KUOW	94.9	
	KOTO	93.3	
	KLSN	96.5	Yes
	KGMJ	95.7	
Spokone	KHQ	98.1	No
	KREM	92.9	Yes
	KXLY	99.9	
Tocoma	KTNT	97.3	
	KTOY	91.7	No
	KLAY	106.1	Yes
	KTWR	103.9	Yes
	KCPS	90.9	
Yakimo	new	106.3	
WEST VIRGINIA			
Beckley	WBKW	99.5	Yes
Charleston	WKAZ	97.5	Yes
	WKNA	98.5	Yes
Huntington	WKEE	100.5	Yes
Martinsburg	WEPM	94.3	
Morgantown	WAJR	99.3	
Ook Hill	WOAY	94.1	Yes
Parkersburg	WAAM	106.5	Yes
Wheeling	WKWK	97.3	No
	WWVA	98.7	No
	WOMP	100.5	
WISCONSIN			
Appleton	WLFM	91.1	Yes
Chilton	WHKW	89.3	Yes
Colfax	WHWC	88.3	
Delafield	WHAD	90.7	
Eau Cleire	WIAL	94.1	Yes
Fort Atkinson	WFAW	107.3	
Green Bay	WDUZ	98.5	
	WBAY	101.1	
Greenfield	WWCF	94.9	
Highland	WHHI	91.3	
Highland Township	WHSA	89.9	
Janesville	WCLO	99.9	Yes
La Crosse	WHLA	90.3	
Modisor	WHA	88.7	Yes
	WIBA	101.5	
	WISM	98.1	
	WMFM	104.1	
	WRVB	102.5	Yes
Milwaukee	WRIT	102.9	
	WMKE	102.1	Yes
	WISN	97.3	
	WMIL	95.7	Yes
	WTMJ	94.5	Yes
	WEMP	99.1	
	WMLW	98.1	
	WQFM	93.3	
	WFMR	96.5	Yes
	WBON	107.7	
Monroe	WEKZ	93.7	
Rocine	WRJN	100.7	
Rice Lake	WJMC	96.3	
Ripon	WPRN	90.1	
Shorewood	new	100.1	
Sporto	WCOW	97.1	Yes
Stevens Point	WSPT	97.9	
Tomah	WTMB	98.9	
Watertown	WTTN	104.7	No
Waukesha	WAUX	106.1	Yes
Wousou	WHRM	91.9	
	WLIN	95.5	
Wouwotosa	WTOS	103.7	No
West Bend	WBKV	92.5	Yes
Wisconsin Ropids	WFHR	103.3	No

RECORDS IN REVIEW

FROM 1961'S RECORDED RICHES. THE EDITORIAL STAFF CHOSE MORE THAN A HUNDRED STEREO DISCS AND TAPES—OUTSTANDING FOR THEIR SONIC QUALITIES. BROWSE HERE FOR THE TOP RECORDINGS OF THE PAST YEAR.

ALBENIZ: **Iberia (orch. Arbós and Surinach).** RAVEL: **Rapsodie espagnole. Orchestre de la Société des Concerts du Conservatoire de Paris, Morel. RCA Victor LSC 6094 (two discs).**

The primary attraction is sound here, with the most spectacular effects of any *Iberia* to date.

ALBENIZ: **Iberia (orch. Arbós).** TURINA: **Danzas fantásticas, Op. 22. Orchestre de la Suisse Romande, Ansermet. London CS 6194.**

Ansermet has an awareness of the inner pulse of Spanish music and gives us an exceptional performance here. Stereophiles will undoubtedly want this edition.

BACH: **Cantatas Nos. 51, 202, 8, 45. Maria Stader, soprano; Ernest Häfliger, tenor; et al. Munich Bach-Orchestra; Munich Bach-Chorus and Solistengemeinschaft der Bach-Woche Ansbach, Richter. Archive ARC 73144/45 (two discs).**

Excellent performances of these fine cantatas, two of which (Nos. 8 and 45) are not otherwise available. Stereo is up to Archive's usual high standards.

BARTOK: **Concerto for Piano and Orchestra, No. 1; Rhapsody for Piano and Orchestra, Op. 1. György Sandor, piano; Symphony Orchestra of the Southwest German Radio, Reinhardt. COX STPL 511350.**

Tough-fibered, percussive, motoric Bartók, beautifully recorded.

BARTOK: **Concertos for Piano and Orchestra: No. 2; No. 3. Géza Anda, piano; Berlin Radio Symphony Orchestra, Fricsay. Deutsche Grammophon SLPM 138111.**

A magnificent pair of performances recorded with marvelous clarity and fidelity.

BEETHOVEN: **Concerto for Violin and Orchestra, in D, Op. 61. Yehudi Menuhin, violin; Vienna Philharmonic Orchestra, Silvestri. Capitol SG 7229.**

Menuhin's performance is masterful, purposeful, and heartfelt. The sound is lustrous.

BEETHOVEN: **Septet in E flat, Op. 20. Melos Ensemble. Oiseau-Lyre SOL 60015.**

Beethoven offers only polite conversation here, but the performance has imagination and wit and stereo brings the small band to life.

BEETHOVEN: **Serenade in D, Op. 8.** KODALY: **Duo for Violin and Cello, Op. 7. Jascha Heifetz, violin; William Primrose, viola; Gregor Piatigorsky, cello. RCA Victor LSC 2550.**

Engaging Beethoven and electrifying Kodály, well performed. Stunningly recorded.

BEETHOVEN: **Symphony No. 3, in E flat, Op. 55 ("Eroica"). Orchestre de la Suisse Romande, Ansermet. London CS 6189.**

An *Eroica* of impressive vigor and force. Although slightly heavy on the right channel, the sound is spacious and pleasing to the ear.

BEETHOVEN: **Symphonies (complete). Soloists; BBC Chorus; London Symphony Orchestra, Krips. Everest SDBR 3065 (eight discs).**

Krips is able to challenge successfully the best of his stereo competition while Everest's engineering produces a rich and spacious sound, outstanding for its open, natural quality.

BERLIOZ: **Romeo et Juliette, Op. 17 (excerpts). New York Philharmonic, Bernstein. Columbia MS 6170.**

Bernstein's real affinity for the music of Berlioz is made certain here, and the stereo is notable for its realism and directional presence.

BERLIOZ: **Symphonie fantastique, Op. 14. Detroit Symphony Orchestra, Paray. Mercury SR 90254.**

A fine performance from all points of view, and one which will make your blood course a little faster. Stereo directionalism and spatial depth are just right.

BLOCH: **Sacred Service. Robert Merrill, cantor; Choirs of the Metropolitan Synagogue and Community Church of New York; New York Philharmonic, Bernstein. Columbia MS 6221.**

An intensely moving work, eloquently performed. Stereo is extremely fine.

BLOCH: **Trois poèmes juifs.** COPLAND: **Fanfare for the Common Man; Orchestral Variations. Hartford Symphony Orchestra, Fritz Mahler. Vanguard VSD 2085.**

Bloch's pieces are put together with lucidity and orchestral brilliance, and Copland's orchestration of a piano work adds new dimension to the music. Both fully exploited by recording engineers.

BRAHMS: **Concerto for Violin, Cello, and Orchestra, in A minor, Op. 102; Tragic Overture, Op. 81. Zino Francescatti, violin; Pierre Fournier, cello; Columbia Symphony Orchestra, Walter. Columbia MS 6158.**

Songfulness is the keynote here, and the resultant glow is irresistible. Stereo separation is realistic; the sound excellent.

BRAHMS: **Orchestral Music (complete). Columbia Symphony Orchestra, Walter. Columbia M4S 615 (four discs).**

A set of beautiful performances by one of the greatest Brahms interpreters. Stereo creates dimensions of width and depth, with just the right degree of studio resonance.

BRAHMS: **Quartets for Piano and Strings: No. 1, in G minor, Op. 25; No. 2, in A, Op. 26. Quartetto di Roma. Deutsche Grammophon SLPM 138014/15 (two discs).**

The Quartetto achieves ensemble playing of a high order, perfectly balanced at all times. Stereo gives a definite place to each instrument on the aural stage.

BRAHMS: **Symphony No. 1, in C minor, Op. 68. London Symphony Orchestra, Dorati. Mercury SR 90268.**

An essentially muscular approach, full of rhythmic drive. The sound is top quality, with the orchestra deployed evenly and naturally.

BRAHMS: **Symphony No. 2, in D, Op. 73. Pittsburgh Symphony Orchestra, William Steinberg. Command CC 11002.**

A major effort to make a record that sounds like a real orchestra rather than a copy of one. An engineering triumph that places emphasis on good musical and recording practices rather than on creating sensational effects.

CORELLI: **Concerto grosso in D, Op. 6, No. 1. Trio Sonatas, Op. 4: No. 4, in D; No. 10, in G. Sonata for Violin and Continuo, in E minor, Op. 5, No. 8. Soloists; Vienna Sinfonietta, Goberman. Library of Recorded Masterpieces, SD.**

This is noble music, with a breadth and vigor that make one think of Handel. Excellent performances, particularly effective in stereo.

COUPERIN: **Troisième Concert royal, in A.** LECLAIR: **Sonata No. VIII, in D.** BOISMORTIER: **Trio in D, Op. 50, No. 6; Concerto in E minor, Op. 37. Camerata Instrumentale of the Telemann-Gesellschaft (Hamburg). Archive ARC 73148.**

Some elegant French pieces from the first half of the eighteenth century receive crisp, vital performances. Excellent sound.

ELGAR: **Enigma Variations, Op. 36.** BRAHMS: **Variations on a Theme of Haydn, Op. 56a. London Symphony Orchestra, Monteux. RCA Victor LSC 2418.**

Sensibility and sensitivity mark these interpretations, and the stereo sound is natural and well distributed.

ENESCO: **Rumanian Rhapsodies, Op. 11: No. 1, in A; No. 2, in D.** LISZT: **Hungarian Rhapsodies: No. 2, in D minor; No. 3, in D. London Symphony Orchestra, Dorati. Mercury SR 90235.**

A genuinely electrifying spectacular, played with dramatic power and éclat.

ENESCO: **Rumanian Rhapsodies, Op. 11: No. 1, in A; No. 2, in D.** LISZT: **Hungarian Rhapsodies: No. 5, in E mi-**

nor; No. 6, in D. Vienna State Opera Orchestra, Golschmann and Fistoulari. Vanguard SRV 119.

Vanguard's low-priced demonstration disc is uncommonly attractive for its special musical as well as technical interest. Stereo is expansive.

GABRIELI, ANDREA: **Aria della battaglia.** GABRIELI, GIOVANNI: **Symphoniae sacrae (selections). Brass Ensemble of the Vienna State Opera Orchestra, Stone. Westminster WST 14081.**

Zestful, brilliant performances by an expert Viennese ensemble, recorded in open, ringing stereo.

HANDEL: **Concerti grossi, Op. 3 (complete). Chamber Orchestra of the West German Radio, Wenzinger. Archive ARC 73139/40 (two discs).**

Good tunes and high spirits are the prevailing elements here, in one of the most rewarding sets of Opus 3 to be recorded in quite some time. The clarity and brilliance of the stereo make the most of Handel's color contrasts.

HANDEL: **Julius Caesar (excerpts). Irmgard Seefried, soprano; Dietrich Fischer-Dieskau, baritone; Berlin Radio Symphony Orchestra, Böhm. Deutsche Grammophon SLPM 138637.**

Fine performances of exceptionally beautiful material—one hardly knows which aria to admire the most. First-class stereo.

HANDEL: **Messiah. Soloists; London Philharmonic Choir and Orchestra, Jackson. Roulette SRGC 1 (four discs).**

This is not a great or glamorous performance, but it is a remarkably strong *Messiah*, and deserves a high place among those available. Balances are just and sound is excellent.

IVES: **Symphony No. 2. New York Philharmonic, Bernstein. Columbia KS 6155.**

This is one of Ives's most endearing, melodious, richly colored, and grandly constituted works. Bernstein's interpretation possesses charm and blandishment, and the stereo qualities are absolutely superb.

LALO: **Symphonie espagnole, Op. 21. Henryk Szeryng, violin; Chicago Symphony Orchestra, Hendl. RCA Victor LSC 2456.**

A complete delight from beginning to end. Szeryng's controlled Gallic elegance is ideal for Lalo. Impeccable

orchestral support, magnificently recorded.

MENDELSSOHN: **The Hebrides, Overture, Op. 26; Symphony No. 3, in A minor, Op. 56 ("Scottish"). London Symphony Orchestra, Maag. London CS 6191.**

What a delight this record is, with unusually expressive performances. The best stereo edition of both works.

MOZART: **Don Giovanni. Birgit Nilsson, soprano; Leontyne Price, soprano; Cesare Siepi, bass; et al. Vienna State Opera Chorus; Vienna Philharmonic Orchestra, Leinsdorf. RCA Victor LSC 6410 (four discs).**

Nilsson makes a remarkably fine Anna, and Price's Elvira is well sung and sympathetic. Leinsdorf does an excellent job, and the stereo sound is first-rate: balances are carefully calculated, with spaciousness and sensible separation.

MOZART: **Mass in C minor, K. 427. Maria Stader, soprano; et al. Deutsche Grammophon SLPM 138124.**

A highly recommended recording of this great masterwork, with Miss Stader and the conductor in top form. Stereo is live and transparent, with very effective separation in the choruses.

MOZART: **Le Nozze di Figaro. Elisabeth Schwarzkopf, soprano; Giuseppe Taddei, bass; et al. Philharmonia Chorus and Orchestra, Giulini. Angel S 3608 (four discs).**

There are many fine qualities in this performance; Miss Schwarzkopf's Countess is moving and human, and sung with great skill. The stereo gives the unmistakable impression of movement in some scenes and separation in others.

MOZART: **Quartets for Flute and Strings: in D, K. 285; in G, K. 285a; in C, K. 285b; in A, K. 298. Samuel Baron, flute; Members of Fine Arts Quartet. ConcertDisc CS 215.**

Baron's playing is first-class, ably seconded by the string performers. If it is stereo you want in this music, this is the disc for you.

MOZART: **Symphony No. 41, in C, K. 551 ("Jupiter"); Overtures. Vienna State Opera Orchestra, Prohaska. Vanguard SRV 118SD.**

A careful performance of the *Jupiter*

which is, stereophonically speaking, one of the best-sounding on records. A bargain.

MUSSORGSKY: **Pictures at an Exhibition (trans. Ravel). Virtuoso Symphony of London, Wallenstein. Audio Fidelity FCS 50004.**

A magnificently played version which makes its points without exaggerating. The stereo is naturalistic and the surfaces absolutely noiseless. One of the best *Pictures* on discs.

MUSSORGSKY: **Pictures at an Exhibition (orch. Ravel); A Night on Bald Mountain (arr. Rimsky-Korsakov). London Symphony Orchestra, Sargent. Everest SDBR 3053.**

Wonderfully spacious sound conveys a sensitive, transparent interpretation. Unbelievably lifelike.

MUSSORGSKY: **Pictures at an Exhibition (orch. Ravel); Night on Bald Mountain. Vienna State Opera Orchestra, Golschmann. Vanguard VRS 1175D.**

Although these readings verge on melodrama, this stereo edition boasts sharply focused sonics, tremendous dynamic range, and incandescent climaxes.

PAISIELLO: **Il Barbiere di Siviglia. Graziella Sciutti, soprano; Nicola Monti, tenor; Florindo Andreolli, tenor, et al. Virtuosi di Roma, Fasano. Mercury SR 2-9010.**

This score is full of charm and wit. Graziella Sciutti is tender and provocative, the Virtuosi play magnificently, and Mercury's production is a model for productions of this kind. Stereo is clear and natural, with no trace of distortion.

POULENC: **Concerto for Two Pianos and Orchestra.** SAINT-SAENS: **Carnaval des animaux. Arthur Whittemore and Jack Lowe, duo-pianos; Philharmonia Orchestra, Dervaux. Capitol SP 8537.**

The first stereo recording of Poulenc's spiffy little concerto, deftly played and excellently recorded.

POULENC: **Gloria; Concerto for Organ, Strings, and Timpani. Rosanna Carteri, soprano; French National Radio Chorus and Orchestra, Gouverné (in the Gloria). Maurice Durflé, organ; French National Radio Orchestra, Prêtre. Angel S 35953.**

Opinions may vary as to the value of this music, but the performances are both magnificent and the engineering is sensational.

PROKOFIEV: **Concerto for Piano and Orchestra, No. 2, in G minor, Op. 16.** HAYDN: **Sonata for Piano, in E flat. Malcolm Frager, piano; Orchestre de la Société des Concerts du Conservatoire de Paris, Leibowitz. RCA Victor LSC 2465.**

Frager's colorful and pianistically resourceful playing of the Prokofiev conveys the music's power and lyricism. Superlative sound.

PROKOFIEV: **Concerto for Piano and Orchestra, No. 3, in C, Op. 26.** MACDOWELL: **Concerto for Piano and Orchestra, No. 2, in D Minor, Op. 23. Van Cliburn, piano; Chicago Symphony Orchestra, Hendl. RCA Victor LSC 2507.**

Superb performances by both soloist and orchestra, magnificently recorded.

PROKOFIEV: **Peter and the Wolf, Op. 67.** SAINT-SAENS: **Carnaval des animaux. Beatrice Lillie, narrator; Julius Katchen and Gary Graffman, piano; London Symphony Orchestra, Skitch Henderson. London CS 6187.**

While Miss Lillie is far too sophisticated for the kiddies, the orchestral performances are splendid. The stereo is first-rate, and most amusing as the narrator skips from one speaker to another in a unique application of stereo's dual channels.

PROKOFIEV: **Peter and the Wolf, Op. 67.** TCHAIKOVSKY: **The Nutcracker, Op. 71: Orchestral Suite. New York Philharmonic, Bernstein. Columbia MS 6193.**

Skillful, warm, rich performances, beautifully recorded.

PUCCINI: **Madama Butterfly. Victoria de los Angeles, soprano; Jussi Bjoerling, tenor, et al. Chorus and Orchestra of the Rome Opera, Santini. Capitol SGCR 7232 (three discs).**

This is the best-sung *Butterfly* in the catalogue, with bright, broad stereo sound.

RAVEL: **Alborado del gracioso; Bolero; Tombeau de Couperin. Philadelphia Orchestra, Ormandy. Columbia MS 6169.**

Performances of true distinction which rank among the finest achievements in the stereo repertory.

RAVEL: **L'Enfant et les sortilèges. Sylvaine Gilma, soprano; Jeanne Berbié,**

soprano; et al. Choir and Orchestre National de la RTF, Maazel. Deutsche Grammophon SLPM 138675.

Engaging and individual performances, utilizing the full advantages of stereo. A splendid achievement.

RIMSKY-KORSAKOV: **Scheherazade, Op. 35. Chicago Symphony Orchestra, Reiner. RCA Victor LSC 2446.**

Reiner plays this music for its colors and emphasizes the drama of these Oriental tales. The sonics are striking.

RIMSKY-KORSAKOV: **Scheherazade, Op. 35.** BORODIN: **Prince Igor: Polovtsian Dances. Orchestre de la Suisse Romande, Ernest Ansermet. London CS 6212.**

A first-rate orchestral performance in an acoustically first-rate large auditorium. The closest imaginable approximation of a live concert hall performance, in which the audio technology reaches the ultimate triumph: self-effacement.

ROSSINI: **Il Barbiere di Siviglia. Gianna d'Angelo, soprano; Nicola Monti, tenor; et al. Bavarian Radio Orchestra, Bartoletti. Deutsche Grammophon 138665/67 (three discs).**

Lively direction and the lucid DGG sound make the long ensembles continuously delightful, and there are some outstanding solo performances.

SCHUBERT: **Symphony No. 9, in C. North German Radio Symphony, Schmidt-Isserstedt. Telefunken TCS 18041.**

A best buy, the first stereo version on a lower-priced label. Performed with tightness and drive.

SCHUMANN: **Symphonies (complete); Concerto for Piano and Orchestra, in A minor, Op. 54; Manfred Overture, Op. 115. Leon Fleisher, piano (in the Concerto); Cleveland Orchestra, Szell. Epic BSC 110 (four discs).**

Szell has captured both the flights of romantic exuberance and the pages of darker melancholy in this music. Admirable fidelity in the stereo, which is vivid and broadspread.

SCHUMANN: **Concerto for Piano and Orchestra, in A minor, Op. 54.** GRIEG: **Concerto for Piano and Orchestra, in A minor, Op. 16. Leon Fleisher, piano; Cleveland Orchestra, Szell. Epic BC 1080.**

The expressively virile performance

of the Schumann has both discipline and freedom—it is one of the most satisfying on records. The Grieg is not so successful, but the sound is excellent and the orchestra resplendent and beautifully detailed.

SOLER: **Six Concertos for Two Organs. E. Power Biggs, Daniel Pinkham, organs. Columbia MS 6208.**

These are curious and interesting pieces in a very rare medium. Tremendously effective on stereo.

STRAUSS, JOHANN: **Die Fledermaus. Hilde Gueden, soprano; Regina Resnik, mezzo; et al. Vienna State Opera Chorus, Vienna Philharmonic Orchestra. Karajan. London OSA 1319 (three discs).**

A striking production, played and sung with tremendous dash and precision. Stereo achieves some remarkable effects of distance and direction. Recorded to perfection.

STRAUSS, JOHANN II: **Graduation Ball (arr. Dorati).** WEBER: **Invitation to the Dance, Op. 65 (trans. Berlioz). Vienna Philharmonic Orchestra. Boskovsky. London CS 6199.**

Both are charming and vivacious works. Stereo sound is eminently clear and spacious.

STRAUSS, JOHANN II: **Waltzes. Philadelphia Orchestra, Ormandy. Columbia MS 6217.**

Ormandy has a true Viennese way with the waltzing Strausses. His strings have a sweeping lushness here, and the spacious stereo is natural and realistic.

STRAUSS, RICHARD: **Ariadne auf Naxos. Leonie Rysanek, Roberta Peters, Sena Jurinac, sopranos; et al. Vienna Philharmonic Orchestra, Leinsdorf. RCA Victor LDS 6152 (three discs).**

Possibly the very finest recording of this masterwork on the market, with Jurinac singing a truly great leading role. High quality stereo used to excellent advantage, particularly for distance effects.

STRAVINSKY: **Pétrouchka. Boston Symphony Orchestra, Monteux. RCA Victor LSV 2376.**

Monteux was not only the first interpreter of *Pétrouchka* but is one of the finest, according to Stravinsky. This recording is incomparable, and Victor's engineers make the most of the work's adaptability to stereo.

STRAVINSKY: **Pétrouchka; The Rite of Spring. Columbia Symphony Orchestra, Stravinsky. Columbia D3S 614 (three discs).**

Definitive, brilliant performances led by the composer, with one full side of reminiscences spoken by him. Stereo does well by the complex orchestration.

STRAVINSKY: **Symphony in C; Symphony in Three Movements. Orchestra de la Suisse Romande, Ansermet. London CS 6190.**

Although Ansermet is less incisive an interpreter of these works than Stravinsky himself, the disc has important qualities of its own. It is the first stereo version of the Symphony in C, and is gorgeously recorded.

TCHAIKOVSKY: **Romeo and Juliet, Fantasy Overture; The Nutcracker: Suite, Op. 71. Philharmonia Orchestra, Markevitch. Angel S 35680.**

The conductor's artistry establishes a select place for this coupling, which rivals the old Toscanini versions. Both performances have subtlety, delicacy, and evocative atmosphere, and Angel has recorded them with devastating impact.

TCHAIKOVSKY: **Serenade for Strings, in C, Op. 48.** BORODIN: **Quartet for Strings, No. 2, in D: Nocturne (arr. Sargent).** BARBER: **Adagio for Strings, Op. 11.** VAUGHAN WILLIAMS: **Fantasia on "Greensleeves." Philadelphia Orchestra, Ormandy. Columbia MS 6224.**

The music is altogether delightful, and the Philadelphians create a wealth of sound. Stereo imparts spaciousness and directionalism.

TCHAIKOVSKY: **Symphony No. 6, in B minor, Op. 74 ("Pathétique"). Los Angeles Philharmonic Orchestra, Leinsdorf. Capitol SP 8530.**

One of the most effective of recent recordings. The tempos are sensible, the playing first-rate, the sonics superb.

VARESE: **Music of Edgar Varèse. Wind and Percussion Ensemble, Craft. Columbia MS 6146.**

This music is completely atonal and extremely dissonant. Space is as much a dimension of music as time for Varèse, and if ever a composer really needed stereo, it is he. In Columbia's stereo the players seem to be right in your listening room and you can practically count the buttons on their shirts.

VERDI: **Un Ballo in maschera. Antonietta Stella, soprano; Ettore Bastianini, baritone; et al. Orchestra and Chorus of Teatro alla Scala, Gavazzeni. Deutsche Grammophon 138680/82 (three discs).**

The performance as a whole is a success. The sound is outstanding, with stereo movement and directionality unusually effective.

VERDI: **Requiem Mass. Leontyne Price, soprano; Jussi Bjoerling, tenor; et al. Chorus of the Gesellschaft de Musikfreunde; Vienna Philharmonic Orchestra, Reiner. RCA Victor LDS 6091 (two discs).**

A reading of uncanny precision, with brilliant soloists. The stereo has good separation and breadth, with clean, full sound.

VERDI: **Rigoletto. Renata Scotto, soprano; Fiorenza Cossotto, mezzo; et al. Chorus and Orchestra of the Maggio Musicale Fiorentino, Gavazzeni. Mercury SR 39012 (three discs).**

All in all, an interesting, frequently imposing release, though far from the most polished of performances. Superior stereo, with considerable impact.

VERDI: **La Traviata. Anna Moffo, soprano; Richard Tucker, tenor; et al. Chorus and Orchestra of the Rome Opera House, Previtali. RCA Victor LSC 6154 (three discs).**

This is the best-led *Traviata* on records, and deserves a place near the top of anyone's list. The superb stereo provides movement and perspectives.

VIVALDI: **Concertos for Violin and Strings, Op. 8, Nos. 1-4 ("The Four Seasons"). Soloists; New York Sinfonietta, Goberman. Library of Recorded Masterpieces, Vol. 1, No. 8.**

In some ways the most imaginative and most thoughtfully prepared of recent *Seasons*. First and second violins are recorded on separate tracks, with fine effect.

WAGNER: **Orchestral Excerpts. Chicago Symphony Orchestra, Reiner. RCA Victor LSC 2441.**

One of the most impressive Wagner excerpts sets to be had, with Reiner's sound at ripest vintage quality. The stereo is magnificent.

WAGNER: **Orchestral Excerpts. Philharmonia Orchestra, Klemperer. Angel S3610B (two discs).**

The performances are extraordinarily fine and the engineering projects them with an exceptionally wide dynamic range and some of the best stereo yet heard from EMI.

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"BALDWIN ORGAN AND BONGOS." **Eddie Osborn; Bob Rosengarden; rhythm accompaniment. Audio Fidelity DFS 7004.**

Although there is nothing sonically unnatural here, the channel separation is as extreme and the high-level recording as ultrabrilliant as on most Audio Fidelity discs.

"BALLET FOR BAND." **Eastman Wind Ensemble, Fennell. Mercury SR 90256.**

Fennell's band is surely one of the finest to be heard. The ultrabrilliant stereo on this disc is positively gleaming.

"THE BEST OF SELLERS." **Peter Sellers, Irene Handl, Fred Flange; Orchestra, Ron Goodwin. Angel S 35884.**

These little masterpieces of observation demonstrate Sellers' wonderful ability to create characterizations merely with words. The stereo version makes very effective use of movement.

"BONGOS, FLUTES, GUITARS." **Los Admiradores. Command RS 812 SD.**

Lew Davies' arrangements are delightfully imaginative, and all are fascinatingly scored and superbly recorded in impressive stereo.

WILLI BOSKOVSKY. **"Philharmonic Ball." Vienna Philharmonic Orchestra, Boskovsky. London CS 6182.**

Attractive, lightweight music conducted with elegance. Magnificently suave stereo sound.

"CAMELOT." **Original Cast Recording. Columbia KOS 2031.**

Loewe has written in *Camelot* a gay and altogether charming collection of melodies, and Julie Andrews sings like an angel. The stereo, with reasonable exploitation of movement, is excellent.

"CAREFREE." **Percy Faith and His Orchestra. Columbia CS 8360.**

There is much more variety, animation, and musical interest here than in

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most mood-music albums. The sound is brilliant throughout, with some stunning effects achieved in stereo.

"CARNIVAL." **Original Cast Recording. M-G-M E/S 3946-OC.**

A masterly score and enchanting performances make this a lively and lovely recording. Stereo gives zip to the proceedings.

"CARTOONS IN STEREO." **Cy Harrice, narrator; Robert J. Prescott, sound effects. Audio Fidelity DFS 7008.**

There is pointed wit here, and devilish ingenuity; this is obviously a forerunner of a popular new technique in stereogenic comedy. Sound effects are excellently produced and recorded.

COLUMBIA UNIVERSITY CHAPEL CHOIR: **"Chorus, Organ, Brass, and Percussion." Soloists; Columbia University Chapel Choir; Ralph Kneeream, organ; Brass and Percussion Ensemble, Wright. Kapp KCL 9057.**

Sound fanciers will not be disappointed: there is an exciting variety of timbres here, and a panoramic aural view of the reverberant St. Paul's Chapel.

DELLER CONSORT: **"Madrigal Masterpieces." Alfred Deller, dir. Vanguard BGS 5031.**

The Monteverdi madrigals, moving and passionate, are worth the price of the disc. The sound is first-rate, and the record highly recommended from every point of view.

"GENE ESTES." **Gene Estes, vibraphone; Ensemble. Carlton STLP 12/125.**

Estes is a virtuoso who brings taste as well as skill to his own solos. The recording admirably captures both the glitter of these sparkling performances and their stereogenic antiphonies.

"GUS FARNEY AT THE GIANT FIVE-MANUAL WURLITZER PIPE ORGAN." **Gus Farney, organ. Warner Bros. WS 1409.**

Deft and tasteful performances on one of the best instruments of its kind around, in Salt Lake City. Spacious stereoism at its most impressive.

FREDERICK FENNELL: **"Marches for Orchestra." Eastman-Rochester "Pops" Orchestra, Fennell. Mercury SR 90271.**

This program is so formidably recorded in broadspread, realistic stereo that it is sure to achieve popularity as a sonic spectacular.

"FREDERICK FENNELL CONDUCTS VICTOR HERBERT." **Mercury PPS 6007.**

Mercury's ultradaring engineers go all out to demonstrate how vigorously the familiar old tunes can be rejuvenated. A real thriller even among today's spectaculars.

"FOLK SONGS, GUITARS, BANJOS, RECORDERS, FLUTES." **Tony Mottola and His Ensemble. Command RS 823.**

Mottola has brought about a true marriage of popularized folk materials and the stereo spectacular. Gleaming stereo sound contributes to the disc's unique charm.

"THE GENTLE TOUCH." **Jackie Gleason and His Orchestra. Capitol SW 1519.**

There is fresh vitality and enthusiasm here which lends an almost entirely new sound to the Gleason band. A special source of pleasure is the exciting and skillful manipulation of the stereo sound.

"GERMAN ARMY CHORUS." **6th Music Corps of the German Federal Army, Capt. Scholz. London SW 99007.**

No one can sing brassy anthems of this type quite like a German Chorus, and London has here captured one of the best in splendid, sweeping stereo.

"GERSHWIN AND GUITARS." **Al Caiola and Orchestra. Time S/2010.**

Familiar Gershwin tunes serve as a peg on which Caiola can hang some really fascinating arrangements. The separation is extremely wide and there is a good bit of channel-switching between bands; the stereo sounds are some of the finest to be produced lately.

"I'VE GOT A RIGHT TO SING THE BLUES." **Eileen Farrell; Luther Henderson and His Orchestra. Columbia CS 8256.**

In this remarkable vocal *tour de force* Miss Farrell sings with uninhibited freedom and a sure sense of style that almost borders on jazz. Extremely fine sound.

"JASMINE AND JADE." **Axel Stordahl and His Orchestra. Dot DLP25282.**

Quasi-Oriental music has always

maintained an irresistible appeal for Occidental ears, and Dot has endowed this tapestry of kaleidoscopic musical patterns with opulent stereo sound, well distributed and of unusual clarity.

"LATIN PERCUSSION." **David Carroll and His Orchestra. Mercury PPS 6000.**

Carroll's scorings and performances are outstanding in their expressive pertinency, their tastefulness, restraint, and variety. The stereo sound contributes to the vivid presence, cleanly defined contours, and dramatic vitality.

"THE MUSIC OF VICTOR HERBERT." **George Melachrino and His Orchestra. RCA Victor LSP 2129.**

A fine new Melachrino disc. The orchestra, with its huge complement of strings, is an ideal instrument for a proper presentation of these Herbert ballads. Wondrous sound.

"THE NEWPORT FOLK FESTIVAL, 1960. VOLS. 1 AND 2." **Vanguard VSD 2087/88, two discs.**

The parade of talent here features Pete Seeger, John Lee Hooker, Tom Makem, and Jimmie Driftwood, among others. Consummate stereo captures the spacious outdoor ambiance of the original performances.

"OPERETTA MEMORIES." **Mantovani and His Orchestra. London PS 202.**

One of the finest Mantovani albums to date. The London sound is nothing short of miraculous, with tremendous spaciousness in the stereo.

"OVER THE WAVES." **Capitol Symphony Orchestra, Dragon. Capitol SP 8547.**

The present salty program includes some topnotch examples of Dragon's new-Straussian elaborations on familiar tunes. Remarkably effective and expansive stereo.

"OVERTURE . . . AMERICAN MUSICAL THEATRE." **Hugo Montenegro and His Orchestra. Vol. 1, 1924-1935; Vol. 2, 1935-1945; Vol. 3, 1946-1952; Vol. 4, 1953-1960. Time S 2035/38, four discs.**

Here is a wonderful four-volume encyclopedia containing 116 songs from 65 Broadway musicals presented between 1924 and 1960. Time has provided tremendously wide-ranged, big-hall stereo.

"SAILOR, SAILOR AND LOLITA'S GREATEST HITS." **Kapp KS 3219.**

Suave performances—Lolita emerges as a *chanteuse* in the best Continental tradition. Superbly recorded.

"SOUND EFFECTS IN STEREO, VOL. 1." **Audio Fidelity DFS 7006.**

This compendium of fifty characteristic sounds of our times may well be the *ne plus ultra* of sonic *divertissements* for fanatical audiophiles. Includes jet planes, air hammers, steam whistles.

"THE SOUND OF A MARCHING BAND: 120 CADENCE." **Medallion Marching Band, Terry. Medallion MS 7505.**

A big and virtuosic band plays a varied selection of marches with wonderfully natural sound. Few band recordings have matched this one in dynamic impact and authenticity.

"STEREO ACTION" SERIES: "DYNAMICA"; RUNNIN' WILD." **Ray Martin's Orchestra; Dick Schory's Percussion and Brass Ensemble, respectively. RCA Victor LSA 2287, 2306.**

Where materials call for sonic movement, the expressive as well as shock effects are admirable. Schory achieves the most kaleidoscopic sonics of any percussion specialist.

QUARTER-TRACK RECORDED TAPES

BACH: **Chorale Preludes: Nos. S. 639, S. 650, S. 606, S. 645. Fantasia and Fugue in G minor, S. 542. Passacaglia and Fugue in C minor, S. 582, etc. Karl Richter, organ. London LCK 80067 (twin-pack).**

The organ at Victoria Hall, Geneva, is nobly attractive for its sonic qualities, and the broadspread stereo is thrillingly impressive.

BACH: **Mass in B minor, S. 232. Pierrette Alarie, soprano; Nan Merriman, contralto; et al. Vienna Academy Chorus; Vienna State Opera Orchestra, Scherchen. Westminster WTZ 119, two reels.**

Although there is some thinness in the high trumpet parts, this taping is one of enchanting vocal and sonic loveliness. The tape has quiet surfaces and expanded dynamic range.

BEETHOVEN: **Symphony No. 9, in D minor, Op. 125 ("Choral"); Overture: Leonore No. 3. Soloists; BBC Chorus; London Symphony Orchestra, Krips. Everest TT 43-006 (twin-pack).**

Krips's Ninth is large-scaled, heroic, and sonically monumental. It is slightly handicapped by a merely routine vocal quartet, but the stereo is dramatically wide-range in dynamics.

BERLIOZ: **Grande Messe des Morts, Op. 5 ("Requiem"). Léopold Simoneau, tenor; New England Conservatory Chorus; Boston Symphony Orchestra, Munch. RCA Victor FTC 7000.**

Although there are some shortcomings in the choral work and in Simoneau's solo here, the orchestral playing is splendid, and the stereo sound encompasses without strain the fabulous dynamics. Indisputably one of today's supreme sonic achievements.

BERLIOZ: **Overtures. Boston Symphony Orchestra, Munch. RCA Victor FTC 2059.**

Munch's preëminence as a Berlioz interpreter has been challenged only by Beecham. Although there is a very slight lack of brilliance here, the smooth stereo spread and transparency are extremely effective.

BOITO: **Mefistofele. Renata Tebaldi, soprano; Cesare Siepi, bass; et al. Chorus and Orchestra of Accademia di Santa Cecilia (Rome), Serafin. London LOR 90011, two reels.**

The power of this opera comes into its own at last. The sonic splendors of Serafin's forces are ravishing in their quiet passages and overwhelming in their grander ones.

BRAHMS: **Concerto for Piano and Orchestra, No. 2, in B flat, Op. 83. Rudolf Serkin, piano; Philadelphia Orchestra, Ormandy. Columbia MQ 347.**

Serkin's latest recording of the Brahms Second is gravely passionate and nobly expansive. The stereo is bold in breadth, auditorium authenticity, and dynamic range.

DEBUSSY: **La Mer; Nocturnes (3).** RAVEL: **Bolero; La Valse. Amsterdam Concertgebouw Orchestra, Van Beinum. Epic EC 813.**

A poignant memorial to Van Beinum's artistry and to the poetic, plastically contoured sonorities for which the orchestra was distinctive. The luminous sound captures to perfection the rich coloring of the players.

DVORAK: **Symphony No. 4, in G, Op. 88. Cleveland Orchestra, Szell. Epic EC 806.**

Szell's idiomatically "Czechish" performance is deservedly famous. Stereo boasts smooth expansiveness and optimum channel differentiation. Top technological rating.

DVORAK: **Symphony No. 5, in E minor, Op. 95 ("From the New World"). Columbia Symphony Orchestra, Walter. Columbia MQ 339.**

Walter has a unique way with this music and infuses it here with the warmth and ripeness of a lifetime's insight and devotion. The orchestra may not be one of the great ones, but the recording itself is a model of transparency and smoothly blended channel-to-channel spread.

GRIEG: **Peer Gynt Suite No. 1, Op. 46.** TCHAIKOVSKY: **Swan Lake, Op. 20: Suite. London Philharmonic Orchestra, Alwyn. Richmond RCE 40005.**

A tape to be recommended for far more than its inexpensiveness. One of the most piquantly lyrical and delicate *Peer Gynts* on tape, beautifully and airily recorded.

HINDEMITH: **Octet for Winds and Strings; Sonata for Unaccompanied Viola, Op. 25, No. 1. Members of the New York Woodwind Quintet and Fine Arts Quartet with Harold Siegal, double bass; Irving Ilmer, viola. Concertapes 4T 5010.**

Every admirer of Hindemith will welcome the premiere recording of one of his most recent compositions, the broad-scaled and intricate Octet. The strongly stereoistic and clean recording captures to perfection every detail of this complex work.

LALO: **Symphonie espagnole, Op. 21. Henryk Szeryng, violin; Chicago Symphony Orchestra, Hendl. RCA Victor FTC 2051.**

This is one of the finest performances of the Lalo on tape, tautly finespun, incisive and resilient as demanded, unmannered yet fierily individual. Stereo is clean and unexaggerated.

LEONCAVALLO: **I Pagliacci. Gabriella Tucci, soprano; Mario del Monaco, tenor; et al. Chorus and Orchestra of Accademia di Santa Cecilia (Rome), Molinari-Pradelli. London LOH 90021 (twin-pack).**

This first stereo *Pagliacci* stresses—in both its stereophonic effects and its stars' performances—the opera's rawest melodrama. Opera lovers cannot fail to be held, at least momentarily, by the crude vigor of this reading and by its broadspread, powerful recording.

MAHLER: **Das Lied von der Erde. Maureen Forrester, contralto; Richard Lewis, tenor; Chicago Symphony Orchestra, Reiner. RCA Victor FTC 3002.**

Although this performance is far too emotionally detached, none can deny that it boasts topnotch vocal and instrumental artistry, a boldly authoritative reading by Reiner, and superb stereo technology.

MAHLER: **Symphony No. 4, in G. Lisa Della Casa, soprano; Chicago Symphony Orchestra, Reiner. RCA Victor FTC 2027.**

The inherent attractiveness of this work is notably enhanced here by the eloquence of Reiner's reading and the crystalline clarity of well-nigh ideal stereoism.

MENDELSSOHN: **Concertos for Piano and Orchestra: No. 1, in G minor, Op. 25; No. 2, in D minor, Op. 42. Rudolf Serkin, piano; Philadelphia Orchestra, Ormandy. Columbia MQ 308.**

The normally reserved Serkin and Ormandy are startlingly passionate here, and the engineers match their enthusiasm with the coolest and boldest of stereo recordings.

MOZART: **Symphony No. 41, in C, K. 551 ("Jupiter"). Overtures: Don Giovanni; Le Nozze di Figaro; Die Zauberflöte. Vienna State Opera Orchestra, Prohaska. Vanguard VTC 1631.**

This Prohaska Mozart is almost a "must" reel—a performance of uncommon lucidity and piquancy. The clarity is further enhanced by the transparent, unexaggerated stereo, miked at just the proper distance.

MOZART: **Concerto for Clarinet and Orchestra, in A, K. 622. Concertos for Horn and Orchestra: in D, K. 412; in E flat, K. 447. Gervase de Peyer, clarinet; Barry Tuckwell, horn; London Symphony Orchestra, Maag. London LCL 80053.**

Surely the finest version of the Clarinet Concerto, in performance as well as in sound, which has yet appeared in any medium.

PUCCINI: **Turandot. Birgit Nilsson, Renata Tebaldi, sopranos; Jussi Bjoerling, tenor, et al. Chorus and Orchestra of the Rome Opera, Leinsdorf. RCA Victor FTC 8001, two reels.**

This recording ranks among the topmost achievements in stereo opera. Performances are splendid, and the engineers have captured the immediacy and galvanic excitement of a live performance.

PUCCINI: **Madama Butterfly. Renata Tebaldi, soprano; Carlo Bergonzi, tenor; et al. Chorus and Orchestra of Accademia di Santa Cecilia (Rome), Serafin. London LOR 90010, two reels.**

There have been more exciting *Butterflys*, but surely none on record as atmospheric and aurally rich as this one.

RIMSKY-KORSAKOV: **Scheherazade, Op. 35. Chicago Symphony Orchestra, Reiner. RCA Victor FTC 2017.**

Reiner creates one of the finest *Scheherazades* in the repertory, captured in luminously rich, immaculately transparent stereo.

SCHUBERT: **Symphony No. 9, in C. London Symphony Orchestra, Krips. London LCL 80043.**

Sheer necessity . . . the most engaging and invigorating of all available stereo versions, in soaringly expansive stereo.

SCHUMANN: **Concerto for Piano and Orchestra, in A minor, Op. 54. Van Cliburn, piano; Chicago Symphony Orchestra, Reiner. RCA Victor FTC 2042.**

Cliburn's Schumann is dreamy and introspective, the stereo recording authentic and full of sonic beauty.

STRAUSS, JOHANN II: **Die Fledermaus ("Gala Performance"). Hilde Gueden, soprano; Regina Resnik, mezzo; Eberhard Waechter, baritone, et al., plus guest artists. Vienna State Opera Chorus, Vienna Philharmonic Orchestra, Von Karajan. London LOR 90030, two reels.**

This performance is incomparable in its own right, and represents advanced stereo technique in a superlative degree.

STRAVINSKY: **The Firebird (complete); Pulcinella: Suite; Le Chant du rossignol. Orchestre de la Suisse Romande, Ansermet. London LCK 80042 (twin-pack).**

This Stravinsky cornucopia is valuable from beginning to end: besides being the only stereo versions of these works available, these performances are among the most spirited, sparkling, and varicolored of all Ansermet's triumphs.

STRAVINSKY: **Pétrouchka. Boston Symphony Orchestra, Monteux. RCA Victor 2007.**

Monteux's reading is leisurely and delicate in detail—an essentially balletic approach to the music. This version tops all others for its orchestral playing, and the stereo sound is magnificent.

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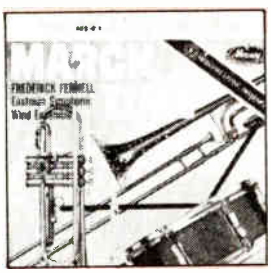

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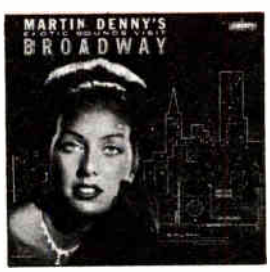

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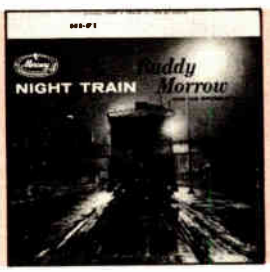

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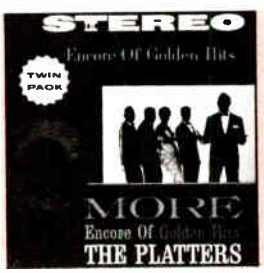

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