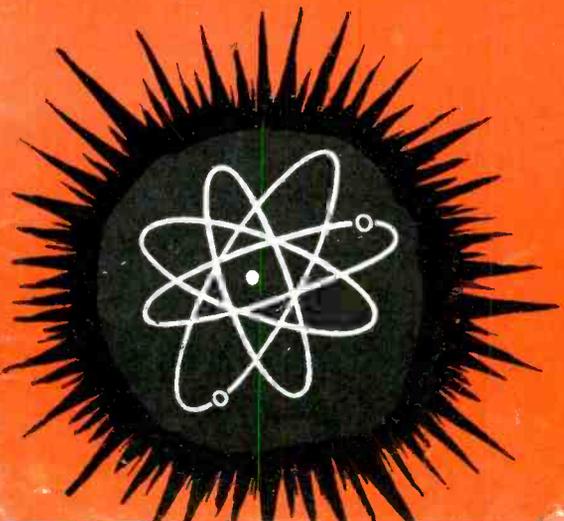




radio
service
dealer



SEPTEMBER, 1947



IN THIS ISSUE:

**ANTENNA SYSTEM FOR MULTI-UNIT TELEVISION SETUPS
SUBSTITUTION BOXES**

HOW ERIE UPPED SALES

FM DISCRIMINATOR CIRCUIT

VEE-d-x TELEVISION ANTENNA

THEY'RE BETTER THAN EVER

*and they cover
every requirement*

- 1 Better impregnation to eliminate moisture
- 2 Better hermetic sealing for longer life
- 3 Quality control during manufacture



MALLORY PAPER TUBULARS

YOU want quality in the paper tubulars you buy — of course! Otherwise your replacement work won't stand up. Mallory gives you the quality you want.

But Mallory gives you quantity, too. Quantity in a wide assortment of ratings

and sizes that meet all requirements that come your way.

That's the story in a nut shell — whether you're looking for wax impregnated cardboard tubulars or oil impregnated ones. The Mallory Catalog and your Mallory Distributor both prove that —

➔ YOU EXPECT MORE AND GET MORE... FROM MALLORY

P. R. MALLORY & CO. Inc.
MALLORY

VIBRATORS . . . VIBRAPACKS* . . . CAPACITORS . . . VOLUME
CONTROLS . . . SWITCHES . . . RESISTORS . . . FILTERS
. . . RECTIFIERS . . . POWER SUPPLIES.

*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

Full-powered RCA "Package" Amplifiers



...designed and priced to sell *Fast!*

30-WATT De Luxe—for your larger installations.

RCA's package sound line now includes these high-performance amplifiers. They are smartly styled... correctly engineered... priced within your prospects' pocketbooks.

Quality features:

RCA-perfected inverse feedback circuits—even in the 12-watt size. This means excellent frequency response and constant voltage output with negligible noise and minimum distortion.

Low microphonics and hum—RCA-6J7 input tubes are used in all models.

High sensitivity—delivers rated output with only 3-millivolts input.

Complete control panels—containing individual volume control

for each input, wide range tone control, separate on-off switch and pilot light.

Smart, modern styling—gives you a decisive edge over competition. The contrasting black-and-satin chrome makes a handsome appearance. Considering the quality of these units, the prices are *low!*

Get these new folders on RCA amplifiers, microphones, speakers and intercoms. They contain descriptions and detailed specifications of RCA package items. Address: Dept. 88-1, Sound Equipment Section, RCA, Camden, N.J.



12-WATT Low-Cost Model provides full output with low distortion, ideal for small PA installations, paging and announcing.



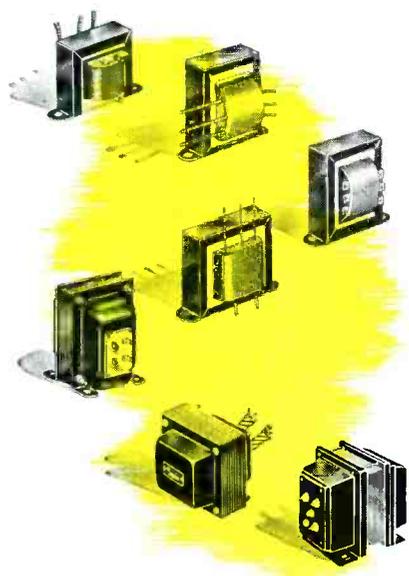
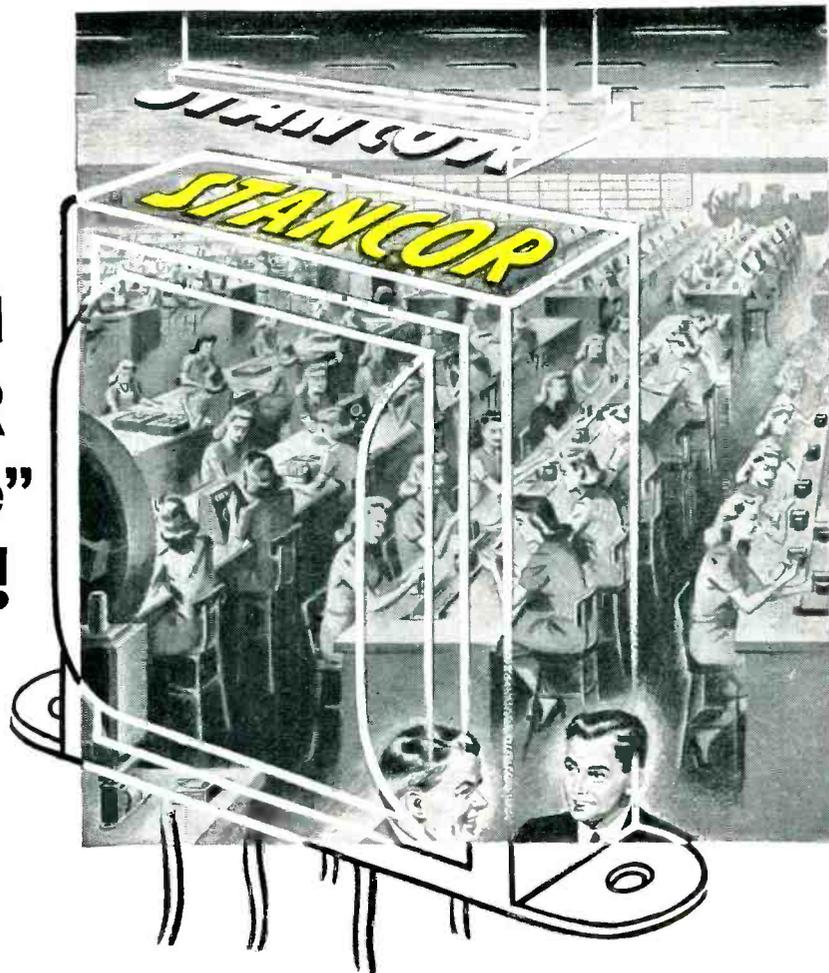
15-WATT Size Covers Broad Field! Medium power, high-gain amplifier, perfectly suited to many classes of work such as ballrooms, amusement parks, restaurants and taverns.



SOUND EQUIPMENT
RADIO CORPORATION of AMERICA
 ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal

when stamped
STANCOR
 you get "plus-value"
PERFORMANCE!



When it comes to merchandise nothing means more to any customer than the best service possible from the equipment he has purchased . . . Similarly, nothing means more to the service man than the good will and increased patronage of satisfied customers...STANCOR has long recognized this truth and has zealously guarded its good reputation for quality transformers by manufacturing the best possible merchandise from the best material obtainable—and with that extra "Plus" in effort . . . Remember, the Stancor identification on a transformer is your assurance of "PLUS-VALUE" for lasting satisfactory service.

standardize on

STANCOR



TRANSFORMERS

STANDARD TRANSFORMER CORPORATION • ELSTON, KEDZIE AND ADDISON • CHICAGO 18, ILL.

EDITORIAL

Dick Tracy Sets

Comic strip addicts know the inimitable Dick Tracy has for many months used a two-way receiver-transmitter radio of wrist-watch size. Recently Dick started to use a camera the size of a finger ring. Will he soon have a radio that tiny?

We mention this because several set manufacturers plan production of home model radios tinier than any made pre-war, and some of them were tiny enough. A trend towards smaller receivers for home use is unjustified. Such sets afford inferior performance; sell at prices that provide profits too low for all concerned; and worst of all, place a severe burden upon servicers who are eventually called upon to repair them. Customers feel that service fees should be low in proportion to the original cost price of their set. They don't know that servicing tiny sets is more difficult and time-consuming than comparable work on large sets.

We favor portable radios, particularly tiny personal battery-operated types. All families should own several of them. But, for home use, we say, make radios big and fine. *The finer the better!* By the way, we hear a leading set-maker will soon announce a portable radio-camera combination. Paging Mr. Tracy!

"Ham" Set Servicing

John F. Rider, manual publisher, asked in his May house organ the interesting question, "Can the serviceman serve the Ham?" — repairing amateur receivers—and then, in practical manner, he shows that while most service shops are technically competent, in general they are not familiar enough with the type of performance a "ham" set is supposed to render and thus they often unintentionally do an inferior repair job and earn the disrespect of "hams".

Appreciating the "ham" market as being a fine potential source of income for Service Dealers, we checked with several leading amateur equipment manufacturers. All opine that as a rule servicers fail to do satisfactory repair job because they work on a communications receiver in the same manner as they would an ordinary home set. The secret of servicing a communications receiver is this: repair it, align it, and make it function exactly the way it did when it left the factory. The work must be done to manufacturer's standards, not to ordinary service shop standards. "Ham" receivers are made to exacting standards and must be worked on as such.

Profits can be made from servicing "ham" equipment. Service Dealers in parts of the country where "ham" gear is not made and where no factory service branch is adjacent should take the necessary specialized training courses required and then they should set up their own factory service branch for leading types of "ham" sets. Manufacturers favor the idea and "hams" would undoubtedly respond favorably too.

S. R. COWAN, Publisher



Member of the
Audit Bureau of
Circulations



VOL.
8
No.
9

SANFORD R. COWAN

Editor & Publisher

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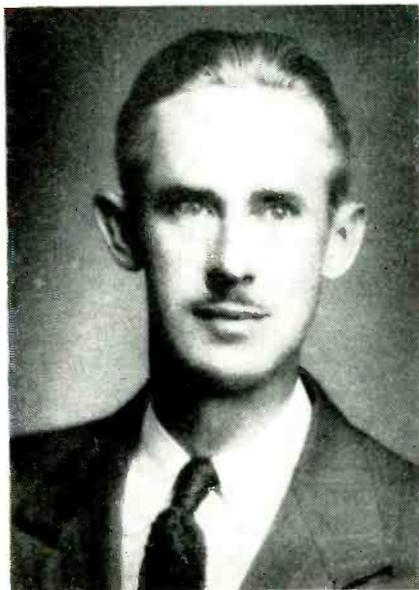
David Saltman
Adv. Production Manager

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COWAN PUBLISHING CORP.

In & Around the Trade

Being a condensed digest of production, distribution and merchandising activities in the radio and appliance trade.



J. V. Rice

Arcturus Plans Telesets

Television receivers that embody departures from present constructions and styles in the popular-priced fields are now in the process of completion by Arcturus Radio & Television Corporation, a newly-formed associate company of Standard Arcturus Corporation of Newark, N. J. The offices and plant of the new company will be located at 19 Nesbitt Street, Newark, N. J.

James R. Donahue, formerly sales manager of Standard Arcturus, has been elected president of Arcturus Radio & Television Corporation. Mr. John V. Rice, formerly associated with National Union Radio Corporation, sales manager of the Tube Division of Standard Arcturus, is formulating plans for an extensive program of jobber promotion of the Arcturus line.



J. R. Donahue

New G-E Displays Rooms

General Electric Company, which moved its Chicago offices recently into the Merchandise Mart, plans one of the most complete radio display rooms in the country for its full line of radios and television receivers, according to Fred A. Parnell, advertising and sales promotion manager of the Receiver Division.

Service Notes Issued

Service Notes covering the first of the new line of Stromberg-Carlson home radio receivers are being mailed to radio dealers from coast to coast, according to F. Leo Granger, radio service manager of the 53-year-old communications firm. Included in the mailing is a copy of the new Stromberg-

Carlson "broad-warranty" Radio Service Policy and a set of Service Notes covering the company's new model 1101 series.

The new service notes embody a number of "first" features which make the serviceman's job easier and simpler. These "first" features include: gain-percentage measurements, complete trimmer chart, voltages at tube terminals, and color schematic drawings to enable servicemen to trace and locate trouble in receiver circuits. Mr. Granger said that service notes covering other models are in preparation.

Concord Issues New Supplement

Keeping pace with the rapid changes and new developments in the radio, electronics and sound equipment field, Concord Radio Corporation, of Chicago and Atlanta announces the issue of a new, up-to-the-minute catalog supplement, featuring new 1947 prices on Radio Sets, Parts, Electronic Equipment, Record Players, Changers, Sound Equipment, Ham Gear, Test Equipment, etc.

Of special interest is the sound equipment section which offers a complete selection of sound equipment needs from accessories to complete sound systems for any size installation.

A free copy of the new Concord Catalog supplement may be obtained by writing the Concord Radio Corporation at 901 West Jackson Blvd., Chicago 7, Illinois or 265 Peachtree Street, Atlanta 3, Georgia.

Westinghouse Price Policy

The Westinghouse Electric Corporation announced that while some lines of apparatus will require some price increase due to recent wage increases, no price advance on home appliances is contemplated at this time.

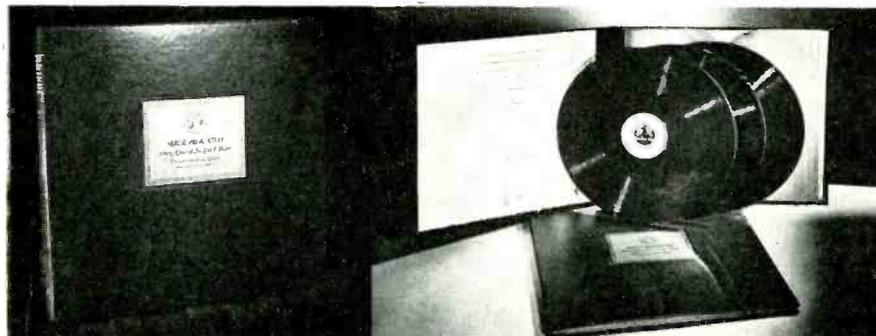
Coin Operated Sets

Hoffman Radio Corp., Los Angeles, is now providing some B-309 AC-DC table model receivers with a coin operated device for use in hotels, motels, public places and other rental units.

The device may be locked, is tamper proof, allows continuous or intermittent playing, includes a rejection slot for slugs and defective coins and takes four coins at a time.

Kits For Radio Education

Radio receiver construction kits for radio education applications in schools and colleges have been made available by the Specialty Division of General Electric Company's Electronics Department. Designed to illustrate all the principles involved in modern radio receiver construction, the new kits are similar to the type used extensively in the radio and electronic training courses conducted during the



Concert Hall Society Inc., 250 West 57th St., New York, packages its classical discs in conservative albums, with autograph signatures of recording artists on inside front cover.

Standard disc makers have gone in heavily for poster type covers on all albums, classical and popular. Both types cover wide range of consumer tastes in music and in "covers."

The great feature thousands are asking for...

Strobo-Sonic Tone

— only Stewart-Warner has it!



THE MUSIDORA— today's superior FM-AM console combination. Two models: the De Luxe with intermix changer and 2 album compartments; the Master with standard changer and one compartment. Full-cycle AC tonal range.

THE CONSOLETTA— the new AM radio-phonograph that performs like a big console! Smooth AC performance, so important for fine records. Automatic changer handles up to 12 discs. Detachable legs quickly convert this set to a table model.

AM TABLE RADIO— never has so much pure enjoyment been engineered into a set this size! Radair Antenna, 5 tubes plus rectifier, tone-box control, powerful reception. Ivory plastic with ruby-red controls.



A Model for Every Purpose—a Radio for Every Room

Stewart-Warner dealers alone can answer the demand for "the tone that's picture-clear." In both AM and FM-AM sets, Stewart-Warner is winning customer preference everywhere with the tone so faithful you can understand each word . . . distinguish every instrument . . . hear music in its true dimensions, picture-clear. True quality—priced for the buyers' market!



THE BALLADEERS—today's superior FM-AM table sets. Full depth Strobo-Sonic Tone! AC-DC, 7 tubes plus rectifier, PM dynamic speaker, 2 built-in Radair Antennae. Handsome in both walnut and desert tan.



AIR PAL—built like a watch, smaller than a phone, yet it's a full-power AC-DC radio that plays anywhere you plug it in! Beautiful jewel-box display . . . gold and satin . . . sets it off for what it is—a console in a jewel case!



Stewart-Warner

FM Radios **AM** Radio-phonographs. Television

CHICAGO 14



ILLINOIS

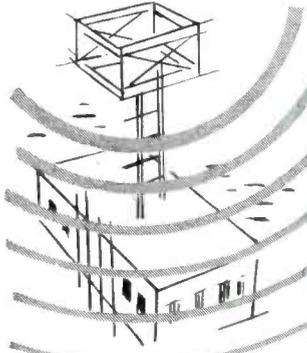
NOW!

TELEVISION

AT TWICE

THE PRESENT

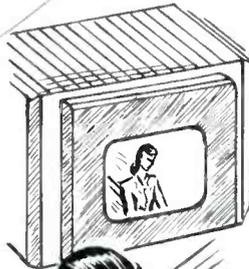
RANGE



VEE-D-X LONG DISTANCE TELEVISION ANTENNA

Men of vision choose . . . THE VEE-D-X!
MEASURE THESE IMPORTANT FEATURES
with your TELEVISION YARDSTICK!

1. RECEPTION AT TWICE THE PRESENT RANGE
High front-to-back ratio, designed for maximum attenuation of all signals in other than the desired directions.
2. LOW IMPEDENCE —
Gives you minimum transmission-line losses. Where man-made static interference calls for co-axial cable — proper impedance-matching is easy with the VEE-D-X antenna.
3. "Q" OR MATCHING SECTION —
gives you convenient method of matching impedences of transmission lines to antenna.
4. RESONATES FOR HIGHER GAIN —
at any given frequency with only slightest reduction of band-width.



Distributors' Territories Still Open—Write to

LA POINTE-PLASCOMOLD CORP.

Unionville, Conn.

war by the Army and Navy.

The radio kits include all the parts necessary to build a complete 5-tube superheterodyne receiver, a punched chassis, tubes, loop antenna, five-inch loudspeaker and specially-written instructions and diagrams. Students may perform many instructive experiments such as studies of rectifiers, filters, amplifiers, oscillators, etc., according to E. C. Hovey, head of the division's educational section.

Further information on the newly-available radio receiver construction kits may be obtained by writing the educational section, G-E Electronics Department, Wolf Street Plant, Syracuse, N. Y.

Guarantees 1947 Prices

Emerson Radio and Phonograph distributors have been informed that existing prices on Emerson radios were guaranteed for the remainder of the year by Mr. Benjamin Abrams, president. The guarantee covers inventory purchased between the dates of April 15, 1947 and December 31, 1947.

Belt Sales

Mr. Julius Finkel, president of the JFD Manufacturing Company of Brooklyn, New York, disclosed that over 2,500,000 JFD radio dial belts were sold during the past year. He attributed this outstanding record to the increased popularity of the line and to the JFD jobber's display stands and wall racks of belts which the firm has been distributing to the trade.

Radio Prices Are Lower

Average retail price per set has declined from \$55.70 in 1936 to \$54.52 in 1946.

Last year the average retail price of a home radio was less than it was ten years ago, according to Frank W. Mansfield, director of sales research for Sylvania Electric Products Inc. During the same period, he said, the average weekly wages of factory workers have more than doubled so that while 2.56 weeks earnings were required for a radio in 1936, only 1.25 weeks were required last year.

In 1936 the average retail price of a radio was \$55.70. In 1946 the price of radios declined to \$54.52. Low point in average retail price of sets was \$29.70 in 1940 when 1.18 weeks wages were required for set purchase.

RCA Appoints Shaffer

Kenneth B. Shaffer, formerly renewal sales field representative for the RCA Tube Department in Cincinnati, has been transferred to the Har-

[see page 36]

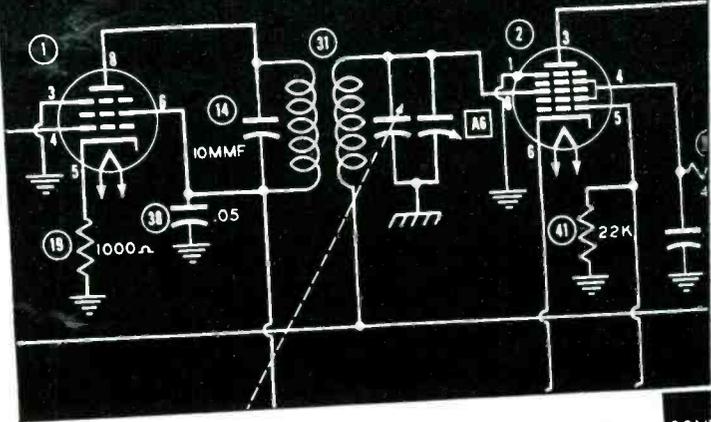
Don't Miss PHOTOFACT Set No. 23!

WITH EXCLUSIVE NEW "Standard Notation" SCHEMATICS

The Greatest Service Data Development in 20 Years!

I am proud to announce to my Servicemen friends the successful development of a new system of "Standardized Schematics" that is now yours exclusively in PHOTOFACT Folders. We have worked on this project for over one year, because we knew that uniform, standardized schematics would save you hours of time and countless headaches—would help you earn more. NOW—we have developed uniform, standardized diagrams on all sets. Now—you can save time—go from diagram to diagram and see the same, easy-to-understand symbols and designations. You no longer have to puzzle out the differences in schematic notations or bang your head against queer-looking diagrams. You'll recognize instantly the functions of all parts in any circuit. The standards used in our new diagrams are yours—the result of the PHOTOFACT "Standards Poll" and thousands of interviews with Servicemen. I wish space would permit me to tell you more—but PHOTOFACT Set No. 23 speaks for itself. You owe it to yourself to see the new diagrams. Use them—learn what a difference they'll make in faster, more profitable servicing.

Howard W. Sams



NOW! UNIFORM SCHEMATICS FOR FASTER, MORE PROFITABLE WORK!

Beginning with Set No. 23, and thereafter, all PHOTO-FACT Folders will feature the new, uniform "Standard Notation" schematics. Each and every diagram is drawn to the same basic set of clear, uniform, easy-to-understand standards. Here's what the new "Standard Notation" Schematics mean to you: Makes circuit analysis simple, quicker, fool-proof, more accurate! No more time wasted puzzling over odd-looking diagrams! No more trouble with varying symbols and confusing styles! Just ONE CLEAR STANDARDIZED STYLE FOR ALL CIRCUITS—SAVES YOU TIME—HELPS YOU EARN MORE. Only PHOTOFACT offers you the "Standard Notation" Schematics!

TWO IMPORTANT NEW HOWARD W. SAMS PUBLICATIONS

DIAL CORD STRINGING GUIDE

There's only one *right* way to string a dial cord. And there's only one book that shows you how. It's the Howard W. Sams DIAL CORD STRINGING GUIDE. Here, for the first time, in one handy pocket-sized book, are all available dial cord diagrams and data covering 1938 through 1946 receivers. Licks the knottiest dial cord problem in a matter of minutes. This low-cost book is a "must" for servicing. You'll want two copies—one for your tool kit and one for your shop bench. Order them today. **75c ONLY**

1947 AUTOMATIC RECORD CHANGER MANUAL

Nothing like it! COVERS MORE THAN 40 DIFFERENT POST-WAR MODELS. Absolutely accurate, complete, authoritative—based on actual study of the equipment. Shows exclusive "exploded" views, photos from all angles. Gives full change cycle data, information on adjustments, service hints and kinks, complete parts lists. Shows you how to overcome any kind of changer trouble. PLUS—for the first time—complete, accurate data on leading WIRE, RIBBON, TAPE, and PAPER DISC RECORDERS! Over 400 pages; hard cover; opens flat. No modern service shop can afford to be without this manual. **\$4.95 ONLY**



HOWARD W. SAMS & CO., INC.
INDIANAPOLIS 6, INDIANA

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"The Service that pays for itself over and over again"

FREE PHOTOFACT AIDS!

FREE. PHOTOFACT CUMULATIVE INDEX—Your guide to more than 1800 receiver models and chassis (1946 and 1947 models covered in PHOTOFACT Folder Sets 1 through 20).

FREE. HOW TO FILE FOLDER—Shows 5 good ways to file PHOTOFACT Folders, including new "30-Second" filing method.

Ask your parts jobber for FREE copies of these PHOTOFACT aids, or write us direct.

RESERVE SET NO. 23 TODAY

MAIL THIS ORDER FORM TO YOUR PARTS JOBBER TODAY—or send directly to HOWARD W. SAMS & CO., INC., 2924 E. Washington Street, Indianapolis 6, Indiana.

My (check) (money order) for \$..... enclosed.

- Send PHOTOFACT Set No. 23 (at \$1.50).
- Send . . . SAMS' DIAL CORD STRINGING GUIDE(S), at \$0.75 per copy.
- Send . . . SAMS' 1947 AUTOMATIC RECORD CHANGER MANUAL(S) at \$4.95 per copy.
- Send PHOTOFACT Volume No. 1 (including Sets Nos. 1 through 10) with DeLuxe Binder. \$18.39.
- Send PHOTOFACT Volume No. 2 (including Sets Nos. 11 through 20) in DeLuxe Binder. \$18.39.
- Send FREE PHOTOFACT Aids.

Name.....

Address.....

City..... State.....

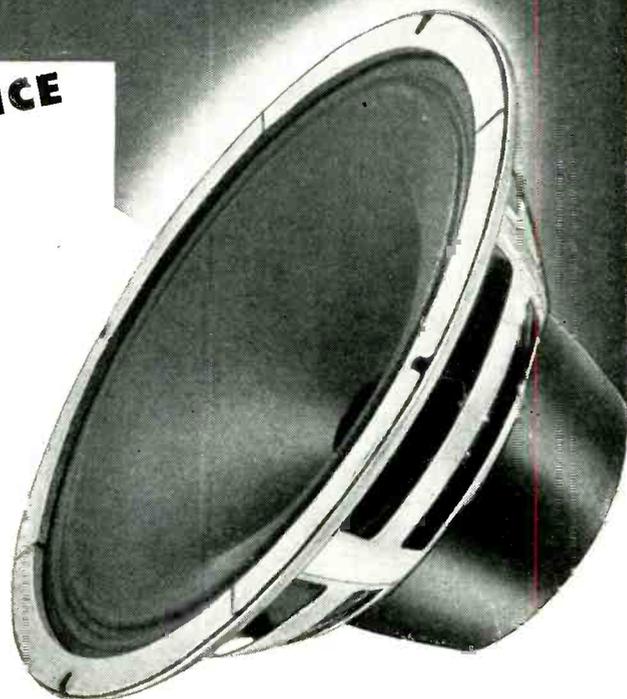


SPEAKERS

ALUMINUM FOIL BASE VOICE COILS PROVIDE



**PERFORMANCE
QUALITY
FIDELITY
DURABILITY**



EVERY General Electric Speaker—from the smallest to the largest—has aluminum foil base voice coils. This G-E development makes possible their high quality performance, tone fidelity, and operating durability. Whether you use them by the hundreds of thousands in production lines, or purchase a single unit for an individual replacement, your customers will appreciate the extra quality performance of G-E Speakers.

G-E Speaker construction gives you these excellent features which assure dependable performance and fine quality reproduction:

- High wattage handling capacity. The metal construction provides much better heat dissipation. This permits operation of the speaker at increased wattages.
- No warping of voice coil. The metal base will not introduce internal stresses, and it is not subject to separation of laminations or to other adverse effects which might result in distortion.
- The aluminum foil base voice coil will not absorb moisture under high humidity conditions.
- Internal stresses which result in dimensional distortion are eliminated through the aluminum foil base voice coil construction.
- Metal construction assures better control of clearance between moving parts.
- Better tone quality and reproduction.

PLUS...

● **ALNICO-5 PERMANENT MAGNETS FOR OVERALL EFFICIENCY AND SENSITIVITY.**



● **DURABLE CONSTRUCTION THROUGHOUT.**



Write now for complete information on speakers to: *General Electric Company, Electronics Department, Syracuse 1, New York.*

GENERAL ELECTRIC

169-F7

HERE ARE SIMPSON'S "BASIC 3" PROFIT-MAKERS FOR SERVICEMEN...

The serviceman who tries to "get along" with cheaply-made, run-of-the-mill test instruments is taking an outside chance on success. The business of radio servicing must be *built* from the bottom up on an endless succession of perfect jobs. Knowing what the trouble is, in a receiver, and knowing when that trouble is eliminated *can be no better than the test instruments that reveal them*.

The "Basic 3" Simpson instruments shown here are an extremely profitable investment for any serviceman. He needs all three and in their price range, he cannot buy better anywhere else. In fact, in their price range they are unequalled. They will do more than many instruments selling for substantially more. These are facts easily demonstrable to any serviceman who will take the time to check up. And it is worth the time in the *cold cash of profits* to discover how Simpson engineering skill and uncompromising quality construction produce the *staying* accuracy for which Simpson instruments are famous.

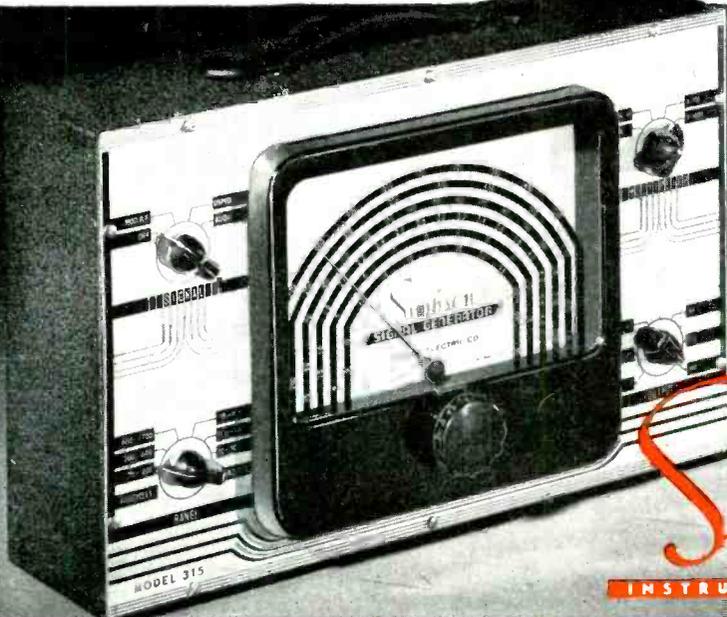
MODEL 315 SIGNAL GENERATOR. Designed down to the most minute detail for highest accuracy, greatest stability, minimum leakage, and good wave form **\$67.35**

MODEL 305 RC TUBE TESTER. Tests all tubes. Provides for filament voltages from .5 volts to and including 120 volts. Spare sockets for future tube developments **\$59.50**

MODEL 260 HIGH SENSITIVITY SET TESTER. 20,000 ohms per volt, D.C. Voltage ranges to 5,000 volts A.C. and D.C. Resistance ranges to 20 megohms. Current ranges to 500 milliamperes, also 10 amperes D.C. **\$38.95**

In New Roll Top Safety Case **\$43.75**

SIMPSON ELECTRIC COMPANY • 5200-5213 West Kinzie Street, Chicago 44
In Canada, Bach-Simpson, Ltd., London, Ont.



Simpson
INSTRUMENTS THAT STAY ACCURATE

Listen it's a Jensen SPEAKER

3 New

CONCERT* SERIES PM SPEAKERS

with Alnico 5 "R" Motors

The new JENSEN Concert Series speakers illustrated are now available at price levels only slightly higher than the well-known Standard Series models P12-S, P10-S and P8-S. These new "R" speakers offer unequalled values in power handling capacity, in efficiency, and in response-frequency. Overall performance is just a notch below that of the famous JENSEN PM12-H (now P12-Q), PM10-H (now P10-Q) and PAH-8 (now P8-Q), at substantial price savings.

Model P12-R, ST-103 — 12 watts \$19.50
 Model P10-R, ST-121 — 10 watts 18.50
 Model P8-R, ST-169 — 9 watts 15.25

For complete information on *all* models in the Concert series, as well as on other JENSEN equipment, send today for JENSEN Catalog No. 1010. Use the handy coupon below.

JENSEN MANUFACTURING CO.
 6619 South Laramie, Chicago 38, Illinois
 Please send me a copy of the 1947 Jensen catalog.

Name _____
 Address _____
 City _____ Zone _____ State _____

*Trade Mark Registered

JENSEN
 MANUFACTURING
 COMPANY

In Canada: Copper Wire Products, Ltd.
 11 King St. W., Toronto 1



MODEL P3-R

MODEL P10-R

MODEL P12-R

SYLVANIA NEWS

RADIO SERVICE EDITION

SEPT.

Prepared by SYLVANIA ELECTRIC PRODUCTS INC., Emporium, Pa.

1947

NEW SYLVANIA OSCILLOSCOPE BOASTS 7-INCH CATHODE RAY TUBE—IS ONLY \$124.50!

Wide Variety Of Uses — Excellent For Rapid Receiver Alignment and Trouble Shooting



Panel is heavy aluminum finished in silver gray, with type and decorations hand screened. Each finish coat and the silk screening are separately baked under a carefully controlled process—for long life and maximum beauty. Here's an impressive, versatile instrument for your establishment.

Now! For little more than you would pay for a smaller instrument, you can obtain a big beautiful, 7-inch Oscilloscope that's the last word for servicing. Excellent for audio circuit analysis, transmitter checking, filter circuit and hum analysis.

CHARACTERISTICS AND SPECIAL FEATURES

Large 7-inch cathode ray tube provides "Jumbo" patterns.

A new push-pull deflection circuit provides clearer patterns, less distortion and more gain.

Observation of a wider variety of phenomena is made possible by the addition of a Z axis input for intensity modulation. This feature is useful in studying pulses and portions of cycles, and leads to many applications in industry.

Panel binding post provides 6.3 volt AC .3 ampere supply for convenient external use.

Subdued red-jeweled panel lamp assembly with removable cap for easy replacement of lamp.

Extra-long, heavy-duty line cord.

Externally accessible line fuse at rear of cabinet.

Power Supply: 105-125 volts, 50-60 cycle, 35 watts.

Accelerating potential 1400 volts.

Horizontal Sweep: Left to right with frequency from 15 to 30,000 cycles. Synchronizing signal sources: internal (vertical), external, line frequency.

Deflection Factor at 1000 cycles

AMPLIFIERS: Vertical .21 volt rms per inch peak to peak deflection.
Horizontal .25 volt rms per inch peak to peak deflection.

DIRECT: Vertical 15 volts rms per inch peak to peak deflection.
Horizontal 18 volts rms per inch peak to peak deflection.

Amplifier frequency response is flat to within 3 db. from 7 cycles to 140 kc. at full gain.

Input Impedance

AMPLIFIERS: Vertical .5 megohm; 26 mmfd.
Horizontal .5 megohm; 33 mmfd.

DIRECT: Vertical and Horizontal 3.9 megohms; 20 mmfd.

INTENSITY MODULATION: .5 megohm; 30 mmfd.

For more complete information, write
Sylvania Electric Products Inc., Radio Division, Emporium, Pa.
SOLD THROUGH YOUR SYLVANIA DISTRIBUTOR

SYLVANIA ELECTRIC

MAKERS OF RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES; WIRING DEVICES; ELECTRIC LIGHT BULBS



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TUBE DEPARTMENT
RADIO CORPORATION of AMERICA
HARRISON, N. J.

SUBSTITUTION BOXES

Crack Tough Service Nuts

MANY radio service dealers have reported lately that sets come in for repairs with resistors so badly burned that the color coding is completely obscured. They also report occasionally finding damaged capacitors which either are not coded or labelled at all, or else seem to have a "private" coloring marking or manufacturer's type number that is so much Greek to the trouble shooter. If the exact circuit diagram in which all components are labelled with their exact electrical values is not available; the problem is doubly vexing, because the service dealer then must draw upon a reserve of circuit design knowledge (which he possibly may not possess) or else he must resort to costly, inefficient cutting and trying until he hits the right values of components. Unfortunately, some of the new receivers have posed this type of problem.

When complete circuit data is not at hand, the only rapid way to determine the value of a component needed is to apply an adjustable, clip-in substitution unit which may be varied quickly to the value which will give best results. For example: A cathode resistor of unknown value has burned open. A continuously variable resistance-substitution unit is clipped to the terminals formerly connected to the cathode resistor. The substitution unit then is varied until the proper value of cathode voltage is developed. The required resistance value then is read from the dial of the substitution unit, and a fixed resistor of this value (or the nearest commercial value) is soldered in place in the circuit. The same procedure may be followed with a calibrated capacitor substitution unit.

Both capacitance and resistance substitution units may be clipped quickly into a receiver circuit and may be adjusted just as rapidly. Thus, they are indispensable in one of the most puzzling varieties of trouble shooting. Substitution units may be made direct

Determining component values, when they are unknown, is simple by using this system

by RUFUS P. TURNER

reading (in ohms or microfarads) so as to eliminate all unprofitable figuring, estimating, guessing, and failing. The author has, on other occasions, pointed out the efficiency of these units for rapid trouble shooting by bridging burned-out component.*

Factory-made substitution boxes are not easily obtainable at this time. Consequently, the service dealer either must build his own (a simple job, if

he has the time) or he must have them built by some other technician. However obtained, these units are well worth the investment and will take their place at once with other important capital equipment in the shop or laboratory.

Because most technicians will have to construct their own substitution boxes, we are presenting in this article complete technical data concerning both capacitance and resist-

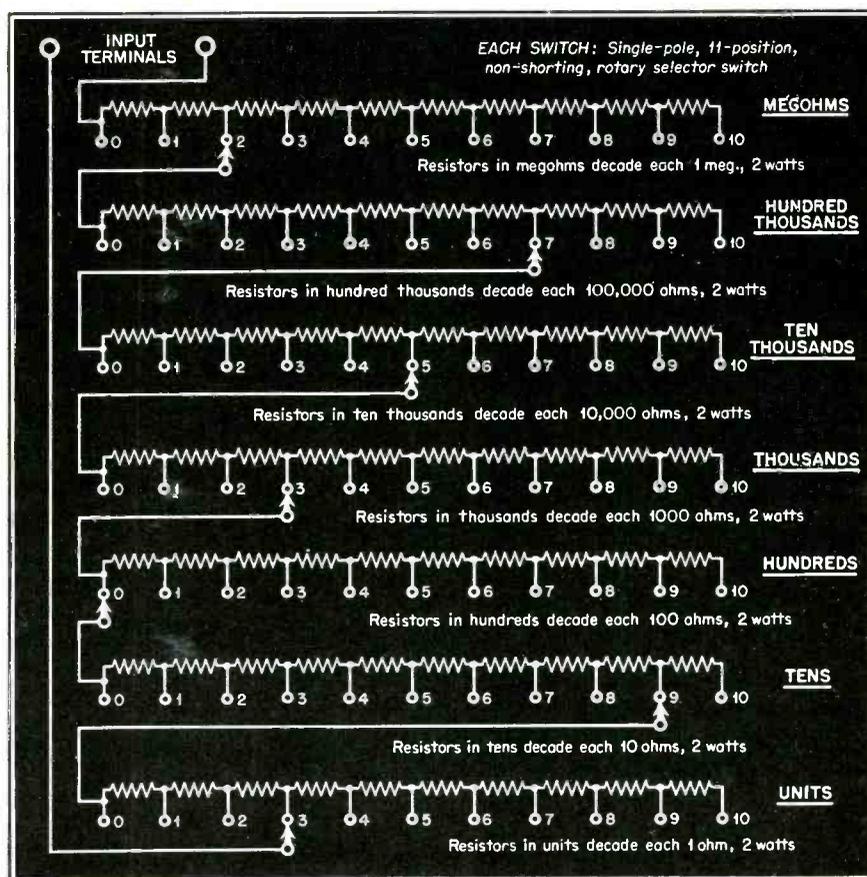


Figure 1. Low-powered resistance substitution box

*"Radio Test Instruments." Turner. (Ziff-Davis Pub. Co.) p. 205, revised edition.

ance units. The electrical values chosen are the result of a complete study of the situation, and will be applicable to the wide range of conditions arising in trouble shooting.

Resistance Substitution Boxes

Early resistor substitution boxes employed rheostats or potentiometers fitted with dials graduated directly in ohms. A calibrated variable resistor of this type provide a smooth, stepless variation of resistance. A very real drawback of this device, however, is the fact that fraction of the resistance winding, corresponding to the various lower-resistance settings, are not able to handle as much wattage as the full winding. The operator of the calibrated rheostat accordingly must continually be on the alert when using the lower-resistance settings, to prevent burning out the instrument. Even the high-wattage rheostats are limited in their application.

The author has found it much better to employ the *decade box* scheme. In this well-known arrangement, separate resistors of the same value are used in conjunction with an 11-point switch. Several such decades may be connected in series in one box to cover accurately a wide resistance range in small steps that rival the action of a rheostat. The resistors usually are all of the same wattage. 1- or 2-watt units are employed in a low-powered box (used to substitute for common radio circuit resistors) and 10-watt resistors in a high-powered box (used to substitute for voltage divider sections, etc., in which the currents will be large).

Descriptions of practical resistor substitution boxes follow:

Low-Powered Box.

The circuit schematic for this unit is given in *Figure 1*. A single-pole, 11-position, non-shorting rotary selector switch and ten 2-watt resistors of the same value comprise each decade. Decades are provided for megohms, hundred thousands, ten thousands, thousands, hundreds, tens, and units of ohms. The power handling capability of this box varies from 2 watts for any single resistor to 70 watts for all six decades in series.

The low-powered box covers resistance values from 1 ohm to 11,111,110 ohms in steps as low as 1 ohm each—a range of over 11 million to 1. The resistance setting is read directly from the settings of the various decade switches. Thus; the switch positions in *Figure 1* are 2 megohms, 7 hundred thousands, 5 ten thousands, 3 thousands, 0 hundreds, 9 tens, and 3 units—or 2,753,093 ohms.

The low-powered substitution box

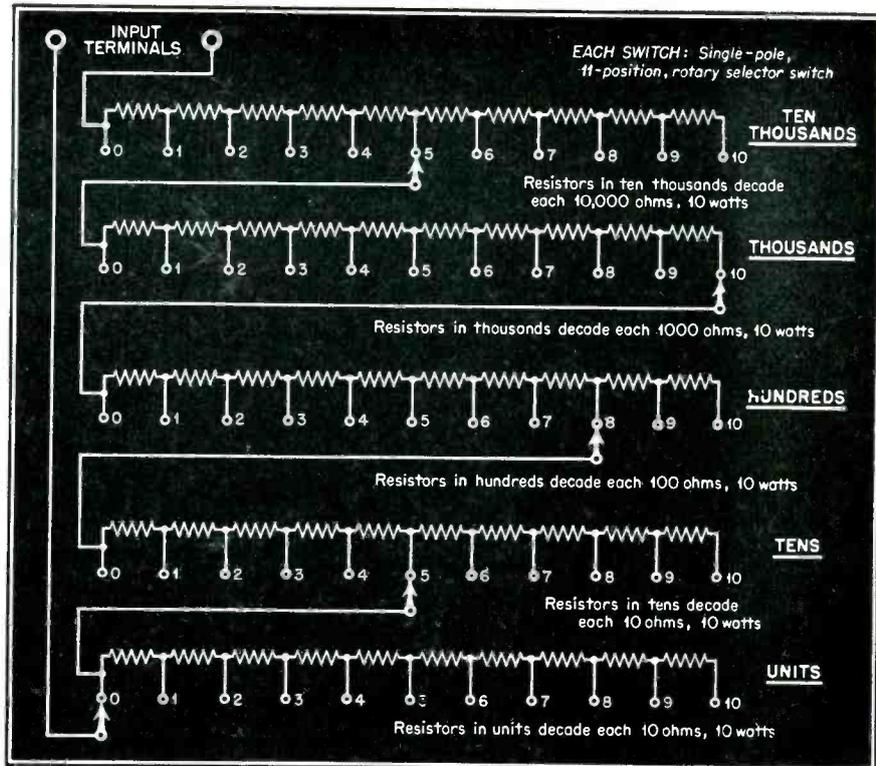


Figure 2. High-powered resistance substitution box

will function in lieu of all cathode, plate, screen, grid, and similar resistors in r-f amplifier, oscillator, i-f amplifier, detector, discriminator, AVC, AFC, and low-powered audio circuits. It may be used also to determine the proper resistance for volume controls, tone controls, and similar rheostats and potentiometers, and to determine resistance values in such experimental circuits as multivibrators, photocontrol devices, and test instruments.

Electrostatic shielding is not necessary in the low-powered resistance substitution box. Any instrument case the builder has available will suffice to house this unit. Wiring between

switches must be made with heavy bus bar. Resistors are soldered directly to switch contacts, as indicated in *Figure 1*.

The resistors should be selected with reasonable care from store stock. Naturally, the accuracy of the substitution box will be enhanced by close tolerance of the individual resistors.

The input terminals of the substitution box should be connected by the shortest possible leads to the appropriate points in the circuit under test. Heavy, flexible, insulated wire should be used. In order to provide the best power-handling combination, resistance values should, whenever possible, be selected with the box in such a way that as many decade resistors as possible are included in series with the input terminals. For example; instead of selecting 100 ohms with the HUNDREDS decade in its no. 1 position, set the TENS decade to its no. 10 position. This latter setting gives the same 100 ohms, but with ten 2-watt resistors in series.

High-Powered Box.

The low-powered box will, in general, not be satisfactory for high-current substitutions, such as in power supply voltage dividers, output amplifier cathode bias circuits, and similar positions where the power handling capability must be comparatively large.

A second resistance substitution box is recommended for higher-powered applications, and is illustrated by *Figure 2*. Since power resistors in



"Will you fix this set? My husband's quite a handy-man but he couldn't. But, as he started the job, you shouldn't have to charge much!"

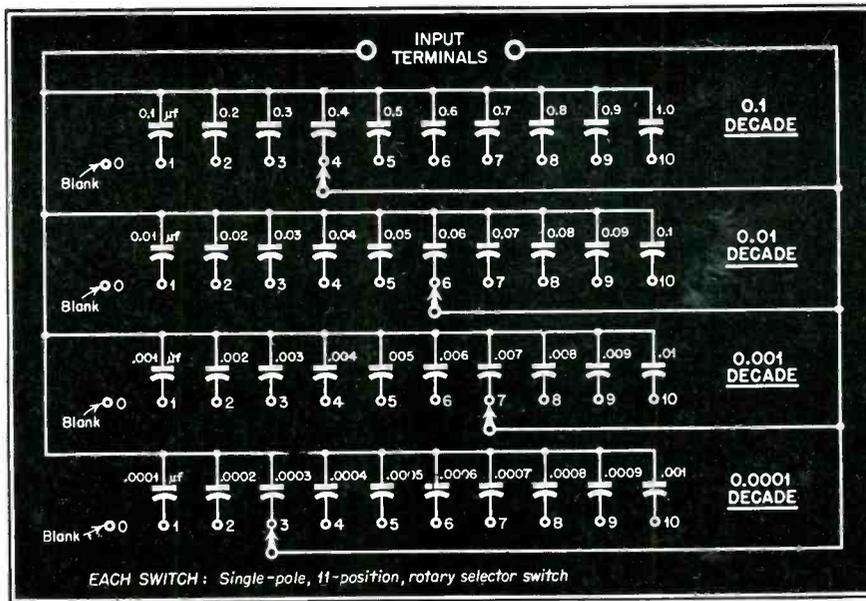


Figure 3

- 0.1 DECADE: 600-volt tubular capacitors.
- 0.01 DECADE: 600-volt tubular capacitors.
- 0.001 DECADE: Postage-stamp mica capacitors.
- 0.0001 DECADE: Postage-stamp mica capacitors.

Connect capacitors in parallel to ob-

tain any of above values which are not standard. For example; 0.7 ufd. may be built up with one 0.5 and one 0.2 ufd. corrected in parallel.

All switches: S.p.s.t toggle.
Capacitors C_1 to C_9 inclusive 600-volt tubular

Capacitors C_{10} to C_{14} inclusive midget tubular electrolytic.

also apply to the high-powered box.

Capacitance Substitution Boxes

The same principles are applied to the construction and operation of capacitance substitution boxes, except that capacitor decades are wired in parallel, rather than in series. Capacitor substitution boxes are shown in Figures 3 and 4.

Low-Medium-Capacitance Box.

This unit (See Figure 3) covers the capacitance range from 0.0001 ufd. (100 uufd.) to 1.111 ufd. in steps as low as 0.0001 ufd. each. The decades are made up with single-pole, 11-position, non-shortening rotary selector switches and postage stamp mica capacitors in each position except C_{21} to C_{10} which are tubular capacitors.

Shortest possible leads are a must

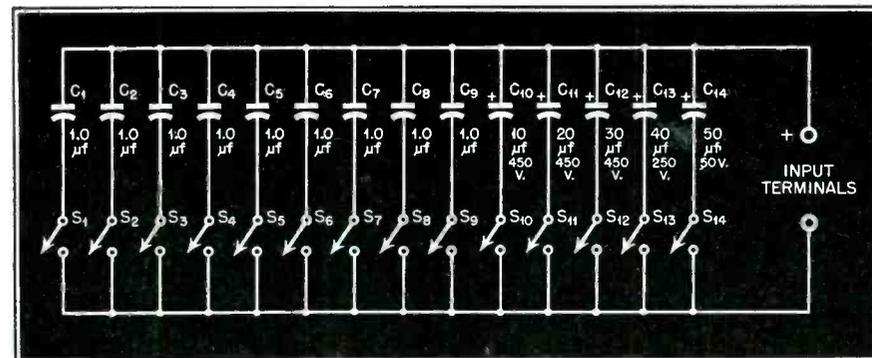


Figure 4

in the capacitance boxes, in order to minimize stray circuit capacitance and to take full advantage of the individual accuracy of the component capacitors. For the same reasons, it is mandatory that test leads from the input terminals of the substitution box to the circuit under test be not only as short as possible but also *rigid*. All wiring inside the box must be done with heavy bus bar.

As with resistance boxes, the capacitance substitution box is read directly from the total settings of the decade switches. For example; the switches in Figure 3 are set at four 0.1's (0.4), six 0.01's (0.06), seven 0.001's (0.007), and three 0.0001's (0.00003)—or a total of 0.4673 ufd.

High-Capacitance Substitution Box

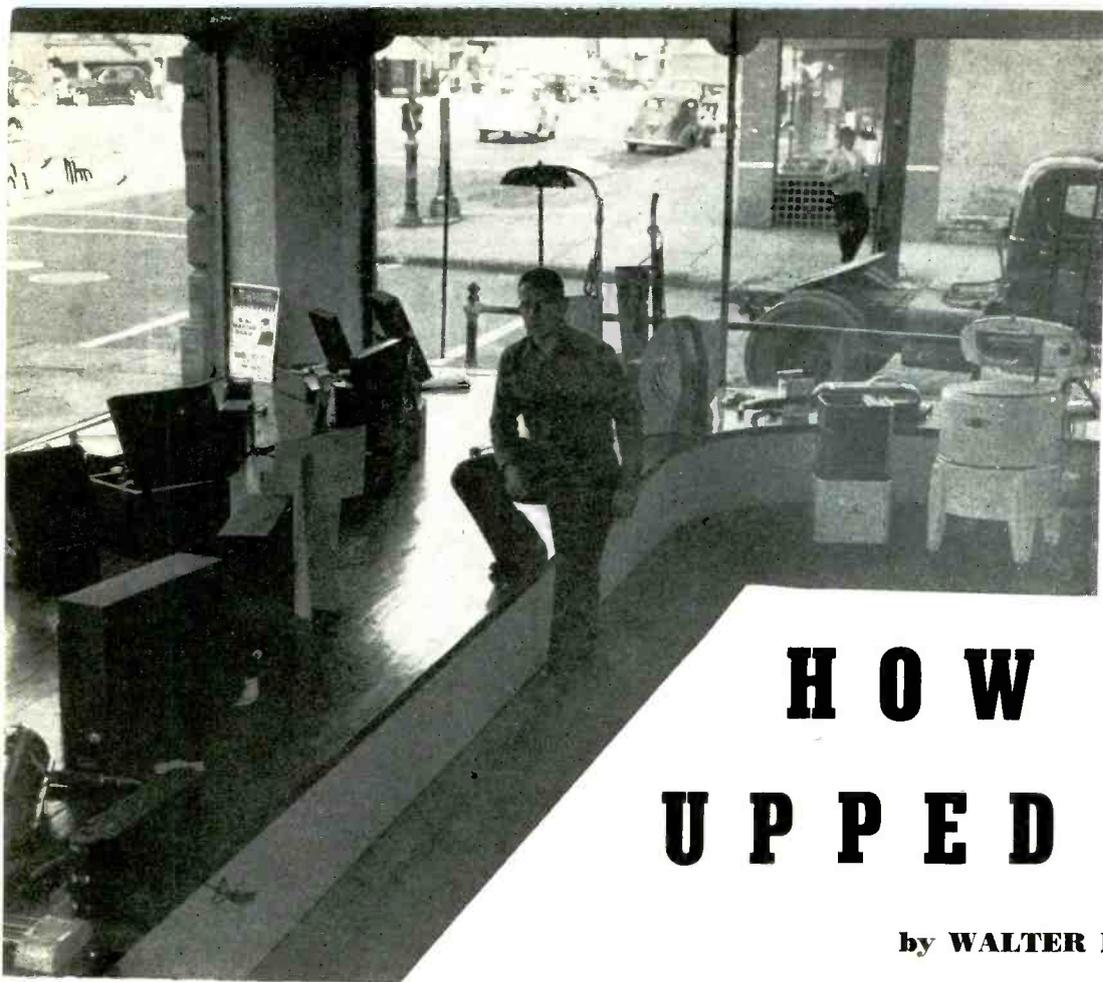
Beyond about 1 microfarad, capacitor decades become rather bulky in size. For this reason, a separate substitution box is recommended for capacitances in the large-size by-pass and filter categories. The circuit schematic for a box of this type is shown in Figure 4.

The electrical arrangement of this box is somewhat different from that of the low-capacitance unit. Here, for example, each capacitor is connected to a toggle switch. If only one switch is closed, its companion capacitor is the only one that is in the circuit. When two or more switches are closed, however, all of the capacitors associated with these particular switches are connected in parallel by the operation, and the total capacitance in the circuit is the simple sum of the individual capacitances that have been switched-in. For example: if switches 1, 7, 8, and 13 in Figure 4 are closed, the total capacitance is 1+1+1+40 ufd.—or 43 microfarads.

The substitution box covers the capacitance range from 1 ufd. to 159 ufd. in steps as small as 1 ufd. each.

Since electrolytic capacitors are employed in the 10-, 20-, 30-, 40-, and 50-ufd. positions, it is imperative that the input terminal connected to the positive terminals of these capacitors be plainly labelled + or *positive*, as shown in Figure 4.

The operator of the high-capacitance substitution box must be careful to observe the working voltages of the capacitors switched into the circuit. The 1-microfarad units (C_1 to C_9) will operate safely at 600 volts d. c., while three of the electrolytics (C_{10} , C_{11} , and C_{12}) are rated at 450 volts, one of the remaining ones (C_{13}) at 250 volts, and the last (C_{14}) at 50 volts. The dial plate of the switches may be marked with these voltages, as a guarantee of indication.



The investment outlay for enlarged store windows and lighting came back within a short time.

HOW ERIE UPPED SALES

by WALTER RUDOLPH

Eric Radio, always a pace-setter in the merchandising of radios and appliances in Erie, Pa., recently opened the eyes of folks in their community a trifle wider—by adding two definite merchandising aids, and all of which are paying off.

"Perhaps the most outstanding innovation to our business," commented Donald M. Rosenthal, owner-manager of the store, "has been the construction of what we believe to be the largest single show window area in the city, measuring about 300 square feet and powerfully lighted at night.

"Another improvement in our overall merchandising plans has been the adaption of a concerted, far-reaching advertising schedule which is efficient and time-saving, while being comparatively easy on the budget.

Taken in order, the first change was a "national" that was planned some months ago when the terrific post war sales possibilities in the radio and appliance field were sensed. This change is simple in concept, but curtailment of building supplies, electrical fixtures, etc. was a big handicap to putting the idea into operation.

It consisted in raising "the floor", as it were, immediately in front of the plate show windows which bound the Eric Radio sales room on its corner location at one of the city's busiest downtown intersections. This elevation to knee-height makes scores of appliances and radios on display visible from cars passing on the street as well as bringing these products closer to the eyes of sidewalk passersby.

"Then, in cooperation with the local Pennsylvania Electric Co. office, we

planned to make this window stand out at night, gleamingly attractive and a merchandising aid while the store was closed," stated Harold Allamon, general service manager at Eric Radio. "And it might come as a revelation to those who hesitate to add more light because of increased overhead, that the powerful lighting which we now have costs us three dollars less per month than we formerly paid.

"That's a fact—the bill for the first month after the installation of the new lighting units over our revamped show windows was \$3.10 below the preceding month," he continued. "Of course, our original installation cost of about \$500, including a third more new lighting units installed elsewhere than in the windows, is a sizeable item, but we figure that the numerous comments and compliments we have received on the show windows at night indicate that our radio and appliance sales will go zooming when we have the merchandise to display and sell. Already we have realized a quickening in sales of what we have."

Installation was done by Eric Radio personnel during working hours and during a few evenings, taking three days altogether. Aside from slight angles and cutting in around the dimensions of the window area as it now is laid out, the new flooring for actual window display measures about 10X28' and by the time this is read will be covered with custom-laid battleship linoleum, with a dark border and an attractive design through its middle.

The lighting units themselves, along the top edges of the large areas of plate glass (but hidden from street view by darkened areas of glass,) consist of 19

Sylvania commercial fluorescent fixtures containing two 40-watt tubes each. The \$500 installation cost given above included conduits, wire, clamps and labor, besides the lighting units.

Advertising Plays A Part

The advertising program at Eric Radio, heretofore rather on the catch-as-catch-can side, has been streamlined into a single, carefully drawn-up black booklet which contains copy and mats for daily advertising, week after week, in systematic order. This schedule in booklet form can be turned over to the newspaper wherein the advertising is to be carried, and the advertiser can practically forget about advertising, as such.

Compiled by the Modern Publicity Co.



New York, this form of advertising eliminates the periodical "pestering" by local advertising salesmen, as the program for months ahead is already planned and awaiting chronological execution.

"Our particular advertising needs are served," explained Allamon, "because the form we have chosen gives us a few square inches of promotion, hammering day after day, within a set symbol or physical outline. This symbol is an eight-pointed star, so to speak—two squares, one superimposed upon the other,—with our firm name beneath, and this will be in practically the same spot in

the daily newspaper, day after day.

"We believe readers will come to recognize this symbol, and sort of look forward to the change of message it will bring. For although the symbol remains the same, the message will read differently from week to week, 52 changes in all.

"These messages run something like: 'We can make your radio sing;' or, 'Complete appliance servicing, and economy, too.' They are designed to be glanced at and swallowed at one bite, or without any great study, and they keep our name in the mental foreground

of the appliance and radio users and buyers."

Looking toward the future, toward the bonanza of radio and appliance sales that is sure to come to the merchant who is ready and prepared for attracting and holding customers, Erie Radio has in the blueprint stage plans for one of the most modernistic stores in the city. Departmentalization, a wealth of lighting, acoustical background under a false ceiling down one side of the large sales floor where floor model radios will be aptly demonstrated, and other features are forthcoming.



AN OLD BUS *became a successful* SERVICE SHOP

by **STEPHEN PORTER LATHROP**

WHEN James E. Wright, owner of the Wright Electric Co. of Decatur, Ala., had to seek a new location for his radio repair shop he found that none was available in that city. He spent six months looking over the city, investigating locations, but without results. Finally one day he was down at the city bus line garage and saw, off to one side, a discarded city bus with the wheels removed. He inquired about it and found that it could be purchased reasonably. He bought it.

The owner of a filling station on one of the side business streets of the city and only one block from the main business street gave Mr. Wright permission to park the discarded city bus to one side of the filling station in a spot where it would not be in the way. The bus was then hauled to this spot and set up. Mr. Wright painted it and fixed up the inside as a repair shop with handy work benches. A telephone was installed and electric light connected. An outside antenna was put up to aid in testing radios after they were serviced.

In the place where the name of the bus line is generally found, Mr.

Wright put up a sign with the name of his firm. And in the two head lights, small signs were placed advertising the business. The light behind each of these signs was connected with blinkers so that when one light was on the other was off which proved attractive eye-catching advertising at night.

A 30,000 watt space heater was in-

stalled, connected with a thermostat which was kept on all winter and it kept the place warm.

The novelty of the whole thing has paid off. In fact what began as a makeshift has proven so satisfactory that Mr. Wright had given up all ideas of looking for another location even when they become available.



Left — Mr. Wright at the bench. Right — a view of the bus interior.

A Television Antenna System

ONE of today's major problems, for tenant and landlord alike, is that of providing satisfactory television reception in large apartment houses. Some apartments consist of three or more units, each unit housing from 50 to 150 or more families.

The problem that exists begins to unfold itself in its proper magnitude when we consider installing the antennas for a dwelling consisting of from 50 to 150 living units, such a building being made up of 3 or 4 building units. To be sure, each and every apartment in each unit may not plan on having a television receiver, but there is no known formula for determining how many will, and which apartments they will be. However, considering any reasonable distribution of television receivers during the next few years, even if only 50% of the tenants of any large apartment building install television receivers, the resultant antenna situation is, to say the least, a "mare's nest".

Not only from the standpoint of building disfigurement is this situation bad, but also from the standpoint of satisfactory reception for even a small portion of those installing receivers. First, there are usually not over one or two "choice" antenna locations on an apartment roof. If these are "grabbed off" by the installation men making the first installations in the block, as they naturally would be, later purchasers have to be satisfied with less desirable antenna locations with the resultant poorer and poorer reception as each less desirable location is utilized. Also as more new antennas are erected considerable interference with existing installations may result. Secondly, the indiscriminate location of antenna after antenna within the restricted area of the block is bound to result in the partial absorption or reflection of signals from those antennas which were originally located in the "choice" spots; and still more annoying may result in the creation of "images" or "ghosts" due to the various reflections involved. Such "ghosts" are difficult enough to eliminate in many locations where "bounce-off" from nearby buildings and objects occurs because of their peculiar location and proximity, without adding to the problem by the addition of some 50 or 150 other ob-

**A practical idea that may be the answer
to one of Television's biggest problems**

by **ALBERT H. CARR**

jects (antennas being resonant devices make excellent reflectors) to further complicate the problem. Thirdly, there is the problem of lead-in cables. This in itself may seem small, but when the total number of lead-in cables is considered and the mechanical phases of their installation are taken into consideration it is not difficult to conjure in the mind what a complex jargon of wiring would result. Also with such indiscriminate routing of lead-in cables, resulting from each installation man's endeavor to give his customer the best possible reception, there is bound to be considerable damage to existing installations and also to the building itself.

Therefore, with the foregoing factors, disadvantages and what-have-you in mind it would appear that an antenna system that would eliminate a majority of these undesirable features, would be welcomed with open arms by set owner and building owner alike. A description of such a system, "one of the things to come", is presented herewith.

This system consists of five major elements as follows:

1. Antennas—(note the plural)—a separate antenna, properly located and oriented for *each* television channel.
2. An individual band pass amplifier for each antenna.

3. A mixing system for combining the outputs of the above mentioned amplifiers and placing their outputs (combined) on to a distribution system.

4. A distribution system covering every apartment in the block and terminating in each apartment in such a fashion that any receiver may be connected to the distribution system through a matching network.

5. A matching network, so designed that the input impedance of any receiver is accurately matched to the distribution system. This matching network also to provide adequate isolation between receivers to prevent radiation from local oscillators (through the system) from interfering with reception on another receiver. A block diagram encompassing all of these elements appears in *Figure 1*.

With the five elements of the system identified, let's have a more or less detailed description of each.

Antennas

Inasmuch as we are going to have one and only one antenna for each television channel on the roof, it stands to reason that this antenna should be of the best construction possible and located and oriented for the best possible reception on the channel for which it was designed. Two types of construction lend themselves readily to roof mounting, the dipole and the folded dipole. Inasmuch as the efficiency of each is nearly the same, the greater mechanical rigidity obtainable from a folded dipole makes it a heavy favorite. The folded dipole itself should be constructed of tubing, not less than $\frac{1}{2}$ " and preferably $\frac{3}{4}$ " in diameter and rigidly mounted on a rugged metal upright with a clear line of sight to the transmitter location. This is, however, not always possible and, in any event, the criterion is, *that* location and orientation

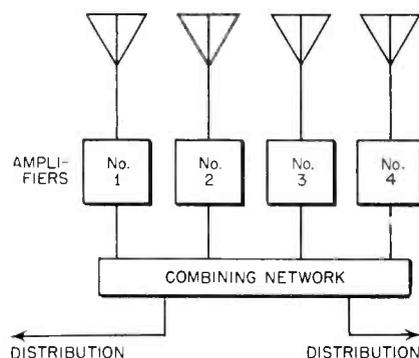


Figure 1—Basic System

for Multiple Unit Dwellings

which gives maximum signal from the particular station for which it was designed, free from "ghosts", "images", etc.

A suitable matching device to match the balanced 300-ohm dipole to an unbalanced 52-ohm concentric cable must be provided. This may take the form of a matching transformer, a "bazooka" or any one of a number of similar devices. One antenna suitably located for each channel is fed through its individual lead-in cable to a central point on the floor below the roof where the cabinet containing the amplifier units may be suitably located. Inasmuch as the FM broadcast band is located adjacent to the high frequency television channel and considering that most television receivers provide for FM reception, it is considered advisable to use an antenna and broad band amplifier tuned to cover the FM band and also pass this through the common distribution system, obviating the necessity of another separate FM antenna for each tenant. At the present time in New York with three television stations operating on regular schedules this will indicate a total of four antennas.

Amplifiers

The amplifiers are wide band devices with high gain and remarkable stability. The gain of each is individually controllable so that the amount of signal from channel #1 may appear on the distribution system in the same magnitude as that from channel #4 or #5, etc., thus assuring within reasonable limits the same satisfactory reception on all channels. A schematic of an individual stage of one of these amplifiers appears in Figure 2. A maximum gain of 60 db per amplifier is considered sufficient to insure proper distribution level and although in the

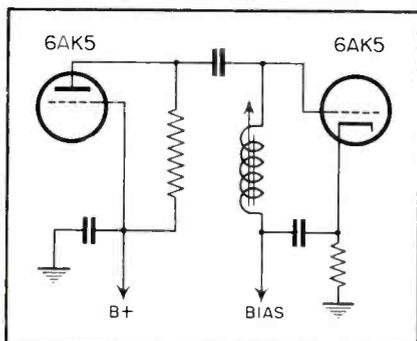


Figure 2—Typical Amplifier Stage

metropolitan area it is seldom that this amount of gain will be required, it is available for those locations in which the strength of an incoming signal is of very low intensity. This amount of gain is easily obtained in an amplifier employing seven stages such as are illustrated in Figure 2 in cascade.

The band pass characteristic of the amplifiers should be within less than $\frac{1}{2}$ db over a 6 mc channel width. This is readily obtainable through suitable i-f transformer design and proper choice of plate loading. The response at the extremes of 10 mc bandwidth should be at least 30 db down. This figure apparently gives sufficient attenuation to prevent cross modulation or other interference from adjacent channels. Inasmuch as it is desirable to maintain constant values of all signals at all times, a well regulated power supply is a must if changes in line voltage are not to affect the proper operation of the amplifiers. Design considerations of the amplifiers include careful selection of the value of components used in the input circuit in order that the various values of bias applied to the input stage do not change its input impedance sufficiently to cause improper termination of the transmission line. Such a mismatch invariably results in a high standing wave ratio and manifests itself in the form of ghosts in the presentation.

Unified Distribution Feeder

One of the main objectives of the system being the elimination of a number of cables running hither and yon, it is mandatory that all signals be fed to each receiver location by means of a single cable if this objective is to be realized. This is accomplished by means of a mixing and matching network system whereby the output of each amplifier is fed into a suitable network which presents the proper load to each amplifier and in turn imposes its output onto a 52-ohm cable in common with the output of the other amplifiers for distribution. It is also a function of this network to provide sufficient isolation between the outputs of the various amplifiers to prevent any interaction and/or cross modulation between them. The values of L , C and R in this network are critical and are to a large extent dependent upon the value of load

chosen for the last stage in each amplifier.

The distribution system is simplicity itself, consisting merely of standard 52-ohm cable going progressively from one outlet to another in a continuous string. (As to how many outlets this may be has not yet been accurately determined, but the best available estimate is that from 40 to 50 outlets may be used from a single group of amplifiers). In practice it would appear desirable to so plan an installation that each feeder would take the form of a vertical riser serving apartments located one above the other and possibly serving two apartments on the same floor if their locations were such that very short horizontal runs could be obtained. The wisdom of this method becomes obvious when one considers the difference in cost in running all outlets from a single vertical riser as compared to lengthy, expensive horizontal runs. It also insures much more uniform and accurate impedance matching between the distribution system and the individual loads.

Shielding

The termination of the distribution system at each outlet is in such form that some 30 db of attenuation is introduced between the distribution system and each receiver. This attenuation, which is fixed, accomplishes two things: First—it brings the signal level down to a proper value to feed the receiver without danger of overloading the input circuits and; Second—by providing 30 db of attenuation between cable and receiver, effectively provides 60 db of attenuation between any two receivers insofar as transmission of any radiation from one receiver to another is concerned. The advantage of transmitting as high a value of signal voltage on the distribution system as possible is [see page 39]

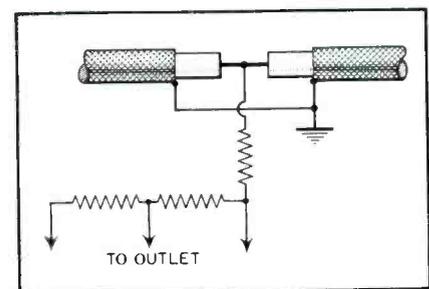
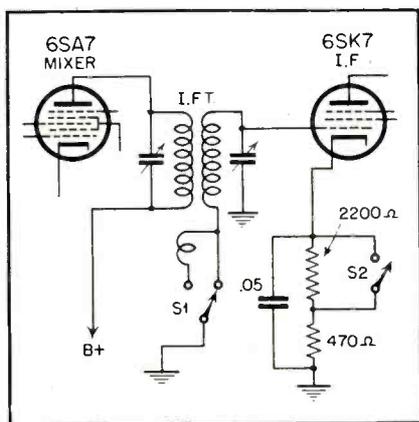


Figure 3—Terminal Connections

CIRCUIT COURT

Magnavox CR-198 Series

This 10 tube receiver employs a special type of i-f transformer between the 6SA7 mixer and the first i-f tube, a 6SK7. The purpose is to provide adequate selectivity for short wave and distant reception, and make available expanded band-pass for local high-quality stations.



Partial circuit of Magnavox CR-198

The result it accomplished by an additional winding on the i-f transformer. In the sharp position will be found the usual tuned primary and secondary. These coils will have a degree of coupling which provides reasonable bandwidth, say out to 5,000 cycles.

In the broad position the additional winding is connected in series with the secondary, but coupled to the primary. In this way the circuits are overcoupled and serve to pass a much wider range of audio frequencies. The switch S₁ is mechanically coupled to the high frequency tone control. When this control reaches the end of its usual range it operates the switch and the high-frequency condition results.

Another feature of the i-f stage is the dual cathode bias resistors. On the broadcast band, where maximum sensitivity is not needed, the total value is 2670 ohms. In the short-wave, the 2200-ohm section is shorted by a section of the range switch. Maximum power is then available for reception of weak signals. This switch is indicated by S₂ in the partial schematic.

RCA 68R Series

An interesting method of switching from FM on the new band to Standard Broadcast is employed in the RCA 68R instruments. A partial diagram showing the pertinent circuits is illustrated.

A 6BE6 miniature pentagrid converter tube is used in each stage. In the case of the FM mixer, a tuned-grid coil is fed a signal from the dipole terminals by a coupling coil. A built-in dipole

serves for local reception. The oscillator circuit is the usual tapped-coil Hartley type. The cathode and one side of the heater is provided with an r-f choke to maintain it at the cathode potential for oscillator frequencies. In the plate circuit appears the primary of a 10.7 mc i-f transformer.

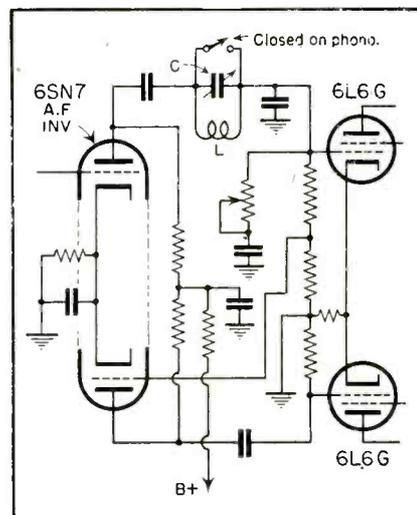
The AH mixer is similar to the one just described except that the broadcast band loop constitutes the inductance in the signal grid circuit, and provision is made for an external antenna by inclusion of a coupling transformer. The plate connects to the primary of a 455 kc i-f transformer. Conventional treatment is given the heater.

The secondaries of the 10.7 mc and 455 kc i-f transformers are series connected and feed a 6BA6 i-f stage. Switching between bands is done simply by applying plate voltage to the primary of the i-f transformer in the desired mixer plate circuit. Neither mixer has a-v-c voltage applied.

Magnavox CR-198 Series

It is a well known fact that the 10 kc spacing of stations on the standard broadcast band imposes serious limitations on the audio fidelity which can be received, even with the best receiver. Phonograph reproduction, on the other hand, need not be limited, except by record and pickup limitations.

This instrument has a wide-band audio system and over-coupled i-f system which

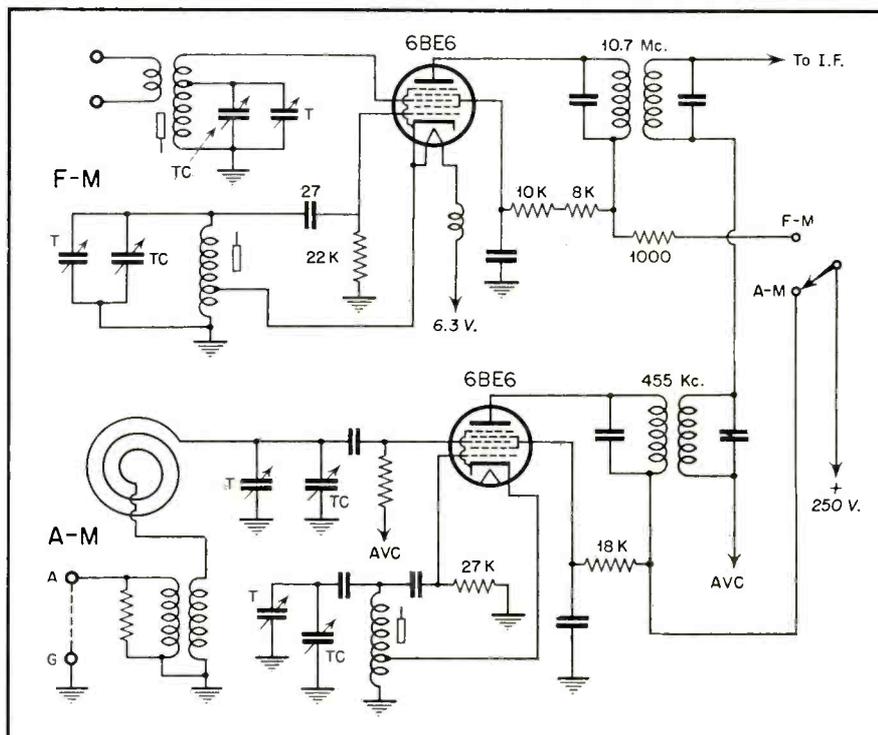


Phono switching section of Magnavox CR-198

provide exceptionally wide frequency response. During radio reception it is necessary to provide a method of suppressing the 10 kc beat which appear as a result of the beat between the carrier of the desired station and one or both adjacent carriers.

The suppression is accomplished by the use of a parallel-tuned L-C circuit in the audio lead between the 6SN7 stage and the 6L6G output stage. It will be seen in the partial schematic that the grid of the phase inverter section of the 6SN7 receives its excitation from a voltage divider in the grid of the 6L6G, subsequent to the insertion of the 10 kc filter.

Provision is made on the range-function switch to short out the filter when the instrument is in the phono position, thus making available the full audio range



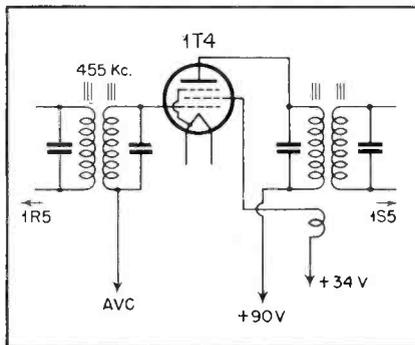
Circuit showing how RCA 68R Series switches from FM to Standard Broadcast

usable in this position. During alignment, a 10 kc signal is fed to the audio system and trimmer C adjusted for minimum output.

RCA Model 65BR9

A system of i-f coupling which results in better gain from some of the battery type tubes than can be obtained by conventional circuits is used in several RCA sets, including the 65BR9.

Several factors limit the gain obtainable in such tubes as the 1T4 and the accompanying diagram shows the method employed to bring the i-f gain of the stage up to 120 times.



Partial schematic of RCA Model 65BR9

It will be observed that the iron core input and output transformers are connected conventionally except that the screen receives its d-c voltage via an additional winding in the output transformer. The action here is to make use of some of the signal which appears on the screen, if it is not by-passed at the tube socket. Up to the point where instability sets in, making use of this permits increased gain from the stage.

Note that the d-c voltage applied to the screen is only 34 volts. It is important that this be near the indicated value to realize the required gain and prevent instability.

B L O C K D I A G R A M S

Block diagrams quickly give experienced technicians the essential functions of each stage of a complex receiver circuit. This block diagram concerns the G-E Model 417

This 10-tube instrument incorporates broadcast, two short-wave and two FM ranges as well as phono reproduction. In the block diagram the tube function line-up has been shown for each type of operation. Electrical push-button tuning is used on the broadcast band, in addition to provision for dial tuning.

Considering the FM performance first, we find a type 6AK5 miniature pentode used as a tuned r-f amplifier. Switching is used in the grid circuit to select either the old or new bands. This stage is impedance coupled to another 6AK5 tube used as a mixer. Grid injection is used from a triode connected 6AK5 high frequency oscillator.

The 10.7 mc i-f resulting from the mixer operation is passed to an i-f system employing a 6SG7 and a 6SV7 in that order. The transformers are in series with the AM coils and switching is done in the grid of the 6SG7 stage.

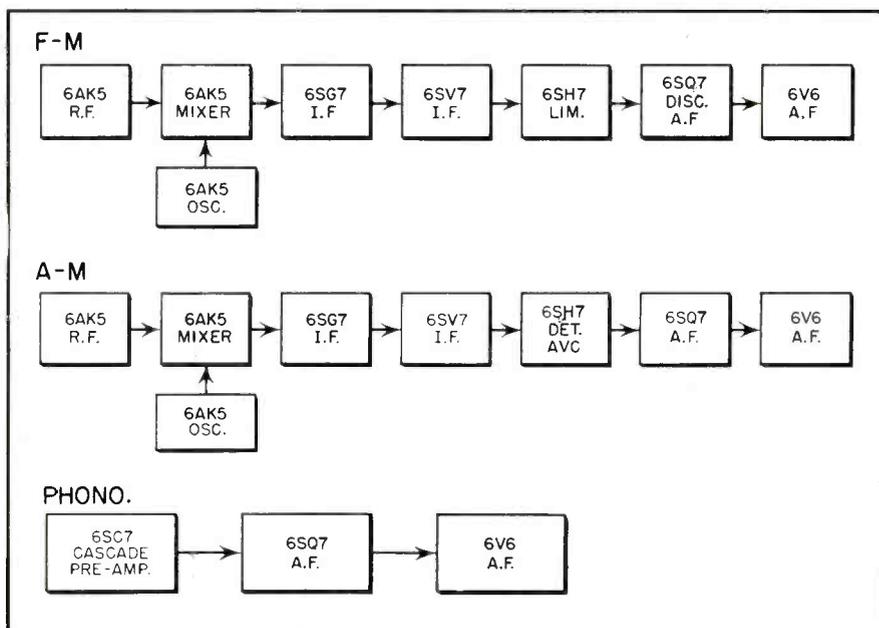
Following i-f amplification, the signal passes through a limiter stage (to remove any AM components) employing a 6SH7 tube. The FM output of the limiter is coupled by the last 10.7 mc transformer to the diode of a 6SQ7 which constitute the discriminator.

The a-f signal supplied by the discriminator is amplified by the triode elements of the 6SQ7 and then drives the single 6V6GT output tube. Inverse feedback is incorporated in the audio stages to improve performance.

In the manual-tuning broadcast position and AM short-wave bands, all the tubes used on FM serve the same functions as outlined above, except as follows; the I.F. is switched to 455kc, the 6SH7 tube performs as second detector and a-v-c source and the diode section of the 6SQ7 is unused.

Push-button tuning on the broadcast band only provides for selecting two circuits as the r-f stage (first 6AK5) is by passed, the signal being fed from the antenna directly to the mixer.

Phonograph reproduction is obtained



Block diagrams of the 3 sections of G-E Model 417

from a low-output pickup and additional amplification is needed. A cascade connected 6SG7, dual triode, raises the output of the pickup to a level where the 6SQ7 (triode section) and 6V6 stages provide normal output. A 5Y3 rectifier completes the tube compliment.

Bendix Improves Models

"Three changes have been made in Bendix Radios that were the subject of information given out in September," writes sales promotion manager J. L. J. O'Connor. "We are pleased to notify you and ask you to correct this information, because it represents increased quality in each instance.

"Model 747-A: This is an AM-FM table model originally described to you

as having six tubes and rectifier. This radio now has seven tubes and rectifier, utilizing a stage of radio frequency amplification and three-gang tuning on FM. This model now becomes 847-A.

"Model 474-B: An AM-FM console with automatic phonograph reproduction incorporates the same change as above. This model now becomes 847-B.

"Model 667-A: This table model radio-phonograph utilizes six tubes and selenium rectifier, rather than five as previously indicated. For increased quality and volume output it offers a full-fledged push-pull output circuit in addition to other features of marked quality. Because of the non-tube character of the selenium rectifier, this model number does not change.

THE DISCRIMINATOR CIRCUIT

a. The discriminator (see Fig. 1) is a device which changes frequency variations into a varying audio voltage. This varying audio voltage corresponds to the sound being transmitted by the FM station.

b. In the Westinghouse Model H-119 and in many other FM circuits a more or less conventional center-tapped i-f transformer and a 6H6 tube comprise the discriminator. This circuit utilizes the phase shift between the primary and secondary voltages across the i-f transformer to produce a differential audio voltage.

c. The step by step operation of the H-119 discriminator is as follows:

1. The i-f signal voltage appears across the tuned primary of the discriminator transformer (condition A).

2. An induced voltage is produced across the secondary winding. This voltage is 180° out of phase with the primary voltage (condition B).

3. At resonance the induced secondary voltage causes an in-phase current to flow through the coil and its tuning condenser (condition C).

4. This in-phase current flows through the coil and produces a reactive voltage drop across the coil and condenser. This reactive voltage is out of phase with the secondary current by 90° (condition D).

5. If the resistance of the secondary winding is low, the reactive voltage drop across the secondary tuning capacitor will be many hundreds of times greater than the induced voltage due to transformer action. This "gain" is similar to that of an ordinary TRF stage when it is tuned and for all practical purposes, we can forget the induced secondary voltage and assume that the secondary voltage is equal to the reactive voltage drop across the coil and condenser.

6. The current through the secondary winding may be assumed to flow from bottom to top of the coil. One half of the reactive voltage drop appears between the center tap and the bottom of the coil; the other half appears between the center tap and the top of the coil. For purposes of explanation, referring to Fig. 1, we will designate the upper half of the voltage drop as "minus" $E_S/2$ and the lower half as "plus" $E_S/2$.

7. The primary voltage is also coupled to the center-point of the secondary winding through the capacitor $C64$. This voltage appears across resistor $R17$, and is the same as that across the primary winding.

8. The resultant signal voltage which appears at diodes No. 1 or No. 2 is

FREQUENCY MODULATION

This chapter covers the Discriminator Circuit and the Deaccentuation Network

PART III

the vector sum of the series voltage drop across $R17$ plus the upper half of the secondary voltage, or the vector sum of the series voltage plus the lower half of the secondary voltage.

9. When the signal voltage frequency is equal to the resonant frequency of the tuned primary and secondary discriminator transformer circuits, the signal voltages appearing at the two diode plates are equal, and equal and opposite rectified voltages will appear across resistors $R16$ and $R17$ (condition E).

10. The audio frequency output under the conditions just mentioned, will be zero. This would be a condition of no modulation at the FM transmitter.

11. As the frequency varies with

modulation, the voltages applied to the two diodes become unequal.

12. At frequencies higher than the resonant frequency of the tuned circuits, the secondary winding presents an inductive reactance causing the current to lag the secondary voltage. As a result the voltage at diode No. 1 is greater than at diode No. 2 (condition F).

13. Diode No. 1 passes current which flows from the cathode mid-point connection through $R16$. The voltage drop across $R16$ is now greater than the drop across $R17$. The voltage output at the discriminator test jack will be equal to the algebraic difference between the voltage drops across $R16$ and $R17$ and will have a definite polarity, plus or minus, with respect to ground.

14. At frequencies below resonance,

[see page 34]

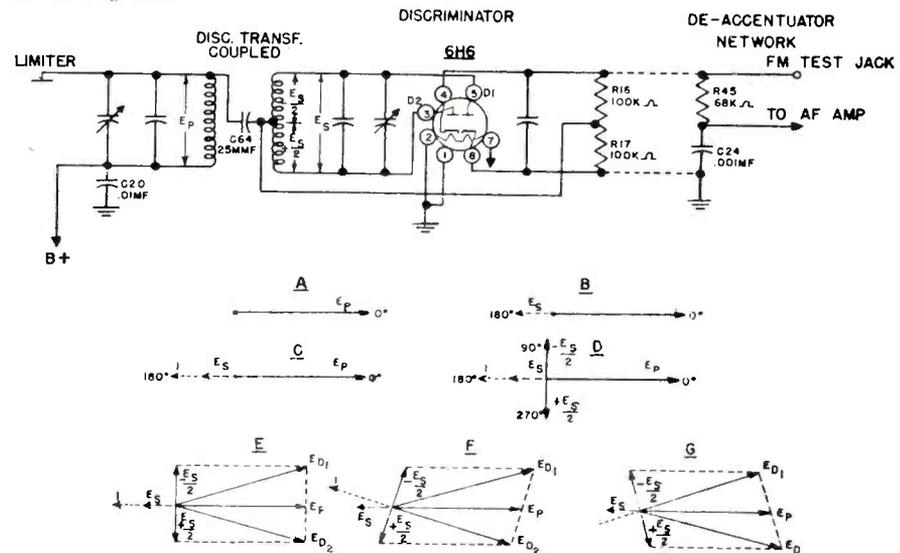


Fig. 1—Westinghouse Model H-119 Discriminator & De-accentuator network

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WANTED—Technical manuals on the RT-3/ARN-1 radio altimeter; R-89/ARN-5A Glide path receiver; RT-34/APS-13 radar set; microwave frequency meter 105S. Will pay \$1.50 ea. Write before sending anything. Paul E. Raor, P. O. Box 333, Marion, Ind.

FOR SALE—Radio test equipment: 2" scope, vacuum tube voltmeter and signal tracer; 2 tube testers all in good condition. Will answer all inquiries. James W. Hoskins, 212 Middlefield Road, Palo Alto, Calif.

SELL OR TRADE—RCA universal output transformer #7853 and Centralab midjet radiom volume control, 50,000 ohm #N-114. Need 300 HY audio choke or larger value and 6.3 volt filament transformer. Clyde Bryan, RT. 3, Box 106, Charlotte 3, N. C.

FOR SALE—Radio City 802 tube tester, set tester. Write for information. Willie E. Raines, R 2, Ridgeway, S. C.

WANTED—Philo chassis and speaker 37-650 in playing condition, cabinet not necessary. Will pay cash. Joe J. Smith, 1115 — N. 15th St., Clarksburg, W. Va.

SELL OR TRADE—Janette Rotary converters, CA-18, 110v d-c 110v, 60 cycle a-c at 1.36A. Like new, \$30 ea or trade. Want 1941 Buick radio 980650 and 1942 Chevrolet radio 985793. Must be reasonably priced. State condition. Paul M. Cordery, Box 367, Tularosa, N. Mex.

FOR SALE—All kinds of slightly used radio text books 40% off. These include advanced serviceman's course, Chromium plated "bug" #6, Francis Collogue, 5 Norfolk St., Roxbury, 19, Mass.

FOR SALE—Complete stock of excellent test equipment, tubes, condensers and parts; also service books and manuals and late NRI course. Will sacrifice. Ira E. Lutz, Sycamore, Ala.

WANTED—Highest grade 1936 Philo chassis and speakers or complete set in its case. Sherman Fairchild Associates, Room 4628—30 Rockefeller Plaza, New York 20, N. Y.

FOR SALE—Bendix tube checker in good condition; also portable short wave receiver by Emerson. \$37.50 or trade for RC-375 G-E transmitter and power supply. Glenn Clark, 1315 Del Rosa Ave., San Bernardino, Calif.

SELL OR TRADE—150 watt CW transmitter; Abbot TR4 complete; DR20, 2200 VCT, 1000 ma transformer; Howard 430 and other receiver and transmitter parts. All letters answered Henry Macaro, 23 Silver St., Waterville, Maine.

FOR SALE—CMI, broad band converter for 10 meters, never used, original box, \$25; two 3mfd, 4000 WVDC Spragues \$1.90 ea. and new 872A, \$2. L. H. Scott, Jr., 4010 Maryland, Shreveport 71, La.

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WANTED—RCA TRK 9 or 90, TRK 12 or 120 television receiver chassis, complete or in part. J. D. Young, 2009 —15th St., S. E. Washington 20, D. C.

FOR SALE—10 watt amplifier, speaker, mike and 75' cable, \$95. C. A. Needles, 1024 Wenden Ave., Missoula, Mont.

FOR SALE—Two 3C23 grid controlled rectifiers, \$5 per pair; controls 500V, 1500ma, 4 1/2 C battery. Lyle J. Crivits, 3743 N. Aldrich, Minneapolis 12, Minn.

WANTED—Record display cabinet, Home Radio Sales & Service, 851 Blake Drive, Brooklyn 7, N. Y.

FOR SALE—New unused, 1946 De Forest Radio Course complete in seven leather bound volumes, including eight extra books covering business methods, \$50 prepaid. Charles C. Butler, 616 E. 5th St., Cherryvale, Kans.

FOR SALE—Hudson automobile receiver A-1 condition \$35. WE meter a-c scale 0-10v, \$2.50. D. J. Bashe, 2917 Milan St., New Orleans, La.

WILL TRADE—1946 I.C.S. Radio Servicing Course for late edition N.R.I. course. Gilbert Watson, 1008 Sansom Ave., Alabama City, Ala.

FOR SALE—Complete repair department, 600 tubes, test equipment, tools, parts, Rider and other publications \$1000 plus shipping charges. Send for list and details. Post Radio Shop, 246 Ave., U. Brooklyn 23, N. Y.

WANTED—Schematic diagrams for SCR-274 N, SCR-522 and BC-375E. All or any part, buy or rent. W. B. Sanders, 4310 Lakehaven Drive, Atlanta 5, Ga.

TRADE OR SELL—New single signal superhet, described pages 247 to 250 in 1945 ARRL Handbook. Need plug-in coils wound, alignment. All new including tubes. Also have new surplus TT-52 tuning unit \$3. Need test equipment, manuals, M. L. Alison, 2931 S. Main St., Ellsbury, Ind.

FOR SALE—Transmitter, 300 watts tone, 450 watts CW, PP812 final cathode modulation, 4 meters. Varostat in primary high voltage transformer. Housed in 2 3/8" racks \$200 complete. Herb Bender, 4515 Upton Ave., N. Minneapolis, Minn.

WANTED—RCA portable BP-10, need not be in working order, need chassis and cabinet only. Will trade other radio items. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N.Y.

FOR SALE—General Electric mutual conductance tube tester for all tubes. Model TC-3P complete with telephone plugs for battery test and tube chart. A-1 condition \$85. John W. Doup, Jr., 709 Hutchins Ave., Columbus, Ind.

SELL OR TRADE—Japanese walkie talkie in leather carrying case, 8" x 3" x 6"; type 19 tube, ariel, 2 sets phones, 2 mikes, trans. 30 miles, 135v on plate; 3 bands 2 1/2, 10, 12 meters, \$35 or swap for 220 Swift, Bee or Hornet. Kenneth W. Burbank, 17 Bachelor St., E. Lynn, Mass.

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FOR SALE—15 watt amplifier, microphones, Precision signal generator, E-200 Precision tube checker. John T. Levine, 15-17 Kelley Sq., Worcester 4, Mass.

WANTED—A-C Superhet receiver, broadcast band only, for use in connection with radio course. Must be popular make. A. N. Bishop, Veterans Hospital, Castle Point, N. Y.

FOR SALE—Two year old precision tube tester #912-P, \$48; 55 new tubes, \$30 and Superior #850 signal generator covering bands from 100 Kc to 99Mc, 2 years old, \$32. John Radio Service, Morristown, Minn.

FOR SALE—AN/APN-4, 5" scope, Precision crystal, new, 15 tubes, convertible to test scope, \$35; also BC-654 75-meter mobile transmitter-receiver, 13 tubes, excellent condition \$20; Leica camera, Walter Luml, 125 W. 90th St., New York 24, N. Y.

FOR SALE—Custom built Oldsmobile auto radio, has push button and set of new tubes \$55, postpaid. H. Ursillo, 693 N. Broadway, E. Providence, R. I.

URGENTLY NEEDED—6N6 tube; name your price, will answer all letters. T. B. Barnes, Jr., P. O. Box 1096, Greensboro, N. C.

FOR SALE—Well established radio sales and service shop. Selling because of health. Warnken's Radio Shop, 630 Main St., Longmont, Colo.

FOR SALE—National 1-10 complete; Burton battery powered test oscillator. Albert Webb, 1514 Chew Ave., Philadelphia 41, Pa.

FOR SALE—Precision 912P tube tester, new in March, used only few times, \$50. M. Polinski, 4731 S. Wolcott St., Chicago 9, Ill.

WILL TRADE—Portable car radio complete with new battery, also \$50 stamp collection. Want BC-348 receiver. Phil Brand, 462, Fordham, Bay Village, Ohio.

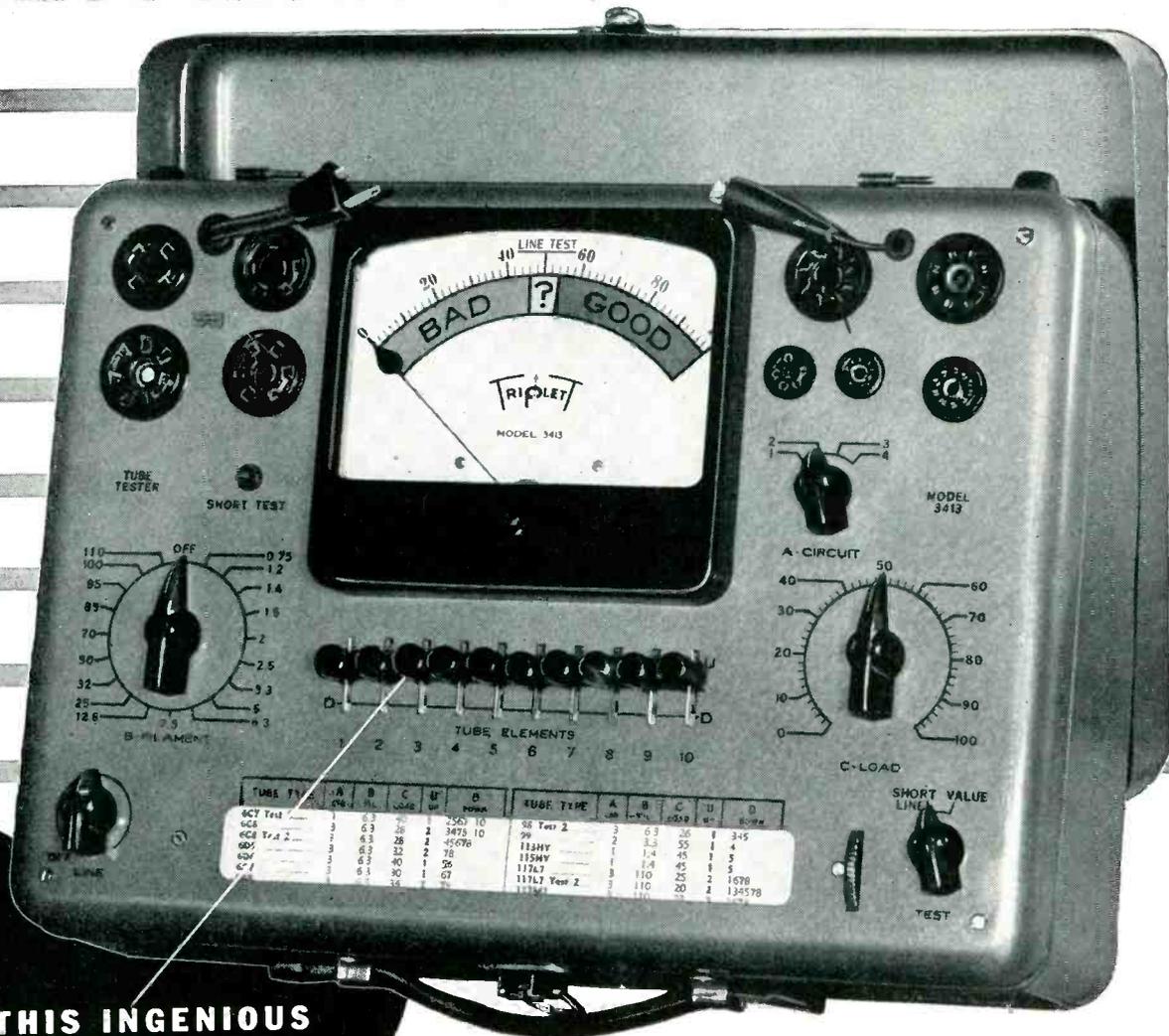
FOR SALE—RCA6204 Variomatic microphone, H. I. brand new. No reasonable offer refused, or will accept in trade mint stamps or small folding camera. Carl Seendlin, 800 N. Main St., Dayton, Ohio.

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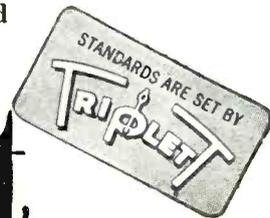
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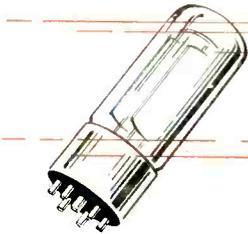
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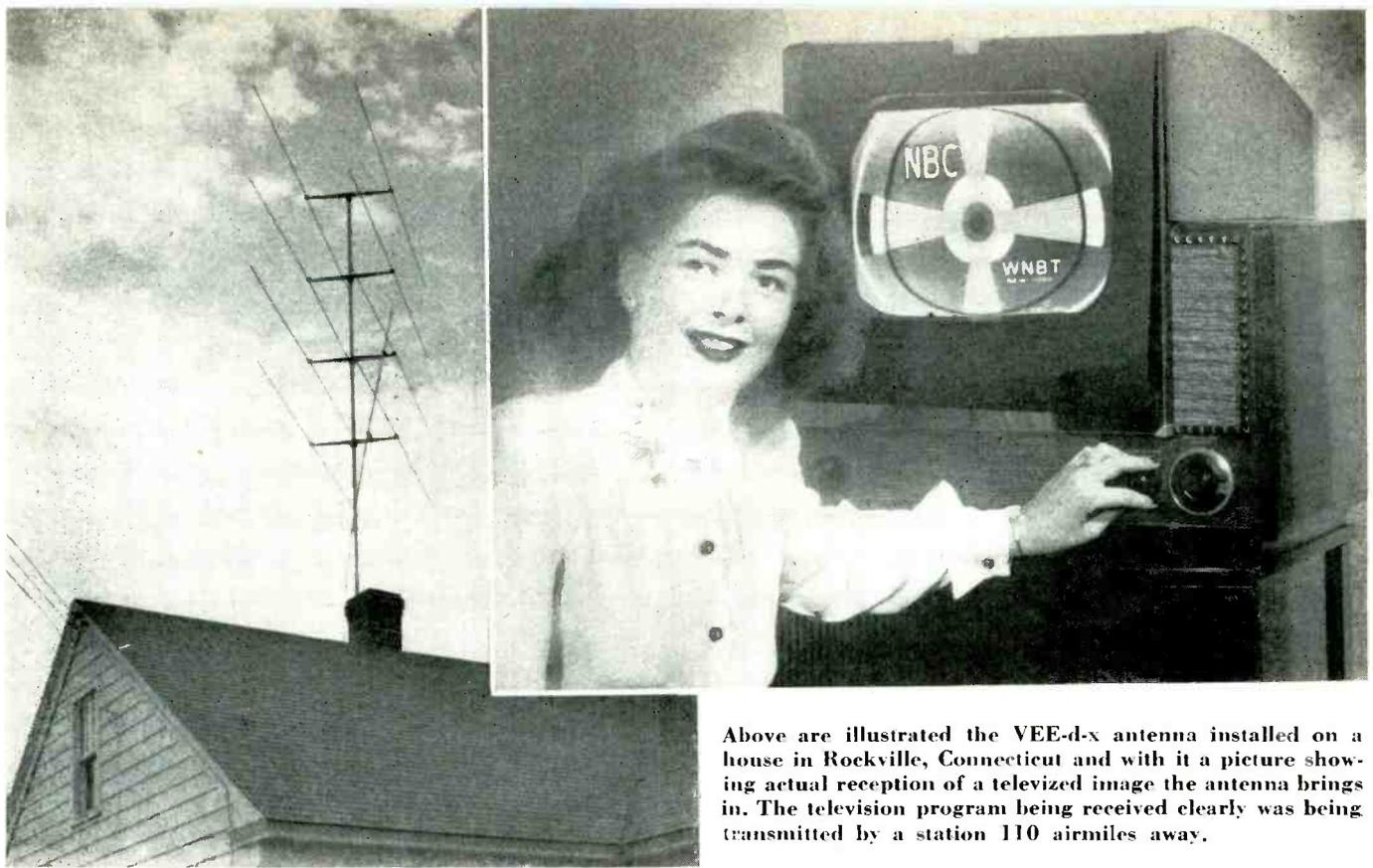
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Above are illustrated the VEE-d-x antenna installed on a house in Rockville, Connecticut and with it a picture showing actual reception of a televised image the antenna brings in. The television program being received clearly was being transmitted by a station 110 airmiles away.

TELEVISION, a major achievement of the present generation, has come into its own. As time goes on it will become an essential part of the everyday life of the average person and influence him as possibly no other medium of communications has in the past decade.

Under average conditions, the generally accepted radius for satisfactory television has previously been limited to approximately 35 to 40 miles. While this, no doubt, covers a large portion of the population in the areas in which transmitters are located, it nevertheless deprives those on the fringe areas and those locations between 45 to 100 miles from the transmitter from the obvious benefits, both personal and commercial, which might be realized were they able to satisfactorily receive television. With this in mind, it became apparent that something must be done to extend this radius.

Television sets have a limiting factor where gain is concerned, due to noise both internal and external. Boosters to be inserted between the antenna and set frequently have the limitation of destroying picture quality and definition in order that adequate gain may be secured. It therefore became essential that an antenna system be used which would combine the broad band response necessitated by multi-channel reception of television signals as well as substantial gain or pick-up in one direction, and the attenuation of signals in other than the desired direction as a means of helping eliminate interference.

Television Received DX

With these thoughts in mind the present Vee-d-x antenna was devel-

VEE-d-x TELEVISION ANTENNA

by A. C. DENSON

oped and has proven extremely satisfactory. Consistent reports made over a period of time from installations varying from 90 to 125 miles from the transmitter have indicated that while reception may not be a solid 100% at all times due to atmospheric conditions, sunspots, etc., reliable reception is none the less secured an average of 80 to 90% of the total time that the system is used.

The Vee-d-x antenna system has a high forward gain thus giving maximum pick-up in one direction while having minimum pick-up from the sides and rear, thus helping to eliminate interference. The incorporation in the Vee-d-x antenna of a matching section provides a convenient and accurate method for matching the impedance of the transmission line which may be from 50 to 600 ohms to that of the antenna, thus helping to prevent ghosts and other undesirable characteristics caused by mis-matching.

While the Vee-d-x antenna is fundamentally broad band in its characteristics it may be adjusted in those areas wherein more gain is desired at some slight decrease in band width. (for example in outlying areas where there is only one station operating) so that the desired station may be received somewhat better than in the normal broad band position of the antenna.

Connections to the Vee-d-x antenna are made by means of suitable coaxial connectors or screw terminals depending upon the type of transmission line used. The entire unit may be easily assembled by one person without technical knowledge, in about a half hour, by following the detailed instructions which accompany each antenna. The entire assembly weighs only about 20 lbs., and may be mounted on the end of a short length of 2" pipe or other structure which may be in turn affixed to the house or mounting pole. It does not require guy wires of any type placed on the antenna proper, as even under severe weather conditions the antenna has ample mechanical strength.

The mechanical construction of the antenna incorporates aluminum castings at all points of strain, aluminum tubing for the elements and an insulating material with excellent mechanical and electrical properties at the frequencies for which the system is designed. The antenna has extremely low wind resistance, good mechanical rigidity and pleasing appearance so that it becomes not only an object of extreme utility but a worthy addition to any television set owner's home or location.

[Complete technical data now being assembled will be published in this journal very soon.]

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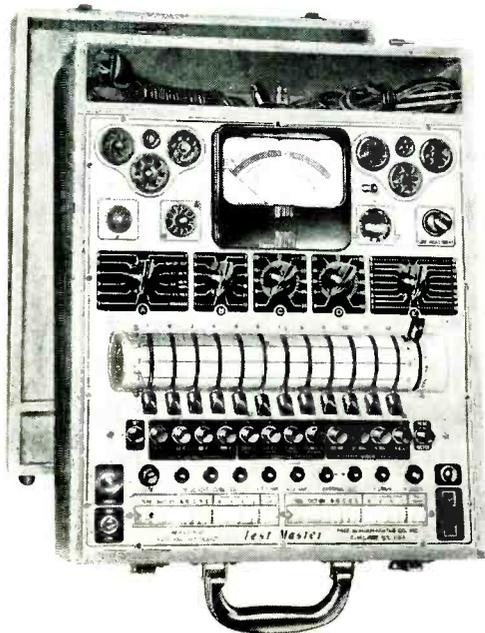
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*REG. PEND. U. S. PATENT OFFICE

THE NEW SERIES 10-20 TEST MASTER



is a complete, rugged service laboratory incorporating the exclusive "Precision" ELECTRONAMIC Tube Performance Tester, combined with full 1000 ohms per volt A.C. and D.C. Multi-Range features; plus a complete radio A, B and C Battery Tester which reveals battery condition under dynamic load test. Ideally suited and particularly engineered for general-purpose radio-electronic and industrial-electronic maintenance, service and installation. Tests all modern standard receiving and low power transmitting tubes, including facilities up to twelve individual element prongs; dual-capped H.F. amplifiers, 5 & 7 pin acorn types, Noval 9 pin tubes, etc.

*Affords highest practical order of obsolescence insurance thru use of the Precision 12 station Master Lever Element Selector System.

CIRCUIT TESTING FEATURES

- ★ Six A.C. Six D.C. and Six Output Voltage Ranges: 0-6-12-60-300-1200-3000 volts
- ★ Four Self-Contained Resistance Ranges: 0-1000-100,000 ohms; 0-1-10 megohms (No A.C. power required)
- ★ Six D.C. Current Ranges: 0-600 microamperes 0-6-60-300-1200 MA. and 0-12 amperes.
- ★ Six Decibel Ranges from -20 to +64 DB.
- ★ All standard functions available at only two polarized tip jacks.
- ★ Automatic interlocking push-button range selection.
- ★ 1% wirewound and matched metalized resistors.
- ★ Large easy reading 400 microampere, 4³/₈" meter.
- ★ All ranges self-contained, without any additional panel controls.
- ★ All circuits insulated from power line.

MODEL 10-20-P; in sloping portable hardwood case with tool compartment and hinged, removable cover. Size 13³/₄" x 17¹/₄" x 6³/₄".....\$109.10

MODEL 10-20-C; in modern, chrome trimmed, counter cabinet; fine dull black ripple finish on heavy gauge steel. Size 17" x 17⁷/₈" x 7¹/₂".....\$111.10

MODEL 10-20-PM; mounted onto 17¹/₂" x 19" steel panel with rear enclosing dust cover. For standard rack mount.....\$109.10

All models include test leads and ohmmeter batteries.

Ask to see the "Precision" Master Electronamic Test Instruments now on display at all leading radio parts and equipment distributors, or write directly for the new Precision 1948 catalog fully describing the Precision Electronamic tube performance testing circuit.

PRECISION
TEST EQUIPMENT
Standard of Accuracy

PRECISION
APPARATUS COMPANY INC.
92-27 HORACE HARDING BOULEVARD
ELMHURST 8, NEW YORK

Export Division: 458 BROADWAY, NEW YORK CITY, U. S. A. • Cables: MORHANEX

RADIO SERVICE DEALER • SEPTEMBER, 1947

NEW PRODUCTS

New G. E. Television Tube

A new 10" television tube Type 10FP4 employing magnetic focusing and deflecting is announced by G.E. Co. The tube has an aluminum-backed direct-view screen which prevents ion spots and intercepts cathode



glow. Ratings: anode, 10,000 volts; accelerating electrode, 410 volts; control electrode minus 125 volts; 7-pin duodecal base; overall length 18"; maximum deflecting angle 50 degrees. Further information may be obtained from the Tube Div., G-E Electronics Dept., Schenectady, N. Y.

Outdoor Dynamic Mike

A new dynamic microphone suitable for outdoor use is now available in chrome finish. Range is 40-9,000 cps. Variable impedance output ad-



justable to low, 200,500 or high. Further details from St. Louis Microphone Co. Inc., 2726 Brentwood Blvd., St. Louis 17, Mo.

Crosley's Table Model Teleset

Crosley announces its first table model television receiver, Model 307-TA. It covers 13 television channels, has 27 tubes plus 3 rectifiers; 7 front panel controls; operates on 105-125



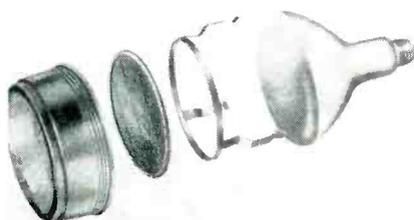
volts; has 5 inch speaker, provides a 6 $\frac{3}{8}$ by 8 $\frac{1}{2}$ inch picture. The picture tube face is protected by safety glass. AFC on horizontal synchronizing circuits and multi-stage sync separators assure steady pictures.

New Dipole Antenna Line

Camburn Inc., 32-40 57th St., Woodside, N. Y. announces four new "Featherlite" television, FM and "ham" antennas. The line includes the Single Dipole, the Dipole and Reflector, the Folded Dipole and the Folded Dipole and Reflector. Complete technical details contained in a new brochure which is available upon request.

Filters For Lamps Improve Displays

A light-weight color clip consisting of a holding-ring and color filter which clamps snugly over the end of any R40 reflector bulb is announced by Sylvania Electric Products, 500 Fifth Ave., New York City. Sixteen



color filters available when used on reflector type lamps simply and effectively change the entire color display of windows or showcases, create seasonal backgrounds or spotlight special merchandise. Further details from manufacturer.

Portable Volt Ohmmeter

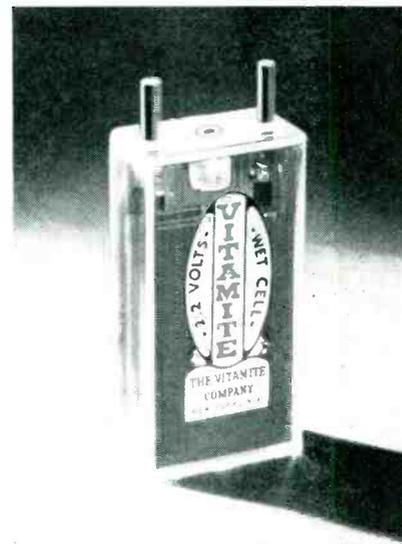
Model 214 Electronic Volt-Ohmmeter, completely self-contained, battery operated, is announced by Hickok Elec. Instru. Co., 10533 DuPont Ave., Cleveland 8, Ohio. It is suited for applications requiring resistance measurements and voltage measurements at high impedance—15 million ohms constant. Not requiring A-C power, can be used in rural areas or for making check in the field. For



resistance and voltage tests, receivers need not be removed from autos or aircraft. No warm-up period is required. Meter is electronically protected against burnout. Characteristics: Power supply, 2 "C" flashlight cells; 1 miniature type 45 v. "B". Ranges: Volts, AC and DC: 0-3,12,30,120,300 and 1200; Ohms: 1 to 1000 megohms in 6 ranges. Input impedance: AC-10 mmf-15 megohms, DC-15 megohms.

New Rechargeable Battery

There will soon be available the new Vitamite Flyweight rechargeable wet battery which is said to be smaller than 2 penlight dry cells and delivers more wattage than 2 class "C" dry

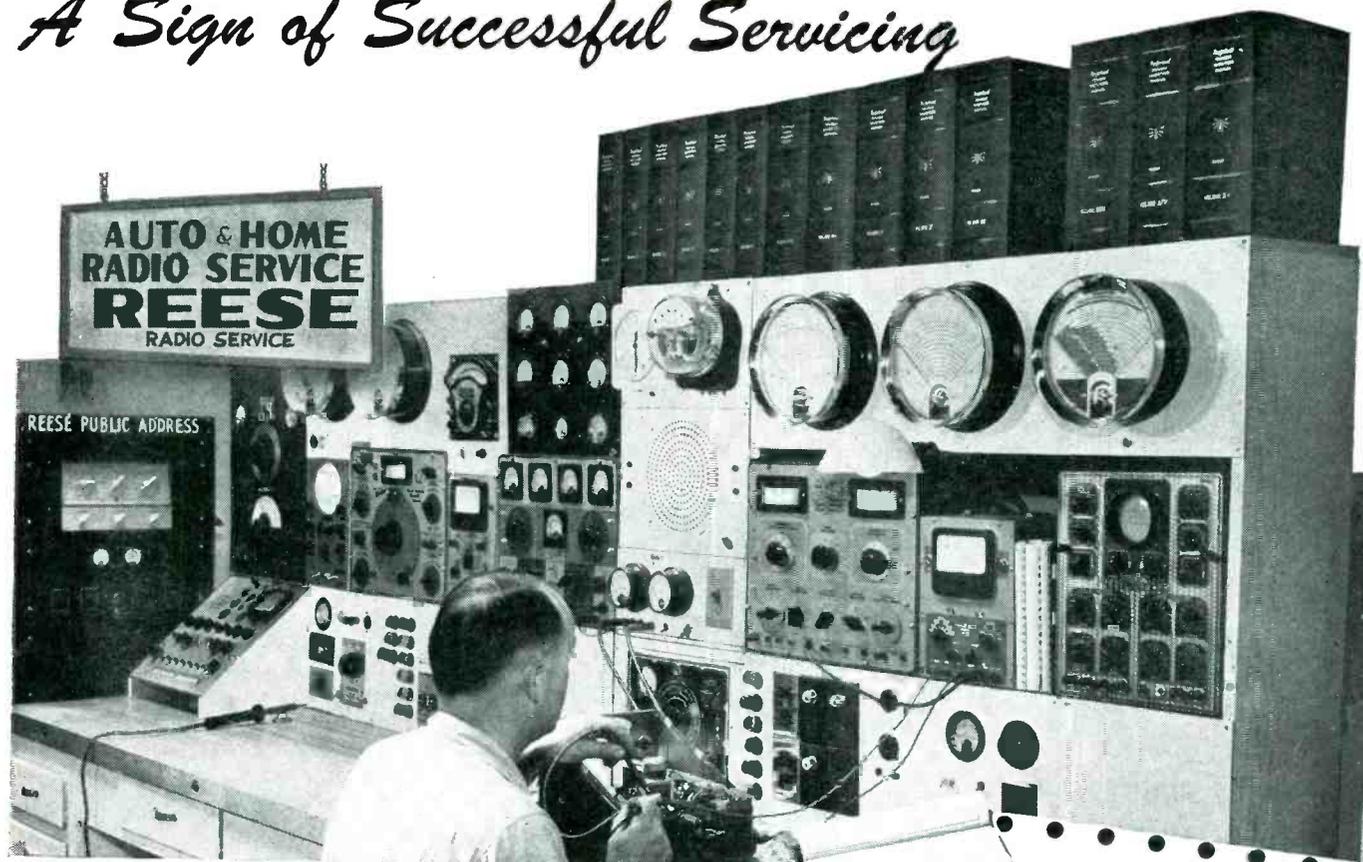


cells upon a single charging. The unit is housed in a 1-piece molded plastic case which is spill and leak proof. It weighs 1 ounce. The battery will retain its original charge until put into use. Full particulars supplied by the manufacturer, Vitamite Co., 227 W. 64th St., New York, N. Y.

New Amperite Ribbon Mikes

Designed for quality reproduction; does not become "boomy" even when talked into close-up. Frequency range 40 to 14,000 cps. Has wide pickup angle of 120° front and back. Low feed-back claimed as the microphone has no peaks. Standard equipment includes a switch, 25 feet of cable and connector. Further details

A Sign of Successful Servicing



Reese has all Fifteen RIDER MANUALS (and Volume XVI on order)

THE servicing shop of Francis Reese in Olean, N. Y. has been the subject of several success stories recently published in radio magazines. Shops so featured are significantly distinguished by a better-than-average profit and a complete set of Rider Manuals. Thus, at Reese you will find all volumes, kept conveniently handy for ready reference. For, no other single source of information supplies the essential data contained in Rider Manuals, and nowhere but in the first fourteen volumes can you find the material you must have to service 80% of the receivers now in American homes. (Those issued from 1920 to 1942.)

To those shops repairing any and all makes of receivers, sets of all ages, this pre-war data is absolutely essential for profitable operation.

—And, Rider Manual data is reliable, the OFFICIAL AUTHORIZED servicing data right from the service departments of the companies that make the sets. No one knows better than the

manufacturer what procedures are best for his products. This is the basis for the authority and success of Rider Manuals.

Volume XVI will be at your jobbers in October; order it today. Remember, Rider Manuals are investments; they keep pouring out profits for you. Copies of Volume I, bought over seventeen years ago, are still benefiting their owners. So, be sure your shop has the sign of successful servicing—be sure it has all sixteen Rider Manuals.

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RIDER MANUALS MEAN SUCCESSFUL SERVICING

Just Out!
VOL. XVI



**RIDER
MANUAL**
At your jobbers
in October
768 Pages
PLUS SEPARATE
'HOW IT WORKS'
BOOK
\$6.60

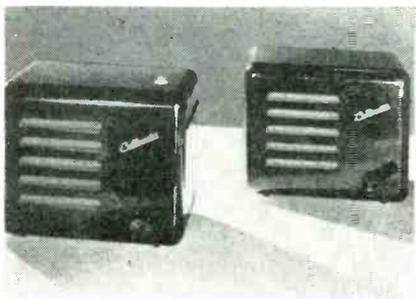
During "Seventeen Years of Continuing Service to the Servicing Industry" we have been anticipating its needs. So, because of the present high rate of receiver production, Rider Manuals are being issued three times a year, to give you complete, authoritative servicing data at the earliest necessary date. And, at the minimum investment; Vol. XVI is less than a cent a page. The binding is the same sturdy, custom-made, loose-leaf binder that matches your present Rider Manuals. And, the contents are the usual high standard, supplemented with "clarified-schematics" on multi-wave band sets and a separate "How It Works" book explaining the kinks of the newer receivers. We are proud to publish Vol. XVI, you will find it profitable to possess.

PLACE YOUR ORDER TODAY

supplied by Amperite Co., 561 Broadway, New York 12, N. Y.

New Callmaster

The new '47 Callmaster intercom features attractive high-lustre ma-



hogany plastic cabinets, improved sensitivity and power output. The Model CM-10 shown is a master and sub combination allowing 2 way communications from each unit. Sold as a 2-unit "package", they are easily installed by the user. Full details may be had from the manufacturer, Lyman Electronic Corp., 12 Cass St., Springfield, Mass.

RCA FM Table Model

The first of RCA Victor's table model receivers incorporating FM as well as standard broadcast reception. The set, having 7 tubes plus rectifier is 12½" high, 17" wide, and 9½" deep, is finished in walnut veneer. Its grille cloth is a deep brown with a golden stripe effect. The model has



a "slide rule" inclined dial for ease in tuning, and twin side lighting for dial illumination. A phonograph in-pu jack is built in. The set is the first of a series of table models combining FM with AM, ranging in price from about \$79.95 to \$95.

Portable Record Changer

A new portable record changer Model 65 is announced by Webster-Chicago Corporation, Chicago 39, Ill.

It consists of Model 56 record-changer in a burgundy leatherette covered luggage case with the turn-



table and changer in matching color. It can be used with either radio or external speaker system and plays a full stack of twelve 10" or ten 12" records with the cover closed. The cover, however, is removable. Weighing 24 pounds; both power and pick-up cords are supplied with the unit. The changer operates on 105-125 volts, 60 cycle current and may be easily converted for 50 cycle operation.

New Precision Tester

Series 858 Multi-Master, is a super-sensitive, 20,000 ohms per volt tester covering 54 AC and DC ranges for measurements of modern electronic circuits. It features the "Precision" Multi-Master Automatic Push Button range and function selection system.

One row of 5 buttons selects all functions such as volts, ohms, mills, decibels, amperes and microamperes. The other row of 6 buttons selects all ranges. 54 ranges, to 6,000 volts, 600 megohms, 12 amperes, 70 DB and 60 microamperes, 20,000 and 1,000

**NEW!
TIME-SAVING!
VERSATILE!**



Sine or Square Wave at the Flick of a Switch!

Now—the General Electric Sine-Square Wave Generator YGA-2 provides you with greater facilities for better, more efficient service work. A top quality equipment, it incorporates two units in one; a high quality, stable oscillator and a square wave generator. It features a low distortion sine wave, stable RC oscillator and instantly available square waves.

SINE WAVE APPLICATIONS

Testing and adjustment of audio amplifiers, transformers, phase inverters, audio filters, etc.

SQUARE WAVE APPLICATIONS

Two point testing of response and characteristics in audio devices. Checking frequency response of wide band amplifiers. Determination of phase shift, distortion and high frequency peaks in audio equipments.

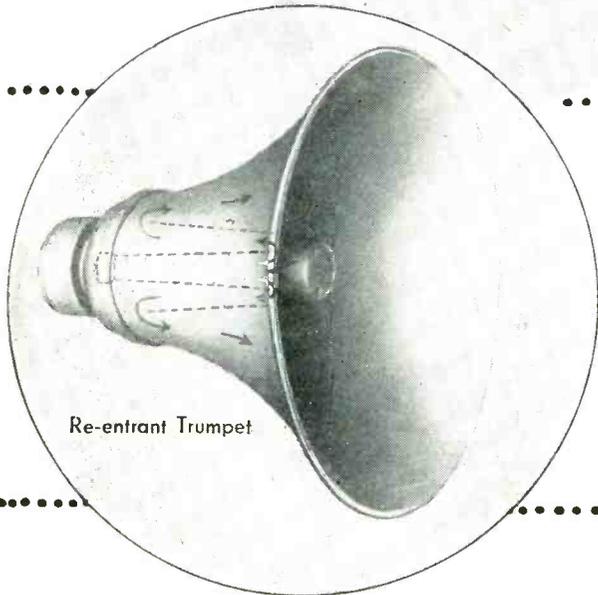
For complete information on the Sine-Square Wave Generator and other General Electric Service Test units write today to: General Electric Company, Electronics Park, Syracuse, N. Y.

GENERAL  ELECTRIC

164-F7

AUDIO ENGINEERING SUPREMACY

is built into every RACON Sound Reproducer



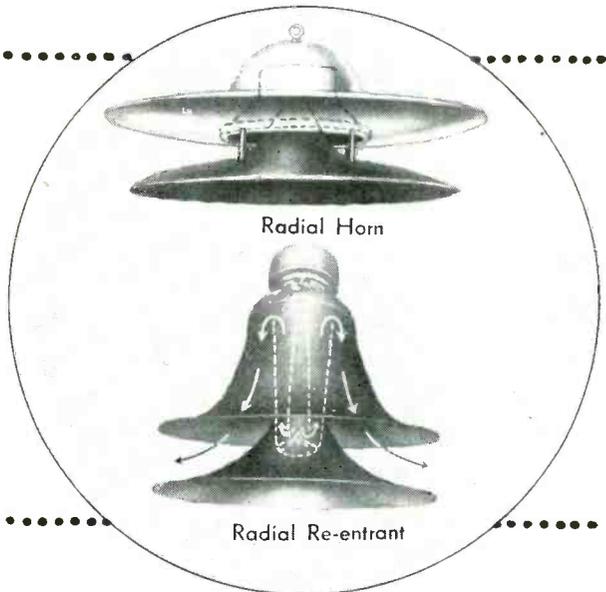
Re-entrant Trumpet

ACOUSTIC & STORMPROOF MATERIAL

Only RACON makes speakers with Racon Acoustic Cloth which is processed by a patented method which gives a non-vibratory wall, thereby increasing the output of the horn without loss due to wall vibration. Supplied as a part of all re-entrant horns, and on all straight horns when so ordered. Stormproof types are guaranteed for life in all kinds of weather and temperature, regardless of climatic conditions.

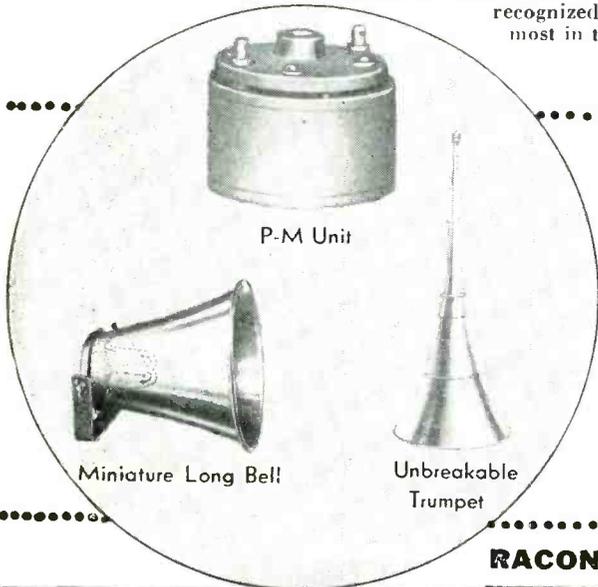
ADVANCED ENGINEERING & DESIGN

RACON'S leadership in sound reproducer engineering has been recognized for almost three decades. RACON driver units have a rated output for peak and continuous performance far in excess of any other brands — continuous operating capacity 30 watts, peak capacity 60 watts. RACON speakers and driving units require less energy input yet they deliver more efficient sound reproduction output. All claims made by RACON as to cutoff frequencies and acoustic lengths of speakers, power handling capacity, efficiency and frequency range of driver units are substantiated by tests made at laboratories recognized as the foremost in the industry.



Radial Horn

Radial Re-entrant



P-M Unit

Miniature Long Bell

Unbreakable Trumpet

COMPLETE LINE TO CHOOSE FROM

There is a RACON driving unit, trumpet or speaker for every conceivable sound application — also the accessories (brackets and housings) that may be required for special purposes. Soundmen know that it pays to choose and use a speaker line that is complete. Yes — RACON makes every kind of sound reproducer from the giant 7 foot length auditorium horn down to the small 4 inch intercom cone speaker — from the super giant P.M. driving unit to the tiny driver for paging horns.

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Gentlemen: Please send me a copy of your new free catalog.
Name
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"Every Season"

BURGESS IS THE LINE THAT SELLS"

This Fall and every season means battery business for Burgess dealers. And Fall means these two big battery markets:

1. Farm Battery 2. Portable Radio Battery

The Farm Market:

Recognized quality makes Burgess a favorite on farms—for radios, flashlights, lanterns. Get stock in now on all these popular items.



Burgess Standard Flashlight Battery



Ignition Battery for General Farm Use

The Portable Radio Market:

Back to school means more portable radio battery sales. Outdoors—at the game, on the picnic—the portable radio goes along in the Fall. Be sure your stock of portable batteries is complete for this Fall trade.



Portable Radio "A"



Popular Portable "B"

National Advertising to over 40 million battery buyers in national and farm magazines prompts YOUR CUSTOMERS to buy Burgess.

Promotional Helps . . . window and counter display material, enclosures, newspaper mats are available.

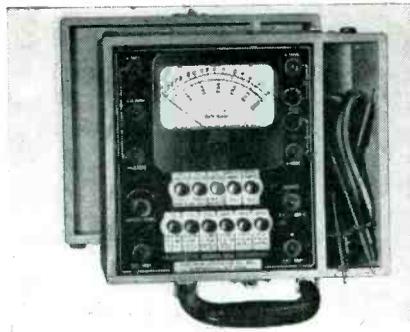
Ask Your Burgess Distributor

BURGESS
IS THE COMPLETE QUALITY LINE

BURGESS BATTERY COMPANY

FREEPORT,

ILLINOIS



ohms per volt DC, 1,000 ohms per volt AC.

Specifications follow:

8 DC voltage ranges to 6,000 volts at 20,000 ohms per volt. Initial range 0-3 volts. 8 DC voltage ranges to 6,000 volts at 1,000 ohms per volt. 8 AC voltage ranges to 6,000 volts at 1,000 ohms per volt. 8 DC current ranges to 12 amperes. Initial range 0-60 microamperes. 6 ohmmeter ranges to 600 megohms. Initial range 0-6,000 ohms with 35 ohms center scale. 8 decibel ranges from -26 DB to +70 DB. 8 output ranges to 6,000 volts.

For additional information write direct to Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L. I., N. Y.

Free Poster Offered by Olson

A 17" by 22" comic poster in two colors which is ideal for hanging on the wall of a store, and which humorously explains how electrolytic

NEW! OLSON AKRAD CONDENSER
FREE YOUR RADIO FROM HUM!

WHAT IS AN ELECTROLYTIC CONDENSER?

Radio Warehouse, Inc.

condensers are made and how they work, is offered free, along with a parts catalog, to any Service Dealer who writes requesting same from Olson Radio Warehouse, Inc., 73 East Mill St., Dept. "RSD", Akron 8, Ohio.

FREQUENCY MODULATION

[from page 22]

the conditions are the direct opposite of those just described. The tuned circuit now presents a capacitive re-

"HOT"
ON THE JOB BUT
COOL
TO HANDLE...



SOLDERING IRONS

FOR service men, mechanics of all types and "handy" men who want quality tools . . . G-E Calrod Soldering Irons meet every requirement.

CALROD ELEMENT

Cartridge type, insulated with highly compacted magnesium oxide which maintains full insulation properties and dependably protects against grounding. The Calrod element conducts heat so rapidly that there is little temperature drop from the resistance wire. High efficiency and quick recovery permit fast work with minimum loss of time.

CALORIZATION

Much longer life can be expected from the calorized tip. Calorization also makes tip removal easy and prevents "freezing in". Corrosion of the tip is greatly retarded by calorization.

HEAT RESERVOIR

An ample heat reservoir is provided by a calorized copper heat conductor which also serves as the tip holder.

STAINLESS STEEL BARREL

There is very low heat loss through the barrel because stainless steel has less than half the conductivity of plain steel. The barrel will withstand extremely hard usage without ill effects.

COOL HANDLE

The smooth, plastic handle remains cool to the touch. The heat is in the working tip where it belongs.

For complete information write: General Electric Company, Electronics Department, Syracuse 1, N. Y.

169-FG

GENERAL ELECTRIC

actance, the secondary current leads the voltage and the voltage at diode No. 2 is now greater than that at diode No. 1 (condition G).

15. Diode No. 2 accordingly passes current which flows from cathode midpoint connection through *R17* causing a greater voltage drop across that resistor.

16. As the frequency swings from one side of resonance, through resonance and to the other side of resonance, the audio voltage output from the discriminator, will decrease to zero, reverse polarity and rise to a peak. If the voltage values appearing across *R16* and *R17* are plotted against the impressed frequency, a curve such as that shown in *Fig. 2*

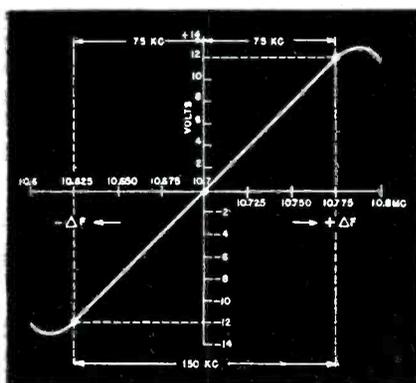


Figure 2

will be obtained. The straight portion of the curve must, at least, extend over the bandwidth covered by the FM signal.

DEACCENTUATION NETWORK

The a-f accentuator is used at the FM transmitter network to raise the amplitude of the audio frequencies in the upper range. At 10,000 cycles the amplitude of the audio signal is up to 15db. The actual signal, as taken from the discriminator output is therefore distorted. It is necessary to utilize this arrangement in order to prevent the transmission of noise from the FM transmitter.

At the receiver, the a-f amplifier must be designed to present a response the direct opposite of that at the transmitter. This means that the a-f amplitude at 10,000 cycles must be *down* 15db in order to realize reproduction of the original sound. This is accomplished by the insertion of a network of resistance and capacitance at the input of the a-f amplifier. The time constant of this network is from 70 to 100 micro-seconds and the values are quite critical. When replacing these components, be certain that the values are identical with those specified by the manufacturer.

Now Small Size, Heavy Duty, Trouble-Free 5-WATT VITROHM

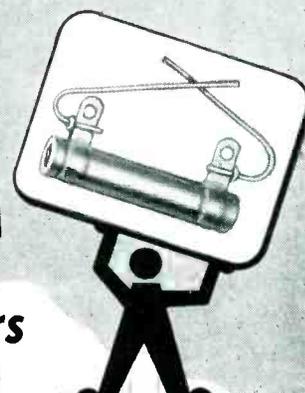
Wire Wound Fixed Resistors

Now . . . for *extra* reliability in many installations . . . for *longer* service and *steadier* performance . . . you can use this compact, low-wattage Type 5F resistor. Resistance wire is insulated and protected by WARD LEONARD'S own Green Vitreous Enamel of exclusive formula developed in the WL laboratories. Tough, hard, moisture and acid resistant. Quickly conducts away generated heat. *Easily* mounted by its wire leads.

Radio and Electronic Distributor Division

WARD LEONARD ELECTRIC CO.

53-P West Jackson Blvd., Chicago 4, U.S.A.



TYPE 5F • 5 WATTS

1" long x 5/16" diam.

Available from stock in resistances from 1 ohm to 5000 ohms.

Available at Authorized Distributors Everywhere

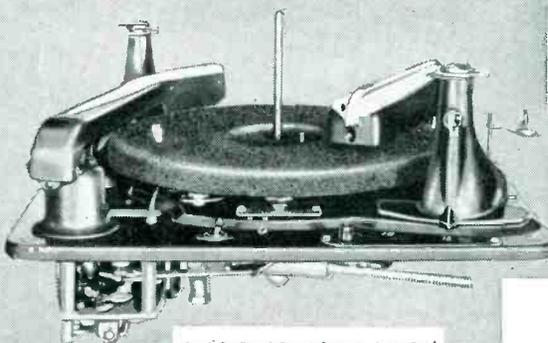
WARD LEONARD RELAYS • RESISTORS • RHEOSTATS

Electric control devices since 1892

Send for Catalog D-2 Gives helpful data and information on the wide variety of WARD LEONARD Resistors and Rheostats.



Smooth Power COMBINATION RECORD-CHANGER • RECORDER



AUTOMATICALLY PLAYS
TWELVE 10" OR TEN 12"
RECORDS

ONE SIMPLE LEVER
ADJUSTMENT

CUTS RECORDS UP TO 10'

Your customers will like the simplicity and fine performance of this unique combination *Smooth Power* unit.

They'll enjoy the ease of operation with one simple lever for quick changing from one size record to another, to remove records or to set for manual operation and recording. They'll appreciate the smoothness and quietness of the record-changer. They'll admire the brown iridescent finish and streamline plastic trim on self-indicating "Reproducer" and "Recorder" arms.

And, of course, they'll value the

quiet, vibration-free operation of the *Smooth Power* Motor.

Send for details. Ask us for complete information on this popularity-building combination that can add new sales appeal to your products . . . and on the complete line of *Smooth Power* Phonomotors and Recorders.

**THE GENERAL
INDUSTRIES CO.**

DEPT. MS. • ELYRIA, OHIO



**Cement
NX Alignment Kit
Spray Kit—
Chemical Lab.**

G-C RADIO SERVICE CEMENT

Best cement for speaker and radio work. Ideal for cementing replacement cones and repairing rattling and torn cones. Waterproof, fast-drying

No. 30-2—2 oz. bottle with brush. List 50c



G-C NX ALIGNMENT KIT

Approved by armed forces. Handy, aligning and neutralizing kit of 5 tools. Leatherette case. No. 5020—List \$6.50

G-C FELT-KOAT FLOCK FINISH SPRAY KITS

Now it's easy to supply flock for refinishing turntables, cabinets, grilles, etc. Kit contains specially designed spray gun, 2 colors flock, undercoats, thinner, brush, instructions, etc. No. 180-2—List \$10.75



G-C ELECTRONIC CHEMICAL LABORATORY



Ideal for experimenters, servicemen, etc. 19 different bottles of chemicals in heavy steel rack (free rack) No. 998—List \$11.12

G-C Products are available at leading distributors

Write for the new G-C 147 and Hardware Catalog of over 4,000 items.

RADIO DIVISION — DEPT. 1

GENERAL CEMENT Mfg. Co., Rockford, Ill., U.S.A.
Manufacturers of over 3,000 products
Sales offices in principal cities

IN AND AROUND THE TRADE

[from page 6]

erson, N. J., headquarters where he will supervise the sale of parts to tube and parts distributors. He will report to the Renewal Sales Manager of the RCA Tube Department.

Parts and accessories currently merchandised by this department include a standard line of radio speakers, crystal cartridges, television parts, antennas, and accessories, as well as replacement parts for all types of RCA equipment. Further additions to the parts line will be announced soon.

Winchester Making Batteries

Dry cell batteries for "personal" or the miniature camera-type radios are on the summer production schedule of the Winchester Repeating Arms Company division of Olin Industries, Inc., it was revealed by W. S. Allen, Winchester sales manager. The new batteries can also be used in two-unit hearing aids.

Williams Upped By RCA

Jack M. Williams, veteran of more than twenty years with the RCA Victor division of the Radio Corporation of America, has been appointed advertising manager of the company's

Ever Sit On A Gold Mine?



You can build a business of your own NOW—either part or full time—with TRADIO, the radio functionally-designed for coin-operation in hotels, motels, stopovers, hospitals, etc. Big earnings . . . Steady income . . . and no clock to punch unless you want to.

★TRADIO — TRIED, TESTED, PROVEN

Tradio has pioneered in this new and fast growing industry. Get in on the ground floor and assure yourself of financial independence for life.

★ONLY SMALL INVESTMENT NEEDED

Thousands of others all over the country have learned that "Tradio Pays While it Plays."



Send for complete information today.

Write To Dept. Q-9.

TRADIO, Inc. ASBURY PARK NEW JERSEY

Presenting the NEW Ferret Line.

Matched, aluminum test units with all miniature tubes.

Blue-gray Hammertone finish. Uniform size—10 1/4 x 10 1/4 x 5 1/2.



**SIGNAL GENERATOR
Wide Range FM-AM Television
Model 701**

Range: 170 K.C. to 115 M.C.—all fundamentals. Crystal calibrated, low loss permeability tuned coils. Internal 400 cycle sine wave modulation—to 100%. Follow-up shorting Turret coils with no dead spots. Tubes: 6C4, 6AU6, 6X4. Vernier drive—9" easy-to-read scale. Ladder attenuator —triple shielded. **\$74 95 Net**

**AUDIO OSCILLATOR
Sine Wave—Square Wave
Model 710**

Range: 20 to 24,000 Cycles. Oscillator: RC type. Sine or square wave through-out range by rotating panel switch. High impedance output. 2% accuracy over all bands. Three color, completely enclosed 9" dial for ease in reading. Tubes: 6X4, 6AQ5, 6AU6, A4522, 6SL7. **\$89 95 Net**



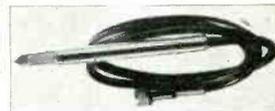
**Combination Signal Tracer and Electronic Volt Ohm Meter with Germanium Crystal Probe
Model 730**

Range: AC-DC 1v to 3000v (7 bands.) Zero center scale for F.M. alignment. Ohm Scale: 10 Ohms to 10 Megohms. Frequency Range: Audio to 110 MC. Input: 100 Megohms AC or DC. Tubes: 6X4, 6O2, 6AQ5, 2-12AU7, 2-A4522. High gain Signal Tracer with enclosed speaker. No amplifications needed in receiver—no hum. **\$89 95 Net**

**DELUXE TEST SPEAKER
And Universal Substitutor
Model 721**

Eliminates need for removing set speaker from radios for servicing. Provides substitution for choke, electrolytic and by-pass condensers, coupling, and a wide range of resistors. Field substitutor—500, 1000, 1500, and 2500 Ohms. Voice coil connection permits substitution of any output transformer. 6" P.M. dust-proof speaker. **\$29 95 Net**

All prices slightly higher in Eastern States



COASTWISE ELECTRONICS CO., INC.

130 North Beaudry Ave.
Los Angeles 12, Calif.

Designers and Manufacturers of Electronic Equipment

New York Office & Warehouse
258 Broadway, New York 7, N. Y.

Home Instrument Department, it was announced by Henry G. Baker, General Sales Manager of the department. Mr. Williams was formerly advertising manager of the RCA Victor Record Department.

RCA Intercom System

An intercommunication system, newly designed and engineered, with compact speaker stations as small as an ordinary desk clock, has been announced by the RCA Sound Equipment Section. A "two-station" intercom, the system is designed with amplifier and speaker station in separate units, permitting off-the-desk location of the amplifier at any out-of-the-way point and reducing speaker station size to a minimum. Conversation may be carried on over the new intercom at normal voice level with a flick of the two-position switch. Releasing the switch returns it to "listen" position. A three-inch speaker is used in the speaker station.

Especially designed for such two-station use as communication between executive and secretary, theatre box-office and manager's office, or doctor and receptionist, the system consists of two speaker stations, separate amplifier, and 100 feet of interconnecting wire. It is easily installed and plugs into any 110-volt AC or DC outlet. If desired,

additional stations up to five can be connected to the amplifier.

The new intercom, which is immediately available, will be distributed through RCA Sound Equipment distributors.

H. C. Handweg Upped By Motorola

Howard C. Handweg, has been appointed to the position of Assistant Sales Manager for the Motorola Home Radio, Car Radio and Car Heater, it was announced by W. H. Kelley, General Sales Manager.

St. Louis Mike Co. Moves

St. Louis Microphone Co. has been incorporated under the laws of the State of Missouri, with an authorized capital of \$100,000. The company recently moved into its new building which has just been completed, at 2726-28 Brentwood Blvd., St. Louis 17, Missouri, where a complete line of the new St. Louis Dynamic Microphones are now being manufactured. Catalogs of these new units are now available.

Aero Needle S. M.

E. Ralph Haines has been appointed sales manager of the Aero Needle Company, Chicago, according to an announcement by Burton Browne, president. The firm manufactures long life Aeropoint phonograph needles. For



Great, New, Complete CONCORD Radio Catalog

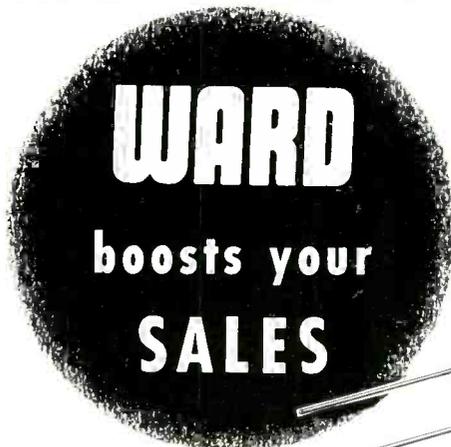
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WORLD'S LARGEST MAKER OF
AERIALS FOR CAR AND HOME

eleven years, Haines was formerly with Raytheon Manufacturing Co., producers of radio tubes. As distributor sales executive, he made his headquarters in the firm's main office in Newton, Mass. Prior to going to Raytheon he was with R C A Radiatron Co., and E. T. Cunningham, Inc., in New York City.

Why Cement-Coated Power Resistors?

The characteristics of cement coating for power resistors are dealt with in a bulletin "Why Cement-Coated Power Resistors?" just issued by Clarost Mfg. Co., Inc., 130 Clinton St., Brooklyn 2, N. Y. Simple tests to determine overload capacity, heat shock immunity, through-coating leak-

age, corrosion elimination and other advantages of cold-setting cement coating, are illustrated and described in this informative bulletin available to anyone on request.

Free Display Piece

General Cement Manufacturing Company of Rockford, Illinois, announces that their new metal display which demonstrates their well-known "SPEEDEX" Wire Stripper is now available to jobbers without charge.

Perkins Promoted By G-E

G. S. Perkins has been appointed sales manager of General Electric's deluxe line of receivers, the Musaphonic, according to Paul L. Chamber-

lain, manager of Receiver Division sales in the company's Electronics Department.

He will have his headquarters at the G-E Bridgeport, Conn., plant until the Receiver Division moves to its new location at Electronics Park, Syracuse, N. Y., later in the year.

Test Equipment

Three attractive new bulletins describing electronic test instruments manufactured by the Electronics Division and distributed by the Radio Tube Division of Sylvania Electric Products Inc. are now available on request to the company at Emporium, Pennsylvania. Instruments described include Sylvania Tube Testers, Type 139 and 140; Type 134 Polymeter; and Type X-7018 Modulation Meter.

The tube testers are supplied in both counter and portable models for testing all elements of electron tubes used in broadcast, FM and television receivers and many other types of electronic apparatus in which receiving type tubes are used. Design of the testers features ease of operation, simplified controls and facility to test standard, miniature, acorn and other types of tubes which may be accommodated by provision for extra sockets.

The Sylvania Polymeter is a combination instrument for effective trouble-shooting and checking of electronic circuits. It embodies all the features of a sensitive and accurate vacuum tube voltmeter and also provides a wide range of measurement of resistance and current. Accessory equipment provided with each instrument includes unusually compact plug-in vacuum tube probe and flexible shielded transmission line for use at frequencies up to 300 mc.

The Sylvania Modulation Meter has been designed to provide an accurate, direct-reading instrument independent of vacuum tubes or external power supply. It provides a means of monitoring the percentage of modulation produced by an amplitude-modulated radio transmitter to prevent under-modulation or overmodulation in amateur, police, marine, forestry and other radio telephone services operating at frequencies up to 54 megacycles. Carrier shift and audible quality of transmission may also be checked.

Stewart-Warner Correction

Stewart-Warner's Radio Division Service Manager N. J. Cooper advises that the mandatory fee for installing S-W television receiver models T-711, T-711M and T-712 is \$64 and not \$55 as reported here last issue. However, as other S-W television models are introduced in the near future the installation fees applying to them may vary.

NUMBERS 4 and 5 OF THE WALSCO Hit Parade

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- Record plays in less than 40 seconds.
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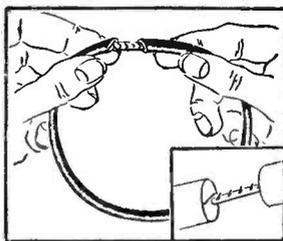
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"UNIBELT" comes in 5-foot length spools and can be installed without taking dial mechanism apart. A real time and money saver. Eliminates the need for stocking numerous sizes of belts.

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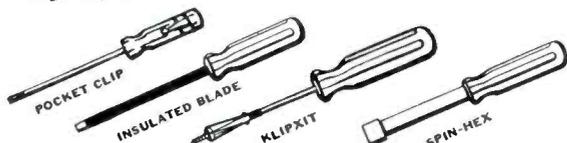
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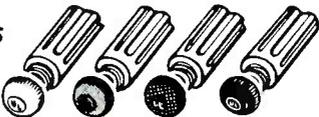


173 TYPES AND SIZES



NEW... Colored Spin-Hex Handle Caps

Developed by Vaco to end confusion of similar sizes, speed up production. Color of cap indicates size of driver.



MULTIPLE DWELLING TELEVISION ANTENNA

[from page 19]

bution system as possible is obvious when considering noise pickup in the cable from elevators and other electrical devices located in close proximity to both cable and junction boxes. The practical limitation on this level is the approach to the point where cross-modulation occurs. As for attenuation of radiation from the local oscillator, it is effective only insofar as transmission of such radiation through the system is concerned. It obviously will not attenuate "direct" radiation from the oscillator itself through space. This condition usually results from unshielded or poorly shielded oscillator circuit components and of course the only remedy for such a situation is to install proper shielding.

The termination network provides for matching the input impedance of the receiver to the distribution network, provision for 72-ohm unbalanced feed or 300-ohm balanced feed being provided. Inasmuch as the vast majority of manufacturers have conformed to one or the other of these two T.B.A. recommended input impedances, the equipment as supplied will take care of the great majority of installations. However, lately one or two "renegade" input impedances have appeared in some of the newer sets on the market. It is, however, a simple matter to make changes in the termination facility to allow for matching to any input impedance value. The termination connection itself fits into a shallow 3" receptacle box and is equipped with a three-connection polarized socket. As supplied by the manufacturer, the termination is set for 72 or 300 ohms merely by proper selection of terminals. A diagram of the termination connection appears in Fig. 3.

Cost Vs. Results

One other very important consideration in connection with a system of this type is cost—cost to the set owner and cost to the apartment owner. When it is considered that the average single antenna installation costs the individual receiver owner between \$50 and \$200, depending upon the policy of the set manufacturer or the installation outfit involved, and at best the set owner has purchased one antenna whose orientation and location have not been chosen for maximum results on any one particular station, but rather, a compromise orientation and location which will give the best possible results on all or nearly all

stations. Frequently in a given location it is impossible to obtain satisfactory reception on all stations in a given area and in order to achieve satisfactory reception on one or two stations, any possibility of reception on other stations is sacrificed.

The multi-unit antenna system eliminates this possibility, plus providing an antenna designed for maximum efficiency on each particular frequency involved, plus the additional advantage of pre-amplification at or near the antenna with its attendant gain in signal to noise ratio. As to costs of this system—obviously it lends itself best to new construction and when so

installed, should reduce the actual cost per-antenna per-receiver to a fraction of that now charged per individual installation. Where this system is installed in existing construction, again its simple construction and consequently reduced numbers of components and cables involved should result in a greatly reduced cost per unit. Obviously if installed in a multi-unit dwelling it must be installed in each and every apartment so that a lower cost per unit may be realized. However, if the project is undertaken by the apartment owner there is no reason why the expense of same cannot be amortized by means of an increase

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in the rental of each dwelling unit. Such rental increase should provide for the amortization of the installation cost over a period of three or four years. This fact plus the improved appearance of the dwelling, plus the improved reception possible serve to make a system of the type described here the answer to the apartment owner's and dweller's prayer.

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(SEE PAGE 27)

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Typical of the quality built into the Brewster line is this Model 6D, beautifully styled in rich ivory plastic. Features improved selectivity . . . increased output and higher selectivity on both broadcast and shortwave bands. Broadcast 540 to 1600 kcs, shortwave 5.75 to 18 mcs. Built-in loop antenna . . . 5 tubes plus rectifier. Operates on 110 volts AC or DC.

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