

*Radio*  
**SERVICE  
DEALER**

SEPTEMBER, 1949



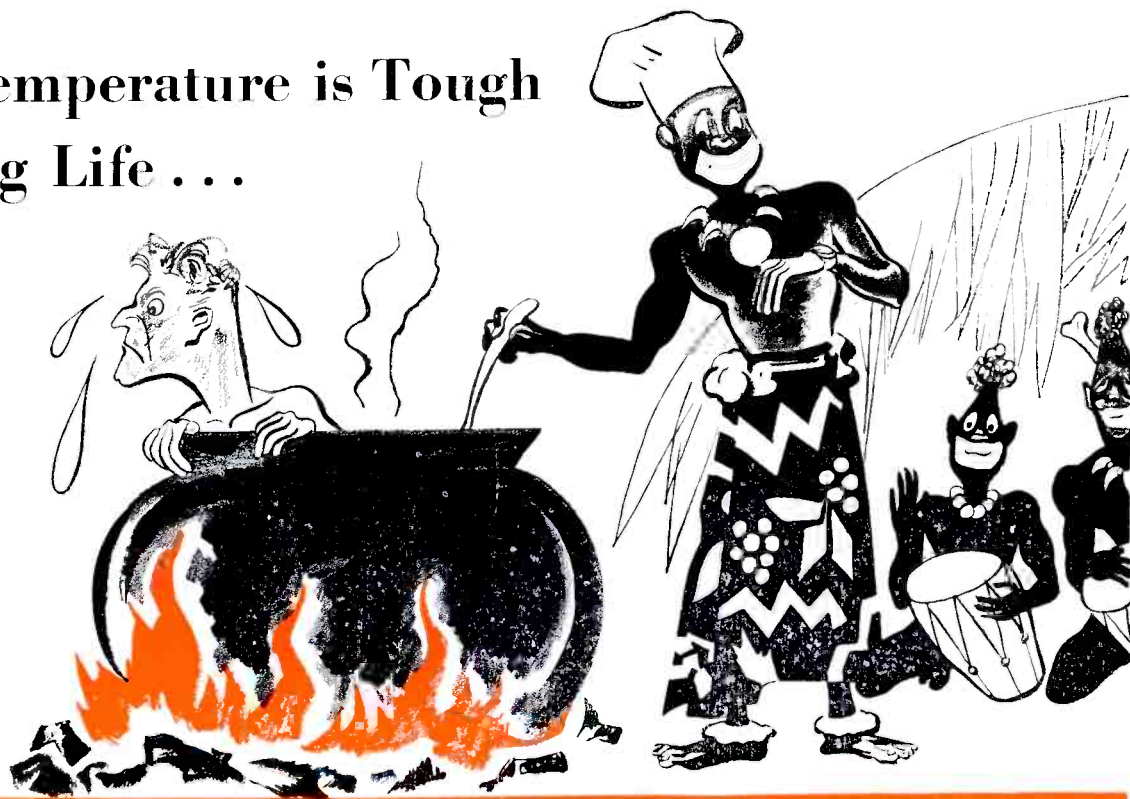
**IN THIS ISSUE:**

Legality of TV "Policies" Clarified  
A Klystron TV Sweep Generator  
High Quality Analysis Series  
"Aspen"—Philco's Built-In TV Antenna  
ESFETA TV Training Program

**AM-FM-TV-SOUND**

*The Professional Radioman's Magazine*

# High Temperature is Tough On Long Life . . .



*But*

## Mallory Capacitors Can Take It!

It's one thing for a capacitor to have long life. But it takes a MALLORY CAPACITOR to sustain its long life at high temperatures. Tests prove that the characteristics of Mallory FP Capacitors are practically unchanged after 2000 hours at a temperature of 185° F.

Rigid manufacturing controls guard MALLORY CAPACITORS against contamination—the enemy of long life. Mallory Capacitors are untouched by human hands; production workers wear rubber gloves. And Mallory specifications on chloride content of the gauze are even more rigid than on hospital gauze, for gauze is the base on which aluminum is sprayed to create the anode plate.

You can depend on Mallory Capacitors for longer shelf life—longer life in an inactive set—lower

RF impedance—ability to withstand higher ripple current.

Mallory Capacitors cost no more than ordinary capacitors. They're easy to install, and when they're installed they're *dependable* . . . and that means the kind of service that satisfies customers. Order from your Mallory distributor.

**NEW IMPROVEMENTS IN MALLORY FP CAPACITORS . . . Feature stronger anode tabs—withstand higher discharge currents—improved high surge separators—still greater heat resistance—extra heavy rubber seal—heavy cathode tab—special etched cathode.**

*Don't Miss the Mallory Television Service Encyclopedia.  
Get Your Copy From Your Mallory Distributor . . . Only 35c!*

P. R. MALLORY & CO. Inc.  
**MALLORY**

CAPACITORS . . . CONTROLS . . . VIBRATORS . . .  
SWITCHES . . . RESISTORS . . . RECTIFIERS . . .  
VIBRAPACK\* POWER SUPPLIES . . . FILTERS

\*Reg. U. S. Pat. Off.

**APPROVED PRECISION PRODUCTS**

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

# EDITORIAL

by S. R. COWAN

## More On TV "Policies"

Our scoop "Legal Bombshell Hits TV Service Policies" last issue caused the greatest furore since TV's inception. Now, as a result and sequel, we proudly call your attention to the article "Legality of TV 'Policies' Clarified," appearing on page 12 in this issue. This second scoop is the official opinion handed down by the New York State Insurance Department, the body responsible for supervising insurance policies and contracts.

Our "Bombshell" article pointed out that independent radio service organizations will not be doomed to oblivion by manufacturer controlled TV service subsidiaries. Independents will only fail if they neglect to conduct their businesses in businesslike manner, and if they prove themselves technically incompetent. Incidentally, in August we typographically erred in stating the "Bombshell" article continued on page 31, whereas it carried over to page 36. Thanks to the hundreds of you who called this to our attention.

## Murrah For October

As reported here in July, Pennsylvania and New York State radio service dealers, service organizations and independents, co-operating with broadcasters, manufacturers and jobbers, will hold a two-state campaign making October 1949 "Preventive Radio Maintenance Month".

This is a grand venture. Let's hope that in 1950 it will be a nation-wide campaign rather than a mere two-state project. In conjunction with the October campaign, which will result in many thousands of extra service jobs which would not otherwise have been obtainable, the Philadelphia Radio Servicemen's Assn. will hold a 3-day convention, (Sept. 18-19-20), which really will be a series of technical clinics to which all technicians are invited. In like manner, technical assistance will be given all New York State servicemen by means of the Empire State Federation of Electronic Technicians' series of clinics which begin the first week in September. A series of 60 lectures is being given in key cities. The complete schedule appears on page 24, this issue.

Radio technicians everywhere would be wise in following the lead of Pa. and N.Y. First, organize local associations, then collaborate with like groups in your state so eventually a state federation having unity and strength can be formed.

## Color TV

The announcement that full color TV transmission and reception is now possible will undoubtedly make many potential TV set buyers hold off making purchases now. Actually there is no telling when or whether such color TV sets will ever be sold commercially. Our advice to TV dealers is to candidly tell the potential TV set buyer that present-day TV sets are worthwhile investments . . . and that if they want to wait for color TV, they may sacrifice much more enjoyment than the long wait justifies.



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**Samuel L. Marshall**  
MANAGING EDITOR

**COWAN PUBLISHING Corp.**  
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# if you know what's in this book

and pass the information  
on to your customers...



## we'll all benefit!

- ★ **YOU... Customer Satisfaction  
More Sales**
- ★ **YOUR CUSTOMERS...  
Better TV Pictures**
- ★ **WE... Your Good Will —  
More Sales**



The prospective TV-set owner is interested primarily in the PICTURE HE WILL SEE. And you are interested primarily in being sure he gets the maximum enjoyment out of his set.

But to sell effectively, you must know the right answer to every question about TV sets *AND MORE BESIDES*. The Sales Manual, "Sell a TV PICTURE", is one of the most important guides available for selling TV. **YOU CAN'T AFFORD NOT TO READ AND STUDY IT.** Do you know, for example, that it has been proved time after time that "an inferior set with a good antenna will outperform a better set with a poor antenna"?

This 16-page book was especially planned for those TV dealers who want to become more familiar with the factors of importance in producing the best picture.

"Sell a TV PICTURE" gives power-packed selling information... exact, scientific data in easily understood terms... that will help you help your customers.

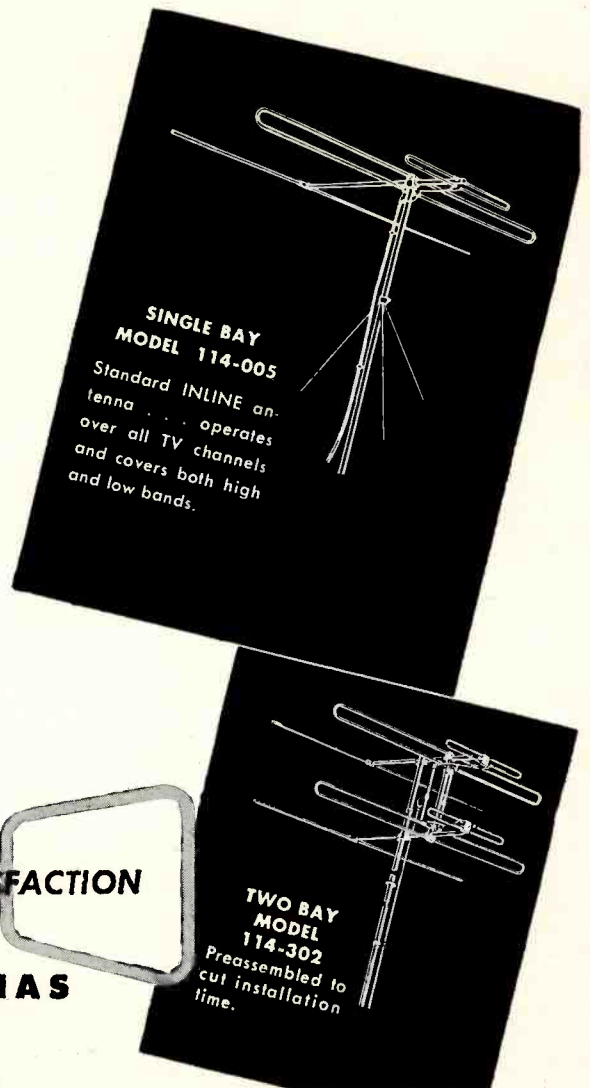
Written and prepared by radio-electronic experts, the manual is a new approach to TV picture selling and all information contained therein is backed by results from laboratory and field tests.

Write for your free copy.

★ **SELL A TV PICTURE FOR CUSTOMER SATISFACTION**  
**SELL**

**AMPHENOL — INLINE — ANTENNAS**

AMERICAN PHENOLIC CORPORATION  
1830 SO. 54TH AVENUE • CHICAGO 50, ILLINOIS

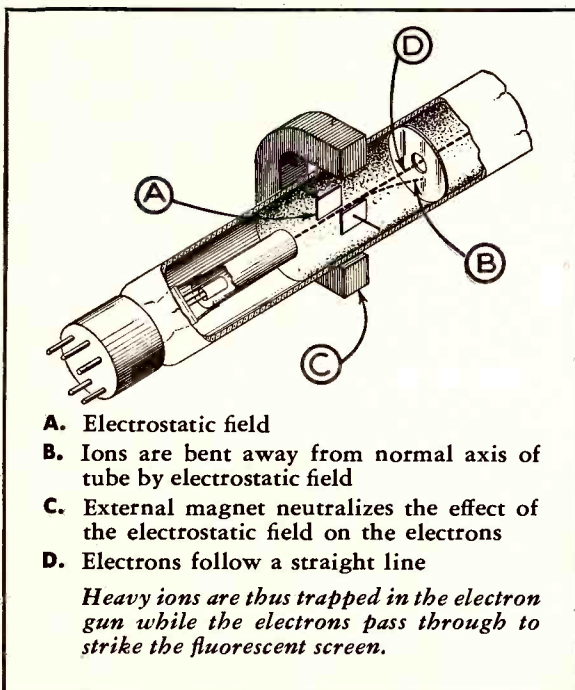


**IT'S  
SYLVANIA  
AGAIN!**

**ION TRAP IN SYLVANIA  
TELEVISION TUBES  
ASSURES HUNDREDS  
OF HOURS FREE FROM  
SCREEN BURNS**



**HERE'S HOW IT WORKS...**



Owners of television sets equipped with Sylvania Television Picture Tubes report their screens still bright and unblemished after more than 1000 hours' use. Much credit for this top quality performance belongs to Sylvania scientists who hold the basic patents on the magic "ion trap." With this device these scientists prevented destruction of the fluorescent screen by heavy ion bombardment. So successful is this ion trap that now many other major TV tube makers are using it under agreements with Sylvania.

These same Sylvania Television Tube scientists are now developing shorter large-screen picture tubes and special tubes for uhf television. Their continued research makes the Sylvania label your guarantee of the newest and finest in television picture tubes. Sylvania has a complete line of all-glass and glass-metal types for television and general purpose cathode ray applications. They are available now from your Sylvania Distributor.

Write for free characteristics and TV set complement chart. Advertising Department, Bo: R-1809, Emporium, Pa.

**SYLVANIA  
ELECTRIC**

RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, SIGN TUBING; LIGHT BULBS; PHOTOLAMPS



# SPRAGUE DISC CERAMIC BYPASS AND COUPLING CAPACITORS

These new ceramic units—no bigger than a dime—find dozens of bypass and coupling uses in both standard and FM as well as television equipment. They have higher self-resonant frequencies than conventional capacitors and fit neatly across miniature tube sockets. They're covered with a tough, protective coating which guards against moisture and heat. Sprague Disc ceramics are available in both single and money-saving dual capacitors.

Use Sprague Disc ceramics whenever circuits call for ultra-compact, bypass or coupling capacitors. Each unit is clearly stamped with capacitance. All capacitors are rated at 1000 v. test, 500 w.v.d.c.

See these remarkable new capacitors at your Sprague distributor today! Write for bulletin M 431.

**SPRAGUE**  
**PRODUCTS COMPANY**  
Distributors' Division  
of the Sprague Electric Company  
NORTH ADAMS, MASS.

# TRADE FLASHES

A "press-time" digest of production, distribution & merchandising activities

## PRMA Convention & Exhibit

Philadelphia Radio Service Men's Association announces a 3-day convention and exhibit to be held in Philadelphia on Sept. 18, 19, and 20. This exhibit is part of the Oct. 1949 Preventive Radio Maintenance Month program. Representatives of various manufacturers, and others are scheduled to deliver technical talks in an elaborate program which has been arranged. See page 29 for further details.

## RMA-IRE Fall Meeting

The program of the Radio Fall Meeting of members of the RMA Engineering Department and the Institute of Radio Engineers, scheduled for Oct. 31 and Nov. 1 and 2, at the Hotel Syracuse in Syracuse, N. Y., is substantially complete, according to Virgil M. Graham, associate director of the RMA Engineering Department and chairman of the committee arranging the meeting.

## ESFETA Launches State-Wide

### Training Program in TV

Empire State Federation of Electronic Technicians Associations (New York) announces a state-wide TV training program in which Industry participates to the extent of providing lecturers for a planned TV course. This project represents the most ambitious program ever undertaken by any organization for this purpose, entailing 64 lecture units given by representatives of 17 firms. See page 24 for further details.

## Philco Service Managers Meet

A TV service managers' convention was held in Philadelphia, on July 27, 28, and 29, at which the Philco Corporation was host. Shown at the various panels held during this meeting was the complete new line of Philco TV receivers. The feature of this convention was the revelation of Philco's new self contained TV antenna, called ASPEN. Speakers included, J. M. Skinner, Jr., Vice President, Service and Parts Division; Ken Kenyon, General Manager, Service Division; H. T. Paiste, Jr., Manager, Field

Engineering; Caywood Cooley, Supervisor, TV Training; John Pell, Manager, TV Service; B. P. Haines, Chief Mechanical Engineer, Electronics Division; H. H. Harris, Chief Factory Engineer, Factory Engineering Department; Ray Robinson, Supervisor, TV Field Service; Wm. E. Bradley, Director of Research, Research Division, Jack Cherry, Manager, Accessory Sales; Wilson Miller, Field Service Engineer; Joe Fisher, Project Engineer, Research Division; and Bill Nagy, Promotion Manager, Service Division, who did an excellent job of MCing. Ted Lucas, Jr., Director of Public Relations, and his charming wife were tops as hosts.

## GE Pocket Aid

A convenient carrying case known as the Pocket Office, now available to radio and television servicemen and dealers through General Electric and Ken Rad Tube Distributors, is being examined by Mauro Schifino, (second from left), Sales Manager



for Rochester Radio Supply. Looking on, from left to right are Charles Richardson, District Representative for G-E Electronic Tubes and Parts in Upstate New York; A. D. Lamphier, purchasing agent for Rochester Radio Supply; and Art Piccarreto, a Rochester service technician.

## DuMont Proffers New TV Plan

The Allen B. Du Mont Laboratories, Inc., will present to the Federal Communications Commission, at hearings to commence in Washington September 26, a program to utilize the Very High Frequencies and the

[Continued on page 6]

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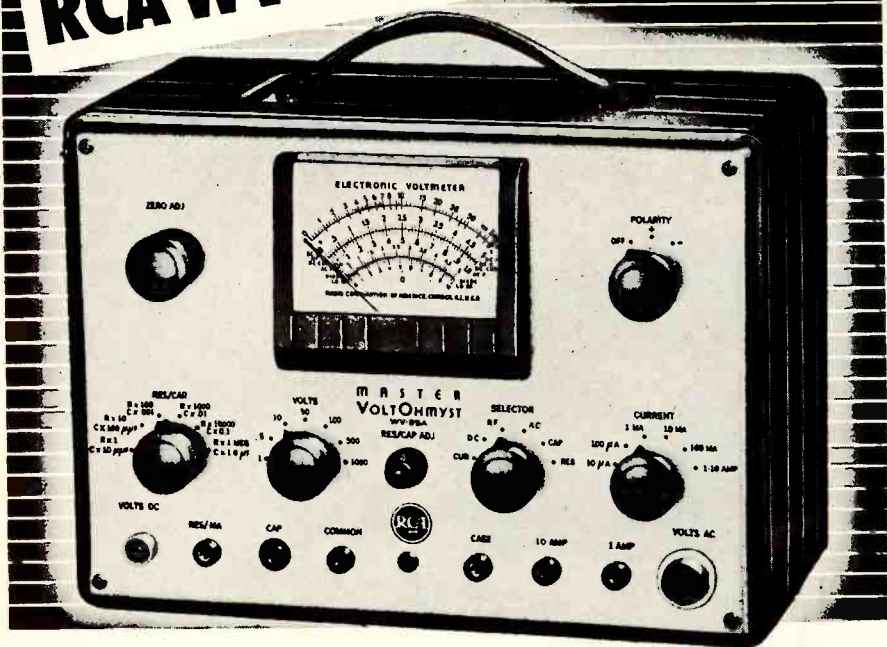
# INTERCOMMUNICATION AND SOUND SYSTEM CABLES

*Every Type for Every Service*

Sold Exclusively Through Recognized Wholesale Distributors

## Belden *Radio* WIRE

# RCA WV-95A



THE

*Master*

## VOLTOHMYST\*

... has no equal for fast, accurate servicing

- MEASURES . . .
- ✓ DC Voltage
  - ✓ Capacitance
  - ✓ DC Current
  - ✓ AC Voltage
  - ✓ Resistance

Truly the "master" electronic multi-meter, the RCA WV-95A combines in one instrument virtually every measuring facility required in the service shop. It measures ac and dc voltages to 1000 volts, dc current from 1 microampere to 10 amperes, resistance from 0.1 ohm to 1000 megohms, and capacitance from 4 mmf to 1000 mf. A polarizing voltage is included for the measurement of electrolytics. The carefully balanced meter is virtually burnout-proof; and has a full scale accuracy of  $\pm 2\%$ . Zero-center indication is provided for discriminator alignment.

The entire electrical system of the WV-95A is insulated from the metal case which may be grounded separately.

When used with the RCA WG-275 accessory diode probe, the WV-95A will measure rf voltages in communication equipment and coaxial lines, and peak-to-peak voltages of recurrent pulses in sync signal generators, television receivers,

etc. The WV-95A can also be used with the RCA WG-284 accessory high-voltage probe to measure up to 30,000 dc volts.

For full details, ask your RCA Test Equipment Distributor for Bulletin 2F721—or write RCA, Commercial Engineering, Section 551X, Harrison, N. J.

### SPECIFICATIONS

**DC VOLT METER**  
Six Ranges.....0 to 5, 10, 100, 500, 1000 dc volts  
Input Resistance, all ranges.....11 megohms

**DC AMMETER**  
Seven Ranges:  
Through DC Amplifier  
0 to 10, 100 microamps; 0 to 1, 10, 100 ma.  
Direct to Meter Movement.....0 to 1, 10 amperes

**OHMMETER**  
Six Ranges.....0.1 ohm to 1000 megohms  
Center-scale Indications  
10, 100, 1000, 10000 ohms; 0.1, 10 megohms

**AC VOLT METER**  
Seven Ranges  
0 to 1, 5, 10, 50, 100, 500, 1000 RMS Volts  
Input Resistance and Capacitance  
0.5 megohm shunted by 125 mmf.  
Frequency Response.....30 to 20,000 cps

**CAPACITANCE METER**  
Six Ranges.....4 mmf. to 1000 mf.  
Center-scale Indications  
100, 1000 mmf.; 0.01, 0.1, 1, 10 mf.

**RF VOLT METER**  
Ranges: (Requires WG-275 accessory probe)  
From 30 cps to 17.5 Mc.  
0 to 5, 10, 50, 100 RMS Volts  
To 75 Mc.....0 to 5, 10, 30 RMS Volts  
To 250 Mc.....0 to 5, 10 RMS Volts  
Dimensions.....10" high, 13 1/2" wide, 7 1/2" deep

\*Trade Mark, Reg., U. S. Pat. Off.

For Test Equipment you can trust . . . see your RCA Distributor



**RADIO CORPORATION of AMERICA**  
TEST AND MEASURING EQUIPMENT HARRISON, N. J.

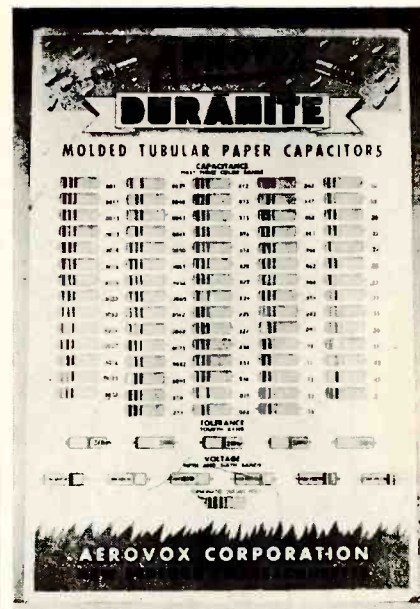
## TRADE FLASHES

[from page 4]

Ultra High Frequencies as carefully integrated components of a national television system that will benefit viewers in most of the country's 140 metropolitan districts.

### Capacitor Color Chart

Simply match colors and read exact values. That's the idea of the Duranite Decoder Chart issued by Aerovox Corporation of New Bedford, Mass. Printed in colors, this chart shows the RMA color band



coding for molded tubular paper capacitors, with corresponding numerical values of capacitance, tolerance and voltage. All the user does is compare the color-coded tubular with the units on the chart until the color bands match, whereupon values are read at a glance.

### Engineering Index

Announcement has been received from John F. Rider, president of the Electronics Research Publishing Co., Inc., that the Electronics Engineering Master Index for 1947 and 1948, and the index for January-June 1949 will be published during November 1949.

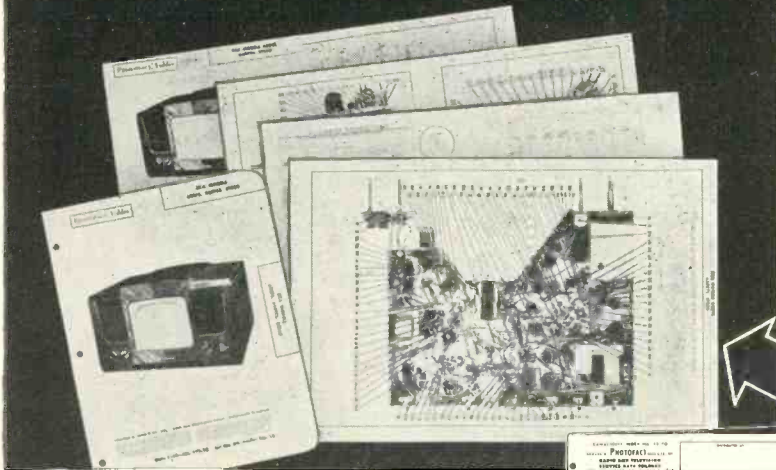
### Sylvania Promotional Campaign

The Radio Division of Sylvania Electric Products Inc. has announced that it will continue its program of radio serviceman promotion from September through December this year. The program will include a series of national advertisements in the Saturday Evening Post, Collier's, Life and Radio & Television Best,

[Continued on page 10]



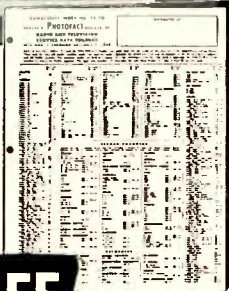
# The Offer Still Stands!



**Only \$18.73 Down Puts the Complete Photofact Library in Your Shop Today...**

NOW—the new “Pay-as-you-Profit” Plan brings the famous PHOTOFAC T Library within the reach of every Serviceman! Now you can easily own the world’s finest radio service data—seven complete volumes, plus continuous PHOTOFAC T Folder Set service—full coverage of all post-war AM, FM and TV models! Everything you’ll ever need for quicker, more profitable servicing! You pay only \$18.73 down—the remainder in small monthly payments. Absolutely no carrying charges and no interest! Make the down payment—and you get the complete Library immediately. Your Jobber has all the details of this amazing new purchase plan. See him today, or write us direct for full information.

**Get the Easy-Pay Details Now!**



## FREE PHOTOFAC T Cumulative Index

Select your FREE PHOTOFAC T Folder (covering any AM, FM or TV model) from the PHOTOFAC T Cumulative Index. Get the FREE Index today. Covers all post-war receivers right up to the present. Helps you find the Folders you want in a jiffy—Folders that make your work quicker, easier, more profitable. Get this FREE Index at your Jobber or write direct for it now.

# SERVICEMEN: We’ll Prove You’ll Save Time, and Earn More with PHOTOFAC T!

We’ll Send You Absolutely

# FREE

**Any PHOTOFAC T Folder Listed in the PHOTOFAC T Cumulative Index!**

NOW—learn for yourself—at our expense—how PHOTOFAC T will make your service work quicker, easier, more profitable! Examine an actual PHOTOFAC T Folder. Use it. You’ll learn first-hand why this indispensable service data is used daily by over 25,000 successful service technicians. You’ll discover quickly that no other service gives you PHOTOFAC T’s outstanding advantages: *completeness, accuracy, uniformity and ease-of-use.* PHOTOFAC T alone, is the *only* radio service data prepared from laboratory analysis of the actual equipment. Nothing in the field equals PHOTOFAC T. Know the facts—get your FREE Folder now. Examine it—use it—compare it—and you will understand why no modern service shop can afford to be without PHOTOFAC T.



## CURRENT PHOTOFAC T BEST-SELLERS

**The Recording and Reproduction of SOUND**, by Oliver Read. The complete, authoritative treatment of the entire subject of Sound, written by the editor of *Radio & Television News*. . . . . **\$5.00**

**Photofact Television Course**. The book used by thousands; gives you a clear understanding of TV principles, operation and practice. **\$3.00**

**Television Antennas**. Shows you how to select and install the proper antenna, and how to overcome antenna problems. . . . . **\$1.25**

**1948 Record Changer Manual**. Covers 45 models made in 1948, including new LP and dual-speed changers, plus leading wire recorders. Based on actual analysis of the equipment. . . . . **\$6.75**

**Auto Radio Manual**. Complete Photofact service data on more than 100 post-war auto radio models—a time-and-money-saver. **\$4.95**

**HOWARD W. SAMS & CO., INC. INDIANAPOLIS 1, IND.**

**NOTE:** This FREE offer is limited to Service Technicians. Attach coupon below to your letterhead and mention the name of your jobber. If you have no letterhead, send coupon to your jobber. Experimenters and others may obtain the Photofact Folder by remitting 50c.

**HOWARD W. SAMS & CO., INC.**  
955 N. Rural St., Indianapolis 1, Ind.

- Send FREE Photofact Cumulative Index
- Send Full Easy-Pay Details

I am a Service Technician:

- Send FREE Photofact Folder for set model . . . . .

I am an Experimenter:

- Send Photofact Folder for set model . . . . . (50c enclosed)

Name . . . . .

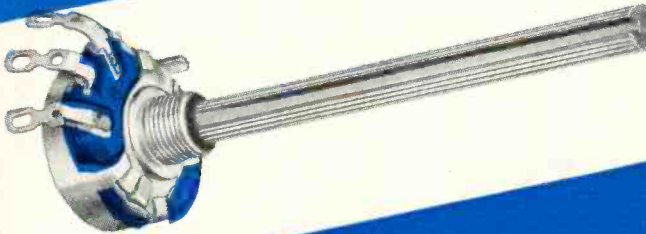
Address . . . . .

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

# NOW

## A SMALL SIZE VOLUME CONTROL

TO MEET THE REQUIREMENTS OF  
MODERN AM, FM AND TV SERVICING



COMPACT  $\frac{15}{16}$ " DESIGN and  $\frac{1}{4}$ " long bushing permit easy installation in the most crowded chassis. Type Q Controls fit many smaller sets which will not take usual  $\frac{3}{8}$ " long bushing, yet are fully capable of handling larger set requirements.



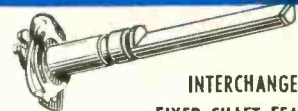
### KNOB MASTER FIXED SHAFT

fits 90% of AM, FM and TV  $\frac{1}{4}$ " shaft knobs. No alteration except cutting to length. Knurled, flatted and slotted to accommodate knurled push-on knobs, spring-type push-on knobs or set screw knobs. Ends spread for fitting oversize or worn knobs. 3" length meets television requirements. No shaft inserts needed.



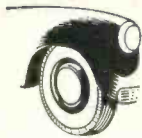
### RESILIENT RETAINER RING

permits removal of Knob Master Shaft and replacement with any of 11 special fixed shafts, in less than a minute, using only a pocket knife or screwdriver.



### INTERCHANGEABLE FIXED SHAFT FEATURE

Gives widest coverage of replacement with nominal stock of controls. Eleven types of shafts let the technician meet many special requirements without expanding control stock. These shafts are sealed in cellophane and individually packaged.



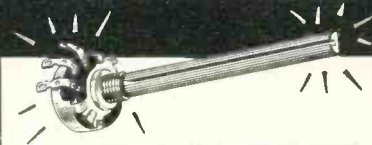
### CUSHIONED TURN.

New Resilient Retainer Ring contributes unusually smooth rotation. Your customers will notice the quality "feel" at once. Cushioned Turn does for IRC Q Controls what low-pressure balloon tires do for automobiles.



### NEW TYPE 76 SWITCHES

designed and manufactured by IRC. Easily and quickly attached to any IRC Q Control.



### STURDIER AND MORE BEAUTIFUL.

Rugged, molded control base and switch enclosure are colored distinctive IRC blue. All metal parts are non-ferrous material nickel-plated for lustrous finish and resistance to corrosion. Customers will like the Type Q's rich precision appearance.

IRC now offers Radio Technicians a new volume control carefully engineered to meet the needs of modern television and radio replacement. The new Type Q Control leads the field in practical convenience. It embodies outstanding constructional, electrical and mechanical features. Absolute uniformity is assured through the elimination of hand operations in manufacture, and by complete production testing.

### SEEING IS BELIEVING

In an actual field test, IRC Q Controls and Interchangeable Shafts were demonstrated to a large cross-section of radio and television technicians. All were enthusiastic over the unique features of these revolutionary new controls. Because of their versatility, ease of use, and dependability, we believe they will become the most widely used controls in the industry.

# A COMPLETE LINE OF 59 TYPE Q CONTROLS

*and 11 Special Shafts*

## GIVES YOU WIDEST SERVICE COVERAGE

Now, with IRC's versatile Q Control Line and Special Fixed Shafts, you can service virtually every type of small control requirement—in a minimum of time. Ease of installation—even in crowded chassis; one-minute replacement of shafts for specials; shaft and bushing lengths to meet current radio and TV conditions—all mean faster, easier servicing.

### PLUS THESE EXTRA CONSTRUCTION ADVANTAGES

Every IRC Q Control, Knob Master Shaft, Interchangeable Fixed Shaft or Switch is simply designed, ruggedly constructed, safeguarded by complete production testing. Control base is precision molded of high strength, low moisture absorption bakelite. Contractor is IRC patented one-piece dual unit of thin high-stress alloy. One-piece collector ring and center terminal are silver-plated brass. And the resistance element is the best IRC ever manufactured!

### FREE CATALOG GIVES FULL INFORMATION

For complete details of IRC's revolutionary new Type Q Controls and Interchangeable Fixed Shafts, write us today. IRC Q Controls mean easier AM, FM and TV servicing for you—more convenience for you. Get the full story. Mail coupon for our new Catalog DC-1.

*Wherever the Circuit Says* 



**INTERNATIONAL  
RESISTANCE COMPANY**

401 N. Broad St., Phila. 8, Pa.

In Canada: International Resistance Co., Ltd., Toronto, Licensee



The IRC Type Q Control comes to you in a newly designed blue and yellow carton. There is also a new matching carton for the Interchangeable Fixed Shafts. Complete easy-to-use instructions are included. Look for them at your distributor's.



### INTERNATIONAL RESISTANCE CO.

401 N. Broad St., Phila. 8, Pa.

Please send me Catalog DC-1 giving full information on new IRC Type Q Control.

Name \_\_\_\_\_

Address \_\_\_\_\_

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

## TRADE FLASHES

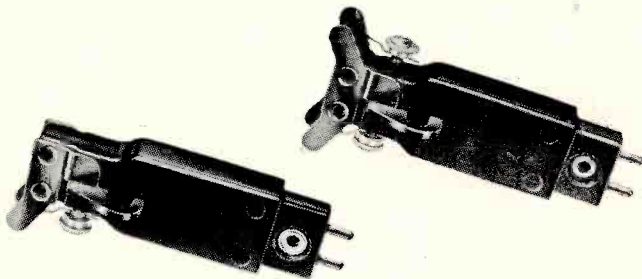
[from page 6]

The little **SHURE** cartridges

that fill the Big need

for High Fidelity

Phonograph Reproduction . .



### THE NEW SHURE "VERTICAL DRIVE"

#### CRYSTAL PICKUP CARTRIDGES

Big things often come in little packages . . . So it is with the superlative new Shure "Vertical Drive" Crystal Cartridges. They reproduce *all* the recorded music on the new fine-groove recordings—a reproduction that meets the strict requirements of high compliance and full fidelity. The "Vertical Drive" cartridges are requisite for the critical listener—the lover of fine music. They are especially recommended for those applications where *true fidelity* is essential.

**SINGLE MODELS:** W23A for standard width-groove records.

W21A for fine-groove records.

**TURNOVER MODEL:** W22A for both standard and fine-groove recordings.

Unusually highly compliant, these "Vertical Drive" Cartridges will faithfully track standard records with a force of only 7 grams—micro-groove records with a force of only 5 grams (an added protection for treasured recordings). Will fit standard or special mountings. Have more than adequate output for the average audio stage.

**SHURE**

**SHURE BROTHERS, INC.**

Microphones and Acoustic Devices

225 WEST HURON STREET, CHICAGO 10, ILL. • CABLE ADDRESS: SHUREMICRO

which will be supplemented by new point of sale merchandising material supplied to service-dealers in kit form.

#### RCA 16" TVs Shipped

Initial shipments of three new RCA Victor television receiver models featuring the 16-inch metal-coned picture tube have been sent to distributors, Allan B. Mills, General Sales Manager of the RCA Victor Home Instrument Department, announced recently.

#### IRE West Coast Convention

Proof of the Far West's growing importance in electronics was supplied this month by the distinguished list of technical papers scheduled for presentation at the 1949 IRE West Coast Convention in San Francisco, Aug. 30, 31 and Sept. 1, at San Francisco's Civic Auditorium.

#### National Electronics Conference

The 1949 National Electronics Conference, an annual national forum on electronic research, development, and application, the conference will be held Monday, Tuesday, and Wednesday, September 26, 27, and 28 in the Edgewater Beach Hotel in Chicago.

#### Ward Appoints So. Cal. Rep

The Ward Products Co., Cleveland, a Division of the Gabriel Corp., has appointed the J. T. Hill Sales Co., Los Angeles, as its Southern California representatives, according to Jerry Hill, executive head of the factory rep firm that has specialized in electronics for more than a score of years.

#### RMA Production Figures

One million or more television receivers were produced during the first half of 1949, the Radio Manufacturers Association estimated today on the basis of reports received from member-companies. This slightly exceeded total TV set production during the whole of 1948. RMA set manufacturers' output totalled 913,071 TV sets.

Following is the breakdown in radio and television set production by RMA members for the first half of 1949:

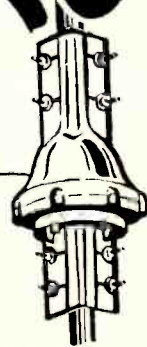
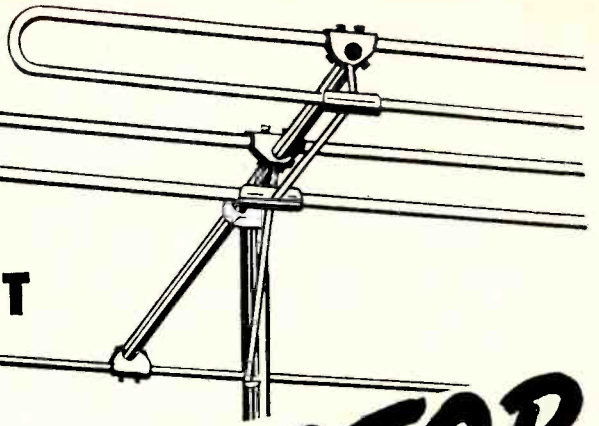
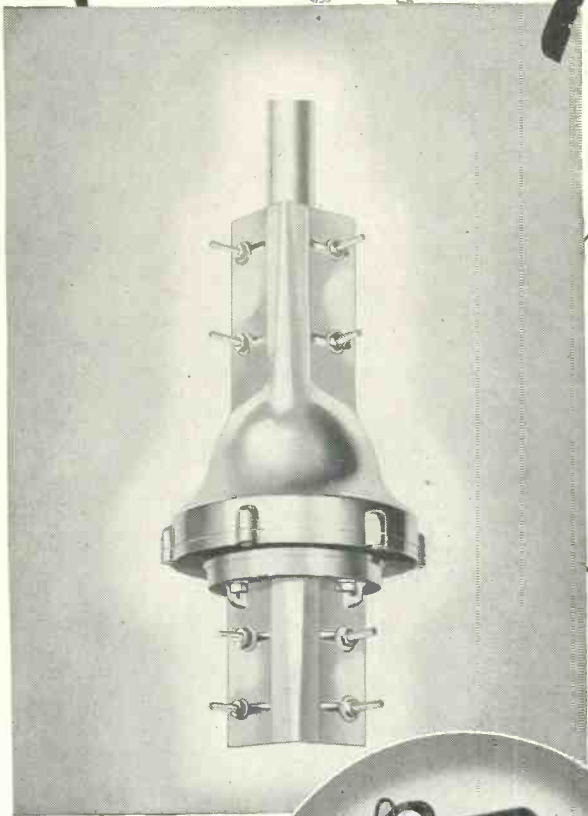
	TV
January	121,238
February	118,938
March (five weeks)	182,361
April	166,536
May	167,262
June (five weeks)	160,736
<b>TOTAL</b>	<b>913,071</b>

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# TELE-ROTOR



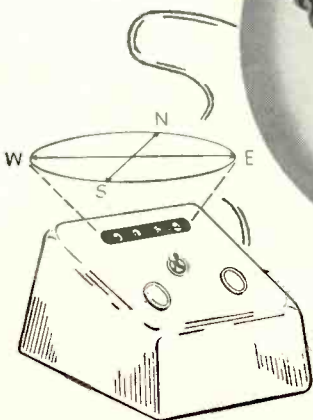
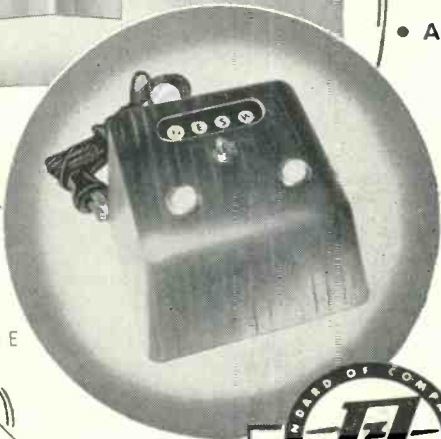
At last... the ultimate in rotators... a triumph in engineering skill. Months and months of patient research and development... now... we are proud to announce our latest triumph... the Radiart "Little Giant" TELE-ROTOR! Not a single factor has been overlooked to bring you the best... true to Radiart tradition that makes Radiart products... **THE STANDARD OF COMPARISON!** To you who have wanted a superior rotator that out-performs all others... **THIS IS IT!**

**Better Because:**

- Handles Heavier Loads... With Ease
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- Absolutely Trouble-Free and Fool-Proof
- Available with "Compass Control" Directional Indicator

**Check These Features:**

- Heavily Reinforced Die-cast Housing
- Two 6½" Ball-Bearing Races
- Heavy-duty Precision Gears
- Positive Stop at End of Rotation
- Takes ¾" to 2" Upper and Lower Masts
- Motor Instantly Reversible
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# Legality of TV "POLICIES" CLARIFIED

**The New York Insurance Department, through Deputy Superintendent Alfred J. Bohlinger, on August 25, 1949, released the following statement with reference to the opinion rendered recently by Att. Gen. Nathaniel L. Goldstein, in connection with television service contracts.**

**S**OME TIME AGO, several of the leading manufacturers of television sets inquired of this Department as to whether or not television service contracts proposed to be used by them violated the provisions of the New York Insurance Law. Dealers, as well as service men, made similar requests of this Department relative to their contracts. Examination of the contracts, as well as the practices followed in the television business, indicated a general pattern. A majority of the contracts submitted by manufacturers indicated that the companies either directly or through subsidiary corporations, or dealers, proposed upon the sale of a television receiver to install and keep it in repair for a specified period of time. A charge, in addition to the sale price of the set, was proposed to be made for such installation and service. The contracts also provided for renewals thereof to keep the sets in repair. Under the original contract, as well as renewal agreements, replacement of parts was included in the so-called "service charge". In all instances, the contracts were limited to keeping the receiver in proper operating condition in the event of failure solely from normal use without intervening external cause, such as fire.

There also came to the attention of the Department the fact that service men who were neither manufacturers nor dealers were making similar agreements with the owners of television sets.

The Insurance Department sought and has received the opinion of the Attorney General relative to the validity of the various proposed plans of operation. From numerous inquiries

made to this Department since the publication of the Attorney General's opinion, it appears that persons and firms engaged in servicing television sets are of the belief that all forms of service contracts are now in violation of the Insurance Law and hence illegal. In order to correct this impression, the Department desires to bring to the attention of the public and those engaged in the television business the Department's interpretation of the opinion as follows:

1. Upon the sale of a television receiver, the manufacturer, including a wholly owned subsidiary corporation, may for a separate consideration enter into a contract with the public whereby it agrees, for a stipulated time, to maintain the receiver in workable order and to replace parts.
2. A dealer who sells a television receiver may do likewise.
3. Service contracts connected with the sale of a receiver must be limited to keeping it in proper operating condition (including replacement parts) because of failure arising from normal use without intervening external cause, as for example, fire.
4. Neither a manufacturer (including a wholly owned subsidiary corporation) nor a dealer may renew such a contract.
5. A service organization which is neither the manufacturer nor the dealer of a television set may not make such a contract.
6. Under the opinion of the Attorney General, all service contracts or renewals thereof made by service organizations, and renewal service

*contracts of manufacturers and dealers, are not automatically violative of the Insurance Law and illegal. The question therefore arises as to what forms of such contracts are valid. The Insurance Department desires to inform the public that any service contract or renewal thereof made by a service organization, and a renewal service contract made by a manufacturer or dealer, pursuant to which a service organization, manufacturer or dealer agrees for a fixed fee or charge to make one or more specified inspections and place a television receiver in good working order, and to make such further inspections or repairs which may be required during the term of the contract, will be construed to be valid. Such a contract may not include replacement of parts, shall be limited to repairs necessitated by normal use and must exclude repairs necessitated by external causes.*

The Department further calls attention to the fact that the aforementioned rules regarding the legality or illegality of television service contracts will be applied in passing upon the service contracts affecting other appliances, machines, equipment or devices whether used in places of business or in residences.

It should be kept in mind that this Department is concerned only with determining the question of whether or not a given agreement is violative of the insurance laws of the State of New York. The Department cannot, and does not, pass upon any other aspects thereof.

IN RADIO AND TELEVISION TUBE SALES

# 1949 IS A G-E YEAR

Now . . . help toward streamlining your service calls! The brand-new **POCKET OFFICE** (a General Electric "first" for more sales and profits) organizes your cards, prices, order blanks, job records in a handy 5" by 8" wallet.

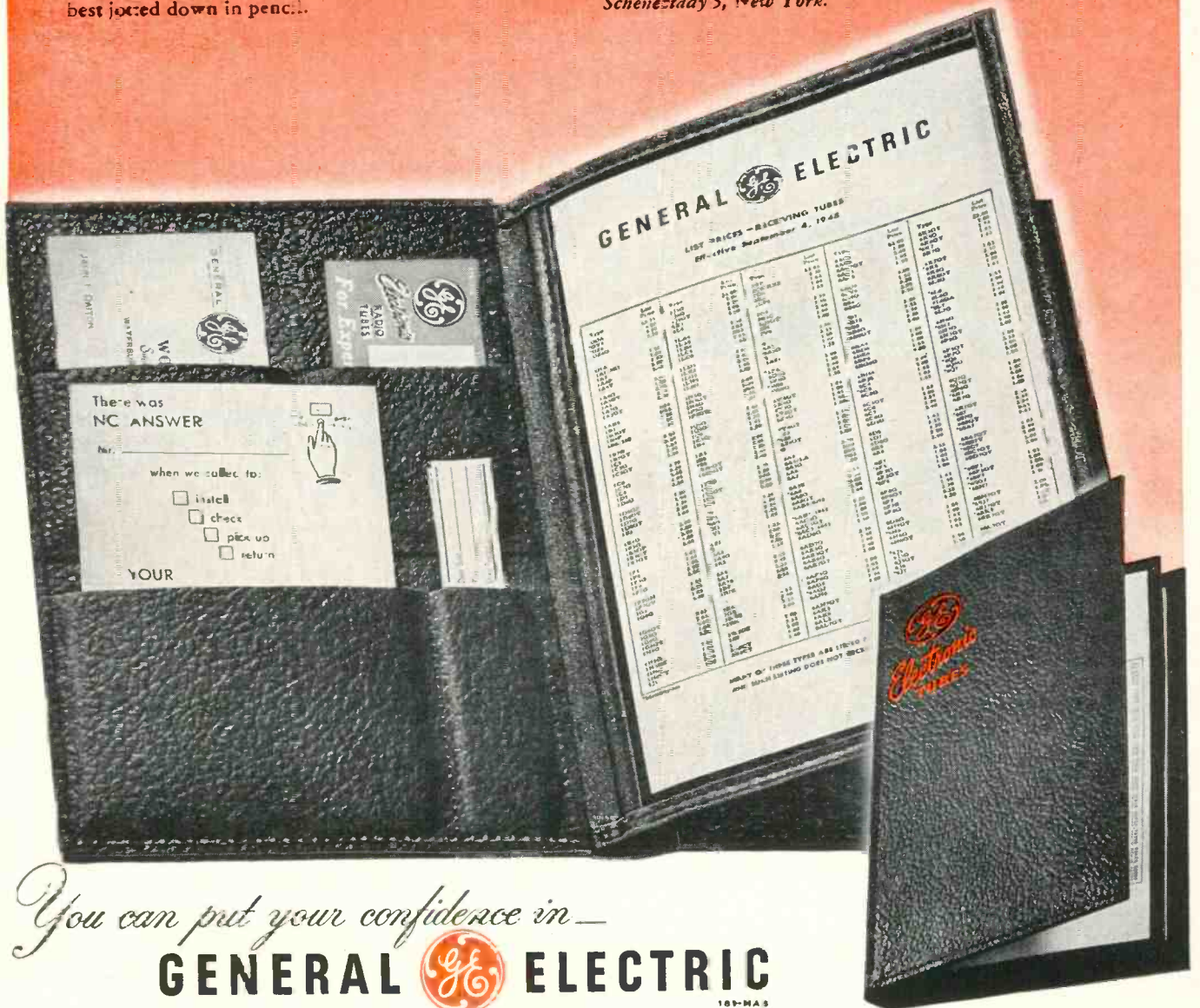
**Y**OU have only so many working hours. And an hour lasts but sixty minutes. How can you make your time more productive?

One answer is the new G-E Pocket Office. All the papers you need on the job, are tucked away neatly in this flat binder that slips conveniently into your coat pocket. When you want a business card, a tube price, a job ticket, it's *there* . . . no searching for a form left back at your headquarters, no calling on your memory to record data best jotted down in pencil.

Handsome in rich brown simulated leather with gold lettering . . . strongly made, durable . . . the G-E Pocket Office is an accessory you'll be proud to own. It holds:

- Your business cards.
- New, cleverly designed "out" cards.
- Tube price list, beneath a clear acetate protective cover.
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- Job tickets, repair stickers, tube-test stickers.
- Large memo pad.

Ask your General Electric tube distributor to show you the Pocket Office, and give you the details on how to secure this up-to-date aid to efficiency. Then use it to convert every minute of your working time into profits! *Electronics Department, General Electric Company, Schenectady 5, New York.*

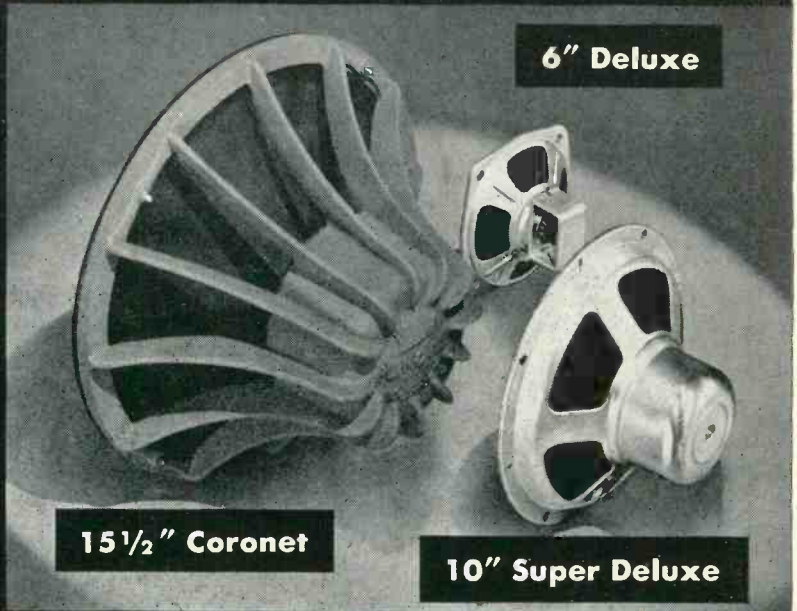


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SIZE	MODEL NO. OR CODE	MAGNET DATA FLUX GAUSS	VOICE COIL DATA DIA-METER	IMPE-DANCE	WATTS
6"	6L-1	10000	3/4"	3.2	5
8"	8T-8-1	10000	1"	8.0	8
10"	10T-8-1	10000	1"	8.0	9
12"	12T-8-1	10000	1"	8.0	10

*Super Deluxe High Fidelity Models—Extra Heavy Magnets—With Pot Covers*

8"	8WP-8-1	10000	1 1/4"	8.0	10
10"	10WP-8-1	10000	1 1/4"	8.0	11
12"	12WP-8-1	10000	1 1/4"	8.0	12
15"	15WP-8-1	10000	1 1/4"	8.0	15

*"Coronet" Supreme High Fidelity*

12 1/2"	125Z-16	15000	2"	16 ohms	20
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# A Klystron

## TV SWEEP GENERATOR

by Allan Lytel

Author of TV Picture Projector & Enlargement

**The klystron tube, which operates on a principle entirely different than conventional vacuum tubes, is primarily designed for UHF applications. In the product described in this article its characteristics are made use of to result in an instrument that is excellently suited for TV alignment. In view of the probability of UHF TV in the future, in addition to its present usefulness, the radio service dealer should acquaint himself with the potentialities of this device.**

**T**HERE are many possible methods which are used to produce Sweep Generators designed for visual alignment of tuned circuits. One of the most highly developed methods is the beating together of two oscillators in order to produce the required frequency modulated sweep. This instrument, the Mega-Sweep, is unique in that it uses two Klystron oscillators of a design which is quite different from the conventional type of oscillator tube. In this test equipment the output covers the entire frequency range from 50 kilocycles to above 500 megacycles while providing a frequency sweep up to 30 megacycles. Because of the use of Klystron oscillator tubes, which operate at a frequency of approximately 10,000 megacycles (type 723) and mixing crystals (Silicon type 1N21, 1N23) there is inherently a tremendous range of operating frequencies.

This extremely wide frequency spectrum requires the use of an unusual type of wave meter. This wave meter is a resonant cavity tuned by means of a plunger which is attached to a micrometer head. It is not the actual frequency of either of the two Klystrons which is important but rather the actual output frequency which is the difference between these two signals. No conventional wave meter could possibly cover this frequency spectrum. In addition to the wave meter there is an attenuator which is used to obtain the proper band width. Also incorporated in the cir-



The Kay Mega-Sweep

cuit are various switches as well as a meter to read crystal current. The functions of these controls will be explained under "Operation."

### The Klystron Oscillator

Since this special microwave tube is very probably unfamiliar to a great number of service technicians, a brief discussion of its characteristics and design must necessarily precede a discussion of the operation. In general, the Klystron falls into a class of tubes which operate on an entirely different principle from conventional vacuum tube circuits. The theory of operation may best be described by noting that this is a velocity-

modulated type of tube designed to permit operations in frequencies far beyond the capabilities of normal oscillators. Figure 1A is a schematic of a Klystron tube which is not used in the Mega-Sweep; however, this type is easiest to understand.

Electrons are emitted from the cathode just as with an ordinary tube; these electrons are attracted by a positive voltage on the accelerator grid. The electrons are then passed through a pair of grids known as "buncher" grids. Assume that the buncher grids are attached to a tuned circuit so that one grid is tied to either end of the circuit. If an alternating potential is applied to these

buncher grids the electrons will be grouped or bunched because of the signal upon the two grids. Since these grids are at either end of the tuned circuit there will always be a difference of potential between the two grids. Some of the electrons will have their velocity increased because they will be pulled by the positive grid and some electrons will have their velocity decreased since they will be pushed from the negative grid. The group of electrons which is between the buncher grids at any moment will be bunched in the foregoing fashion. Very few of these electrons hit these grids but they pass through in groups.

As these electrons travel down the tube the bunching will become more and more pronounced. In any given group of electrons the slow ones will fall back slightly and the fast ones will move ahead slightly which increases the bunching action as they travel down the tube. This action may be seen by referring to *Fig. 1* where the electrons traveling in the drift space become more tightly bunched.

The group of electrons are then intercepted by another set of grids known as the "catcher" grids. These grids are also attached to another tuned circuit. All that is necessary, in order that the buncher grids will be able to give up energy to the catcher grids, is to maintain the proper distance between these two groups of grids. Electrons coming from the cathode are accelerated by the first positive grid, are then grouped by the buncher grids, and finally give up their energy to the catcher grids. There is an increase in energy between the first set of grids and the second set of grids because the electrons tend to group themselves more closely as they travel through the drift space. In traveling through the catcher grids the electrons give up a great deal of their energy which they attained in their travel. This release of energy causes oscillations in the tune circuit attached to the catcher grids.

The final element in the tube is a collector or plate. This gathers the electrons and removes them from the tube since the electrons have no further useful purpose. Both the buncher and catcher grids have a positive d-c potential applied which is used to accelerate the electrons toward the plate. Since there is a greater output from the catcher grids than is needed for the buncher grids, this tube can act as an oscillator. Feedback is

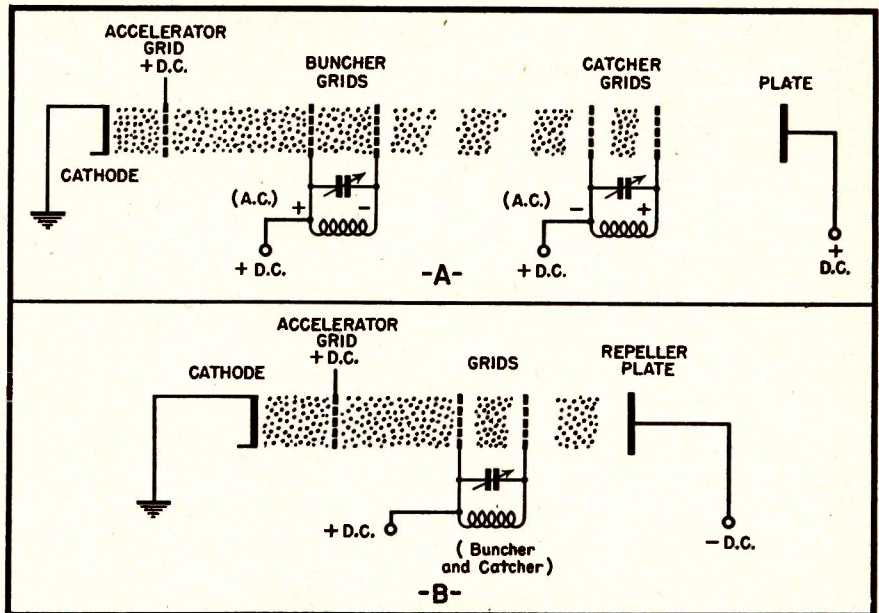


Fig. 1. Two types of klystron operation.

necessary from the output to the input, as with any oscillator, and this is usually obtained by means of a coaxial cable which takes a portion of the larger signal and feeds it back in the proper phase to the buncher grids in order to sustain oscillations. An output signal may be obtained by inductively coupling to the tune circuit of the catcher grids. Amplification occurs in this velocity modulated tube because, in actual operation, electrons pass through the buncher grids in a steady stream and arrive at the catcher grids in bunches.

The resonant circuits associated with this oscillator are cavities which represent tuned circuits having a very high "Q." This represents the fundamental operation of any oscillators of this general velocity modulated class. These can be operated as amplifiers, oscillators, or mixers; we are here concerned with their operation only as an oscillator. The frequency of operation of the oscillator may be determined by varying the geometry of the tuning cavities. This may be done by metal plugs which may be screwed in or out of the cavity thereby changing its resonant frequency.

#### The Reflex Klystron

The Klystron oscillator is used in the Mega-Sweep. The design of this reflex Klystron is somewhat more simple than the ordinary velocity modulated Klystron with two sets of grids. In *Fig. 1B* the reflex Klystron has only one set of grids which function as both the buncher and catcher grids. The plate in this oscillator has a negative voltage hence it is known as the repeller. Electrons

travel from the cathode through the grids, acting as buncher grids, and are repelled or reflected back by the negative voltage on the plate. On the return trip of the electrons the grids now act as catcher grids. If the proper voltage is maintained on the repeller plate this tube will act as an oscillator since the bunched electrons will pass through the grids the second time in the proper phase to give up their energy. Feedback is obtained in this manner and the tube appears much more simple in construction.

The frequency output may be varied by changing the potential upon the repeller plate; it is this voltage which determines how long it takes for the electrons to make a round trip journey until they are removed from the tube by the accelerating grid. This changing repeller voltage also somewhat affects the operation and amount of output for this tube. These 723 type tubes are known as Pierce-Shepard Reflex Klystrons and have a cavity sealed in the tube which is tuned by moving the tube envelope in order to vary grid spacing.

A saw tooth voltage is applied to the repeller tube of the reflex Klystron in order to provide a variable frequency output. Changes in the actual resonant frequency of this oscillator may be obtained by changing the spacing between the grids. The Coarse Frequency Adjustment on the front of this sweep oscillator changes the grid spacing of the Klystron which is the local oscillator.

#### The Mega-Sweep Oscillator

By means of the reflex Klystron

it is possible in this instrument to produce a very wide range of frequency output with an exceedingly wide frequency deviation. The 723 tube provides approximately 35 milliwatts output over a frequency band from 8500 to 9700 megacycles. Taking any particular point in this band a change in repeller voltage will produce a frequency modulation with a total frequency excursion of 30 megacycles. By means of internal changes it is possible to extend the frequency sweep to as much as 80 megacycles. The output from the two reflex Klystrons is mixed in a wave guide convertor which provides a constant load over the entire frequency range. The output voltage is supplied at an impedance of 50 ohms which results from the crystal impedance and resistors in parallel. The actual output voltage is approximately 0.1 volt over the entire range. It is possible to increase this output to 0.4 volts by raising the impedance to 300 ohms.

A thyratron (miniature type 2D21) provides the sweep voltage for the repeller of the first oscillator. Sweep voltage is at a rate variable between 50 and 100 times per second. Sweep Amplitude varies the sweep voltage in order to provide a frequency sweep from 30 kilocycles to 30 megacycles.

Sweep voltage which is applied to the repeller of the first oscillator is brought out through jacks; this may be applied to the sweep amplifier of the cathode ray oscilloscope and used as the sweep voltage for this indicating device. By this means there is no necessity for synchronization or phase controls as is the case with other types of sweep oscillator outputs. There is a wide enough sweep voltage output to provide a complete picture of the response curve of a video amplifier (except for the lowest frequencies passed by the video amplifier).

#### Operation of the Mega-Sweep

A period of time should be allowed

in order for this test equipment to reach a stable state. The Sweep Amplitude Control is set to its maximum counter-clockwise position and the Attenuator Control is rotated counter-clockwise until the spring tension is released. There are two Peaking Adjustment Controls and an associated switch. The switch is held down and the crystal current reading on the meter is made maximum by rotating *Peaking Adjustment #2* which is a reading of the condition of *Oscillator #2*. With the switch still in the down position the Wave Meter Control is rotated until a very definite dip is found in crystal current. This reading is an indication of the frequency of this oscillator and should be recorded; the switch is then released.

Since the output signal will be determined by the difference in frequency between the two oscillators this reading is very important. *Oscillator #1* is set in the same manner as *Oscillator #2* except that the wave meter is adjusted to provide a dip corresponding to the desired frequency of *Oscillator #1*. *Oscillator #1* is adjusted by first peaking the crystal current reading by *Peaking Adjustment #1*. The *Coarse Frequency Adjustment* is then rotated. Small frequency changes are made by adjusting the *Fine Frequency Control*. The peaking adjustments and the coarse and fine frequency controls are used only when it is desired to set the Mega-Sweep in a new operating frequency.

#### Operation Procedure

1. Set Sweep Amplitude Control counter-clockwise.
2. Set attenuator Control counter-clockwise.
3. With the switch in down position rotate *Peaking Adjustment #2* for maximum current reading. Rotate the *Wave Meter* for maximum dip. Record this reading and release switch.

4. Set *Wave Meter* at the proper position corresponding to the desired output frequency of the local oscillator. Remember that the output frequency represents the difference between the two oscillators.

5. Rotate *Peaking Adjustment #1* for maximum current.

6. Adjust *Coarse Frequency Control* for a meter dip.

(Voltage should never be applied to the output jack because of the possibility of damaging both the meter and the crystal.)

7. A switch marked, *3 mc. per division* or *0.1 mc. per division* is used in conjunction with the *Sweep amplitude* to control the range of the frequency change.

In this manner the Mega-Sweep functions as a sweeping oscillator with two outputs. One output is the r-f signal which is variable in frequency at a rate which may be changed. By use of peaking adjustments and the coarse frequency control, (and the fine frequency control if necessary) the center frequency of the r-f output may be obtained. This is found to be the difference in frequency between the two Klystron oscillators. The other output is the sweep voltage going to the cathode ray oscilloscope. The sweep frequency may be adjusted by use of the sweep rate control and this is not a critical adjustment. The sweep width or sweep amplitude is adjusted by means of the toggle switch and sweep amplitude control. Thus there are three variables; the center frequency of the oscillator output signal, the sweep frequency rate, and the amount of swing over which the center frequency is deviated. In general use the Mega-Sweep should have a 0.01  $\mu$ fd across the output in order to cut down traces of unwanted signals.

In *Fig. 2* the Mega-Sweep is shown in operation in block form. The sweep output is feed from the Mega-Sweep into the cathode ray oscilloscope; this scope must have the *Sweep Selector Switch* set to external position. This sweep voltage will pass through the horizontal amplifier of the scope and become the sweep voltage of the cathode ray tube. The r-f voltage output from the Mega-Sweep is feed to the grid of the mixer tube assuming that we are aligning a video amplifier. The output of the video amplifier is placed upon the vertical signal plates of the cathode ray tube. In this manner the signal and the sweep will be in exact synchronization in order to provide a visual signal on the scope.

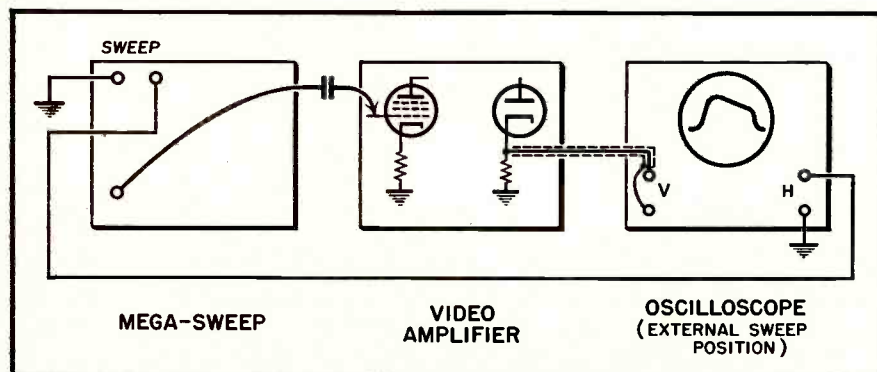
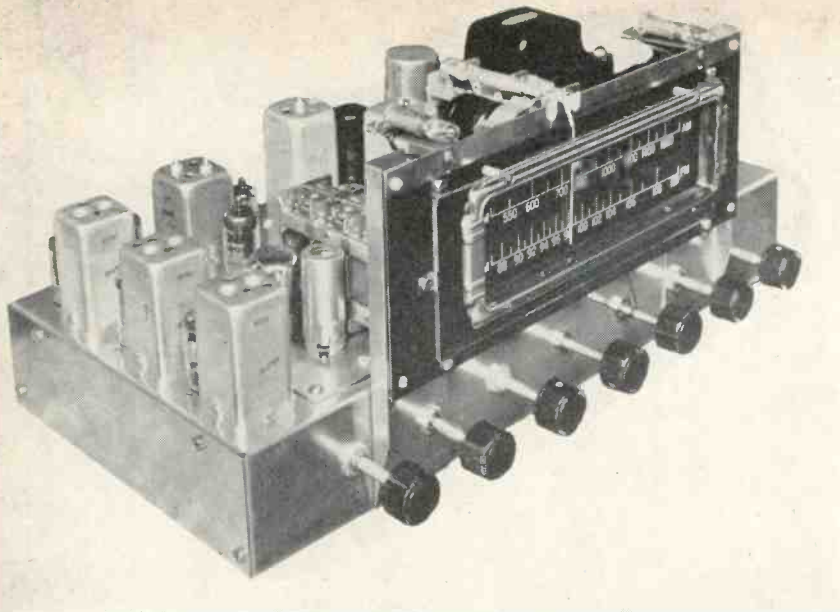


Fig. 2. Operation of Mega-Sweep in block diagram form.



# High Quality Analysis Series

by C. A. TUTHILL

PART I

Browning Laboratories RJ-20 FM-AM tuner

Another in this series on high quality FM and AM tuners

**W**HETHER your requirement be:

- high Quality Reception in the commercial field,
- engineered equipment for custom-built spreads,
- precision laboratory assignments,
- finger-tip control from the easy-chair,
- rejuvenation of a cherished but antiquated cabinet, or whatever else, the AM-FM Tuner Chassis up for discussion offers a good example of equipment capable of meeting that requirement.

### FM Section

The FM section of this dual tuner

(Model RJ-20 Browning Laboratories) is independent of the AM section. Its Armstrong circuit has its own *RF, Mixer, IF, Cascade Limiter, and Discriminator* sections. Only the audio output section is common to AM and FM. In the schematic of *Fig. 1*, we see that either a 300 ohm or 72 ohm antenna may be coupled to the tuned r-f stage employing the miniature pentode 6UA6 tube. It will be noted from the schematic that four more of these 6UA6 miniatures are used in the FM section. Their high mutual conductance and low inter-electrode capacitance, (0.0035  $\mu\text{f}$  maximum between grid and plate) ideally qualifies them for the functions assigned.

The output of the tuned r-f stage feeds a triode mixer thus holding mixer noise to a minimum since such noise is a function of the number of tube elements involved. Mixer and oscillator duties are performed by a twin triode (7F8) shown split in the schematic for reasons of clarity. The first half of this tube serves the FM Mixer circuit while the second triode half of the tube is used as a local oscillator. The curves of *Fig. 2* prove the need for stability control at this point. It will be noted from the upper curve, where no temperature compensation was employed, that the oscillator frequency drifted considerably even after 10 minutes of operation. The lower curve of *Fig. 2* shows the

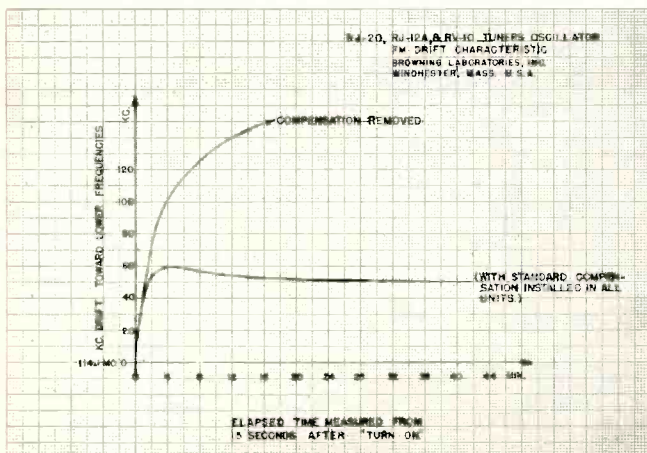


Fig. 2. Stabilizing effect of ceramic trimmer.

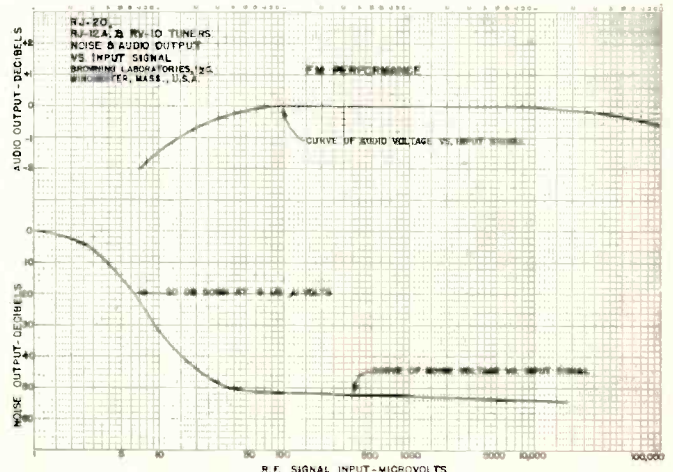


Fig. 3. Limiter action.

stabilized results through the introduction of a ceramic trimmer having a temperature coefficient of  $-750$  parts per million per  $C^0$ , and through the judicious placing of components relative to heat sources. Oscillator drift is stopped, even reversed.

It can be shown that oscillator frequency shifts up to 20 kc are imperceptible and do not require tuning. The lower compensated curve of Fig. 2 shows a total drift of no more than 20 kc after 1 minute of operation. That much time is usually required, after the set is turned on, for the selection and tuning of a desired station. Hence stability is available from the outset. Plate voltage is fed to either the FM or AM oscillator through switch (Sw-1).

Returning to the mixer, we find from the schematic that its output is fed to two tuned i-f stages employing once again the miniature 6UA6 tubes. These are high gain stages operating at a frequency of 8.25 megacycles. Slightly overcoupled transformers afford the necessary 150 kc bandwidth with good adjacent channel attenuation. High dielectric constant ceramics are used for r-f by-passing throughout the amplifier.

### Limiter Action

Signals pass from the i-f stages to a cascade limiter, again employing two miniature 6UA6s, where amplitude disturbances are removed and where noise peaks are clipped to the same amplitude as the limited carrier.

It is essential in any FM receiver that an adequate signal level be applied to the input of the limiter if it is to derive effective limiting action. Only then will the full qualities of the FM be realized in the reduction of noise and interference. For that reason more gain is required between antenna and the discriminator or final detector than is usually required in AM tuners.

This points up the fact that a good antenna is particularly essential, in fact the orientation of a good dipole means the final elimination of contradictions in reception.

Limiter action is graphically shown in Fig. 3. Here curves are plotted of noise voltage and audio output versus input signal. According to these curves, background noise is down 20 db down when a 6.5 micro-volt signal is present on the antenna. Similarly there is a 32 db quieting if a signal of 10 micro-volts be introduced. Re-

ception of distant or weak FM stations is aided by such sensitivity.

### Discriminator Performance

The output of the second limiter is applied to a balanced discriminator circuit which demodulates the signal and produces a useful audio voltage. In the schematic of Fig. 1 this is comprised of the dual diode (6AL5) called a detector and its preceding tuned coupling circuits. It is in this circuit that translations of frequency variations to amplitude variations occur. If this is to be accomplished with true undistorted reproduction the relation between frequency and output voltage amplitude must be linear over the intermediate frequency band pass. Measurements for this chassis indicate no more than  $3\frac{1}{2}\%$  deviation from linearity over a range 75kc above and below the i-f center frequency. This represents one form of stability control which contributes toward clean reproduction. Tests recorded for this equipment indicated the presence of 1.06% 2nd harmonic distortion and 2.65% 3rd harmonic distortion for a 200 microvolt input on 100 mc with 400 cycle modulation and 75 kc deviation.

[To be continued]

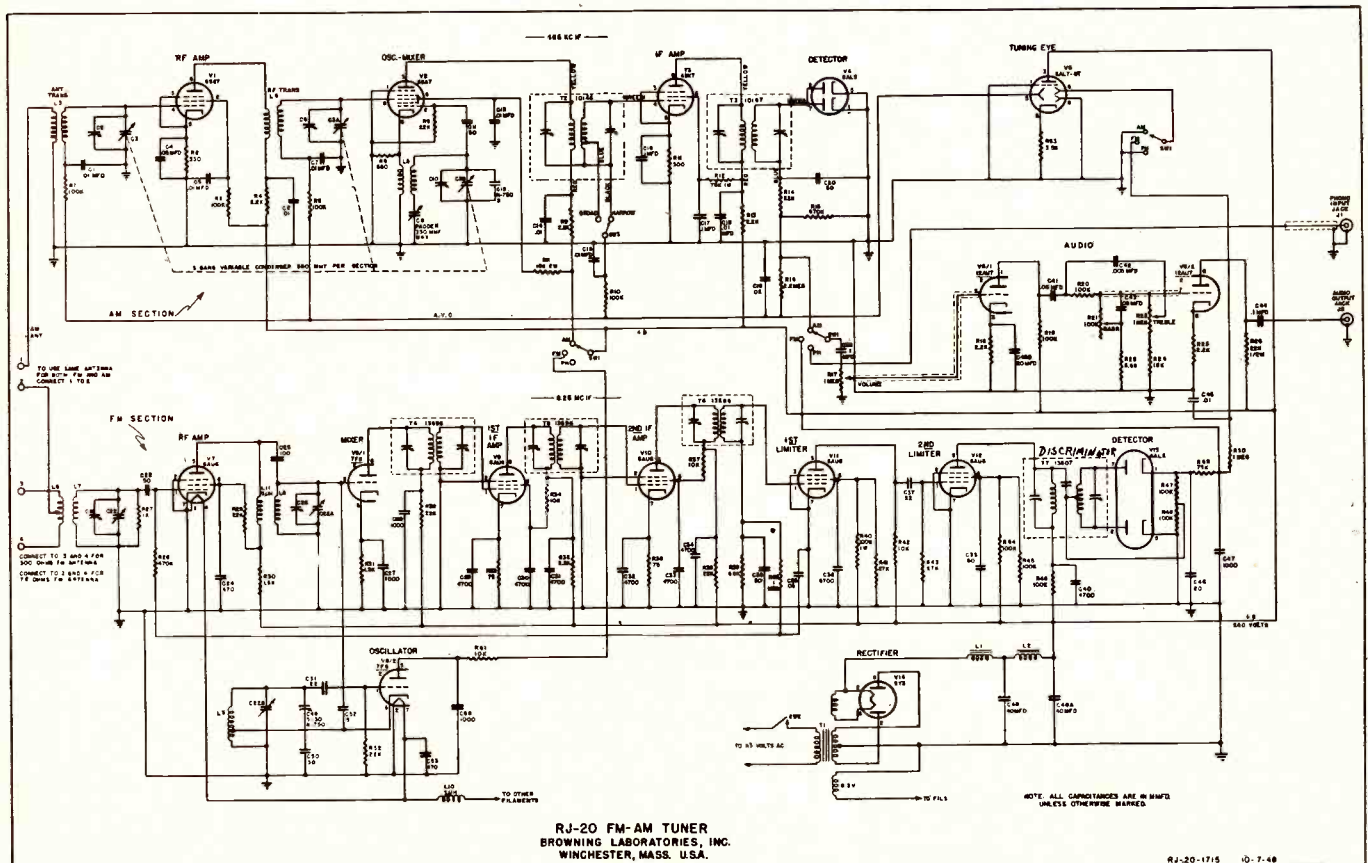


Fig. 1. Circuit diagram of Browning Laboratories RJ-20 FM-AM tuner.

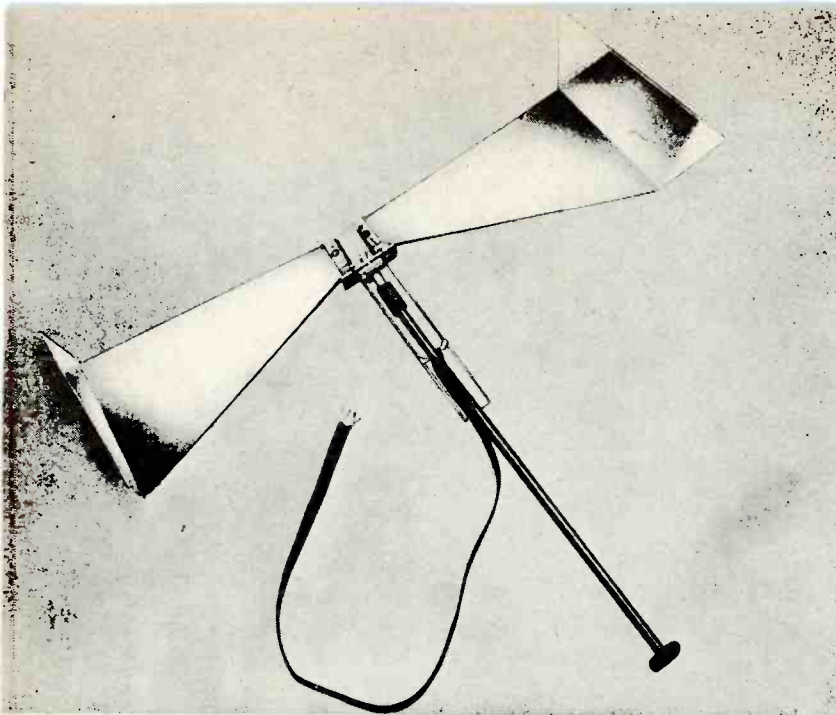


Fig. 1. Physical view of Philco Aspen antenna.

**T**HE television industry, including especially service technicians, as well as the public have long hoped for a television receiver with an efficient and satisfactory built-in aerial. That day has now come with the introduction of the new Philco television receivers for 1950, which incorporate an electronic built-in aerial system developed in the company's research and engineering laboratories.

This aerial may be called electronic because it is electrically tunable to each of the present 12 television channels. The aerial is built in as an integral part of all the new Philco television models, including table receivers, consolettes, television consoles and TV-radio-phonograph combinations in various sizes and styles of cabinets.

The new built-in aerial should properly be considered as a *system* because it provides not only a broad-band antenna, but also a tunable matching device and lead-in to bring the received signal into the tuner at peak efficiency for each channel.

The result is that this Philco electronic built-in aerial system, on the basis of careful and thorough field tests, in a great many installations



Fig. 2. Representation of coils contained in Philco antenna.

makes outdoor antennas unnecessary. We do not claim that this Philco built-in aerial is a cure-all for every installation problem. We do know that in the vast majority of many scores of test locations in the New York, Chicago, Philadelphia and Washington areas, this new built-in aerial system has given good performance.

#### Housing The Aerial

The Philco built-in aerial system consists essentially of two parts; an *antenna* that covers both the low band (54-88 mc) and the high band (174-216 mc) satisfactorily; and a *tunable circuit for matching* the aerial to the standard 300-ohm input line to the tuner.

The physical characteristics of this aerial system are illustrated in *Fig. 1*. The antenna itself is a half-wave dipole consisting of two tapered sections of aluminum foil 0.005" thick. The narrow ends of these aluminum arms of the dipole are attached to a tunable matching circuit consisting of a variable condenser connected across the terminals of a hairpin coil, which has two shorter loops attached to it at the antenna end. The 300-ohm line is taken off at the halfway point of the hairpin. A simplified sketch of these coils appears in *Fig. 2*. A long bakelite rod with a control knob at one end is attached to the tuning condenser, not shown in *Fig. 2*.

When mounted in the cabinet of a television receiver, this Philco built-in aerial is attached to the underside of the top of the cabinet. The aluminum foil extends across the

# "Aspen"

## PHILCO'S BUILT-IN TV ANTENNA

**The announcement of Philco's new built-in antenna has aroused the interest and curiosity of our**

width of the cabinet, near the back and is folded at the wide ends not only to follow the contours of the inside of the cabinet but also to provide augmented capacity between the ends of the dipole. The rod carrying the tuning knob extends from the rear to the front, and the knob itself appears in a special slot at the top front of the cabinet so that it is easy for the user to tune the aerial. This construction is shown in *Figs. 3* and *4*.

In most of the new Philco television receivers, it is possible to remove the chassis from the cabinet without disturbing the built-in aerial. In the case of two smaller table models, the 1104 and 1105, the built-in aerial can readily be removed by taking out two screws holding the condenser assembly and a single set screw at the front holding the tuning knob. This aerial should be removed before the chassis is taken out of Philco models 1104 and 1105.

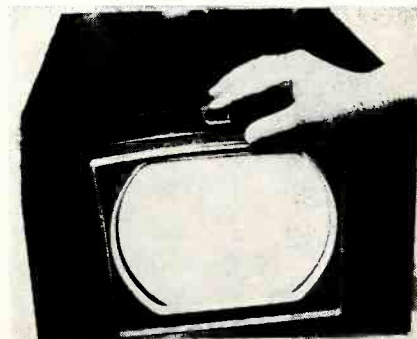


Fig. 4. Front adjustment.

by **JOHN PELL**

Manager of Television Service  
Philco Corporation

readers. In this article the theory of operation and practical service data are made available.

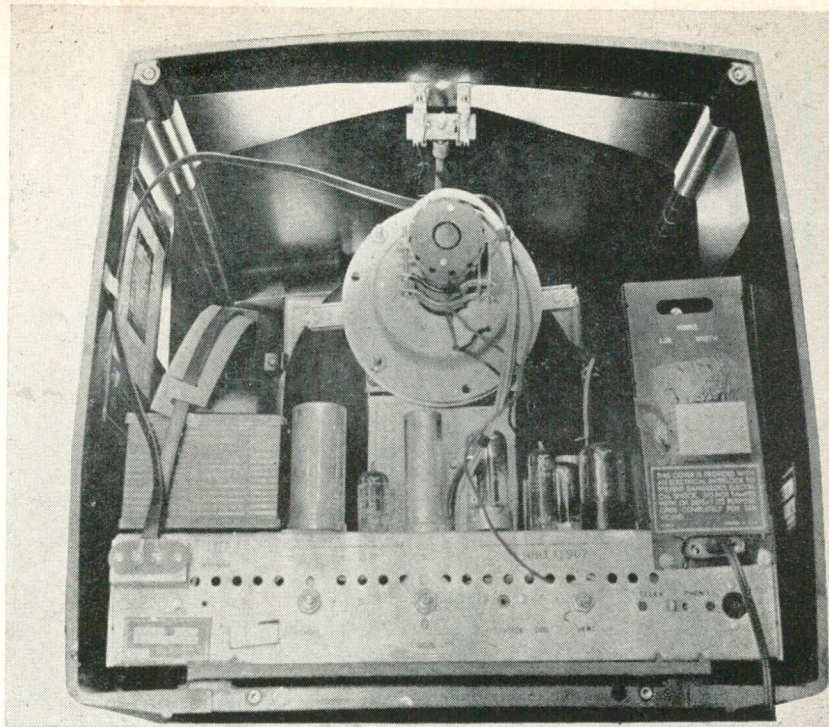


Fig. 3. View of antenna mounted in cabinet.

**How The Built-In Aerial Works**

The simplest way to understand the principles behind the Philco built-in aerial is to examine a schematic of this aerial's equivalent circuit, shown in *Fig. 5A*. At the extreme right is the circuit of the antenna, or of the two aluminum foil sections. Note that it consists of both a reactance,  $X_A$ , and the radiation resistance of the antenna,  $R_A$ . Connected to this antenna circuit is the tunable matching circuit, consisting of the variable condenser with reactance  $X_C$ , the two smaller side loops which are inductive with reactances labeled  $X_1$  and  $X_2$ , and the long inductive loop

with reactance  $X_L$ . Note at the left that the 300-ohm transmission line, which leads to the tuner and is labeled  $T_L$ , is tapped off the long coil at a point which corresponds to an impedance of about 300 ohms. This obviously results in a good match between the antenna (foil) and the lead-in (twin-X) to the tuner and input circuit, and hence a minimum standing wave ratio.

This point is graphically shown in *Fig. 5B*, which indicates that the matching circuit connected to the antenna is tuned for each channel to an impedance of about 1500 ohms. By

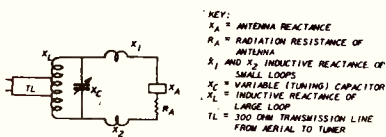
loop at which to tap off the 300-ohm line, we can effectively match the line's 300-ohm impedance. The actual tap-off point is approximately halfway along the length of the long loop.

Now let us consider the matching circuit and equivalent antenna circuit again, to see how they behave for the low and high bands. Over the low band, 54-88 mc, the radiation resistance,  $R_A$ , of the antenna is fairly uniform and low in value, while the antenna's reactance,  $X_A$ , is capacitive as shown in *Fig. 5C*. Hence to bring this antenna circuit to resonance for television channels 2 to 6, the matching circuit must be inductive. The relatively large inductance of the loop or hairpin loop is the principal factor in achieving this, whereas the effect of the smaller loops on this band is of lesser importance. The tuning capacitor serves to vary the inductive reactance of the long loop over the low band for the purpose of matching the  $X_A$  (capacitive) of the antenna.

A similar analysis of the aerial system's operation on highband channels is illustrated in *Fig. 5D*. Note that now the antenna's reactance,  $X_A$ , is inductive. Also it may be mentioned that the radiation resistance of the antenna is higher on channels 7 through 13. Here the circuit is tuned to resonance by means of the variable condenser, and the inductance of the two smaller loops,  $X_1$  and  $X_2$ , is a substantial factor.

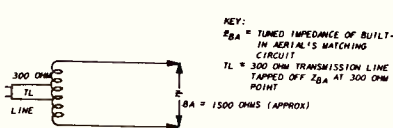
Summarizing this circuit analysis, it is evident that the Philco built-in

FIGURE 5A



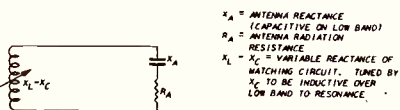
COMPLETE CIRCUIT OF PHILCO ELECTRONIC BUILT-IN AERIAL

FIGURE 5B



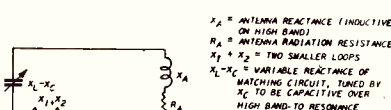
EQUIVALENT MATCHING CIRCUIT—BOTH TV BANDS

FIGURE 5C



EQUIVALENT BUILT-IN AERIAL CIRCUIT—LOW BAND

FIGURE 5D



EQUIVALENT BUILT-IN AERIAL CIRCUIT—HIGH BAND

Fig. 5. Equivalent circuit of antenna.

aerial system includes an antenna, the response of which is quite good over both high and low television bands, and a tunable matching circuit which converts the impedance of the aerial system at the tap-off point to about 300 ohms and thus matches the impedance of the short twin-X cable leading to the tuner.

### Performance Results with Built-In Aerial

It is particularly interesting to the service technician to understand how efficient this Philco built-in aerial is in actual operation. Tests have been made to compare the efficiency of the built-in aerial system with a half-wave folded dipole cut in each case to the exact length for each channel from 2 to 13.

Such an array of folded dipoles, 12 of them for the 12 channels, would be inconceivably awkward in an actual installation in a customer's home. In the case of channel 2, the full-length folded dipole would have to have an overall length of approximately 8.6 feet!

It has been found that the Philco built-in aerial approximates the best results one could obtain with 12 separate folded dipoles, cut to the right dimensions for each station. Hence, with a simple and compact installation built into the television receiver, the customer now gets performance equivalent to a whole 'Christmas tree' of specially cut aerials.

### Servicing Information

By turning the aerial tuning knob, mounted at the top front of the cabi-

net as shown in *Fig. 4*, it is possible to tune the Philco electronic built-in aerial system to resonance with the video carrier frequency of each channel.

This aerial system is adjusted at the factory so as to resonate on each of the 12 channels at the correct tuning position. These tuning positions are shown on *Fig. 6*, which indicates the fraction of a full turn counter-clockwise from the completely clockwise position of the tuning control needed to reach the correct resonance position for each channel. For instance, to tune in channel 2, the knob is turned only a slight distance counter-clockwise from the fully clockwise position.

Incidentally, it should be noted that all the other controls of the receiver (channel selector, fine tuning, etc.) should first be correctly adjusted for the desired station. Then use the aerial tuning control to bring in the best picture and sound on the desired channel.

As noted above in connection with the smaller Philco table television receivers, Models 1104 and 1105, it is necessary to remove the built-in aerial before taking the chassis out of the cabinet. This aerial is readily removed by taking out the two screws at the center top rear of the cabinet—these screws holding the tuning condenser assembly in place—and by taking out the set screw in the tuning knob at the front of the cabinet.

When the built-in aerial is removed, it may get out of adjustment. Or there may be other reasons why it is

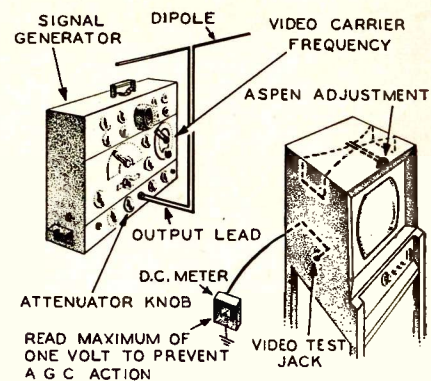


Fig. 7. Aligning Philco antenna

necessary to adjust this Philco built-in aerial system. Any competent service technician will find the following adjustment procedure easy to carry out. However, one point should be mentioned first. In the presence of very strong signals, the tuning of the built-in aerial will not appear to be sharp because of the AGC action. In such cases, tune the receiver by means of the aerial tuning control for minimum background noise on each station.

### Alignment Procedure

1. Connect a dipole through a 72-ohm coaxial cable to the output of a suitable AM signal generator having a band range covering the television channels. For instance, the Philco Model 7008 Precision Visual Alignment Generator, as shown in *Fig. 7*, provides an efficient signal generator for such TV servicing. It should be mentioned that the dipole used for this purpose may be merely two clip-leads of appropriate length.

2. Connect a 20,000-ohm-per-volt voltmeter to the AGC bus, pin 2, of the *Align Test Jack* of the receiver. (In some early production models, pin 1 is the AGC bus.)

3. Turn the *Contrast Control* of the receiver fully counter-clockwise to remove delay voltage from the AGC circuit.

4. Set the *Channel Selector* to Channel 2 and the *Fine Tuning Control* to the middle of its range. Then tune the receiver's local oscillator on the sound carrier of the channel (tune for maximum sound).

5. Place the dipole near the back of the receiver, and set the signal generator for a modulated output at the video carrier frequency of Channel 2. Adjust the signal generator attenuator for an output that will just give an indication on the meter. Keep the meter reading less than 1 volt DC.

6. Turn the *Aerial Tuning Control*

[Continued on page 30]

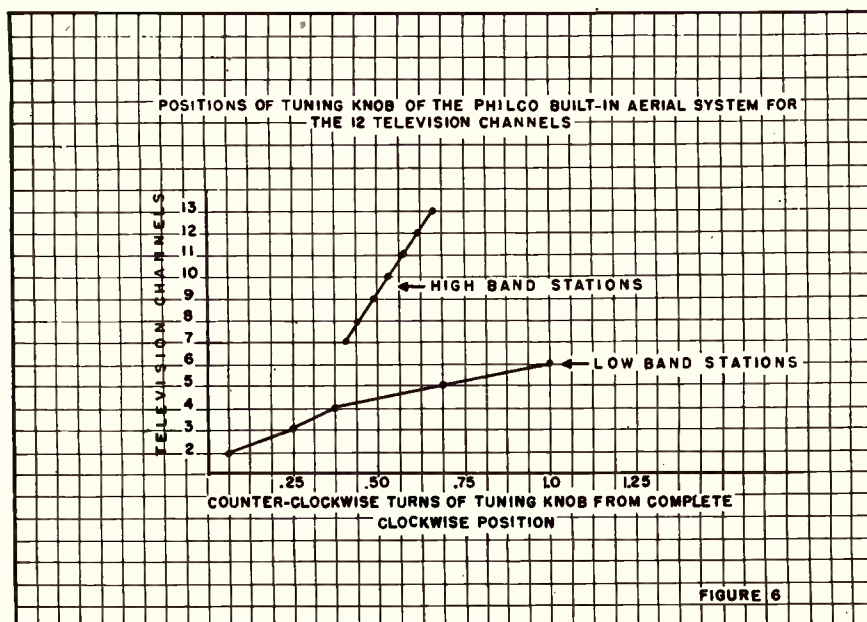
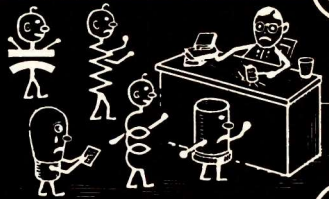


Fig. 6. Knob positions for various channels.



# CIRCUIT COURT

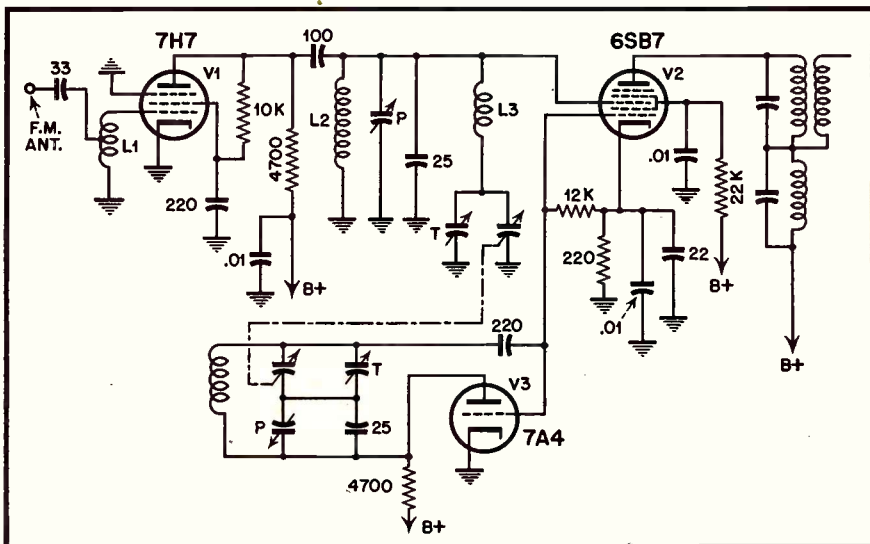


## General Electric 376

This nine-tube, a-c d-c instrument covers standard and FM bands. In line with the trend to eliminate, in-so-far as possible, losses introduced by range switches, particularly elaborate multi-section ones, use is made of circuits which are out of the ordinary. A partial schematic shows details to be discussed.

The input circuit of the 6AG5 tuner r-f stage is fairly conventional. The grid is switched to the loop for AM and to an inductance-tuned circuit for FM reception. A fixed capacitor across the coil completes the tuned circuit, except for the antenna matching network. Note that the antenna transmission line and small capacitor form a capacitor voltage divider or impedance matching device.

In the plate circuit of the 6AK5 we find *Ch-1*. This coil is series resonant at such a frequency that it confines the FM signal voltage to the plate and the 47  $\mu\text{f}$  coupling capacitor. The signal appears across the second inductance-tuned circuit. A small capacitor couples the signal to the signal grid of the 6BE6 converter stage. *Ch-2*, like *Ch-1* maintains the the circuit at high impedance for FM frequencies.



Partial schematic of FM head end of Temple 14 tube receiver, Model G-1430.

In the case of AM signals, they pass readily through the relatively low inductance of *Ch-1* and build up voltage across the primary of the AM interstage transformer. The secondary of the transformer is tuned and tapped at an appropriate point. AM signal voltage from this tap is impressed on the converter grid through the small inductance of *Ch-2*.

Note that the 47 and 10  $\mu\text{f}$  capacitors which couple the FM signals between the r-f and converter simply act as small shunt capacitors to the tuned grid circuit of the mixer in the AM position.

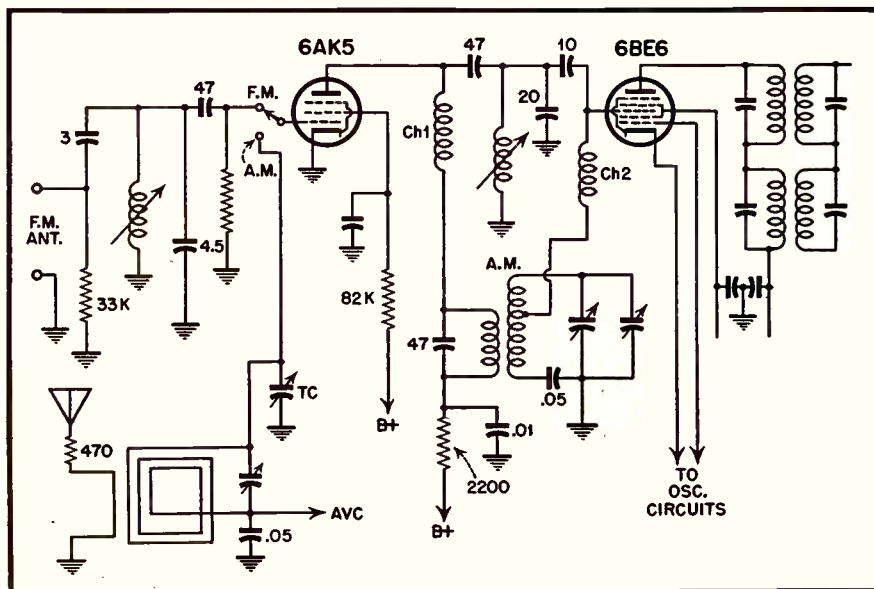
Both 455 kc and 10.7 mc appear in the plate series coils of the mixer and subsequent amplification takes place in a conventional manner, with the only switching at the secondaries of these transformers.

## Temple Model G-1430

Several features of interest are to be found in this one instrument, a 14 tube a-c, multi-wave band set. To be discussed at this time is the FM head end. The tubes and circuits involved are shown in the partial schematic. A single type 7Q7 performs similar functions on AM, and both arrangements feed into a common i-f system at the usual 455 kc and 10.7 mc frequencies.

Signals from a resonant dipole antenna, built-in or external, are matched to the first coil *L1*, by an appropriate tap thereon. This coil is self-resonant at the middle of the FM band and applies the signal to the grid of *V1*, a type 7H7, r-f amplifier. The plate voltage for the tube

[Continued on page 30]



R-F and converter stages of G.E. 376

# ASSOCIATION • NEWS •

## Empire State Federation Of Electronic Technicians Associations

### TV LECTURE SERIES—SEPT. 7, 1949 TO MAY 23, 1950

1. The nature of TV, transmission and reception, modulated waveforms, high frequency propagation and reception
2. Antennas and transmission lines
3. Front ends, mechanical and electrical consideration of
4. Video i-f circuits of all types including intercarrier systems
5. Sound circuits and alignment
6. Detector and video amplifiers—theory and commercial applications including intercarrier systems
7. Cathode Ray picture tubes—operation and control circuits
8. Synch and sweep circuits—theory and commercial applications, adjustments and controls, AFC
9. High voltage circuits—theory and commercial applications
10. Cathode ray oscilloscope—theory and applications in TV
11. Cathode ray oscilloscope—theory and applications in TV
12. Sweep Generators—theory and applications in conjunction with CRO
13. Alignment of TV receivers—theory and practical applications
14. Installation Problems, midtown, suburban, fringe areas
15. Servicing TV receivers
16. Examination

#### New York City Area

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John F. Rider Publishers, Inc.

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The Ward Products Corp.

Lecture No. 3; Oct. 5, 1949  
Philco Corp.

Lecture No. 4; Oct. 19, 1949  
Westinghouse Elec. Corp.

Lecture No. 5; Nov. 2, 1949  
Emerson Radio & Phono Corp.

Lecture No. 6; Nov. 16, 1949  
Radio Corp. of America &  
Radio Service Dealer Magazine

Lecture No. 7; Dec. 7, 1949  
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Lecture No. 8; Jan. 4, 1950  
Bendix Radio

Lecture No. 9; Jan. 18, 1950  
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Lecture No. 10; Feb. 1, 1950  
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Lecture No. 12; Mar. 1, 1950  
Coastwise Electronics Co.

Lecture No. 13; Mar. 15, 1950  
Kay Electric Co.

Lecture No. 14; Apr. 5, 1950  
Service Magazine

Lecture No. 15; Apr. 19, 1950  
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Examination

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John F. Rider Publishers, Inc.

Lecture No. 2; Sept. 28, 1949  
The Ward Products Corp.

Lecture No. 3; Oct. 12, 1949  
Philco Corp.

Lecture No. 4; Oct. 26, 1949  
Westinghouse Elec. Corp.

Lecture No. 5; Nov. 9, 1949  
Emerson Radio & Phono Corp.

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Radio Corp. of America &  
Radio Service Dealer Magazine

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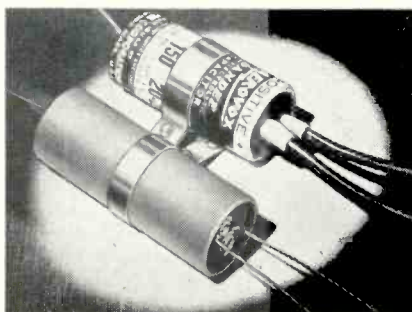
[Continued on page 26]

# NEW PRODUCTS



## TV BOOSTER

A new television booster declared to provide high gain is announced by The Astatic Corporation, Conneaut, Ohio, representing the initial entry into the television field of this well known manufacturer.



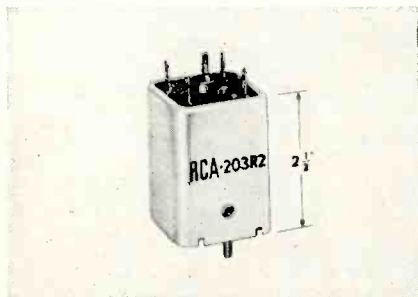
## MIDGET-CAN ELECTROLYTICS

The insulation of terminals and leads, added to the stud terminal construction previously announced, rounds out the advanced design of the new Type PHS multi-section Dandees or midget-can electrolytics offered by Aerovox Corporation, New Bedford, Mass.



## 16 INCH TUBE

Sylvania 16 inch metal direct view television tubes are now available for authorized distributors. Advantages of the metal tube, according to Sylvania, include increased physical strength, a reduction in weight of approximately 50%, increased image brightness and improved contrast of television image, a relatively flat face and ion trap gun.



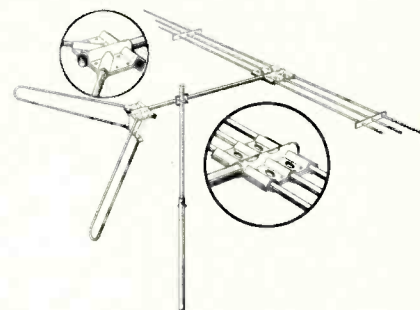
## HORIZONTAL OSC. COIL

The new horizontal-oscillator and sync-stabilizer coil 203R2 is designed for use in television receivers employing the medium-mu twin triode 6SN7-GT as a combined horizontal blocking-oscillator and synchronizing-control tube. The synchronizing control coil greatly improves the stability of the horizontal oscillator. Tube Department, Radio Corp. of America, Harrison, N. J.



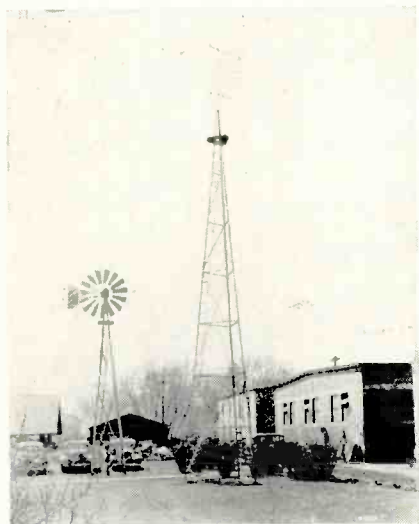
## SWEEP GENERATOR

A new entirely electronic sweep generator, Type ST-4A using a variable permeability type sweep and having no moving components has been developed by the Specialty Division of the General Electric Company at Electronics Park, Syracuse, N. Y.



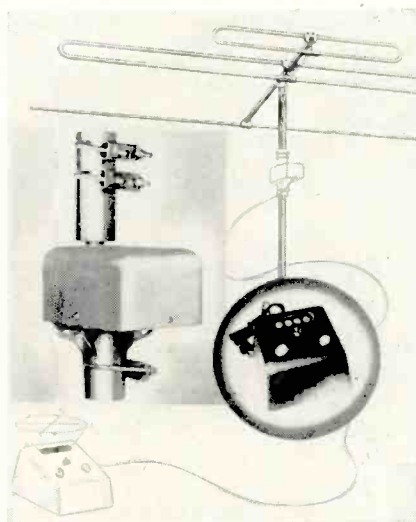
## TV ANTENNA

The Dielectric Products Company, Inc. of Jersey City, New Jersey, announces the availability of its DPC Duoband Dipole with Reflectors featuring the Exclusive Duo-Antenna Head.



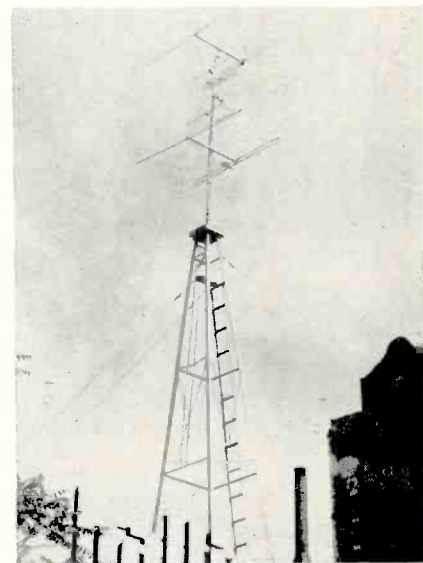
## TV TOWERS

Baker Manufacturing Company, Evansville, Wisconsin, announces a newly designed line of Monitor Towers for Television. Models included in the line are guyed ground and roof mounting towers and a three post self supporting tower, all of steel construction.



## ANTENNA ROTATOR

Radiart Corporation of Cleveland, Ohio, announces the Radiart Tele-Rotor. This new rotator rotates the antenna to the exact point that affords the clearest reception and simultaneously indicates the position of the antenna by lights on the remote-control unit that is mounted in an attractive brown plastic cabinet.



## TV ANTENNA

The Ward Products Corp., a division of the Gabriel Co., 1523 E. 45th St., Cleveland 3, Ohio, has announced its new Model TVS-47 television antenna which reduces installation time and cost considerably.

RACON LOUDSPEAKERS . . . America's Finest Since 1922



**QUALITY**

*"There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper . . . and the people who consider price only are this man's lawful prey."*

—RUSKIN

**P**retty smart chap, this Ruskin.

Styles may have changed since his time, but basic thinking remains the same. There are still many of us who believe the best is the least expensive in the long run and will not accept any shortcuts to quality.

Racon Electric Co., Inc., was founded twenty-seven years ago with the clear conviction of the kind of products to make . . . the best public address loudspeakers it was in their power to produce, without any compromise to accepted acoustical theory or craftsman's honor.

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Coastwise Electronics

*Lecture No. 13; Mar. 22, 1950*  
Kay Electric Co.

*Lecture No. 14; Apr. 12, 1950*  
Service Magazine

*Lecture No. 15; Apr. 26, 1950*  
Allen B. DuMont Labs., Inc.

*Lecture No. 16; May 10, 1950*  
Examination

### Binghamton-Endicott Area

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Philco Corp.

*Lecture No. 4; Nov. 2, 1949*  
Westinghouse Elec. Corp.

*Lecture No. 5; Nov. 16, 1949*  
Emerson Radio & Phono Corp.

*Lecture No. 6; Dec. 7, 1949*  
Radio Corp. of America &  
Radio Service Dealer Magazine

*Lecture No. 7; Jan. 4, 1950*  
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*Lecture No. 8; Jan. 18, 1950*  
Motorola Inc.

*Lecture No. 9; Feb. 1, 1950*  
Precision Apparatus Co., Inc.

*Lecture No. 10; Feb. 15, 1950*  
The Hickok Electrical Instrument Co.

*Lecture No. 11; Mar. 1, 1950*  
Allen B. DuMont Labs., Inc.

*Lecture No. 12; Mar. 15, 1950*  
General Electric Co.

*Lecture No. 13; Apr. 5, 1950*  
Kay Electric Co.

*Lecture No. 14; Apr. 19, 1950*  
Service Magazine

*Lecture No. 15; May 3, 1950*  
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*Lecture No. 16; May 17, 1950*  
Examination

[Continued on page 28]



*Here are some of the many reasons why there are more Simpson 260 high sensitivity volt-ohm-milliammeters in use today than all others combined. The Simpson 260 has earned world-wide acceptance because it was the first tester of its kind with all these "Firsts":*

# Simpson 260 SET TESTER

## WORLD FAMOUS FOR ALL THESE "FIRSTS"

- First high sensitivity instrument to use a metal armature frame.
- First to use fully enclosed dust proof rotary switch with all contacts molded in place accurately and firmly.
- First to do away with harness wiring.
- First to provide separate molded recesses for resistors, batteries, etc.
- First to cover all resistors to prevent shorts and accidental damage and to protect against dust and dirt.
- First with a sturdy movement adapted to the rugged requirements of a wide range of service work or laboratory testing.
- First to provide easy means of replacing batteries.
- First to use all bakelite case and panels in volt-ohm-milliammeters.
- First volt-ohm-milliammeter at 20,000 ohms per volt with large 4½" meter supplied in compact case (size 5¼" x 7" x 3⅛").
- First and only one available with Simpson patented Roll Top Case.
- First to provide convenient compartment for test leads (Roll Top case).
- First to offer choice of colors.

**RANGES**

20,000 Ohms per Volt DC, 1,000 Ohms per Volt AC  
**VOLTS:** AC & DC—2.5, 10, 50, 250, 1,000, 5,000  
**OUTPUT:** 2.5, 10, 50, 250, 1000  
**MILLIAMPERES, DC:** 10, 100, 500  
**MICROAMPERES, DC:** 100  
**AMPERES, DC:** 10  
**DECIBELS:** (5 ranges)—12 to +55 DB  
**OHMS:** 0-2,000 (12 ohms center), 0-200,000 (1200 ohms center), 0-20 megohms (120,000 ohms center).

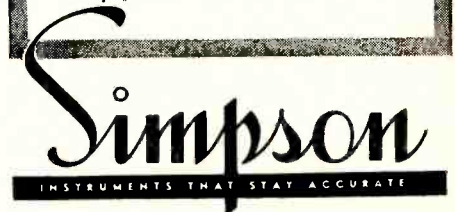
Prices: \$38.95 dealers net; Roll Top \$45.95 dealers net.



*The Model 260 also is available in the famous patented Roll Top safety case with built-in lead compartment. This sturdy, molded, bakelite case with Roll Top provides maximum protection for your 260 when used for servicing in the field or shop.*

25,000 volt DC Probe for television servicing, complete, for use with 260, \$12.85

**SIMPSON ELECTRIC COMPANY • 5200-18 W. Kinzie St., Chicago 44, Ill. • In Canada: Bach-Simpson, Ltd., London, Ont.**



## Association News

[from page 26]

### Rochester Area

Lecture No. 1; Sept. 27, 1949  
John F. Rider Publishers, Inc.

Lecture No. 2; Oct. 11, 1949  
The Ward Products Corp.

Lecture No. 3; Oct. 25, 1949  
Philco Corp.

Lecture No. 4; Nov. 8, 1949  
Westinghouse Elec. Corp.

Lecture No. 5; Nov. 22, 1949  
Emerson Radio & Phono Corp.

Lecture No. 6; Dec. 13, 1949  
Radio Corp. of America &  
Radio Service Dealer Magazine

Lecture No. 7; Jan. 10, 1950  
Allen B. DuMont Labs., Inc.

Lecture No. 8; Jan. 24, 1950  
Motorola Inc.

Lecture No. 9; Feb. 14, 1950  
Precision Apparatus Co., Inc.

Lecture No. 10; Feb. 28, 1950  
The Hickok Electrical Instrument Co.

Lecture No. 11; Mar. 14, 1950  
Allen B. DuMont Labs., Inc.

Lecture No. 12; Mar. 28, 1950  
General Electric Co.

Lecture No. 13; Apr. 11, 1950  
Kay Electric Co.

Lecture No. 14; Apr. 25, 1950  
Service Magazine

Lecture No. 15; May 9, 1950  
Allen B. DuMont Labs., Inc.

Lecture No. 16; May 23, 1950  
Examination

Phila. Radio Service Men's  
Association, Inc.

On May 17th, the Philadelphia Radio Service Men's Association presented to its members at a closed meeting a Television Trouble Shooting Session on Zenith TV sets through the cooperation of Motor Parts Company, who presented Mr. Jack Hirst, Television Service Manager. Mr. Jack Hirst, who has had a great many years of experience in the radio field, spent several hours explaining and demonstrating the proper procedures for setting up, aligning and trouble shooting on Zenith television sets. He was assisted by Mr. John T. Stinson, our local Hickock test equipment representative who helped in demonstrating to the men present the proper procedure to use Hickock equipment for aligning and trouble shooting. Mr. Hirst also provided sub-assemblies for the men to examine the chassis in order to have a better understanding of each part.

Harry Small borrowed one of Dave Krantz's ladders for TV installation and broke one of the lower rungs. Harry claims that he only fell a couple of feet but Dave was sore and

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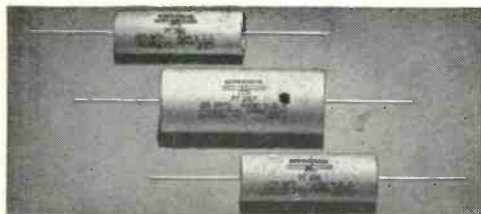
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CABLE - ARIAS - N.Y.

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wished it was one of the top rungs that had broken.

The Preventative Radio Maintenance Month, which is promoted by the State Federation for October, will be sponsored under the auspices of the PRSMA here in Philadelphia. We have received the cooperation of all our local distributors and many of the members of the Keystone Chapter and at this writing, we are also expecting the cooperation from all local AM and FM broadcasters and our local "reps" organization, and Mr. Sam MacDonald, who is president, has assured us of such.

Mr. Jimmy Skinner, Jr., vice president in charge of Philco Service and Parts, has offered us the assistance of Bill J. Nagy who is Promotion Manager for the Service Division. We were proud to accept this assistance. Mr. John Rider of Rider Publications, Sam Marshall of Radio Service Dealer Magazine, and Lew Winner, editor of Service Magazine, will act as co-ordinators for the Penna. State Federation.

From time to time you continuously read of theft of radio sets and appliances from stores and windows of many dealers. Recently the following merchandise was removed from F. C. Haab and Company, 21st and Chestnut Streets:

RCA Model No.	Serial No.
54B5	3469
8x542	62117
8B41	2185
8x521	10912

#### Independent Radio Television Technicians of Westchester County

This new association was started on June 17, 1949. Officers are as follows: Pres: Harry Weigand; V.P. : T. Olsen; Treas. : Miles Michaelson; Sec. : M. Erler. At a meeting held at Turn Hall, 10th and Stevens Aves., in Mount Vernon a substantial number of men attended.

#### Lackawanna Radio Technicians Association, Pennsylvania

The Lackawanna group has gone on record as favoring state licensing of radio and television technicians. They have expressed considerable concern over the safety hazards created by the erection of some TV and FM antennas. Furthermore, the group contends, licensing would maintain high standards and ethics in the profession.

With regard to Sandy Cowan's talk delivered before the group, they say, "—personal thanks to you for your efforts in not only giving the boys a good lecture but taking on the job of entertainer until that darn picture machine arrived—"

#### Long Beach Radio Technicians Association, Inc., Long Beach, Calif.

First June meeting featured Jack Meyers and A. B. Sherwood of G. E. who talked on a new TV sync circuit. Second meeting found Alfred Dowers of A. W. Marsh Co. expounding on changers.

Santa Monica and Los Angeles have asked to join RTA of Long Beach.

Harry E. Ward, Chairman of technicians apprenticeship committee Mooney award from Carleton E. Webb, representative of the Bureau of Apprenticeship standards, U. S. Dept. of Labor. The award came when

technicians apprenticeship committee vote Mr. Ward the "Most outstanding, aggressive and valued member" in the Long Beach and Harbor area for the past year.

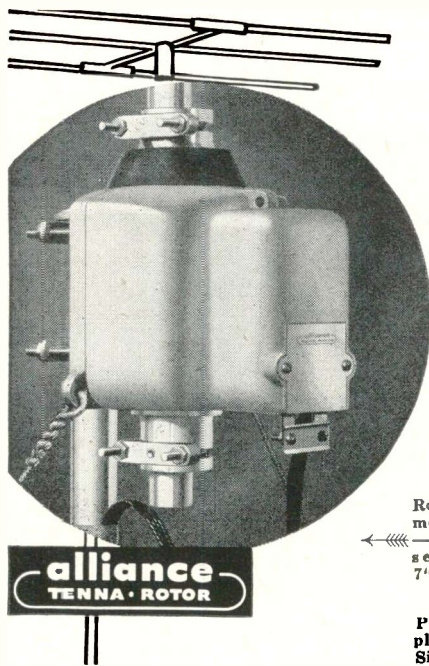
#### Cooperating Appliance Dealers Association of Brooklyn, Inc.

The Cooperating Appliance Dealers Association of Brooklyn held their annual informal Outing and Picnic on Sunday 24 July 1949 at the Grove and Recreation Hall in Hecksher State Park.

Joseph J. Jones  
Chairman Picnic Com.

## TELEVISION Service Shops . . . End 'Fixed' Antenna Troubles!

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Order #W 7530 ..... \$7.95 list

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## CIRCUIT COURT

[from page 23]

flows through a 4700 ohm resistor, and the screen is fed from the plate via an additional 10K unit.

The r-f voltage appearing on the plate passes through a 100  $\mu$ f capacitor to an unusual tuned network in the signal grid of V2, a 6SB7 pentagrid converter. L2 is a choke coil providing return to ground for d-c purposes and along with shunt capacitors determining the low frequency characteristics of the circuit. The unit marked P is the adjustment for this end of the range.

The coil L3 is the actual tuning coil, and in conjunction with the tuning condenser and its associated trimmer, comprises a series-tuned resonant circuit. The use of series tuning permits the use of larger values of L and C with attendant improvement in stability and gain.

V2 serves only as a mixer, having the oscillator voltage supplied to its injection grid from a separate source consisting of a 7A4 tube, V3, and appropriate components. A Colpitts circuit is employed in the oscillator.

## ASPEN

[from page 22]

of the receiver for a maximum reading on the voltmeter. For Channel 2, this maximum reading should occur less than one-quarter turn counter-clockwise from the fully clockwise position of the tuning knob, as shown in Fig. 6.

7. Repeat the above steps for Channels 3 through 13. In each case, the peak reading on the voltmeter should come near the correct turn position of the tuning control indicated on Fig. 6.

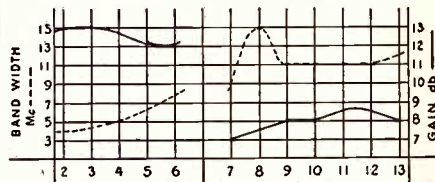
In the event peaking cannot be obtained on Channel 6 in early production sets of the smaller Philco table models 1104 and 1105, remove about 1.5 inches of the aluminum antenna foil from the right-hand end of the foil, looking at the rear of the cabinet. Just cut off the foil with a sharp knife and straight edge. This is the end of the foil nearest the high voltage power supply. The uncut dipole is level with the top of the high voltage cage. There will be a space of 1 1/2" when the dipole has been cut.

8. If a peak reading cannot be obtained on each channel in the low-frequency band at approximately the correct turn position of the tuning

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P-3063	\$30.00	360-360	250	5	3				6.3	5	3 1/2 x 4 1/4
RCA Repl									6.3	5	3 1/2 x 4 1/4

### Dimensions

Type No.	H	W	D	Mir	Type
P-3061	6 1/4	3 7/8	4 3/8		C
P-3063	5 1/4	3 7/8	4 3/8		C

### VERTICAL OUTPUT TRANSFORMER

Type No.	List Price	Turns Ratio	Pri	to Sec	Mfg. Centers	Mfg. EV
A-3035	\$5.25	10	1	1 1/2	1 1/2 x 2	

### Dimensions

H	W	D
3 1/8	2 1/4	2 1/2

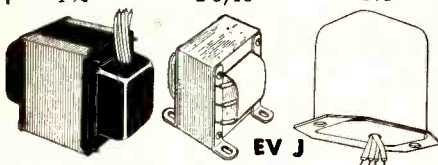
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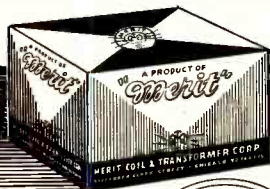
Type No.	List Price	Turns Ratio	Pri	to Sec	Mfg. Centers	Mfg. J
C-4000	\$2.75	1.4:2	1	1 1/2	1 1/2	

### DIMENSIONS

H	W	D
1 3/4	2-5/16	1 1/2



3063 PRODUCTS OF MERIT



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knob, the long section of the loop assembly, to which the 300-ohm line is attached, may be pushed together or bowed out to obtain peaking. Referring back to Figure 2, the legs of the loop sections labeled "A" and "B" can readily be squeezed together or pulled apart to achieve peaking in the correct turn position for each low-band channel from 2 to 6.

9. If a peak reading cannot be obtained on each channel in the high-frequency television band, the two small loops near the tuning condenser (marked "C" in Fig. 2) may be elongated by squeezing the wires together or may be bowed out into more circular shape.

After these adjustments have been made, if it is still not possible to obtain maximum meter readings at the correct positions of the *Aerial Tuning Control*, we suggest that the variable tuning condenser be replaced. Incidentally, this aerial tuning capacitor has a capacitance range from 2 to 30  $\mu$ f.

### Life Testing of Philco

The new Philco electronic built-in aerial system was developed, designed and engineered for production over a considerable period of time, as you may imagine. An important phase of engineering this aerial system for production was to take the original models, developed by a group from the Research Division and Engineering Department under the direction of Robert B. Albright, and to subject these models to grueling life tests.

During the life tests, a number of minor flaws in the construction of the moving parts of the aerial tuning assembly were discovered and corrected. Production samples of the new Philco built-in aerial system have been tested on a special machine which turns the knob of the tuning assembly through its entire throw, from tight clockwise to fully counter-clockwise. A typical Philco aerial is still in good condition after 45,000 turns or the equivalent of many years' service in the customer's home.

### Field Tests

As we have seen, tests of the Philco tunable built-in aerial shows that the performance of this new system is substantially equivalent to that of a dozen folded dipoles, each cut to precisely the right length for each of the 12 television channels.

These results have been corroborated by a series of extensive field engineering tests of the Philco electronic built-in aerial in four metropolitan areas: New York, Philadelphia, Chicago and Washington.

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reception is difficult, surprisingly good performance has been obtained from the Philco built-in aerial. In addition, a comparison of reception was made from a new Philco receiver with a built-in aerial system vs. reception from an identical receiver which had its built-in aerial purposely disconnected and was instead connected to a good outside antenna. The results of these tests indicated that, in the presence of a fair-to-strong signal, the reception from the built-in aerial was superior in quality! This is because, using the tunable built-in aerial, a better match was obtained on each channel and it was possible to tune out interference from FM stations and other electrical noise.

Such tests, made in a wide variety of locations by Philco field engineers, proved that the new electronic built-in aerial will be valuable to many occupants of metropolitan apartment buildings and hotels, especially where landlords have refused permission for rooftop aerials.

Even more successful results in reception were obtained when the Philco built-in aerial system was tested in residential districts around Manhattan, including Queens, Flushing, Brooklyn, The Bronx, northern New Jersey and the commuting areas of Long Island and Westchester County. Here good picture and sound quality was obtained from practically all stations in all locations.

In Philadelphia and Chicago, similar tests indicated comparable performance. In the downtown areas where there are tall buildings, reception is often marred by multiple images, but performance with this built-in aerial was superior to that with a typical single dipole outdoor antenna. Tests made in the residential districts of these cities indicated excellent reception in the vast majority of locations.

Tests made at a great many sites throughout the Washington, D. C. area showed that up to 80% of prospective customers will get good reception with the Philco electronic built-in aerial system. In Washington, the transmitters are located favorably and there are few tall buildings—conditions typical of many other television cities. Here it can safely be said that "plug-in-and-play" performance in television has arrived with the Philco tunable built-in aerial system.

One final point should be noted. In fringe locations, where the signal is very weak, an outdoor antenna may be necessary. In such cases, disconnect the built-in aerial merely by removing its 300-ohm line from the antenna terminals and then substitute the lead-in from the outside aerial.

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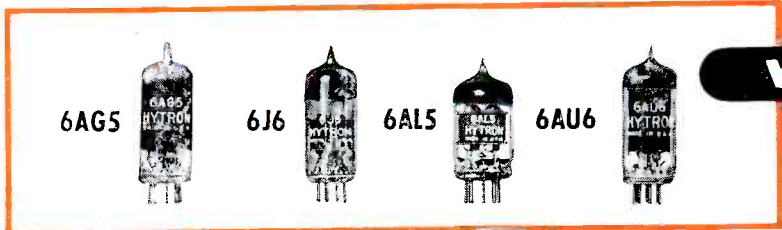
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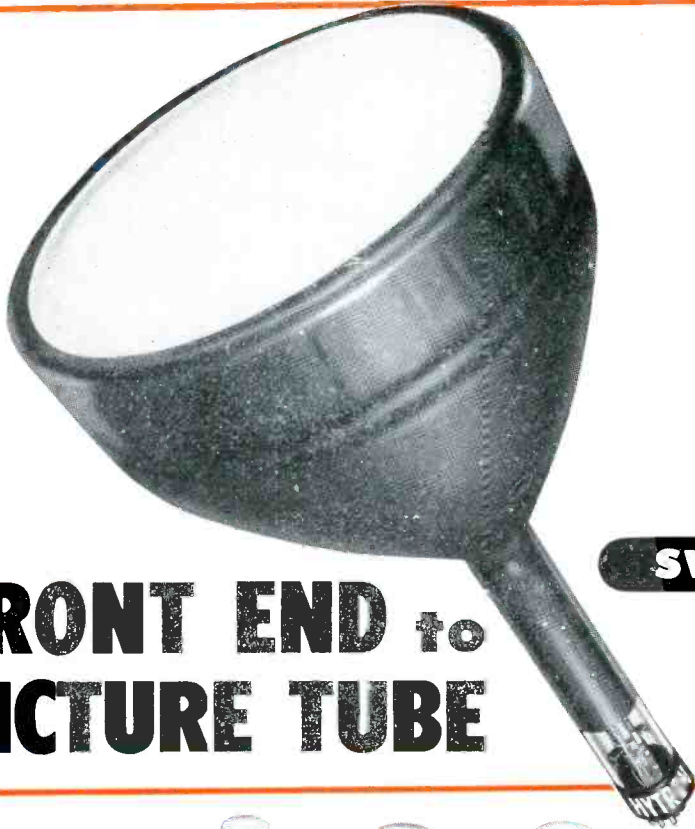
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