



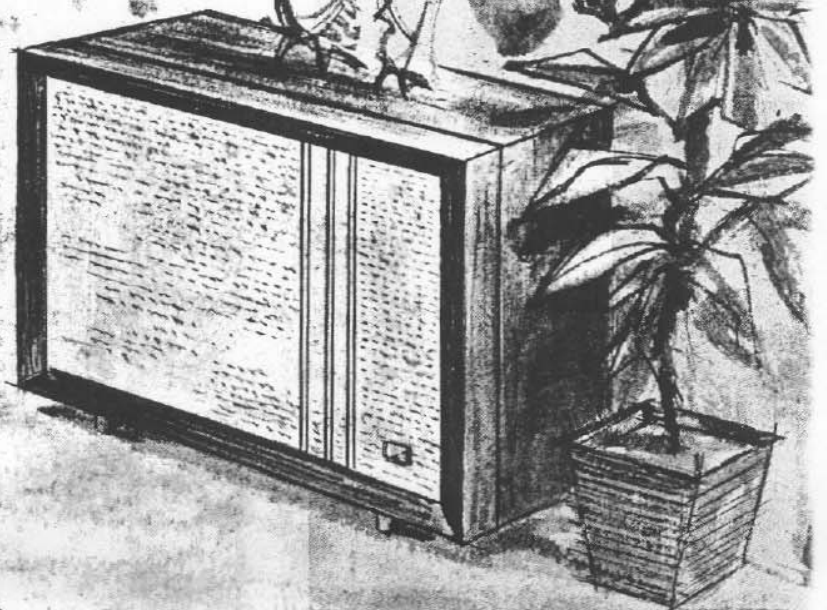
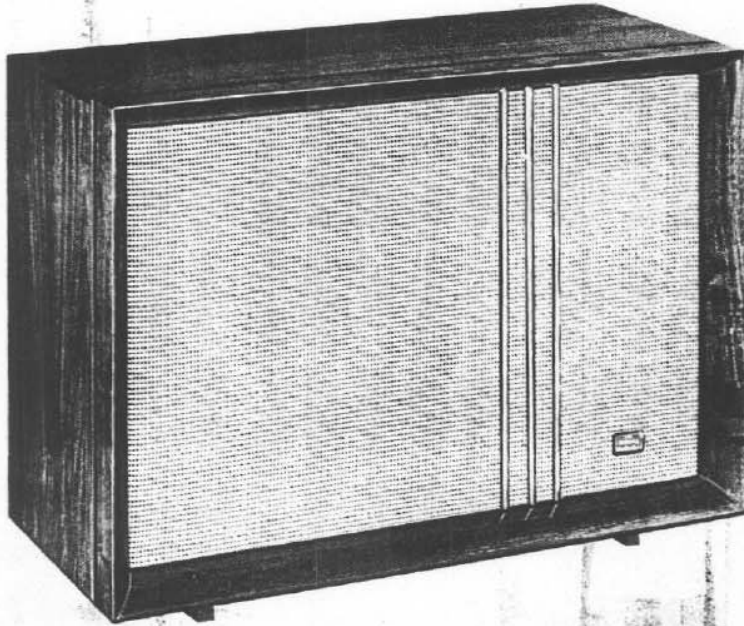
# ROYAL

LOW RESONANCE ULTRA-COMPACT LOUDSPEAKER SYSTEM

*Electro-Voice*<sup>®</sup>

# 400

- SPECIFICATIONS
- INSTRUCTIONS
- APPLICATIONS



# Electro-Voice®

## ROYAL 400

### INTRODUCTION

The new Electro-Voice Royal 400 is a 3-way low-resonance system which, despite its ultra-compact design, provides exceptionally wide-range response. It contains a special 18" woofer, the Electro-Voice Model 18WS, utilizing a 4 lb., 10 oz. ceramic magnet; an 8" mid-range cone-type speaker, with a 1 lb., 6 oz. ceramic magnet; and a compression-type very high frequency driver. These features make it an excellent choice for either monaural or stereo reproduction. Constructed of fine hardwood veneers, the use of heavy, vibration-free  $\frac{3}{4}$ " panels gives the Royal 400 unusual rigidity.

### SPECIFICATIONS

Nominal Impedance: 8 ohms

Power Handling Capacity:

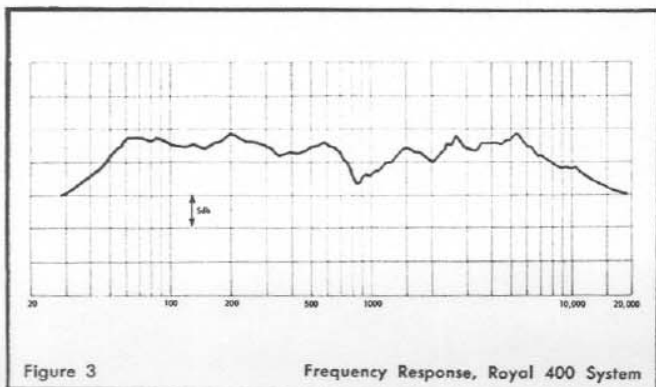
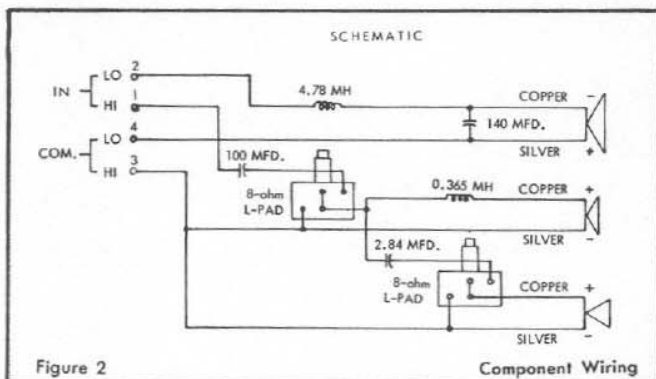
Sine Wave: 30-2500 cps., 30 Watts, Maximum; 2500-20,000 cps., 5 Watts, Maximum.

Program: Maximum undistorted output of 70 Watts amplifier on complex program signal.

Frequency Response Range: 30-19,000 cps.  $\pm$  4 db.

Components: 18" woofer, 8" extended range speaker, compression high-frequency driver, crossover network, two level controls.

Size: 15" Deep, 27 $\frac{3}{4}$ " High, 25 $\frac{1}{4}$ " Wide.



### Setting Up For Operation

Shipping Damage: Your Royal 400 is packed in accordance with all shipping requirements of the Interstate Commerce Commission, plus extra protection. If shipping damage occurs, contact the carrier directly, requesting inspection and instructions. Use the date code of the speaker in your correspondence.

Date Code Number: The date code is noted on your warranty registration card. The number indicates type, style, and date of manufacture of the unit. Always use this number in your correspondence.

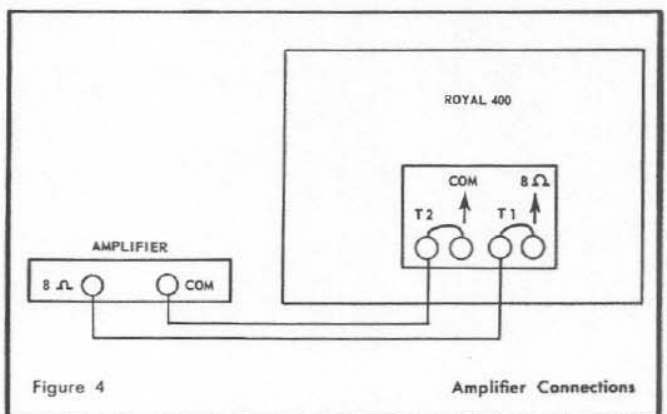
Warranty Card: To register your Royal 400, fill out the Warranty Registration Card and send it to the factory within ten days after your purchase.

### Placement

Nearly any speaker system will sound best if it is placed in or near the corner of the room in which it is to be used. This positioning provides the best coupling between the speakers and the air in the room, the corners and walls acting as a large "horn" for the sound.

### Connections

Connection of your Royal 400 to the amplifier should be made with No. 18 or larger wire (Common lamp cord is good). If you wish to run the lead between amplifier and speaker farther than 30' or to run it behind a moulding strip or under a carpet, use 300-ohm TV twin lead. Connect to the 8-ohm and common taps on the back of the amplifier. Be certain that these connections are secure. Connectors, already in place between terminals on the Royal (Fig. 4), should be left in place unless unit is used for stereo reproduction with E-V Stereon 300 "add-on" unit. Specific instructions will be found with the Stereon 300.



### Level Controls

Your Royal 400 is equipped with two controls, a treble array adjustment and a brilliance control, both of which are on the rear panel. Set treble array fully clockwise unless the unit is to be matched in a stereo arrangement with a speaker of differing efficiency.

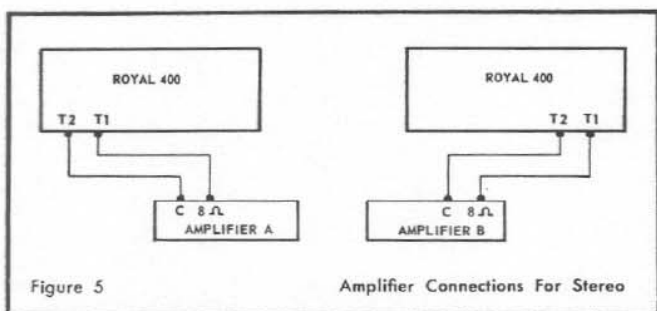
Brilliance control setting should usually be at "NORMAL", but this may be adjusted to suit the acoustics of the room in which the Royal is used. A simple, convenient way to adjust the high-frequency level control is to tune in a live FM broadcast and listen closely to the announcer's voice, particularly the "s" and "t" sounds, at a volume level equal to that of your own speaking voice. Adjust the control until the "s"

and "t" sounds are no more prominent in the announcer's speech than they are in yours; such an adjustment will generally be quite satisfactory. Too high a setting of the high-frequency control will be audible as a piercing, harsh "metallic" sound. The best guide, of course, to proper setting of the control on the speaker system, is a familiarity with the sound of live music. Most listeners will find it easy to balance the sound to conform to their personal tastes.

## Stereo Operation

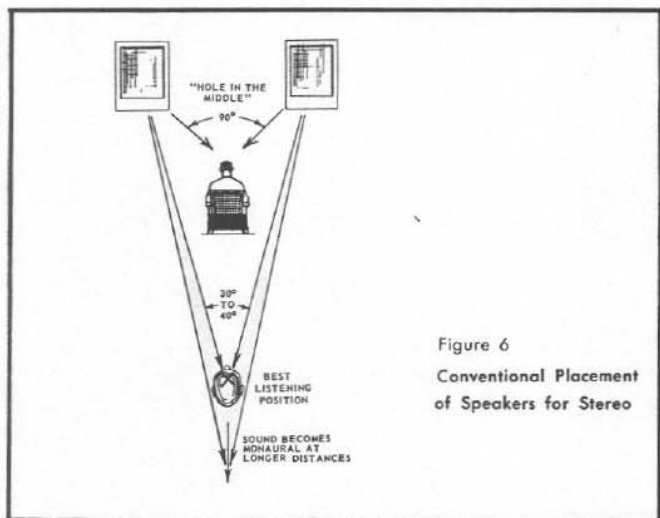
Your Royal 400 is designed to give professional quality sound reproduction. The same performance features which make this unit outstanding for monaural reproduction will also give superb performance in stereophonic array.

The wiring connections for a pair of Royals in stereo are shown in Fig. 5. When connecting be sure to run the lead from T1 on the Royal to the 8-ohm terminal on the amplifier and from T2 to the COMMON terminal. With this connection both units will then be phased correctly.



## Placement For Stereo

When arranging a pair of Royal 400's in stereo array, the units should be placed at positions which allow the listener to sit in the area of the apex of a 30° to 40° angle, as shown in Fig. 6. This will provide the best stereophonic effect. If this placement is not possible, you may, by experiment, use room reverberations to advantage in finding other desirable positions.



## Widening The Stereo Area — 3-Channel Listening

The natural extension of 2-channel stereo reproduction is to recreate completely the original performance, suitably tailored to suit the individual taste and listening area.

In stereo recording, great pains are taken to capture full realism by using 3 microphones to insure complete coverage of the sound stage. The sound from the microphone in the center is then "mixed out" to both left and right channels of recorded sound. From this master recording emerges the commercially available 2-channel stereo tape or disc.

In these "two track" stereo tapes and discs the element of this third channel remains and can be reformed by means of the Electro-Voice XT-1 Stereo Mixer Transformer. XT-1 recovers the center sound from the left and right channels, adds them together in the correct proportions, and passes them to the central speaker.

The addition of this third channel to your system gives complete flexibility of seating, in that one can now enjoy good stereo anywhere in a very large room, or more importantly, quite close to the loudspeakers in small rooms. At all times, in virtually any listening position there is a complete curtain of stereo sound.

## Stereons

For those who have space or budget limitations, a Stereon 300 (see next page) can be used with the Royal 400 for either two- or three-channel stereo. The Stereon 300, which matches exactly the treble array of the Royal 400, can be used virtually without compromise in sound by taking advantage of a natural phenomenon: in 1934, an acoustic engineer, Harvey Fletcher, determined that sounds from about 300 cycles per second downwards in the audio spectrum (which have a wavelength greater than 3½ feet) are not intercepted to any perceptible degree by the head; accordingly, the ears find it impossible to detect the direction from which such sounds originate. E-V Stereons take advantage of this phenomenon by using the full bass reproduction capabilities of one full-range reproducing system for all bass and channelling the "stereo" sounds (above 200 cps.) correctly to each channel. The Stereons, then, permit easy and economical expansion to the stereo system.

The popular approach to E-V Panasound (3-channel stereo sound) is obtained by using two Royal 400's with one Stereon 300. This arrangement permits the use of two full-range units, to achieve the fullest bass response. Where space is an intense problem, good performance can also be achieved by using a pair of Stereon 300's with one Royal 400.

Complete wiring diagrams for connecting the Royal 400 with Stereons and XT-1 will be found in the instruction sheets accompanying the Stereon.

## Speaker Repairs

Your Royal 400 system is guaranteed indefinitely against defects in workmanship and materials. Should it become damaged or develop faulty operation from unusual conditions of use, Electro-Voice maintains a complete service department to put equipment in factory-new conditions. Please write for authorization and shipping instructions before returning any equipment. Be sure to give full name and address together with a short description of the difficulties in your system.

## Technical Service

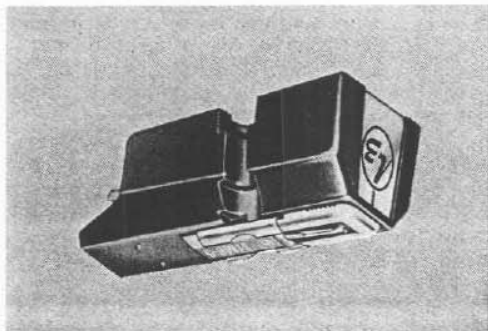
The firm from which you purchased your equipment knows thoroughly the application of Electro-Voice products and high-fidelity stereo techniques. His advice on the installation of Electro-Voice components and on the selection of associated high-fidelity equipment will be invaluable. Technical problems which cannot be answered locally may be referred to:

MANAGER, CONSUMER PRODUCTS DIVISION  
Electro-Voice, Inc.  
Buchanan, Michigan

When writing, please list the manufacturer and model number of all components used in your high-fidelity system.



# HIGH FIDELITY ACCESSORIES SUGGESTED FOR USE WITH THE ROYAL 400



For more than 35 years, Electro-Voice has been a leader in the development and manufacture of dynamic microphones and loudspeakers. Why then, with this extensive experience in designing and producing electro-magnetic devices, is Electro-Voice introducing the new Magneramic 31 Series stereo cartridge using ceramic elements? Electro-Voice is genuinely convinced that a precision ceramic cartridge is the finest type that can be made today . . . the superiority of the E-V Ceramic, Magneramic 31, is demonstrated in these three areas:

(1) *Greater Flexibility* — The 31 Series cartridge will operate perfectly at any stylus pressure from 2 to 20 grams. The same stylus assembly can be used for operation of both turntable and record changers; performance need not be compromised by using a special, stiff stylus assembly for record changers. Record wear is the only criterion in setting stylus pressure — cartridge operation is not affected. Thus, when converting from a changer to a turntable, or vice versa, replacement of the stylus assembly is not necessary when using the Magneramic 31.

(2) *Higher Output* — Along with the trend toward less efficient speaker systems, more amplifier power has become a necessity. While most stereo amplifiers are now designed with input sensitivities to match the typical 5 millivolt output of magnetic stereo cartridges, nearly all monaural amplifiers were designed for at least 8 millivolt input. These cannot be driven to full output with a magnetic stereo cartridge.

The Magneramic 31 develops a full 8 millivolt output and couples directly into any magnetic preamp unit. This higher output should be given special consideration by those planning to convert to stereo with existent monaural amplifiers.

(3) *Freedom from Hum*. — The increased amplifier gain required to drive low efficiency speakers coupled with decreased cartridge output has significantly increased system hum problems. Also, conventional methods of hum elimination used in monaural magnetic cartridges become difficult or impossible to apply to stereo magnetics. The Magneramic 31 completely eliminates these problems. It is non-inductive and has adequate output.

The Electro-Voice Magneramic 31MD7 cartridge directly replaces any monophonic or stereophonic magnetic cartridge now on the market. It feeds into the preamp input jack specified for magnetic cartridges and does not require adapter or circuit modifications.

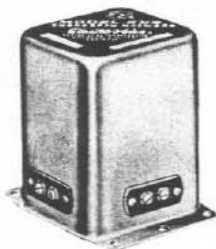
## SPECIFICATIONS — MAGNERAMIC 31MD7

<i>Response Range:</i>	20 to 15000 cps. + 2 db (Westrex 1A)	<i>Output:</i>	8 millivolts
<i>Compliance, Vertical:</i>	3.5 x 10 <sup>6</sup> cm/dyne	<i>Recommended Load:</i>	22,000 to 47,000 ohms (Magnetic phono inputs)
<i>Compliance, Lateral:</i>	3.5 x 10 <sup>6</sup> cm/dyne	<i>Elements:</i>	2, lead Zirconium Titanate (Ceramic)
<i>Isolation:</i>	28 db @ 1000 cycles	<i>Weight:</i>	8 grams
<i>Tracking Force:</i>	2 to 4 grams in transcription arms 4 to 6 grams in changer arms	<i>Terminals:</i>	4, standard .050" connectors
<i>Styli:</i>	.7 mil diamond	<i>Mounting Centers:</i>	Fits both 1/2" and 7/16"

**Audiophile Net \$24.00**

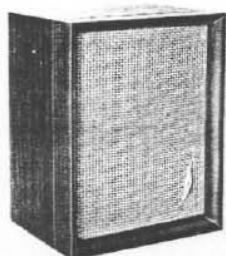
Want more information? Send for the booklet, "FACTS ABOUT THE ELECTRO-VOICE Magneramic Cartridge."

## Model XT-1 Stereo Mixer Transformer



For use with the Stereon 300 and Royal 400. Only one required for two- or three-channel stereo system.

**Audiophile Net \$13.50**



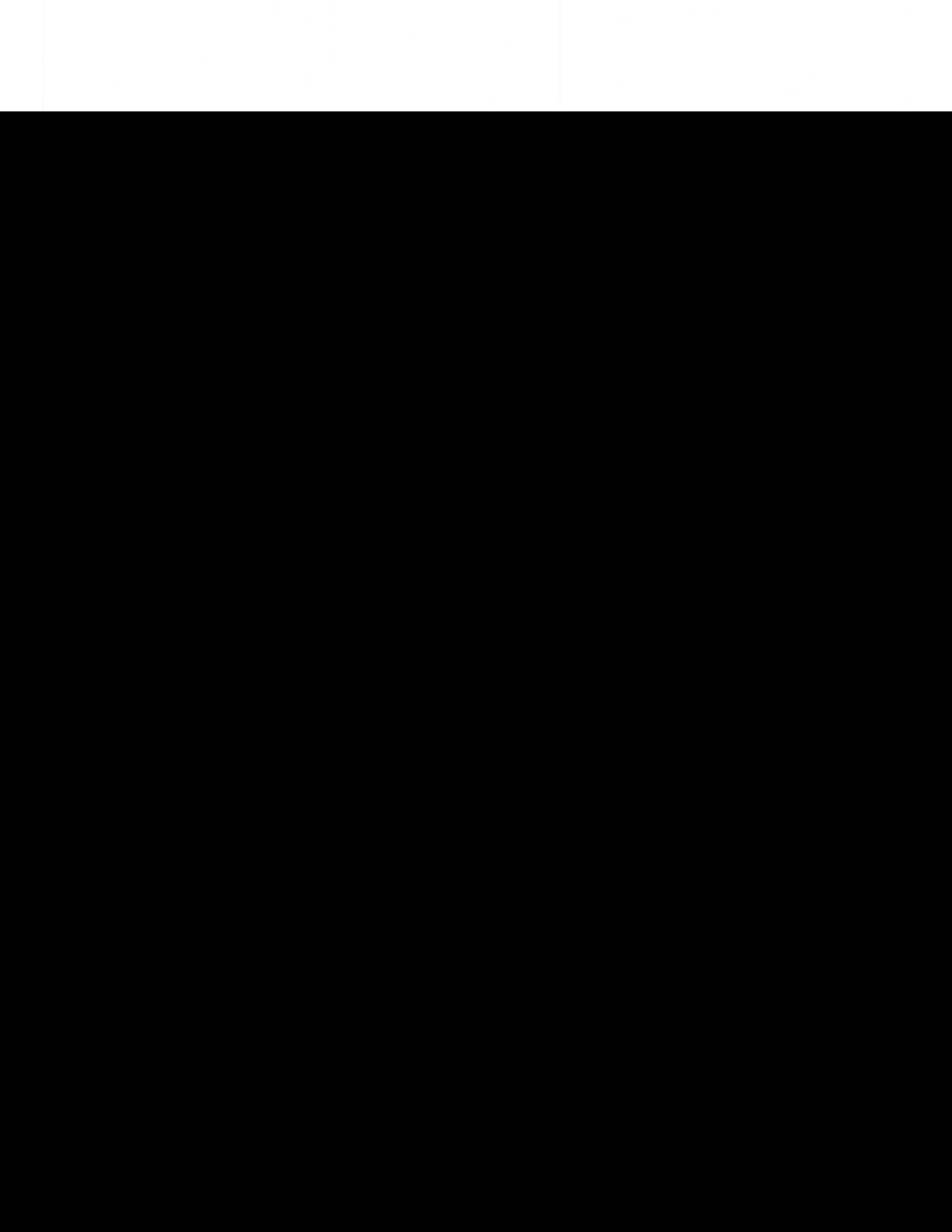
## Stereon 300

A two-way system consisting of a Radax extended-range speaker, together with a diffraction horn very high frequency driver. Operates with the Royal 400 in two- or three-channel stereophonic systems.

**Audiophile Net \$69.50**

**Electro-Voice®**

ELECTRO-VOICE, INC. / BUCHANAN, MICHIGAN



AS LONG AS SUPPLIES OF SCARCE MATERIALS COMPONENTS IN THIS BULLETIN ARE AVAILABLE ANY 15" SPEAKER WILL PERFORM

**KLIPSCH LICENSED CORNER HORN LOADING.**

DESIGNED FOR 15" COAXIAL SPEAKERS, AND SEPARATE 2-WAY AND 3-WAY SYSTEMS — without modification.

ONE FULL OCTAVE OF ADDED BASS GUARANTEED OVER ANY COMMERCIALY AVAILABLE BASS REFLEX ENCLOSURE.

UNPRECEDENTED EFFICIENCY — LABORATORY FLATNESS  $\pm 5$  db to 30 cps! 10 to 15 db more efficient than conventional enclosures!

MODERATELY PRICED.

— Authentically styled, the motif of the ROYAL is at once conservative, but appealing as a design of excellence and enduring beauty. Adaptable to the living room, study or den, the exquisite mahogany veneers are hand-rubbed to a mirror Heirloom finish on every exposed surface. The workmanship reflects all the pride and consummate skill of the ELECTRO-VOICE master craftsmen. Available, too, in smart lustrous Korina blonde. To promote further the decorative scheme of the ROYAL, the attractive, solid grille is formed of lacquered metal in brushed brass antique.

The spatial requirements of the very highest fidelity reproduction are conserved to the fullest. The trim size of the ROYAL will afford an agreeable surprise.

Proportions of the ROYAL are based on the established precepts of dynamic symmetry; the corner of the room, for which furniture usually is not designed, is incorporated functionally as a part of the housing, enhancing not only the appearance of the ROYAL, but forming also a very vital part of its employment.

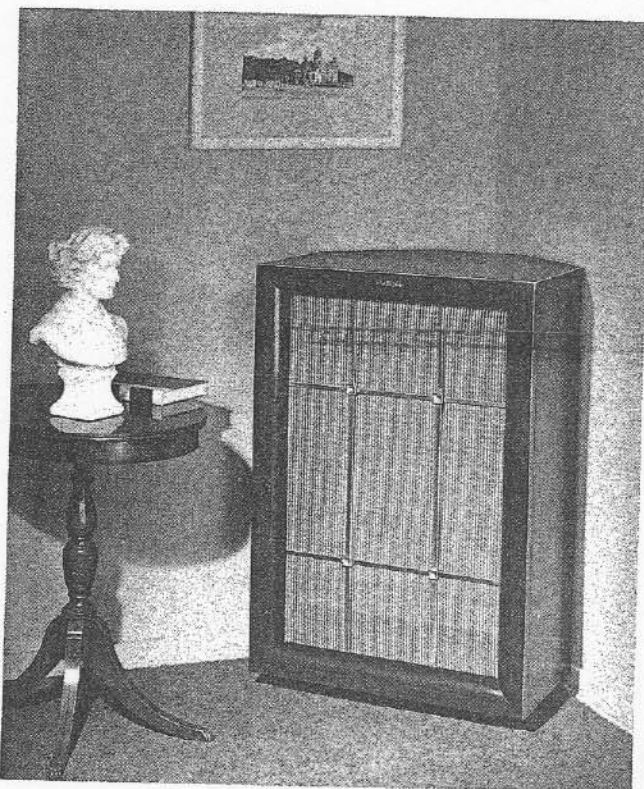
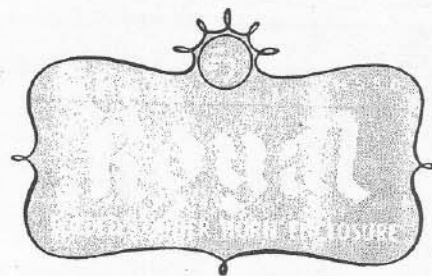
— Recognizing the maxim which dictates that the quality of a music reproducing system is proportionate to its size, ELECTRO-VOICE physicists and engineers have, through unique design, hidden the bulk of the acoustic system of the ROYAL. The very walls of the living room have been employed as an extension of this compact and beautiful reproducer. The result is a performance so vibrant and vital that the first listening purveys an utterly new emotional experience.

YOU ARE INVITED to a command performance by the ROYAL! Plan to hear this new concept in design at your ELECTRO-VOICE dealer today — then — let your own ears be the judge.

**PRINCIPLE OF OPERATION** — Scientifically correct propagation of the first 3 octaves, or those frequencies included between 16 and 128 cycles per second, requires that the cone of the low-frequency driver be loaded with a column of air of relatively huge dimensions. For instance, the smooth reproduction of a 50 cycle tone requires that the cross-sectional area at the mouth of this column be  $\frac{1}{4}$  wavelength of this frequency, or 80 inches. At 30 cycles this dimension is 111 inches! It is quite apparent that a structure capable of housing a horn shape of this large size precludes its use in a living room.

Several years ago Paul W. Klipsch invented the exponential folded corner horn, which employed the walls of the room as an extension of a horn throat cleverly concealed in a furniture housing. This effectively permitted extended bass range reproduction in a room of reasonable dimensions for the first time.

But one thing more was necessary. Although the bass range was extended, efficiencies were low — only  $\frac{1}{8}$  to  $\frac{1}{4}$  of the necessary power for achieving musical balance with reasonable economy of amplifier power and equalization. Accordingly, Electro-Voice scientists participated with Paul W. Klipsch in the development of super-low resonant bass drivers. The unique high compliance, or capacitive factor of these units is designed to match the mass, or inductance of the air in a carefully-calculated chamber immediately in back of the cone. The combination results in a very broad 4 octave pass-band circuit. This circuit becomes acoustically resonant when the ROYAL is coupled to the room air load by placement in a corner. An advantage of this discovery is



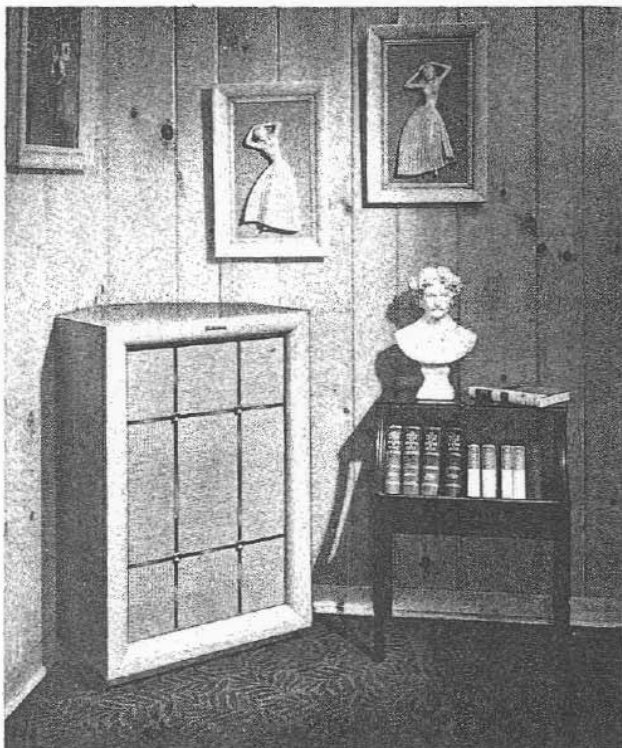
the unequalled damping of the driver cone. The large resistive airload prevents voice coil override with attendant non-linear distortion, holds the voice-coil efficiently in the region of most dense gap-flux and permits better than a 50% higher power rating on the driver!

Through these means the ROYAL delivers phenomenally wide range bass, virtually perfect, peak-free and 100% full powered. It generates extended bass tones at the necessary full level of efficiency with purity never attained before commercially in the living room. It performs this function without the characteristic peaks and null points of narrow range, "one-note" bass-reflex enclosures.

**ROYAL FOLDED HORN CORNER LOUDSPEAKER ENCLOSURE, only**

In hand-rubbed mahogany veneers. List.....\$180  
In blonde Korina wood. List.....\$190

\*Licensed under Klipsch Patent Nos. 2310243 and 2373692



## THE ROYAL II SOUND REPRODUCING SYSTEM

When the music lover first hears the E-V ROYAL II REPRODUCING SYSTEM, he is delighted to discover its breadth of response range... literally *feeling* the physical impact of timpani and tuba. Yet, he is instantly aware that this tremendous bass capacity is balanced by sparkling, brilliant reproduction of the delicate treble tones of the highest audible registers. A second hearing discloses that this is but an introduction to the ROYAL II's superb performance. He hears a cleanliness of reproduction that lends third dimensional quality to the music... heightening the illusion of *presence*.

And then listening carefully for favorite musical passages, he learns how the ROYAL II handles difficult flights of orchestral fancy with a distortion-free fidelity quite unlike that experienced before. Then he appreciates why music *lives* when recreated by this remarkable sound reproducing system.

The ROYAL II is a complete audio package ready for connection to the amplifier. It includes the E-V MODEL 114 SEPARATE 2-WAY SPEAKER SYSTEM installed in the ROYAL FOLDED HORN CORNER ENCLOSURE. The ROYAL enclosure is smartly styled and hand-finished in either rich mahogany or blonde Korina wood. Each component of the ROYAL II REPRODUCING SYSTEM contributes a specific virtue to the overall performance. The purpose and technical specifications of these components are described individually.

### ROYAL II, AN 800 CPS SEPARATE 2-WAY SOUND REPRODUCING SYSTEM

In Mahogany Royal Enclosure. List.....\$465

In Blonde Royal Enclosure. List.....\$475

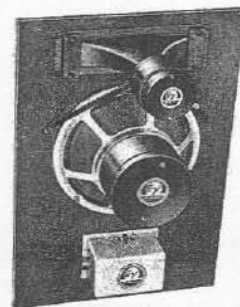
#### SPECIFICATIONS, ROYAL II SOUND REPRODUCER

DIMENSIONS: 37" high, 23 3/4" wide, 20 1/2" deep; WEIGHT, NET: 126 1/2 lbs. SHIPPING: 136 1/2 lbs.

To recreate the synthesis of the original music, a speaker system must reproduce all the original frequencies with a minimum of harmonic, intermodulation and transient distortion. This requires a sound gener-

ation system which divides the reproduced spectrum between disparate drivers by crossover networks of the lowest possible frequency.

The Model 114 SEPARATE 2-WAY SPEAKER SYSTEM achieves the finest results possible from live FM, recorded tape or vinylite disc sources. Low, powerful, extended bass is produced by the E-V Model 15W LOW FREQUENCY DRIVER. The Model X-8 CROSSOVER NETWORK restricts low frequencies to the bass driver and directs tones above 800 cps to the Model T-25 HIGH-FREQUENCY DRIVER. The treble driver exhausts through the Model 8-HD DIFFRACTION HORN, which distributes upper octave tones through a solid angle of 180°.



The Model 114 SYSTEM is an acoustically balanced sound generating component for the ROYAL II SOUND REPRODUCER. It is an equally fine driver unit for custom installations in walls or "built-in" cabinets, or for existing enclosures. The individual components of the Model 114 SYSTEM are available separately, also.

### MODEL 114 800 CPS SEPARATE 2-WAY LOUDSPEAKER SYSTEM. List.....\$285

#### SPECIFICATIONS, MODEL 114 SPEAKER SYSTEM

Includes Model 15W Bass Driver, Model T-25 Treble Driver, Model 8-HD Horn, Model X-8 Crossover Network, Flat Baffle Board and Model AK-1 Mounting Kit. For installation in E-V Royal Corner Enclosure or in existing cabinets or walls. DIMENSIONS OF BAFFLE BOARD: 33 3/4" high, 22 1/4" wide, 3/8" plywood. WEIGHT INCLUDING ALL COMPONENTS, NET: 57 1/2 lbs; SHIPPING: 78 lbs.

## COMPONENT SPECIFICATIONS

### MODEL 15W LOW-FREQUENCY DRIVER

In the ROYAL CORNER ENCLOSURE, the MODEL 15W LOW-FREQUENCY DRIVER reproduces bass tones down to 16 cps with high efficiency! The high compliance, or acoustical capacitance of the driver, perfectly matches the inductance of the back chamber air mass of the enclosure. This permits the formation of a broadly resonant circuit in conjunction with the frontal air load.



The unusually high compliance of both the outer cone rolls and inner spider of the Model 15W provides a fundamental resonance in free air of 37 cps. This means that the 18 db per octave roll-off, or drop in acoustical output common to all cone or diaphragm type generators, starts at a much lower frequency. The stiff, straight sided 27 oz. cone is extra strong, thus preventing relaxation of the suspension material along its length. This precludes the formation of spurious sum and difference tones, a result of the outer area moving at a slower rate than the central fundamentally excited area.

The Model 15W uses the largest Alnico V magnet to be found in any commercially available 15" low-frequency driver, guaranteeing the highest efficiency and freedom from voice coil override. This reduces to a minimum the attendant transient distortion. The Model 15W BASS DRIVER is ideal for improving existing speaker systems too. No other 15" low-frequency driver is its equal in efficiency, extended low range, and distortion-free characteristic.

### MODEL 15W DRIVER. List.....\$120

#### SPECIFICATIONS, MODEL 15W LOW-FREQUENCY DRIVER

RTMA SENSITIVITY RATING: 49 db. RESPONSE RANGE: To 30 cps  $\pm$  5 db in E-V Royal Enclosure in average size living room; to 35 cps  $\pm$  5 db on flat infinite baffle. SHORT DURATION PEAK POWER INPUT: 50 watts in Royal Enclosure; 35 watts on flat baffle. CONTINUOUS PROGRAM level: 35 watts. IMPEDANCE: 16 ohms at 400 cps. RESISTANCE: 11.3 ohms DC. FREE AIR CONE RESONANCE: 37 cps. CONE WEIGHT: 27 oz; cone moisture and fungi-proofed. FIELD STRENGTH: 14,300 lines/sq. cm. MAGNET WEIGHT: 5 1/4 lb Alnico V. MAGNET STRUCTURE WEIGHT: 27 lbs. BINDING POSTS: Positive, marked red and Negative, marked black for forward motion of cone with dry call applied. MOUNTING DIMENSIONS: four 1/4" holes spaced 90° apart on 1 3/8" circle. DIMENSIONS: 15 1/2" diameter, 8 7/8" deep behind mounting panel, 13 1/2" baffle opening. WEIGHT, NET: 34 1/2 lbs; SHIPPING: 44 lbs.



## MODEL T-25 HIGH-FREQUENCY DRIVER

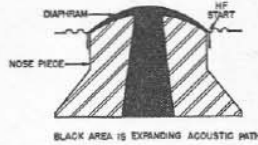
**General:** In order to reproduce the rapid delicate pulses of the upper octaves, the vibrating or piston member of a high-frequency driver must be light, and thus small. On the other hand, to achieve useable power transfer the diaphragm assembly must be large and consequently heavy. These irreconcilable requirements have limited the high range of driver units in the past; the usual roll-off of a 40 watt 2½ inch diaphragm being 3000 cps, and that of 25 watt 1½ inch diaphragm about 4500 cps. Resonant cavities are frequently introduced to gain augmented response several thousand cycles higher, but with accompanying raggedness in the reproducing characteristic and sharp attenuation after the resonant peak. Another factor entering into this complicated design problem is the violent phasing-out of the acoustic energy at certain frequencies. This phenomenon transpires when the signal approaches in wavelength twice that of the diameter of the diaphragm. The unfortunate circumstance thus experienced drastically affects listening quality, which demands a rise of between 5 and 10 db in this region (5000 KC).

ELECTRO-VOICE High-Frequency units completely by-pass these seemingly unsurmountable design difficulties! Lewis Hoodwin, a brilliant physicist on the ELECTRO-VOICE engineering staff, has invented the unique loading device for the HF diaphragm,

whereby the effect of diaphragm diameter is no longer a factor. The accompanying sketch shows that the usual cavity in the piston region has been eliminated. The throat of the acoustic system begins directly at the voice coil where it is joined to the diaphragm; thus, for the first time, a true scientific exponential flare takes place from the very origin of the sound source. This results in the greatest transfer efficiency, and the

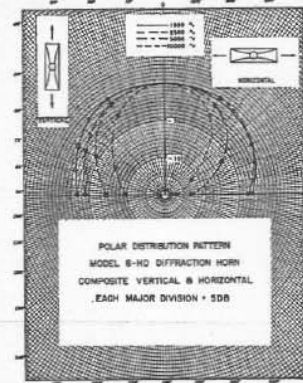
smoothest, most extended high frequency response available on the market today. The phenolic moulded and cloth impregnated diaphragm has tremendous strength and can be overloaded to the point of voice coil disintegration without fracture. Furthermore, it is not susceptible to the radial splitting and buzzing common to delicate aluminum diaphragms.

**MODEL T-25 DRIVER. List \$ 90.00**



## MODEL 8-HD DIFFRACTION HORN

For the first time, the superior high-frequency dispersion characteristics of the Diffraction Principle are available in a compact horn suitable for home high fidelity systems. In order properly to load the driver diaphragm, an exponential horn is required of the proper flare. In addition the high frequencies which would ordinarily beam straight down the axis must be adequately dispersed in order to cover the entire listening area. In the past this dispersion has been meagerly effected by a multiplicity of cells, each pinpointing a spot in the room, usually 8 in number. Each cell intercepts a solid angle of 20° at about 2 KC; at 10 KC this angle is only about 10°.



In keeping with the requirements of the discriminating listener, ELECTRO-VOICE has developed the Diffraction Principle of high-frequency sound dispersion. The employment of this principle in the Hoodwin horn design effects better than 180° of dispersion, sans all pinpointing effects, and does this with more efficiency at all frequencies. The MODEL 8-HD HORN, in addition, has a wide margin of safety near the recommended crossover frequency of 800 cps; the horn is designed actually with a 600 cps cut-off, thus eliminating the response disturbances associated with operation too near the actual cut-off point. A most important feature of the HOODWIN HORN is the increased

efficiency of 3 db, or double that of conventional cellular horns. This is brought about by the elimination of the viscous resistivity of the air engendered by the multiplicity of throats at the driver unit mouth. The horn design uses the new material Fibreglas, noted for its fine acoustic properties and extreme ruggedness.

**MODEL 8-HD HORN. List \$ 15.00**

### SPECIFICATIONS, MODEL T-25 H. F. DRIVER

RTMA SENSITIVITY RATING: 48 db. RESPONSE RANGE: to 15,000 cps with efficient response; to 11,000 cps ± 5 db. SHORT DURATION PEAK POWER INPUT: 50 watts above 800 cps. CONTINUOUS PROGRAM MATERIAL: 25 watts. PROGRAM MATERIAL ABOVE 400 CPS: 20 watts. IMPEDANCE: 16 ohms at 400 cps. RESISTANCE: 10.5 ohms DC. DIAPHRAGM DIAMETER: 1½", diaphragm is phenolic moulded and cloth impregnated for tremendous strength. Not susceptible to radial splitting and buzzing as are delicate aluminum diaphragms. Can be overloaded to point of voice coil disintegration without fracture. FUNDAMENTAL RESONANCE: 275 cps. FIELD STRENGTH: 1¼ lbs. Alnico V magnet. MOUNTING DIMENSIONS: Two 5/16-18 tapped holes spaced 180° apart on 2" circle or four 5/16-18 tapped holes spaced 90° apart on 3" circle. DIMENSIONS: 5" diameter, 6" deep, ⅜" throat diameter. WEIGHT, NET: 10 lbs; SHIPPING: 16 lbs.

### SPECIFICATIONS, MODEL 8-HD DIFFRACTION HORN

DISPERSION: 180°. ACTUAL CUTOFF: 600 cps. RECOMMENDED CROSS-OVER POINT: 800 cps; eliminates response disturbances associated with operation too near actual cutoff point. APPLICATION: for 25 watt or 10 watt treble drivers. MOUNTING DIMENSIONS: two 5/16-18 holes spaced 180° apart on 2" circle. Uses AK-1 Mounting Kit for a panel mounting. (List price AK-1 Kit . . . \$5) DIMENSIONS: 3¼" high, 14¼" wide, 7¼" deep, ⅜" throat opening. WEIGHT, NET: 1 lb; SHIPPING: 2 lbs.

## MODEL X-8 CROSSOVER NETWORK



Utilizes the standard circuit employed by the motion picture industry, the full m derived ½ section configuration. Restricts low-frequencies to bass driver, and directs high frequencies to treble driver. M is .6. Attenuation is a 12 db per octave each side of crossover point, presenting an optimum degree of attenuation with minimum possibility of transient distortion generation. Utilizes

air-cored coils to eliminate distortion with varying load and frequency. Q is better than 150. Condensers are paper type with generous over-load factor. Insertion loss is less than 1 db. Phase rotation is 270°.

**MODEL X-8 CROSSOVER NETWORK.**

**List \$ 50.00**

### SPECIFICATIONS, MODEL X-8 CROSSOVER NETWORK

POWER RATING: 60 watts. IMPEDANCE: 16 ohms for input, and high and low output. DIMENSIONS: 8" long, 5½" wide, 4½" high. WEIGHT, NET: 4½ lbs; SHIPPING: 6 lbs.

## MODEL SP-15 COAXIAL LOUDSPEAKER

Reproduction so clear, so vibrant that the illusion of "presence" prevades the room . . . yours with the SUPER-FIFTEEN. This large 15-inch speaker is capable of receiving and transmitting the tremendous energy from the lower portion of the audible spectrum. A mechanical crossover, operating at the sixth octave directs the sensitive high-frequency pulses of the treble register to the smaller RADAX high-frequency propagator. RADAX generates and distributes the highest four octaves without loss of level. By dividing the spectrum between two specially designed coaxial diaphragms the Radax Principle assures music in flawless proportion and balance throughout the entire listening area.



Power or efficiency is many times that of conventional one-way speaker units . . . actual acoustic power is seven to eight times higher! The heavy speaker frame is accurately machined and polished for improved voice coil operation and extended, trouble-free life. The SUPER-FIFTEEN is a fitting complement to the finest amplifiers. (SP-15, continued on last page)



To reproduce the powerful impact of the bass drum, the loudspeaker must move large volumes of air. Transmission of the lowest frequency range is proportional to the size of the bass diaphragm and the design of its enclosure. The SUPER-FIFTEEN will transmit sounds as low as 30 cycles per second without level disparagement. To the listener, this means faithful reproduction of the deep, resonant tones of the contrabassoon, bass drum and tuba. And an acoustically proper enclosure for this splendid fifteen-inch system need contain only nine cubic feet of space. The E-V ROYAL cabinet, for instance, designated with ideal dimensions, makes a graceful appointment in any room. Reproduction of the high frequencies is best obtained from a small diaphragm capable of vibrating small volumes of air, but with great rapidity. When the generation of these delicate pulses is consigned to a large cone, heavy and stiff enough to receive the tremendous energy of tympani, the vital sparkling tinkle is masked and lost.

In the E-V SUPER FIFTEEN this apparent inconsistency is completely resolved by the Radax Principle. The 15-inch bass cone is freed of all but the full, sonorous tones it can produce so well. A mechanical crossover transfers the sounds of the upper octaves to the small, lightweight high-frequency propagator. This divides the musical spectrum and provides uncompromised emphasis to both low and high registers, maintaining pleasing proportion between bass and treble.

To assure full response from the two disparate driving cones, the MODEL SP-15 utilizes a large 2½ inch voice coil and massive 5¼ pound Alnico V Magnet. The high damping factor, made possible by the oversized magnet, spider, and stiff bass cone, suppresses the generation of distortion products.

Where baffle areas must be held within smaller limits, the RADAX SUPER-FIFTEEN makes an ideal component for installation by the custom builder who requires distinguished performance. It will provide full range sound reproduction for churches, school auditoriums and highest quality public address installations... specifications exceed those of the Research Council of the Academy of Motion Picture and Sciences for theaters up to 750 seat capacity.

**MODEL SP15, 15" COAXIAL LOUDSPEAKER SYSTEM. List.....\$120.00**

**SPECIFICATIONS, MODEL SP-15 LOUDSPEAKER SYSTEM**  
**FREQUENCY RESPONSE RANGE:** 30 to 13,000 cps ± 6 db in E-V Royal Enclosure. **SHORT DURATION PEAK POWER INPUT:** 35 watts. **INPUT IMPEDANCE:** 16 ohms ± 40 percent with amplifiers employing feed-back. **BASS CONE RESONANCE:** 41 cps. **TREBLE CONE RESONANCE:** 250 cps. **RADAX Crossover FREQUENCY:** 3000 cps. **FIELD EXCITATION:** 5¼ lb Alnico V Magnet. **MAGNET STRUCTURE WEIGHT:** 27 lbs. **FEATURES:** Bass and treble cones are specially treated for moisture and fungus protection. Cones are compliance damped to prevent frame reflections from reinforcing or cancelling certain frequencies. Heavy frame casting is accurately machined. Speaker pot structure finished in iridescent maroon hammertone. **BINDING POSTS:** Positive, marked red; negative, marked black for forward motion of cone with dry cell applied. **DIMENSIONS:** 15¼" diameter, 8¾" depth behind mounting panel, 13½" baffle opening. **WEIGHT, NET:** 35 lbs; **SHIPPING:** 44 lbs.

*Response, Impedance, Efficiency and Distortion Data*

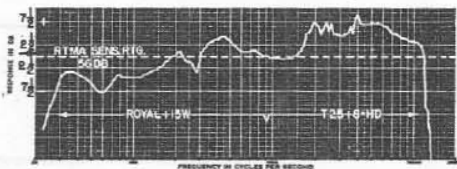
ELECTRO-VOICE is the only speaker manufacturer so far to publish authentic, unretouched, machine-run response curves of its products. The industry in the past has been reluctant to do this because the test conditions influence the character of the results. Furthermore, it is recognized that the significance of curves leaves considerable to be desired in the subjective evaluation of loudspeaker performance. A satisfactory degree of correlation can be established by careful interpretation, however, and an attempt is made to achieve this correlation in the short notes covering the measurements shown below.

Because the anechoic chamber does not permit the inclusion of the walls of a room, the response curve is a composite of anechoic chamber above 100 cps, and the simulated living room below this point. Observe that a 5 db dip is introduced in the design exactly at 60 cps to reduce the effects of turntable rumble. Augmented response in the "presence" region 3-6 KC is satisfactorily introduced to offset ear insensitivity at room reproducing levels. Sensitivity, or efficiency, is measured by the recommended method established by the Radio and Television Manufacturers' Association.

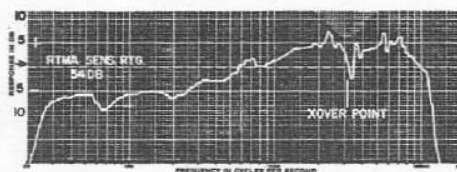
**TEST CONDITIONS:** An anechoic chamber was employed of the dimension 12' x 12' x 20', with a standard calibrated microphone. Impedance measurements were made in a simulated living room 12' x 14' x 9' using a Ballantyne Voltmeter across the voice coil with 100 ohms in series.

The same anechoic chamber and microphone was employed, in addition to a Model TI-401 signal generator and a Model TI-402 distortion analyzer. For the intermodulation distortion tests a carrier signal of 60 cps was employed modulated by 2, 7 and 12 KC with a ratio of 4:1.

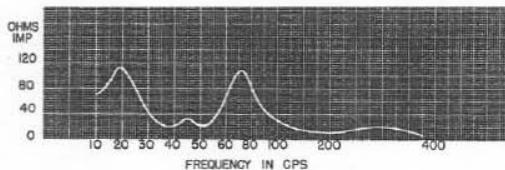
**RESPONSE RANGE ROYAL II SYSTEM**



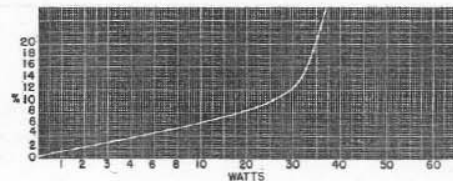
**RESPONSE RANGE SP-15 RADAX**



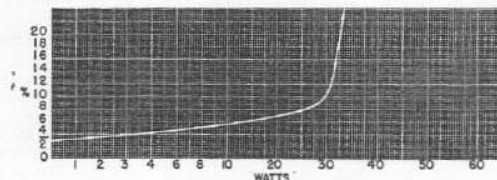
**IMPEDANCE OF ROYAL WITH 15" E-V DRIVERS**



**INTERMODULATION DISTORTION ROYAL II SYSTEM**



**INTERMODULATION DISTORTION SP-15 RADAX**



Although the most modern equipment was used in this distortion analysis, its value in measuring distortion products in loudspeaker systems is open to considerable question. For instance, the only available and arbitrary modulating frequencies could be the weakest points in the design distortion-wise, and every other frequency point might be comparatively distortion free; thus a very fine speaker could show up poorly. The converse is also possible. For the arbitrary points shown, the distortion in the ROYAL II SYSTEM and SP-15 RADAX is unusually low compared with other commercially available quality systems.



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