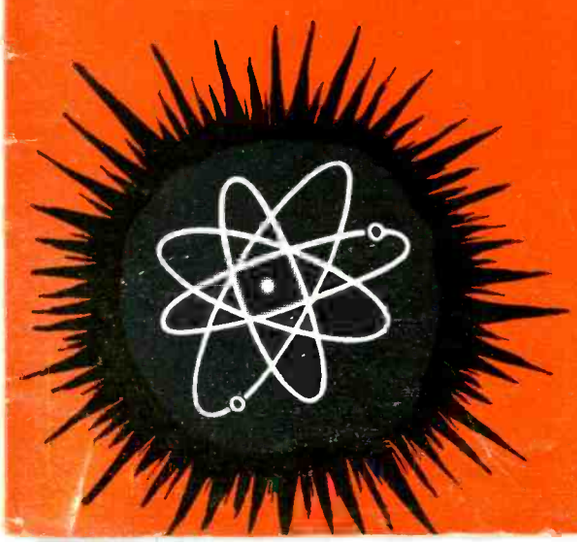
radio service dealer

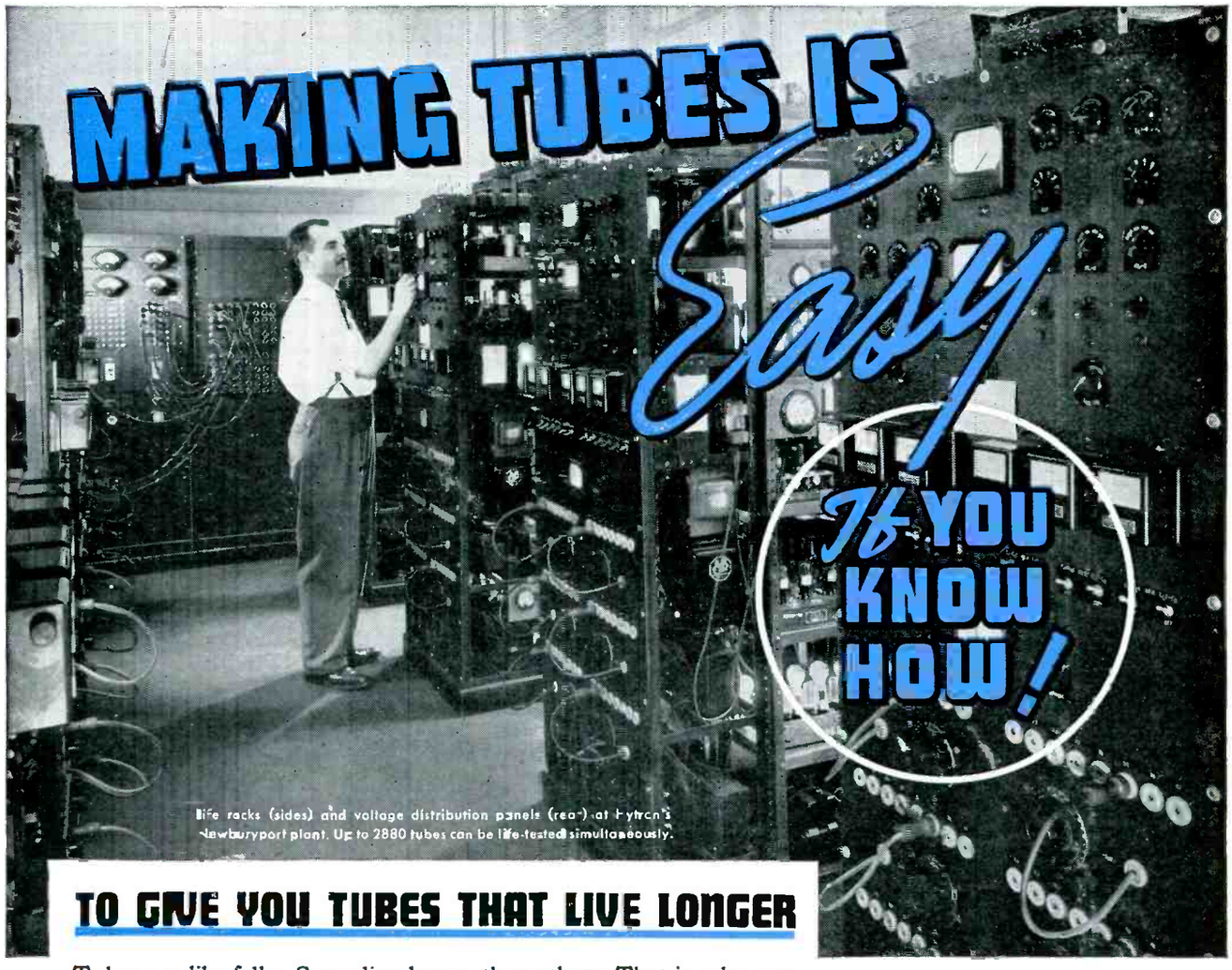
AUGUST, 1947



IN THIS ISSUE:

MAKING TUBES IS *Easy*

If YOU KNOW HOW!



Life racks (sides) and voltage distribution panels (rear) at Hytron's Newburyport plant. Up to 2880 tubes can be life-tested simultaneously.

TO GIVE YOU TUBES THAT LIVE LONGER

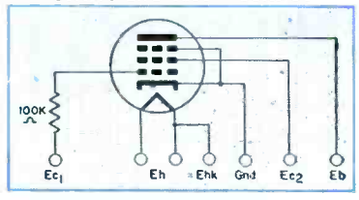
Tubes are like folks. Some live longer than others. That is why you are protected by your Hytron service guarantee. More important to you, statistical information amassed by continual life testing provides Hytron engineers with the means to control and extend the life of the average tube.

Of necessity, life tests are limited samplings. An adequate number of tubes from each day's production are plugged into life racks. Positive potentials are patched in from distribution panels. The life racks themselves supply other potentials. Time meters count the hours of operation. Cycling controls permit adjustable intermittent tests. Repetitive, paralleled circuits, such as those diagramed, simulate worst-possible maximum operating conditions.

Tubes run to predetermined life test end points – adequate to control deterioration of characteristics during normal life. At frequent intervals, engineers check important characteristics like transconductance, gas current, and power output. Special dynamic life tests help determine ratings and overload capabilities of newly developed tubes. For example, the 5516 was life-tested intermittently and continuously at 160 mc.

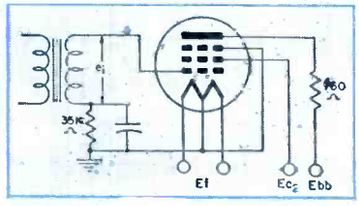
Life will vary from tube to tube. But such careful, persistent checking makes it much easier to assure you of uniform Hytron tubes which live longer.

STATIC LIFE TEST—6SK7GT



Static class A amplifier with fixed bias, maximum operating potentials, and heater-cathode potential to test breakdown of h/k insulation.

DYNAMIC LIFE TEST—2E30



Dynamic class C amplifier with grid leak bias and maximum operating potentials. Note rms voltage in series with rectified d-c grid potential.

SPECIALISTS IN RADIO RECEIVING TUBES SINCE 1921

HYTRON

RADIO AND ELECTRONICS CORP.

MAIN OFFICE: SALEM, MASSACHUSETTS

Has Battery Inventory GOT YOU UP A TREE?

Simplify with one complete line— "EVEREADY" RADIO BATTERIES!

Do you ever feel your radio-battery stock *owns you?*

Plenty of dealers do. Because they're *loaded up* with "specials"...odd brands...mushroom-growth additions to the radio-battery field!

If *you're* up that kind of a tree...here's the way down:

Specialize on "Eveready" radio batteries. They fit virtually *all* makes of sets—with *less* inventory and *more* customer confidence. And, size for size, "Eveready" "Mini-Max" batteries will outlast *any* others!

You can get them NOW—in quantity...you *don't have to buy any other items!* And you can sell them more easily—and more profitably!

The registered trade-marks "Eveready" and "Mini-Max" distinguish products of National Carbon Company, Inc.

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UCC

Go to a Radio Manufacturer for Radios—a Battery Manufacturer for Batteries!

A SIGN OF SUCCESSFUL SERVICING

Community has all fifteen Rider Manuals*

**(and Volume XVI on order)*

In national magazines it's the successful shops that are featured editorially. Note how many carry photographs showing complete libraries of Rider Manuals. Community Radio and Electric Service of Wilkinsburg, Pa. is an example; was recently featured in **Radio Retailing** for its "Plus-Service". At Community you will find all fifteen volumes in daily use. For, from no other single source is such essential information available to shops called upon to service all makes and all types of radio receivers — of all ages.

For this reason the first fourteen volumes of Rider Manual are time-savingly essential to the average shop. These volumes alone cover the years when over 80% of the sets now in American homes were issued. (From 1920 to 1942 inclusive.)

Too, the information on these receivers is the OFFICIAL AUTHORIZED servicing data direct from the service departments of the companies that made the sets. No one knows better than the manufacturer what procedures are best for his product. That is the basis for the authority and the success of Rider Manuals.

And you get this dependable information at the earliest possible date. For, Rider Manuals are now being issued three times a year!

Rider Manuals are investments. They keep pouring out profits for you. Copies of Volume 1, bought 17 years ago, are still benefiting their owners. So, be sure your shop has the sign of successful servicing — all fifteen Rider Manuals.

RIDER MANUALS NOW IN 16 VOLUMES

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Covers sets issued during 1946 and some previously unpublished pre-war models. Contains 530 Rider-exclusive "clarified-schematics."

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RIDER MANUAL

704 Pages . . . $6.60

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Important Policy Announcement

Because of the current high, receiver production rate, Rider Manuals will be issued three times a year, as long as existing conditions continue. This will provide independent servicemen and dealer-service-shops with complete information at the earliest possible date, on those new sets which may require adjustment or repair. This accelerated publishing schedule is but another example of our alertness to meet your radio receiver servicing data needs with greatest economy to you. Rider Manuals represent, "Seventeen Years of Service to the Servicing Industry".

JOHN F. RIDER
Publisher, Inc.
404 — 4TH AVE., N. Y., (16) N. Y.

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13 E. 40th St., New York City
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EDITORIAL

Customers Are Getting Choosy

Retailers, and makers of radio receivers and electrical appliances have noticed that since early April customers are no longer willing to walk into a store and purchase the first radio set or appliance offered merely because the item is immediately available. Likewise, customers now are "shopping" amongst service organizations, getting estimates, before authorizing a repair job.

Nationally known and recognized "standard" brands sell quicker, with less sales-resistance than new or off-brand lines. Customers are considering product-merits before making a commitment. They are weighing a firm's reputation too, before making a purchase or okaying a repair job. The adage: "There's no better advertising than a satisfied customer" is proving to be well founded.

So, it seems we are well out of the "Seller's Market" and into the "Buyer's Market". It is a healthy condition. Free enterprise and keen competition lead to the elimination of "weak sisters," price cutters and firms that are not reliable and those who do not maintain high ethical standards.

The months since war ended have been toughest on the so-called middle-class of people. Capital and Labor differed; middle groups being squeezed from both ends. Higher prices resulted-so naturally, to be as well off as before, the average merchant must find a way to establish for himself a higher income. As America thrives on competition, and since the middle class is numerically the largest class, we have a right to feel quite optimistic about prospects for the future.

More About Petrillo

Last month we opined that the general public and the radio industry, and the FM phase of radio in particular, could expect great benefit from the Supreme Court's adverse ruling against music Czar James Petrillo.

Subsequently Mr. Petrillo declared to a Congressional Committee that his organization might achieve its ends and circumvent the decree against it by going into the phonograph record making business for itself. It is a brash threat and has no foundation upon which to stand. We doubt that any important record retailers, who in the majority of cases are the leading retailers of radios, would even consider handling Petrillo-made records. If they did do so they would contribute to the murder of network broadcasting and the demise of radio receiver selling and thus figuratively cut their own throats. Businessmen don't do such things!

It takes two to make a bargain. Some of Petrillo's demands against broadcasters are just, should be met, and undoubtedly will be in time. But, from where we sit, it is the Juke-box industry and not the radio industry against which Mr. Petrillo has the most justifiable gripe.

S. R. COWAN, Publisher

radio service dealer

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VOL. 8

No. 8

SANFORD R. COWAN

Editor & Publisher

AUGUST, 1947

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COWAN PUBLISHING CORP.

IN & AROUND THE TRADE

PIX OF TELEVISION SCENES

The new television business is joined with the old amusement arcade business with the manufacture of a new-type television machine by International Mutoscope Corporation, Long Island City, it was announced by William Rabkin president.

The object of the new television machine is to provide an adequate television viewing screen and at the same time provide a mechanism for photographing the image, inside the equipment, merely by pressing a button.

The machine will operate on an interlocked coin mechanism for viewing the photographing. "All clear," for photographing will be signalled by a white light, and a red light will indicate it is time for another coin. Exposure time for photographing any image is set at 1/25 of a second. The print is automatically developed and delivered in one minute.

Possibilities for this machine are great.

The primary outlet would be the popular amusement arcades, where patrons can select the television program they wish to view and, as a particularly fine image is screened they press a button and get a permanent print of the scene.

Newspaper offices would find an excellent use for the machine. It would eliminate the delay time of having a photographer on the scene of an important event and waiting for the negative to be brought to the office and developed. One of these machines could be kept in operation constantly viewing a public or sporting event. As a particularly newsworthy image was screened the photograph could be taken and the print ready for newspaper-processing in one minute.

Plans for distribution of the television-photographing machine call for the first units to be placed in the early fall.

Mallory N. Y. Office Moves

P. R. Mallory & Co., Inc., announces the removal of their New York Office to 41 East 42nd Street, Suite 1215. P. R. Mallory & Co., Inc., manufacturers electrical, electronic and metallurgical components, dry cell batteries, resistance welding electrodes and special metals, with headquarters and main plants at Indianapolis, Ind., and branch plants at North Tarrytown, N. Y., and Tipton, Ind.

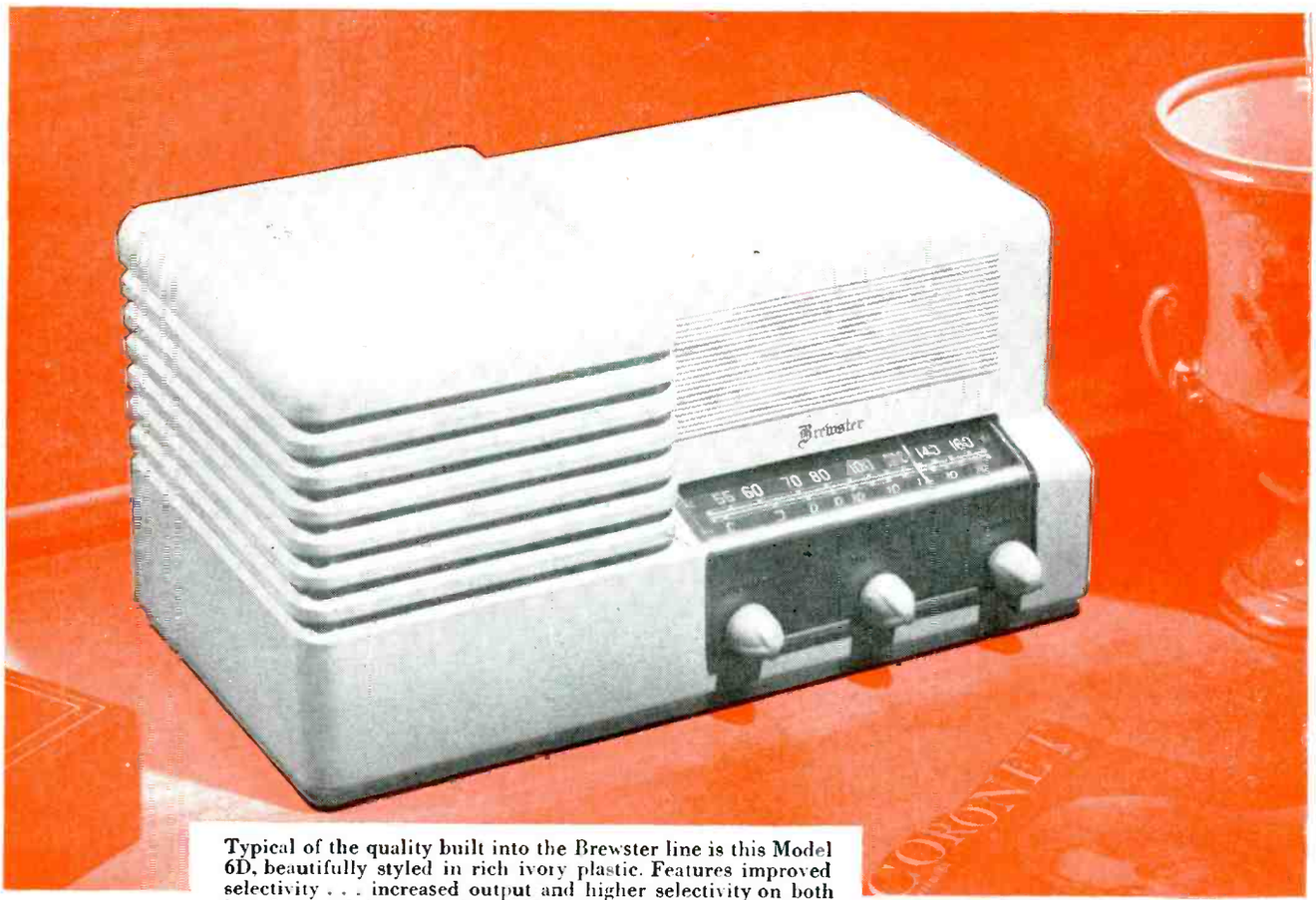
RMA Proposes Service Clinic

RMA directors voted to underwrite a proposed experimental clinic for servicemen, to be sponsored by the Radio Parts Industry Coordinating Committee and local distributors.

Chairman J. J. Kahn of the RMA Parts Division proposed an appropriation up to $2250 to launch the project in

Meissner

PRESENTS THE NEW BREWSTER LINE OF TABLE MODEL RADIOS



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

Here in these new Brewsters is the outstanding line you have been waiting for! Superbly designed, unmatched for sheer beauty of tone, these completely new sets reflect the skill and craftsmanship that have made the name Meissner a byword for quality in the trade. Encased in cabinets of surpassing charm, they are easily superior to anything now being offered in this field.

Smartly designed, quality engineered, these sets are being manufactured by Meissner for exclusive distribution through parts jobbers only. No quotas, no high-pressure tactics, no "special deals", no sales direct to dealers or special distributors . . . in fact, nothing that might even remotely interfere with your merchandising this new, exclusively-jobber line to the hilt. More than this . . . Meissner unconditionally guarantees the prices on these new Brewsters against reduction for the balance of the year.

This complete line is available for delivery NOW. Wire or write today for full information, prices and illustrated folder.

Meissner **ELECTRONIC DISTRIBUTOR AND INDUSTRIAL SALES DEPARTMENT**

MAGUIRE INDUSTRIES, INCORPORATED

936 NORTH MICHIGAN AVENUE • CHICAGO 11, ILLINOIS

EXPORT DIVISION • SCHEEL INTERNATIONAL INCORPORATED
4237 NORTH LINCOLN AVENUE, CHICAGO 18, ILLINOIS • CABLE ADDRESS HARSCHEEL

Philadelphia and probably also in a mid-western city. If successful, the clinic may be extended to other cities throughout the United States. Local expenses for meeting halls, entertainment, et cetera would be borne by local distributors in cooperation with the N. E. D. A.

A suggested code of ethics for radio servicemen also is planned by the Radio Parts Coordinating Committee, Mr. Kahn said, as part of an industry program to raise the standards of servicemen and to enable them to expand their service to radio listeners.

U. S. T. Appoints Rubin

The appointment of Robet H. Rubin as sales representative of the United States Television Mfg. Corp., for the Washing, ington, D. C. area has been announced by Francis H. Hoge, Jr., Vice-president of sales.

G-E Disposalls Available

Increased production of Disposalls in the General Electric factory has made possible the removal of the appliance from an allocation basis, according to company officials. The device is now generally available throughout the country.

Sparton Appoints Pierce

E. C. Bonia, V.P. in charge of sales, The Sparks-Withington Company, has just announced the appointment of H. L. Pierce as District Merchandising Manager of the Sparton Radio and Appliance Division. His territory will be all of eastern Pennsylvania and southern New Jersey.

FM Sales & Service Aid

To assist radio service dealers who are putting out crews of door-to-door demonstators to bring FM into the homes of thousands for the first time and servicemen who are installing FM receivers, Bendix Radio offers the Facto Meter which takes the guesswork out of the installation, halts unnecessary service costs and prevents a great percentage of warranty returns.

The FactoMeter is best described as an AM-FM set that is portable to any light socket. It is equipped with a small, telescopic antenna and a precision meter which accurately translates the strengh of incoming signals on the antenna.

Since the very short waves of FM are only about ten feet long, as compared with the thousand foot wave length

[*see page 30*]

Bendix FactoMeter

IMPORTANT ANNOUNCEMENT to my Servicemen friends:

In just one year, PHOTOFACT has become the leading Radio Data Service. I owe this success to you. Your support has made it possible for the SAMS organization to provide you with the most complete, accurate and uniform service information ever published. Your backing has encouraged us to extend our activities. As part of our continuous program in behalf of the Servicing profession, I am happy to announce two important new publications. Like PHOTOFACT Folders, they meet a real need—you've told us so. And like PHOTOFACT, these new publications are based on our own actual study of the equipment covered. I am confident these new books will help your business . . . To each and every one of you I say a heartfelt "Thanks!"

Howard W. Sams

NEW! HOWARD W. SAMS

DIAL CORD STRINGING GUIDE

Only Book of its Kind!

There's only one *right* way to string a dial cord. And there's only *one* book that shows you how. It's the Howard W. Sams DIAL CORD STRINGING GUIDE. Here, for the first time, in *one* pocket-sized book, are complete dial cord diagrams and data covering 1938 through 1946 receivers. Actually, there are many ways you can go about stringing a dial cord—but only *one* is *right*. You know from your own experience that if you get started the wrong way, you can waste hours of your valuable time and work yourself into a nervous lather. You can say "goodbye" to wasted time when you have a SAMS DIAL CORD STRINGING GUIDE. It licks the knottiest dial cord problem in a matter of minutes. This low-cost book is a "must" for servicing. You'll want two copies—one for your tool kit and one for your shop bench.

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Over 96 pages
Easy to read diagrams and data

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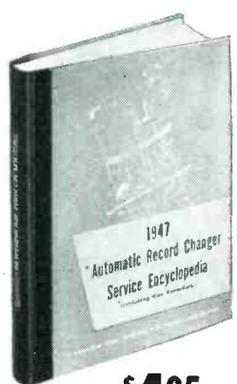
AUTOMATIC RECORD CHANGER MANUAL

There's Nothing Like It!

COVERS MORE THAN 40 DIFFERENT POST-WAR MODELS! A DeLuxe volume, packed with ORIGINAL data based on actual study of the equipment covered. Absolutely *accurate, complete, authoritative.* No other information like it available: Shows exclusive "exploded" views; photos of top, side, bottom and rear views. Tells you manufacturers who use the equipment. Gives full change-cycle data. Complete information on all adjustments. Invaluable Service hints and kinks. Shows complete parts lists keyed to diagrams and photos. Uniform treatment for each piece of equipment. *PLUS*—for the first time in any publication—complete, accurate service data on leading WIRE, TAPE, AND DISC RECORDERS! No modern service shop can afford to be without this book!



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

- ☐ Send .....SAMS' DIAL CORD STRINGING GUIDE(S), at $0.75 per copy.
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QUALITY
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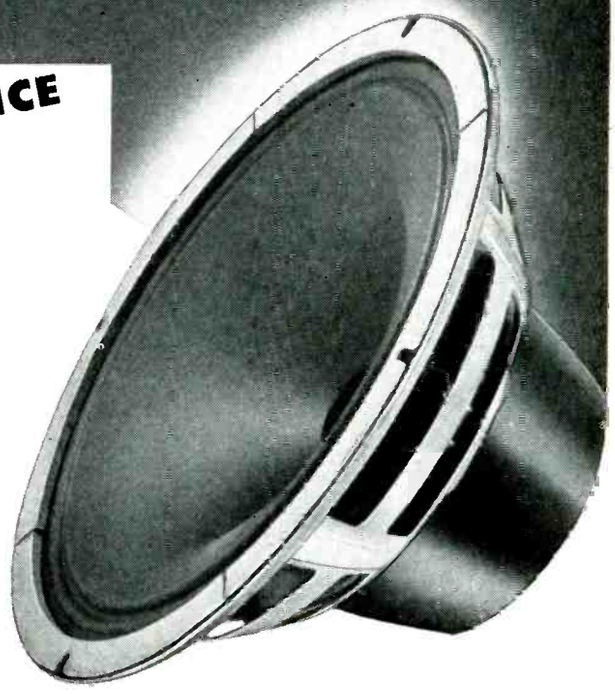

EVERY General Electric Speaker — from the smallest to the largest—has aluminum foil base voice coils. This G-E development makes possible their high quality performance, tone fidelity, and operating durability. Whether you use them by the hundreds of thousands in production lines, or purchase a single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

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

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

PLUS...

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

● DURABLE CONSTRUCTION THROUGHOUT.

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

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For Quality Tubes that give Peak Performance see your RAYTHEON DISTRIBUTOR.

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RAYTHEON MANUFACTURING COMPANY

RADIO RECEIVING TUBE DIVISION

NEWTON, MASSACHUSETTS CHICAGO, ILLINOIS

Says the service expert who values his good reputation and the repeat business that goes with it—

"I SELL KEN-RAD RADIO TUBES BECAUSE THEY'RE BUILT RIGHT"

"...AND BECAUSE THEY PLAY RIGHT I BUY THEM!"

—asserts the tone-conscious radio owner who appreciates the superior quality of Ken-Rad tubes.

KEN-RAD DOUBLE ACCEPTANCE

puts profits in the repairman's pocket

● You're glad to install Ken-Rad tubes because their reputation stands high with you, as well as with other service experts. And Ken-Rad tubes reward this enthusiasm by helping you secure a bigger repeat business—based on clients' faith in your standards of work as shown by the quality tubes and parts you use.

DOUBLY ACCEPTED . . . by you and your customers! That's why Ken-Rad tubes hold a coast-to-coast margin of popularity. Radio owners endorse their finer tone, their long-playing life. *You* prefer to sell Ken-Rad tubes—*customers* want to buy them! It's a favorable meeting of minds, creating more sales and greater profits.

NOW is the time to impress your name and high-grade repair facilities on your neighborhood! Radio-set production is large; owners' service needs will grow. Ken-Rad tubes can help you gain wider, friendlier local recognition, with the increased business "take" that will result. Install and sell Ken-Rad *doubly-accepted* radio tubes!

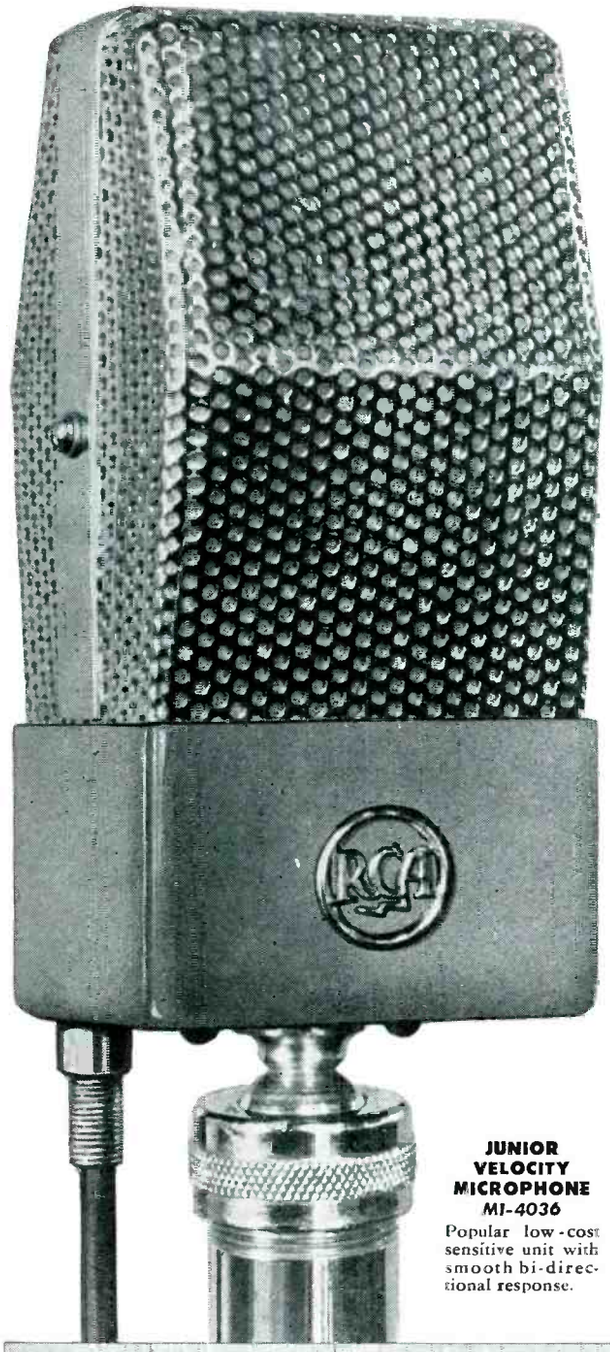
● **HERE'S REAL ADVERTISING HELP!** Ken-Rad Booklet ETR-62 illustrates and tells about the big, elaborate line of display and promotion material (it's tops in the trade) available to help you sell more radio tubes as well as *more repair service.* Write for your free copy!

178-F7-8850

KEN-RAD *Radio Tubes*

PRODUCT OF GENERAL ELECTRIC COMPANY

Schenectady 5, New York



RCA *Microphones*

supply quality input to All sound jobs

HERE ARE FIVE HIGHLIGHTS from the popular RCA package sound line. They are high quality RCA microphones . . . selected for the new line because their characteristics best meet the requirements of the types of sound jobs you handle. They are priced for easy sales and quick profit. They bring you the very highest customer acceptance and confidence.

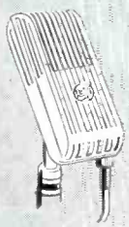
All models are supplied in both high and low impedance types. They work perfectly with any of RCA's new package amplifiers. They provide exactly the right choice for speech or music . . . inside or outdoors.

JUNIOR VELOCITY MICROPHONE
MI-4036
Popular low-cost sensitive unit with smooth bi-directional response.

Send for these folders

Descriptions and specifications of RCA microphones, amplifiers, loudspeakers and intercoms . . . just printed . . . waiting for you. Get them now. Address: Dept. 88-H, Sound Equipment Section, RCA Camden, New Jersey.

VARACOUSTIC
MI-6203,04

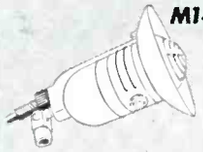


An extremely versatile velocity type. Has variable directional characteristics . . . a wide range of application.

PROGRAM VELOCITY
MI-12002,03

Extremely small, highly sensitive . . . the ideal portable microphone.

AEROPRESSURE
MI-6206,07



Heavy duty, indoor-outdoor type. Reversible baffle varies directional response.

AERODYNAMIC
MI-6226,28

Very sensitive, close-talking dynamic . . . ideal where noise level is high. Weatherproof.

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

In Canada: RCA VICTOR Company Limited, Montreal

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There are excellent mechanical and engineering reasons why more Mallory-made vibrators are used in original equipment than all other makes combined.

TWELVE MALLORY VIBRATORS ANSWER 90% OF YOUR REPLACEMENT NEEDS

Make replacements easily and quickly. Thanks to the Mallory program of standardization, the number of vibrators you need to meet most of your requirements is materially reduced—only twelve in all.

MALLORY HAS A COMPLETE VIBRATOR LINE

In addition to the 12 basic units, Mallory also makes *39 other replacement vibrators* so that even when you meet a rare or unusual service problem, your Mallory distributor can supply the answer. The Mallory line leaves *nothing out* —it's a complete line that rounds out your business.

See Your Mallory Distributor for a free copy of the 1947 Replacement Vibrator Guide.

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TELEVISION R-F CIRCUIT APPLICATIONS

An analysis is made, for the first time, of the various types of r-f circuits likely to be encountered in present and future television sets

by S. L. MARSHALL

Commercial television receivers being comparatively new, plus the War developments in ultra-high frequency techniques, television r-f circuits as founded in current receivers employ widely varying techniques and principles. These will now be discussed. However, as a basis for comparison it is desirable to point out certain basic requirements which any properly designed television receiver should possess as far as its r-f section is concerned. These are as follows:

Basic Requirements

1. A wide band-pass of frequencies on either side of the resonant frequency to which the r-f stage is tuned. This band-pass is 3 mc wide on each side of the center frequency. Thus, a total of 6 mc is included in the response curve of *Fig.* 1 which illustrates the ideal condition obtained in an r-f stage tuned to channel No. 1 44-50 mc.

The frequency response curve of a transmitter operating in this channel is shown in *Fig.* 2. If the r-f circuit is tuned broadly enough, the video and audio carriers of the station, and their side-bands, will fit into the r-f response curve of the receiver in the manner shown in *Fig.* 3. Observe that in this particular channel the video r-f carrier frequency is 45.25 mc, the audio r-f carrier frequency is 49.75 mc, and the resonant frequency of the r-f circuit is 47.0 mc. Methods of obtaining broad bandpass response characteristics will be discussed shortly.

2. A suitable band-switching mechanism which will effectively connect the required tuning units to the desired channels. At the television frequencies, contact resistance, stray inductance and capcitance effects, and temperature capacitance variations are important factors in the operation of a receiver. For this reason the circuit components must be selected with due consideration of these variables, and the wiring given considerable care.

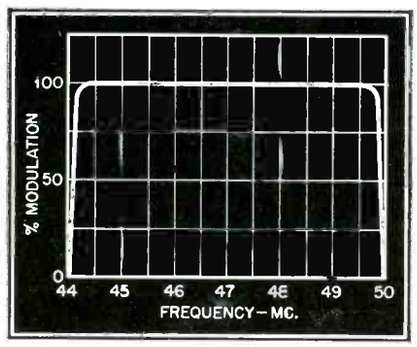

Fig. 1 — R-F stage response curve obtained when r-f unit is tuned to 47 Mc.

Tuned RF Stage Advantages

Tuned r-f stages employed in television receivers result in superior operating qualities as compared to receivers in which the antenna transformer is coupled directly into the mixer. These are as follows:

1. An increase in signal voltage is obtained at the mixer grid. This increase depends primarily on the circuit design. Some receivers are designed rather elaborately around this section, as will shortly be illustrated.

2. An incerase in selectivity, and therefore a reduction in image frequency response takes place. This results in less stringent band-rejection design requirements in the i-f stages.

3. An increase in signal-to-noise ratio results. This noise is that developed in the mixer tube due to thermal effects. By a proper choice of tube combinations in the r-f stage and the mixer the inherent signal to noise ratio of a circuit can be considerably minimized.

4. A buffer action between the oscillator circuit and the antenna takes place, thereby preventing radiation of oscillator energy into the antenna.

Basic and Commercial RF Circuits

A simple type of r-f circuit employed in many early television receivers, and still used today is shown in *Fig.* 4. This is a conventional tuned circuit with a re-

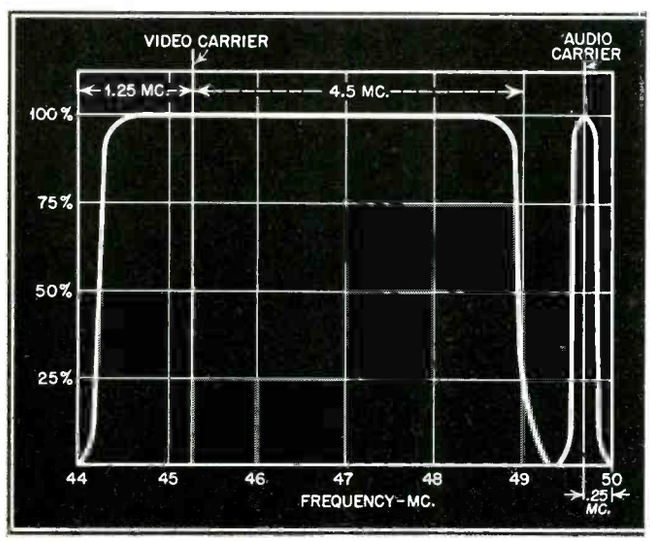

Fig. 2 — Waveform to transmitted signal

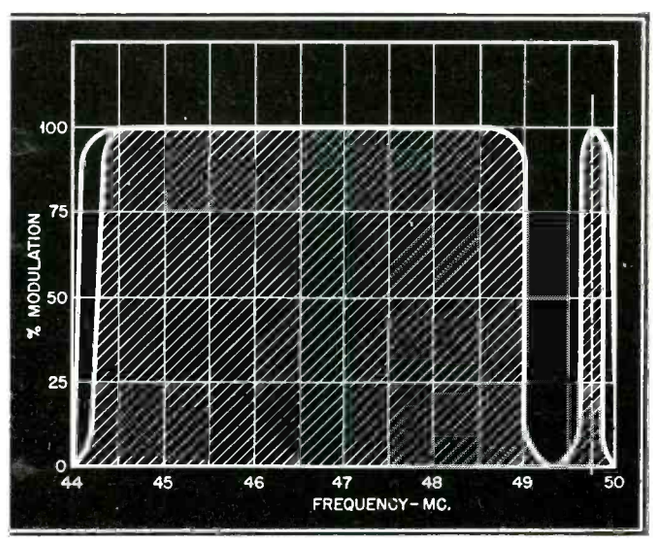

Fig. 3 — How trans. wave fits into r-f response curve

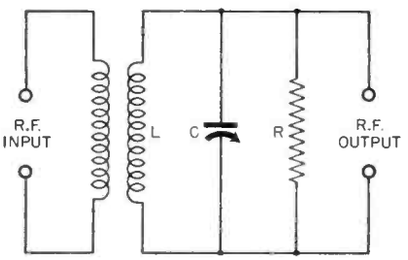

Fig. 4 — Transformer coupled series resonant circuit

sistance shunted across L and C. The manner in which the side band response is increased for different values of shunt resistance, R, is indicated in the graph of *Fig. 5*. In this particular instance the circuit components are such that the side-band response is adequate when R equals 4,000 ohms. This value of R varies considerably with different receivers. A commercial application of this circuit is shown in *Fig. 6* which is a simplified schematic of the r-f and mixer section of the Dumont #180 receiver. Although one tuned channel is shown, actually this receiver contains three.

A second type of r-f circuit is shown in *Fig. 7*. Here a series resonant circuit is used in conjunction with an r-f input transformer. This circuit was used considerably by G.E. in their receiver as is evident from *Fig. 8*. In this illustration it will be observed that the channel tuning is accomplished by means of the indicated series resonant circuit. Observe that the value of the shunt loading resistance is 18,000 ohms.

Figure 9 illustrates a third type of r-f circuit. This is a band-pass circuit with its respective coils overcoupled enough to effect the desired band-pass characteristics. This arrangement is superior to the parallel and series resonant circuits just discussed in that greater gain and better side band attenuation characteristics are obtained. Many commercial receivers will be found utilizing this type of circuit including the one illustrated in *Fig. 10* which is a simplified schematic of the Andrea KTE-5.

The three previously discussed r-f circuits were of the single-stage variety.

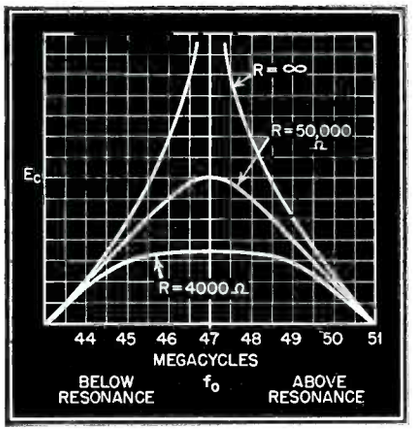

Fig. 5 — Side-band response as fixed by R

Modern trends, for reasons mentioned previously are towards the inclusion of an added r-f stage between the antenna following circuits employed by Dumont, transformer and the mixer tube. The Philco, and R.C.A. respectively, are at once, entirely individual, and absolutely without precedent.

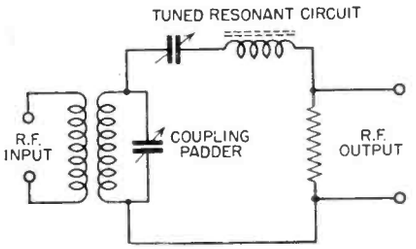

Fig. 7 — Another type of r-f circuit

tor. The antenna input circuit is cathode-coupled into the r-f tube thereby effecting an efficient energy transfer from a low to a high impedance network. A noteworthy accomplishment of this unit is the tuning arrangement which permits continuous coverage of the frequency spectrum between 44 to 216 mc. This enables the user to receive both television and FM broadcasts contained within the limits of this spectrum.

Referring to *Fig. 11*, which is a view of the tuning units of the Inductuner with its cover removed we observe three coils mounted on a common shaft, and insulated from each other. Two of these coils are part of a band-pass r-f circuit shown in *Fig 12*. The third coil is in the oscillator circuit illustrated in *Fig. 13*. Each coil is continuously tunable for ten complete revolutions, resulting in an inductance variation of between .02 and 1.0 microhenry approximately. This is done by means of a *trolley contact* n'b which divides each coil into a used and unused part. The capacitors are of the adjustable-fixed type.

At the ultra-high frequencies it is much easier to obtain a tuning ratio with coils than with capacitors. This due to the relatively smaller degree to which a

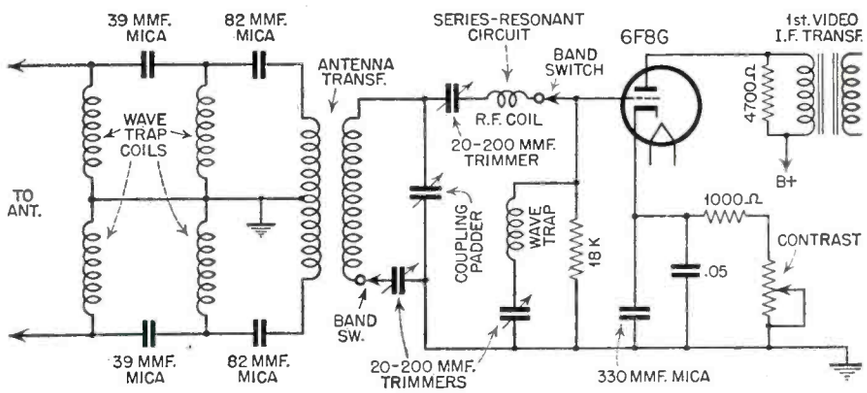

Fig. 8 — Simplified circuit diagram of G-E television sets HM-171, 185, 225-B and 226-B. Only one band shown

The Dumont Inductuner

The Dumont Inductuner employs three tubes, an r-f, a mixer, and an oscilla-

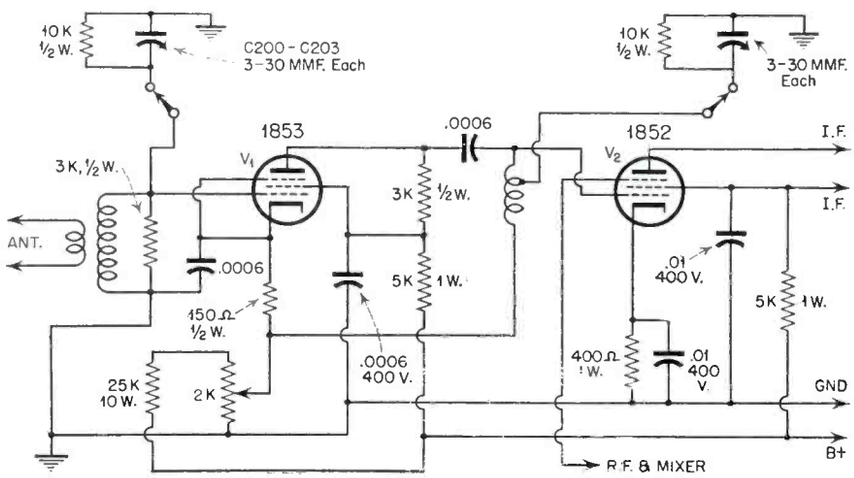

Fig. 6 — DuMont model 180, simplified schematic

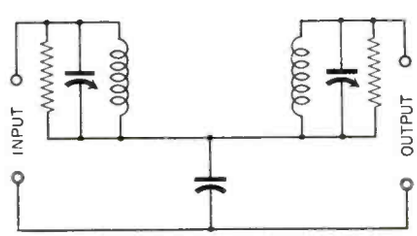

Fig. 9 — Band-pass capacity coupled resonant circuit

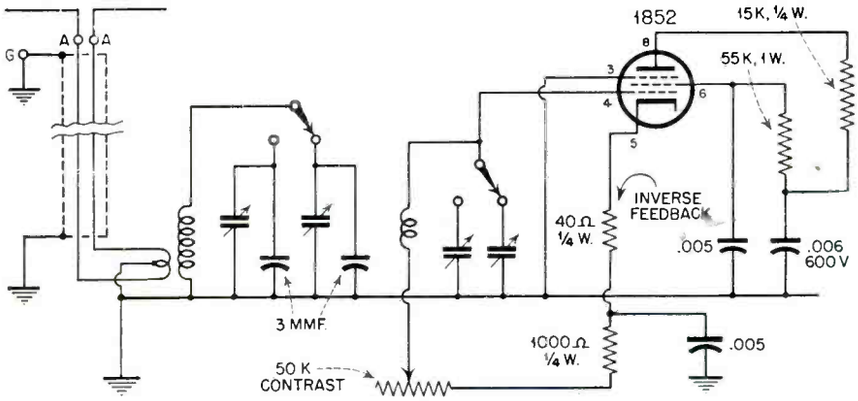

Fig. 10 — Partial schematic of Andrea KTE-5, 1F5 model

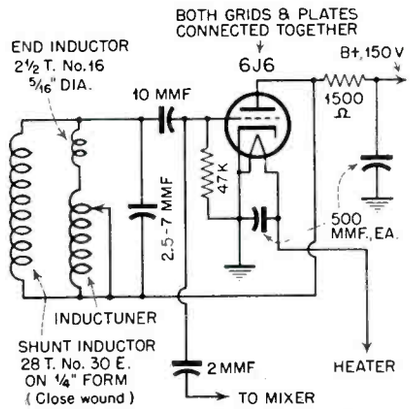

Fig 13 — Oscillator circuit

length of wire (hence its inductance) can be reduced as compared to the plates of a variable condenser spacing (and hence its capacitance). This accounts for the wide frequency range of this unit.

The bandwidth characteristics are shown in *Fig. 12*. This bandwidth is obtained by a combination of band-pass coupling and suitable loading resistors. The gain of this unit is about 10, as measured between the grid of the first 1-f tube and the cathode of the first r-f tube, with a slight increase in gain at the upper frequency limits.

An interesting feature of the Inductuner is the dial arrangement and mechanism. An "hour" and "minute" hand are provided, the latter being connected directly to the shaft and knob handle, and the former to a geared mechanism. Ten turns of the minute hand results in one complete turn of the hour hand for complete coverage of the frequency range between 44-216 mc. To tune in a station it is merely necessary to turn the knob to the desired frequency. For a television station this frequency corresponds to the audio carrier. Thus, turning the knob to 49-75 mc will tune in the 44-50 mc channel. Other varations of this tuning device will be found in slide-rule dial and push-button mechanims.

It will be of interest to the serviceman to know that other manufacturers besides Dumont who are in current production are utilizing the Inductuner as the r-f-mixer-oscillator unit of this complete receiver. For those who are interested in the adjustment data of the assembly, *Fig. 12* gives a partial set-up and adjustment of the various trimmers. At present there is no complete data available on this score.

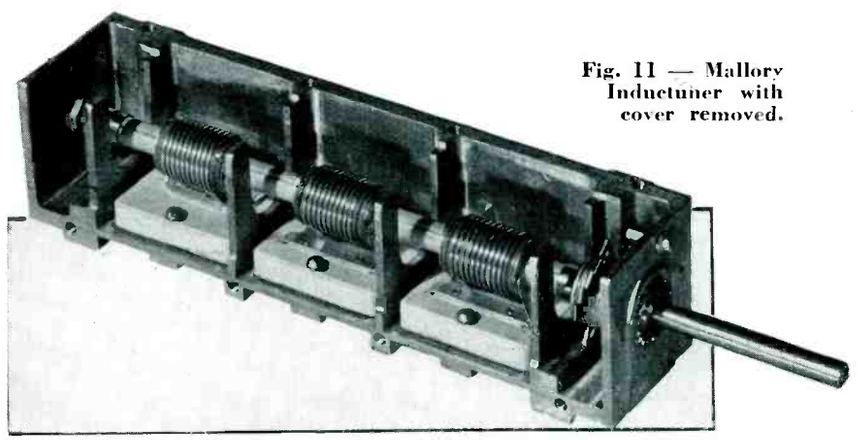

Fig. 11 — Mallory Inductuner with cover removed.

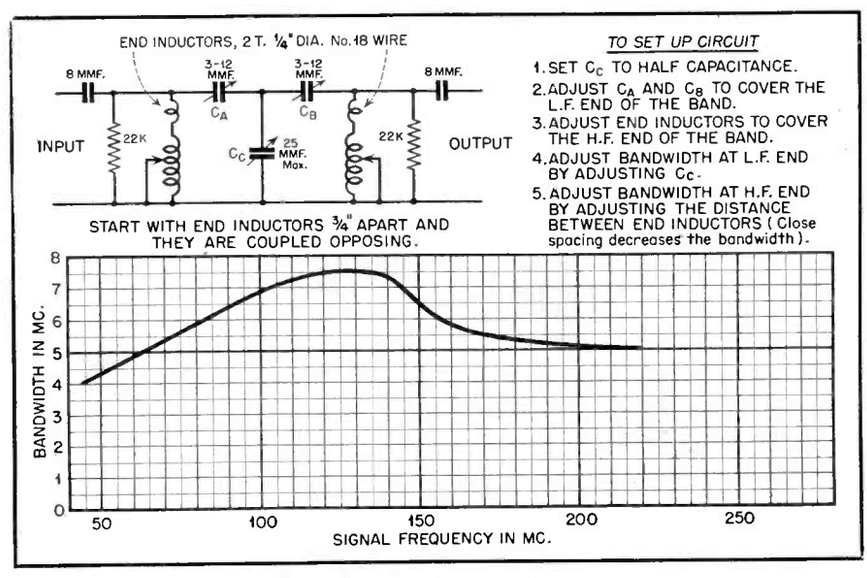

Fig. 12 — Band-pass r-f circuit

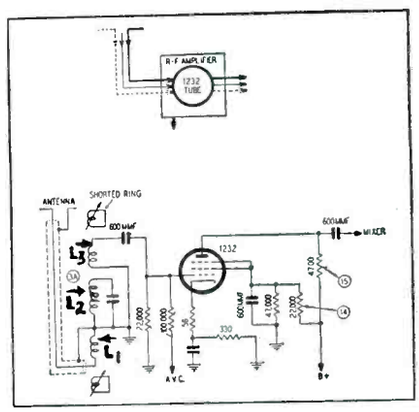

Fig. 14 — R-F amplifier, simplified schematic. Only one channel is shown

Philco RF Assembly

The r-f stage of the Philco television receiver is shown in *Fig. 16*. The antenna

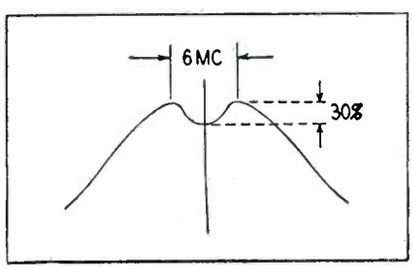

Fig. 15 — R-F amplifier response curve

FREQUENCY MODULATION

Part II — Covering FM Receiver Fundamentals

The design of a receiver for FM is similar in many respects to that employed in AM practice, but is somewhat more complex. The superheterodyne circuit is standard, but the 88-106 megacycle tuning range brings in some variations from the usual AM practice, and, of course, we have the special FM circuit features such as limiters, discriminators, etc. In this discussion we shall start at the FM antenna input terminals of the Westinghouse Model H-119 receiver and discuss the major differences between the FM and AM circuits.*

R.F., MIXER AND OSCILLATOR CIRCUITS

The r-f end of an FM receiver has somewhat the same functions to perform as in an AM receiver. I-F rejection is of less importance as the 10.7 mc. i-f is comparatively interference free. Image rejection is not a major problem as the high i-f places images of FM stations outside the band. *The major function of the r-f end of the receiver is to add as much as possible to the gain of the set so that a good signal-to-noise ratio will be obtained.*

Figure 1 shows the r-f amplifier, mixer and oscillator circuits of the Westinghouse Model H-119 AM-FM receiver. Only the FM portion of this circuit is shown. It will be noticed that one wire of the two-wire transmission line from the antenna is connected to chassis ground; the other wire is connected to a tap on the antenna coil. The tap location has been selected for maximum signal voltage delivery to the 6SG7 r-f amplifier grid and is correct for use with transmission line impedances of from 50 to 300 ohms. The tuned circuits, both physically and electrically, are more or less conventional, as compared with regular AM circuits, except for the size of the tuning capacitors and coils. One and one-half volts of negative bias for the 6SG7 r-f amplifier tube is obtained from the voltage drop across a resistor in series with the power transformer high-voltage winding center tap and additional bias from the AVC circuit. The r-f energy from the 6SG7 plate is fed to a tap on the mixer r-f coil in order to obtain the proper impedance match between the 6SG7 plate and the 6SB7Y signal grid.

This mixer-oscillator tube is a 6SB7Y which is a special metal-shell type developed for converter service on the new 88-106 mc. FM band. The circuit and connections are similar to those of the ordinary 6SA7 type; however, the interelectrode capacitance of the 6SB7Y is much lower than that of the 6SA7 and the 6SB7Y is fitted with a low-loss base. The oscillator circuit is a conventional tapped-coil Hartley type. The coil and resistor network, *L13* and *R50*, is a parasitic suppressor circuit. When the 14-tube chassis was designed it was found that a spurious oscillation appeared near the 1600 kilocycle point on the regular AM broadcast range. The coil and resistor combination effectively eliminates this condition.

INTERMEDIATE FREQUENCY AMPLIFIER CIRCUITS

Electrically, the i-f amplifier circuits of the H-119 are conventional. The 10.7 mc. i-f transformer windings are connected in series with the regular 455 kc. AM i-f windings. Due to the wide difference between the two intermediate frequencies, no interaction or ill effects are encountered. The gain and other characteristics are about the same as when separate transformers are used. In tuning such composite i-f units, the AM or 445 kc. trimmers are adjusted first and the FM or 10.7 mc. trimmers last.

It will be noticed that a 22,000 ohm loading resistor is connected across the secondary winding of the first i-f transformer and 12,000 ohm resistors across the primary and secondary windings of the second i-f transformer. The higher value of resistance in the grid circuit of the first i-f stage is used because of the comparatively low signal level at this point. If the resistance value is made very low the loss in signal level would be too great. The purpose of the resistors is to permit "peaking" of the i-f circuits; unless resistor loading is used, it would be necessary to "flat-top" the i-f circuits in order to obtain proper band-pass characteristics. There is some curvature, of course, in the top portion of the resistance-loaded frequency response curve but the limiter acts to clip off this curvature providing, in effect, a wide-band flat-top response at

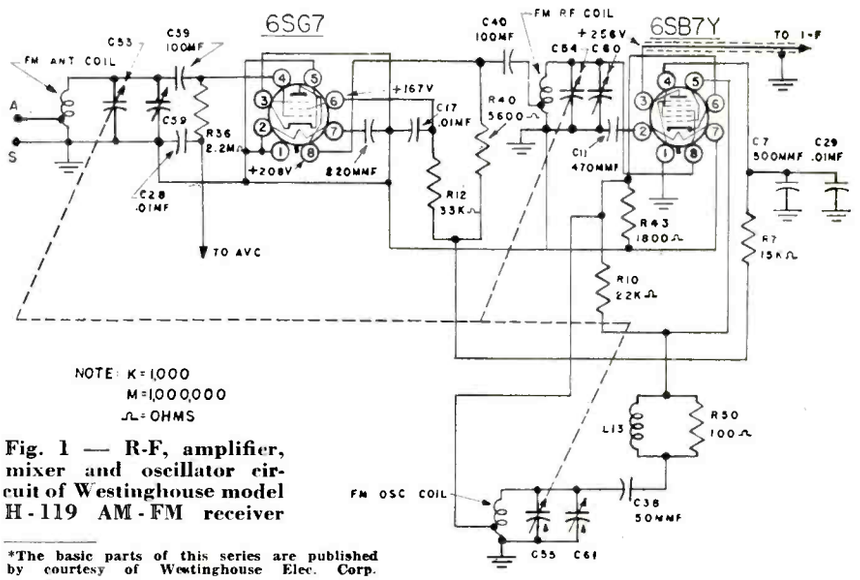

Fig. 1 — R-F, amplifier, mixer and oscillator circuit of Westinghouse model H-119 AM-FM receiver

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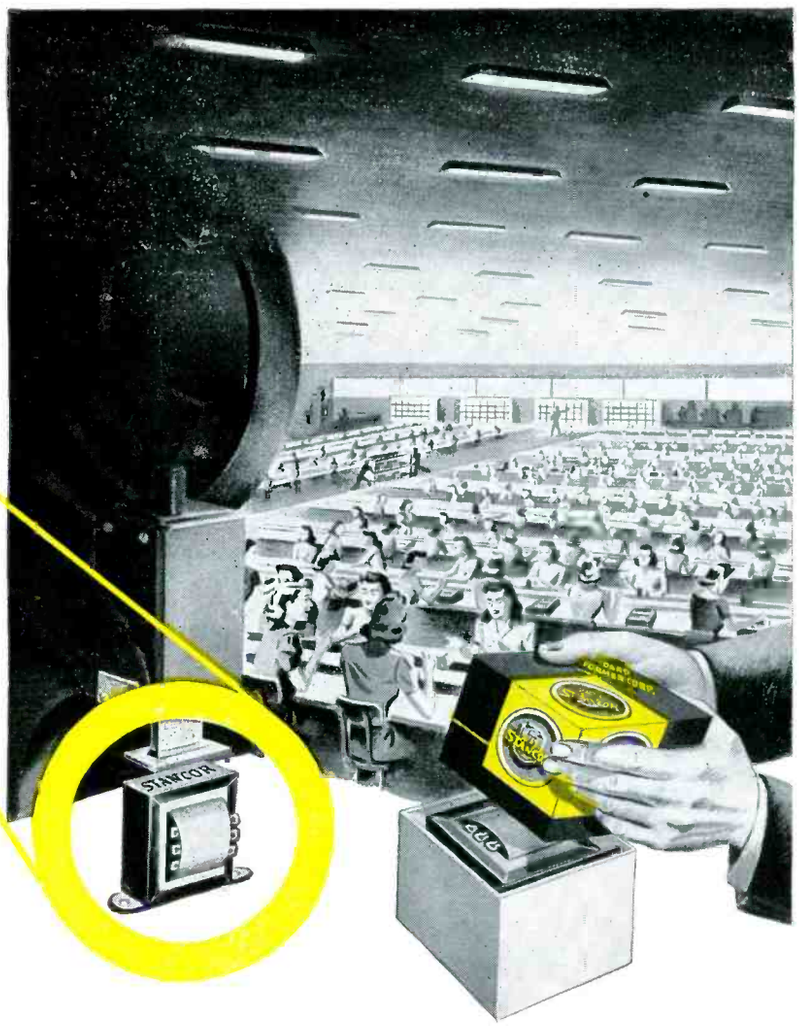

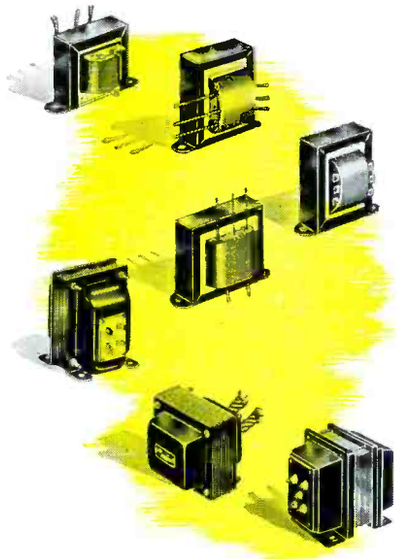

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the discriminator input.

Figure 2 shows the 68 ohms voltage dropping bias resistor in the power transformer high-voltage center tap. Note that the signal for the AVC rectifier is taken directly from the plate of the 6SG7 second i-f tube through a 22 mmf fixed capacitor. This permits the same AVC circuit to function on both AM and FM without becoming involved in complex switching arrangements. In every other respect the i-f amplifier is strictly conventional. We shall now discuss the operation of the limiter stage.

THE LIMITER CIRCUIT

a. *The limiter circuit shown as Fig. 3 is an i-f amplifier stage designed to "saturate" at a certain signal level.* It acts somewhat like a tank, which allows the water level to rise to the outflow pipe and then keeps that level constant no matter how much water is poured in.

b. In the FM set the purpose of the limiter is:

1. *To remove all amplitude variations in the i-f amplifier system ahead of the limiter.* It should pass on to the discriminator a signal of constant amplitude and varying frequency.
2. *To enable the FM set to discriminate between two stations on the same frequency* as long as the signal strength of one station is two times that of the other. (Similar to AVC.)
3. *To reject static,* both natural and man-made.

c. Operation of the limiter:

1. *The limiter works on the grid rectification principle.* A grid condenser and grid leak are used in the same manner as the "square law" detectors used in the radios of 15 or 20 years ago.
2. *No negative bias is supplied to the grid.* The grid swings positive and grid current flows at the moment a signal is applied. Grid current flows through the 470,000 ohm grid resistor, *R28,* from grid to cathode of the 6SJ7 tube. The voltage drop across *R28* has a polarity which makes the grid negative with respect to cathode. The stronger the signal, the greater the bias voltage. This "automatic" bias reduces the gain of the tube and maintains a constant output.

d. The step by step operation of the limiter follows:

1. A *strong* signal is impressed on the 6SJ7 grid. The 47 mmf capacitor, *C3,* rapidly charges up to nearly the peak signal amplitude.
2. *The capacitor then discharges through the 470,000 ohm resistor R28.*
3. *The values of the resistor and capacitor are critical.* The discharge rate through the resistor will be *slower* than the charging rate through the tube. This results in a steady negative bias voltage being built up on the grid.
4. *This negative voltage is almost equal to peak of the signal.* The grid will swing positive only on signal peaks and for a very short period of time. The length of these periods is determined by the time constant of the grid capacitor, *C3* and the grid resistor, *R28.*
5. Under these conditions the 6SJ7 tube then will "squash" down any changes in the strength or amplitude of the signal. From its plate circuit it will deliver a constant amplitude signal to the discriminator.

e. Precautions

Limiter tube voltages are quite critical. When replacing the grid condenser or the grid and plate resistors, the exact value specified by the manufacturer must be used.

This series on FM will be continued in next issue.

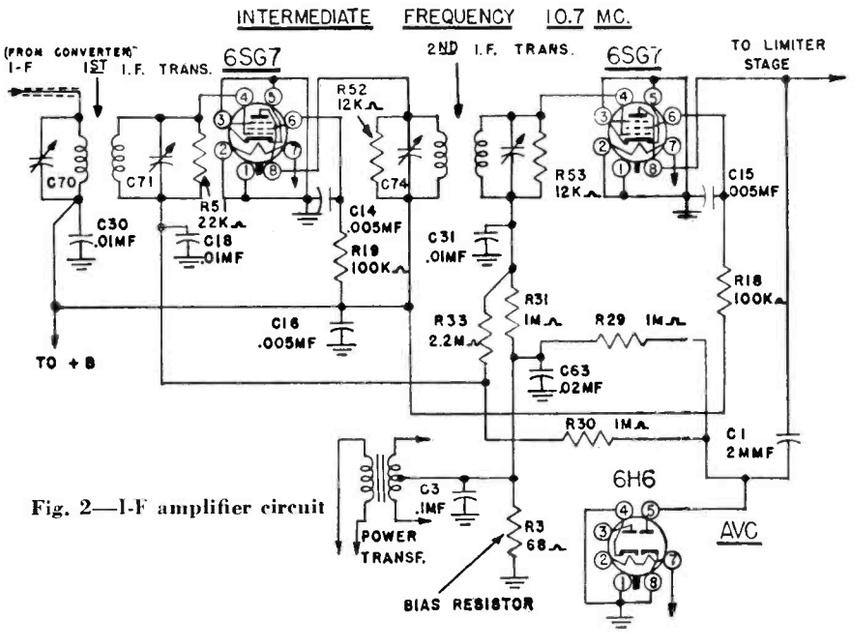
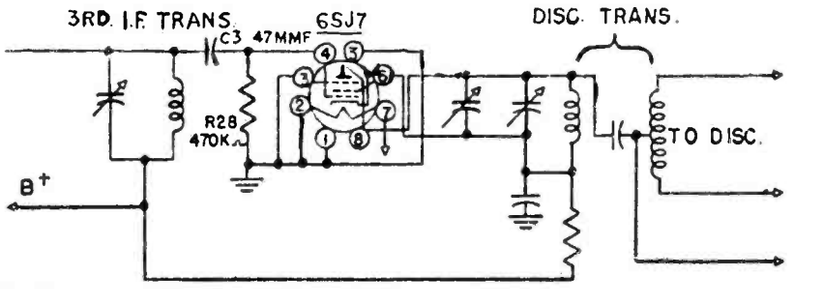


Fig. 2—I-F amplifier circuit

Fig. 3—The limiter circuit



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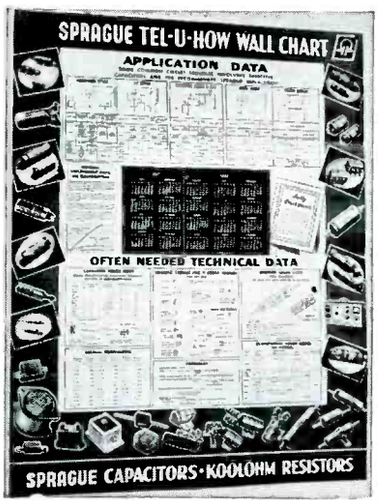
Beautifully lithographed in colors, size 22" x 28", the chart includes handy service application data; diagrams and descriptions of common circuit troubles involving capacitors and their remedies; general replacement data on electrolytics; formulas; transformer, resistor and capacitor color codes; schematic symbols, and other related information invaluable.

The Wall Charts are now in the hands of Sprague distributors throughout the country and servicemen can obtain free copies from them on request.



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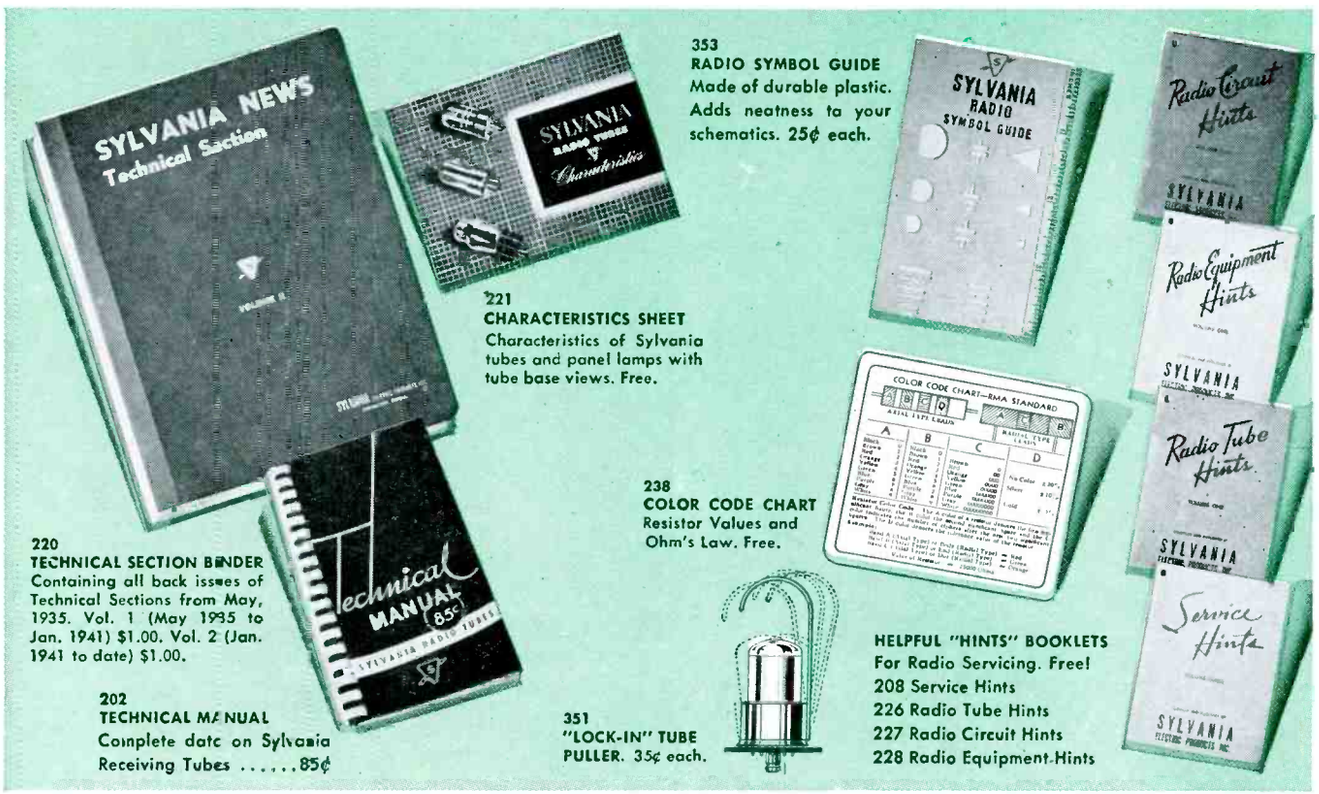

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TECHNICAL QUIZ No. 2

Subject: Basic Fault Diagnosis

BEFORE ANSWERING THE QUESTIONS—READ THESE RULES:

There are 50 questions. After each question, preceded by a letter *a*, *b* or *c* are optional answers. In each case one answer is basically correct. You are only allowed 20 minutes time in which to mark the letter *a*, *b* or *c* which you believe represents the correct answer.

For each correct answer to a question you are credited with 5 percentage points. Thus 17 correct answers would give you 85% or 14 correct answers would rate you 70% on the examination. Answers to the questions are given on Page 35.

RATINGS FOLLOW: *100% = Perfect, 90% = Excellent, 80% = Good, 70% = Fair, 60% = Passing. Any score below 55% is failure. Tests must be completed within 20 minutes.*

How much of a diagnostician are you? Listed below are a number of questions pertaining to common receiver troubles and their symptoms. The accuracy of your answers, and the relative speed with which you can complete this quiz is a measure of your theoretical knowledge and practical experience. Answers are to depend on the *most prevalent* and *frequent* causes of the symptoms given. There may be more than one reasonable answer—however, the *most correct* answer is the one desired. Circle what you believe is the proper answer:

QUESTIONS 1 to 6

1. The pilot light of an AC, DC receiver goes on and off, during which time the reception likewise goes on and off. The trouble is due to:
   - *A. Defective line switch.*
   - *B. Poor pilot light or pilot light connection.*
   - *C. Defective filament in one of the tubes.*

2. A receiver begins to develop hum and distortion after 10 or 15 minutes of satisfactory operation. On testing the tubes in an ordinary tube tester they are found to read O.K. The trouble is due to:
   - *A. Defective speaker.*
   - *B. Defective filter condenser.*
   - *C. Defective audio tube (cathode leakage).*

3. A receiver is generally weak and oscillates rather freely whether or not a station is tuned in. The trouble is due to:
   - *A. Open input filter condenser.*
   - *B. Open output filter condenser.*
   - *C. Open R.F. or I.F. cathode by-pass condenser.*

4. A receiver is generally weak, and all "B" plus voltages are low. The trouble is due to:
   - *A. Open input filter condenser.*
   - *B. Open output filter condenser.*
   - *C. Open cathode by-pass condenser in one of the R-F or I-F stages.*

5. The screen grid of the power tube glows very brightly, and the receiver is inoperative. The trouble is due to:
   - *A. A defective power tube.*
   - *B. An open "C" bias circuit in the power stage.*
   - *C. An open output transformer.*

QUESTIONS 6 to 11

6. The plates of a rectifier tube get red hot. The trouble is due to:
   - *A. Shorted input filter condenser.*
   - *B. A shorted output filter condenser.*
   - *C. A shorted power tube.*

7. A receiver sounds alive, and stations come in all together irrespective of the tuning dial position. The trouble is due to:
   - *A. A defective tuning dial.*
   - *B. A misaligned oscillator circuit.*
   - *C. An inoperative oscillator circuit.*

8. A 3-way a-c d-c battery-operated portable receiver, using a 117Z6 rectifier tube, operates in the *battery* but not in the a-c d-c position. The trouble is due to:
   - *A. Defective switch.*
   - *B. Defective line cord resistor.*
   - *C. Defective 117Z6 tube.*

9. A receiver oscillates when receiving certain stations only. The trouble is due to:
   - *A. A defective R-F or I-F by-pass condenser.*
   - *B. A defective R-F or I-F tube.*
   - *C. Improper I-F frequency setting of the I-F transformers.*

10. The magic eye tuning indicator suddenly develops a condition whereby the eye does not close sufficiently when tuning in a station. The trouble is due to:
    - *A. A defective aerial.*
    - *B. A defective magic eye.*
    - *C. The receiver requires alignment.*

QUESTIONS 11 to 16

11. A receiver has a pronounced background buzz which keeps in time with certain audio frequencies, particularly speech, and which sounds like the humming noise emanating from a sheet of tissue paper. The trouble is due to:
    - *A. A defective audio tube.*
    - *B. The speaker cone which is off center.*
    - *C. A loose speaker connection.*

12. The sound coming out of a receiver is pitched rather high, and distorts easily on loud passages. The trouble is due to:
    - *A. An open audio cathode by-pass condenser.*
    - *B. A defective loud speaker.*
    - *C. An open power tube plate to ground by-pass condenser.*

13. The stations over the lower frequency portion of the dial of a receiver are not received, while those over the higher frequency portion of the dial are. The trouble is due to:
    - *A. A defective oscillator tube.*
    - *B. A shorted variable condenser.*
    - *C. Receiver misalignment.*

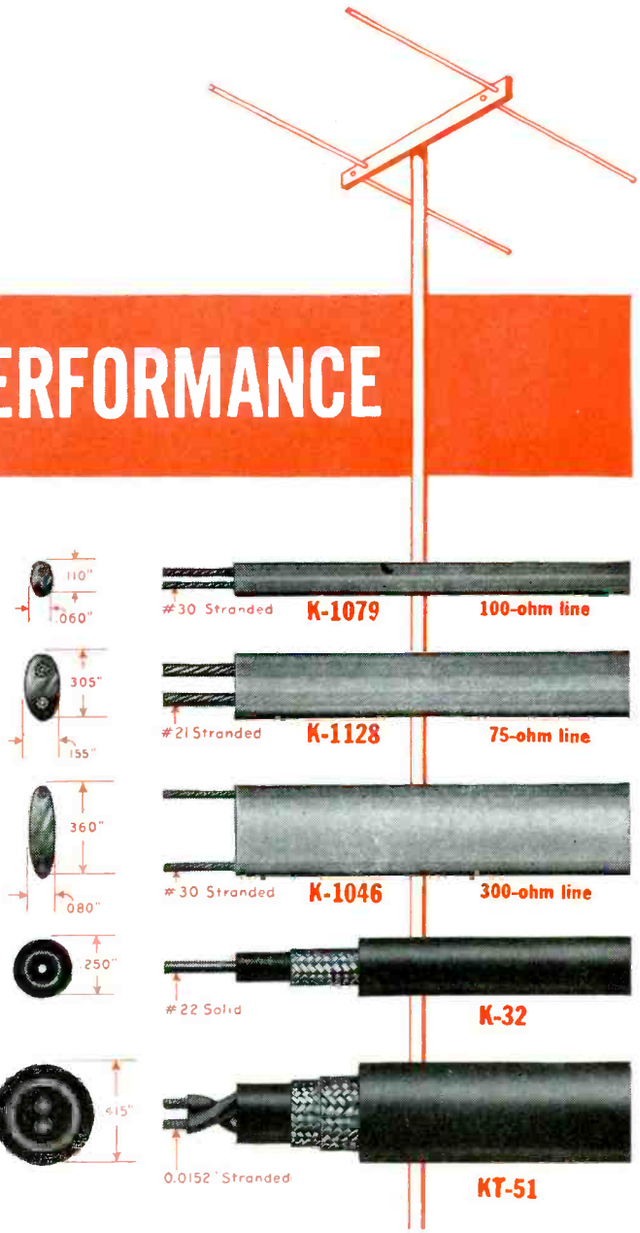
[*Continued on page 33*]

Here's Why Your Antenna Installations Will Give

LONGER-LASTING PERFORMANCE

with Federal's Intelin® H-F Transmission Lines

1. **Their unusually low attenuation losses assure the most efficient transfer of energy between antenna and receiver or transmitter.**
2. **Their uniformity and permanence of characteristics permit peak receiver performance, without annoying distortion from locally-induced interference.**
3. **Their flexibility and outstanding resistance to weathering, moisture and abrasion contribute to years of trouble-free service.**



IN THE FIVE ITEMS listed here, there's a high-frequency cable for practically every antenna application. The K-1128 75-ohm line, for transmitter use—the K-1079 and K-1046 lines for general FM and Television service. The smooth oval cross-section of these 75, 100, and 300-ohm lines prevents the accumulation of foreign matter, thereby maintaining stable capacity characteristics. The K-32 and KT-51 coaxial cables offer peak performance for applications where locally-induced interference is severe.

For complete information and prices on these cables, see your local distributor. For other high-frequency cables —write to Federal, Dept. D185.

DATA FOR FEDERAL H-F CABLES

Type Number	Characteristic Impedance Ohms	Velocity of Propagation (in percent)	Capacitance Per Ft. mmf	Attenuation, Db per 100 Ft. Frequency in Megacycles				
				1.0	1.7	30	100	300
K-1079	100	71	15.5	.6	.75	2.8	5.2	8.8
K-1128	75	71	19.5	.3	.4	2.0	4.0	7.3
K-1046	300	300	4.0	.38	.57	.85	2.0	—
K-32	73	66	22	—	—	2.0	3.8	7.0
KT-51	95	66	16	—	—	1.8	3.8	7.5

*Reg. U. S. Pat. Off

KEEPING FEDERAL YEARS AHEAD... as IT&T's world-wide research and engineering organization, of which the Federal Telecommunication Laboratories, Nutley, N. J., is a unit.

Federal Telephone and Radio Corporation

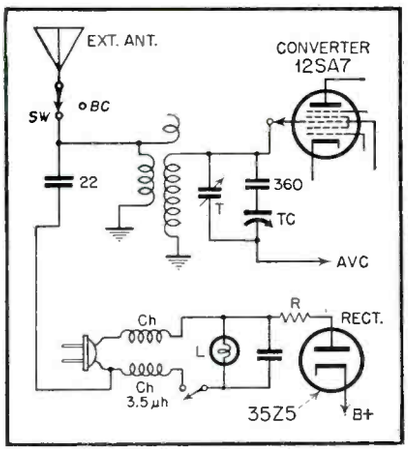
SELENIUM and INTELIN DIVISION, 1000 Passaic Ave., East Newark, New Jersey

In Canada: — Federal Electric Manufacturing Company, Ltd., Montreal.
Export Distributors: — International Standard Electric Corp., 67 Broad St., N. Y. C.

CIRCUIT COURT

GENERAL ELECTRIC *Models 219-220-221*

Provision for short-wave reception over the band of 6 to 10 mc is made in this instrument. An r-f stage is used on the broadcast band, but on shortwave the antenna couples directly to the grid of the 12SA7 convertor. The instrument is a-c/d-c operated and has a conventional tube lineup.



Circuit of G. E. Model 219

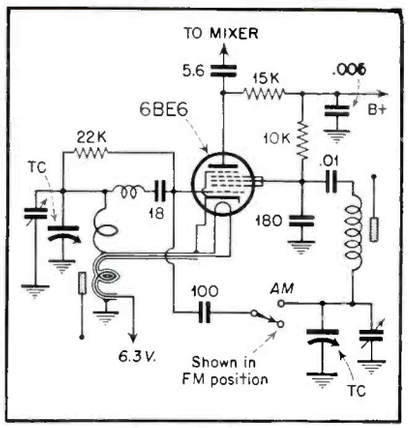
Reference to the abbreviated schematic discloses that there is a primary coil and capacity link coupled to the grid coil. An external antenna terminal is provided, switched with the other r-f circuits when changing bands. To provide pick-up when no external antenna is available a 22mmf condenser connects from the shortwave antenna terminal to one side of the power cord.

Since there is an .05 mfd condenser across the power line in the set, and because this would effectively bypass the high side of the line to ground (presuming one side to be actually grounded at the service entrance), we find an r-f choke of 3.5 uh in each side of the line in the set. This makes such signals as appear on the house wiring available for use. The set uses a loop for pick-up on broadcast and the line pick-up is not employed.

A 360 mmfd fixed padding condenser is series with the tuning condenser accounts for the 6-10 mc range with the 265 mmfd tuning condenser.

RCA *612V Series*

A unique oscillator circuit is employed in this series. Among its virtues is the fact that no switching



Oscillator of RCA 612V

is done in the FM circuits. This makes for improved stability and continued satisfactory operation, compared to designs in which switch contacts appear. An examination of the schematic shows that the components which provide the FM oscillator operation are permanently connected in the circuit. They comprise a tapped-coil Hartley oscillator. The tube, a 6BE66 miniature, operates on the same principle as the common 6SA7-12SA7 type.

The inductance consists of two sections, wound continuously on a small tubular form. The lower portion is a small piece of co-ax, the outer conductor of which is a small copper tube, through which an insulated wire takes heater voltage to the tube. The other heater terminal, and the cathode, connect to the junction of the co-ax and solid wire which makes up the rest of the coil. The bottom end of the co-ax is at chassis potential.

A small tuning condenser, 21mmfd maximum, shunted by a 2.5-13 mmfd trimmer is connected across the whole inductance. The top end of this L-C circuit is connected to the oscillator grid by a broadly resconant, series-tuned circuit. The coil is wound on the 22K ohm grid leak. The condenser is only 18 mmfd.

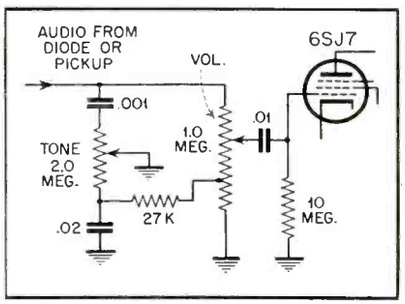
The Hartley circuit is completed by tying grids 2-3-4 together, bypassing them to ground with 180 mmfd, and supplying voltage via a 10K ohm resistor. The whole operates as a triod and the output is taken from the tube plate, through a 5.6 mmdf condenser to the mixer. A 15K ohm resistor supplies voltage to this plate.

When the set is switched to AM operation, a 100 mmfd condenser connects the oscillator grid to one end of an L-C circuit which in turn connects to the 2-3-4 grid point (the triod plate), via an .01 mfd blocking condenser, 342 mmfd max., forms one branch of the L-C circuit and forms a Colpitts oscillator. This mode of operation is used on the A and C bands, with the employment of appropriate coils. The signal is transferred to the mixer as on FM.

Note that the small values of the FM portion look like only a 18 mmfd shunt on the grid for AM. The heater being at the same r-f potential as the cathode prevents hum in the oscillator output. The AM components are disconnected from the grid in FM position.

ADMIRAL *Model 7C63*

A simplified tone control circuit which provides both bass and treble control is employed in this set. A portion of the schematic showns the components comprising the network.



Tone Control of Admiral 7C63

The audio signal passes to and along the volume control to the arm, and then via the .01 coupling condenser to the grid of the 6SJ7 first audio stage. The .001 condenser will by-pass the highs to an extent determined by the proximity of the grounded arm of the control. When the arm is at the top of the resistor, as shown, the attenuation of the highs will be maximum.

At the same time, the 27K ohm and .02 mfd combination from the tap on the volume control to ground will provide a bass boost, particularly at nominal volume control settings. As the arm moves down the tone control the degree of attenuation of highs decreases and the bass boost is flattened off. When the arm reaches the bottom of the control the highs will be maximum and no bass boost will take place. In this simple manner, a single control provides a wide range of tone compensation.

SILVERTONE *Models 7115-7116-7117*

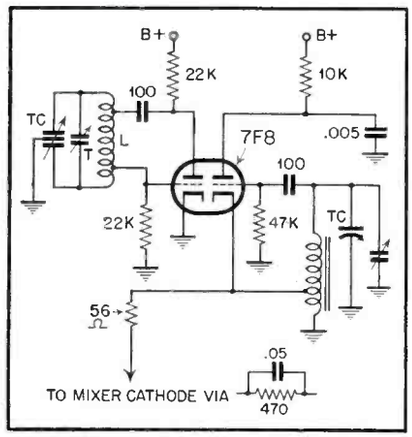
The essentials of the oscillator circuit of the Silvertone Models 7115-6 and 7 are shown. A dual triode tube

CIRCUIT COURT

[*Continued from previous page*]

type 7F8 is used. The set operates only on the standard broadcast and new FM bands. All switching is done in the voltage-supply circuits. Inductive feed between coils provides injections on the FM band, while cathode injection is used on AM. The cathode of the 7H7 mixer is connected to ground on FM and to the oscillator cathode, through a by-passed 470 ohm resistor, on AM.

Inspection discloses that the oscillator operates as two separate tubes, one section being used on each band. The separate cathodes permit full use of this feature.



Circuit of Silvertone 7115

Let us look at the FM portion of the set first. The L-C circuit consists of a coil, trimmer condenser and splitpstator tuning condenser. The use of this type of tuning condenser permits balanced circuit design, both ends of the tank being above ground. This is a version of the Colpitts circuit. The grid and plate of the tube are tapped in from the ends of the coil, thus permitting the maintenance of good Q in the tank circuit. The plate is shunt-fed via the 22K ohm resistor.

The second section of the tube, and its associated components, comprise a Hartley oscillator for the A band. An iron coil has a tap to which the cathode connects. The grid, via coupling condenser, and tuning condenser are connected to the top of the coil. The plate is by-passed to ground and shunt-fed via 10K ohms.

BLOCK DIAGRAMS

Block diagrams quickly give experienced technicians the essential functions of each stage of a complex receiver circuit. Less experienced men should become adept in using them. Here are the first in a series covering AM-FM combinations.

RCA 612 Series

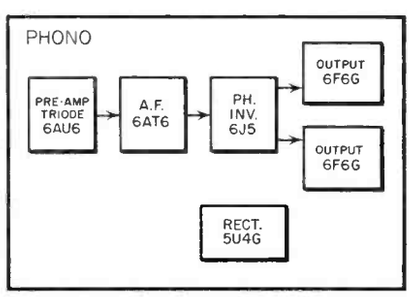
A block diagram of the RCA 612 series discloses that this twelve tube set uses all the tubes on the FM band. A tuned antenna circuit is followed by a 6BA6 r-f stage. This tube is transformer coupled to another tube used as a mixer. The oscillator, a 6BE6, acts as a Hartley oscillator and feeds it output, by electron coupling, via a small capacity, to the grid of the mixer.

The 10.7 mc i-f signal developed in the mixer plate is amplified by three stages, employing a 6BA6, 6AU6 and 6AU6 in that order. The last stage, termed a driver, feeds the ratio detector, developed by Seeley, provides limiting and a.v.c. as well.

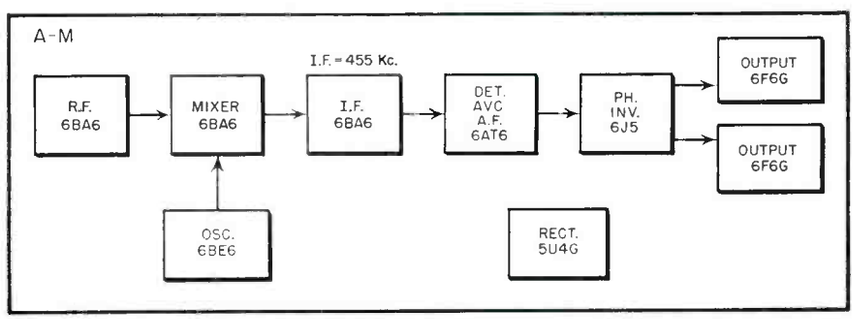
The audio voltage developed in the 6AL5 ratio detector is amplified by the triode section of the 6AT6, and by means of a 6J5 phase inverter, feeds the grids of the 6F6G output tubes in push-pull. A 5U4G rectifier supplies power for the set.

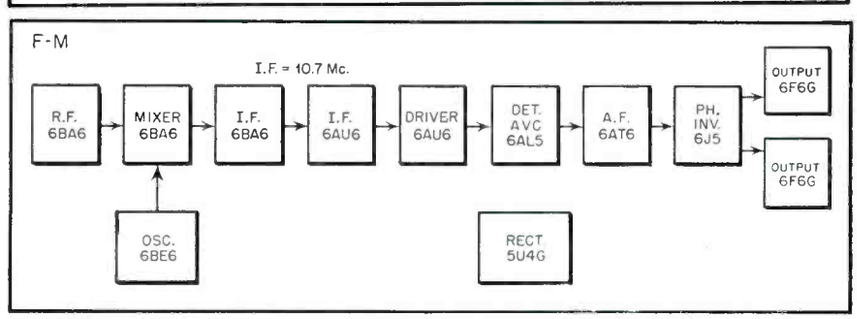
When switched to AM, either A or C bands, the r-f mixer and oscillator circuits operate much as on FM except that a Colpitts oscillator circuit is used. The i.f. is 455 kc and is amplified in only the first, 6BA6 stage, the transformers being appropriately switched in the mixer plate circuit. The signal is then rectified by one diode of the 6AT6 and a.v.c. also developed there. The audio then follows the same path as on FM.

On phono, the second i-f stage, 6AU6 is used as a triode pre-amp., with the signal applied to the control grid and taken off to the screen. After that is passes to the triode section of the 6AT6 and follows the same path as on radio positions.



Typical block diagrams of the Phono, AM and FM portions of a modern set, in this case the RCA 612 Series





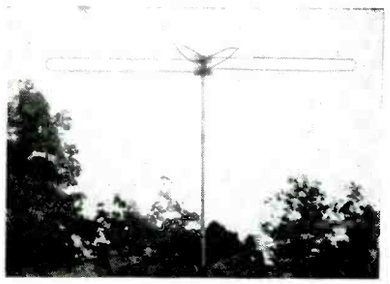


Fig. 1—Cosgrove broad-band antenna

PRACTICAL INSTALLATIONS

Fig. 2—Single di-pole

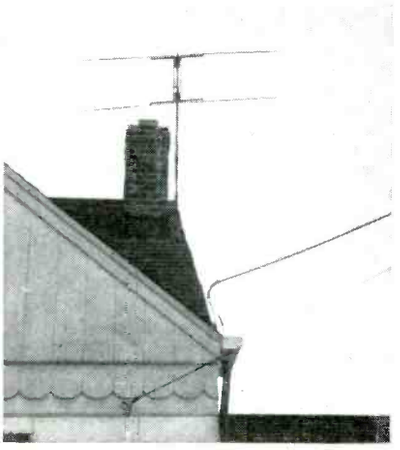


Fig. 3—Double di-pole

Fig. 4—Di-pole and reflector

Facts that improve performance and simplify the installation of television antennas

IN the reception of Television there is no single "most important" element, for like the proverbial chain a system of television reception is no stronger and of no greater fidelity than its weakest link.

Generally speaking, today's weak link is the television antenna. The best television receiver built may be said to be only as good as the antenna and its installation.

The present trend in the television field is to provide the customer with a guarantee that his installation will provide perfect reception for at least a one year period. In order to effect installations which can be guaranteed, service organizations must have good tools, extension ladders, mortar and wood drills, "nailit" knobs, staples etc., and the men who know how to use them.

To select the proper men to install antennas and adjust television sets make certain that they have no reaction to climbing and altitudes, that they are mechanically inclined, and have adaptable personalities so that they can learn the new techniques which the service organization must develop to assure that the installations stay sold. Except for service work a highly technical man should not be employed. Installation engineering is relatively simple when the installation men are properly indoctrinated with standard solutions to the installation problems.

ANTENNAS

In primary areas where the field strength is high a folded dipole or a broad band antenna (see *fig. 1*) is the preferred antenna because of it's wide frequency response and constant impedance characteristics.

When difficulty is encountered in developing sufficient signal strength to operate the television receiver a dipole cut to the length of frequency of the weakest station (see *fig. 2*) may build up the signal strength to provide the necessary "Synch locking voltage". If the signal is still insufficient a double dipole (see *fig. 3*) will further increase the signal voltage to the receiver input.

If the signal strength is satisfactory good reception may still be difficult to realize if there are strong reflection voltages induced into the antenna or if high level interference voltages from diathermy machines, oscillators, and station harmonics are encountered.

REFLECTIONS

The reflected signal image may be either white or black depending on the polarity and may vary from appearing as strong as the initial transmission to a level where it may be hardly noticeable.

The reflection problem in suburban areas is relatively simple and usually the rotation of the folded or simple dipole, so that it discriminates against the reflection, clears the picture of reflection "ghosts". By having one man at the receiver and the other at the antenna in a few minutes a good adjustment can be made. Communication between the two men (installation man who adjusts the set and the helper who rotates the antenna) can be maintained by sound powered crystal phones or loud voices. In most of the suburban areas the adjustment is very easy and can even be done by one man when he gains experience in the neighborhood reflection conditions. If reflections are coming from different directions a dipole and reflector combination (see *figs. 1, 5, 6)* will usually solve the problem.

In metropolitan areas multiple reflections occur, some of which are received in the same direction as the transmitted signal. The only action which can be taken when such a situation exists is to

TELEVISION

by IRA KAMEN
General Manager of
Intra-Video Corp. of Amer.

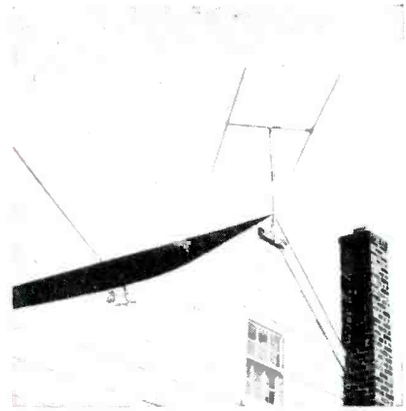


Fig. 5—Another type di-pole and reflector

Fig. 6—Double di-pole and reflector

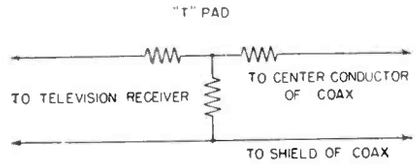


Fig. 7—A simple "T" pad network that can be assembled in the average service shop

attenuate the signal to a point where the direct signal will still operate the set; at this reduced level the reflection voltage which is usually of a lower level input than the direct signal, no longer blurs the reception. *Figure 7* shows a typical T pad network which can be preassembled in the shop and given to the installation man for use at his discretion. Design values for 5, 10, and 20 to 1 attenuation are available in standard handbooks.

When installing sets in heavy traffic zones there is only one good policy—"Get it as high up and as far away from noise as possible." Present television sets have a-f-c circuits which are relatively insensitive to triggering but, heavy ignition fields and strong diathermy signals (see *Fig 8)* may still override the control circuits.

If it is not possible to get away from the noisy area it may be possible to suppress the noise at the source by shielding condensers as in the elimination of radio interference.

There is no substitute for a pre-survey with an actual Portable Television Receiver on complex installations.

While survey work is expensive it is cheaper than having the dealer deliver the set and picking it up when the installation is condemned. Much of the survey expense can be defrayed and justified if it only helps determine, for the installer, what type of antenna is going to be required. Sometimes a survey discloses that no satisfactory installation can be accomplished at that particular location.

To conduct a successful survey you must have the following:

1. An adjustable mast from 10-25 feet.
2. Portable television receiver with long a-c power cable and a reel of coax connected to the receiver input
3. A set of easily assembled antennas which can be installed on the mast if necessary.

In some complex locations two antennas may be necessary to get reception on the stations transmitting and should be recommended rather than accept a poor compromise. A plug board or switch arrangement can be provided at the receiver so that the customer can switch antennas with stations.

Present television sets are expensive and the customer expects motion picture reception for his money. Therefore "good enough" installations should be avoided as they are difficult to keep sold.

In constructing or purchasing a sturdy portable television receiver make sure that the gain of the receiver is slightly less than that of the one to be installed. No special noise limiter circuits should be incorporated in the receiver as many times, by the isolation method (turning on and off various equipments), you can find noisy devices in the area which can be suppressed at the source.

If a slight "ghost" is going to be present it is better to show the customer the type of reception he will realize, without pointing out the ghost, before making the installation.

ADJUSTMENTS

The following are important guides in making adjustments to television receivers:

1. Adjust focus control for best visual appearance at focal distance from screen.
2. Adjust "sweep" and "sync" circuits at the lowest voltage presented at the outlet during the day's service. This will insure picture stability as the line voltage fluctuates.
3. Adjust the picture size controls so that the raster is slightly larger than the face of the tube. In this way the line voltage changes, which may adjust the raster size, are not apparent to the customer.

All other adjustment instructions are usually well taken care of in the manufacturers' instruction manual.

Advise customers that any adjustments by "Family Radar Men" COMPLETELY VOIDS the television receiver's guarantee.

All photos courtesy of Allen B. DuMont Labs.

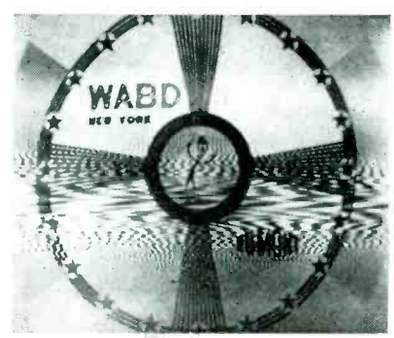
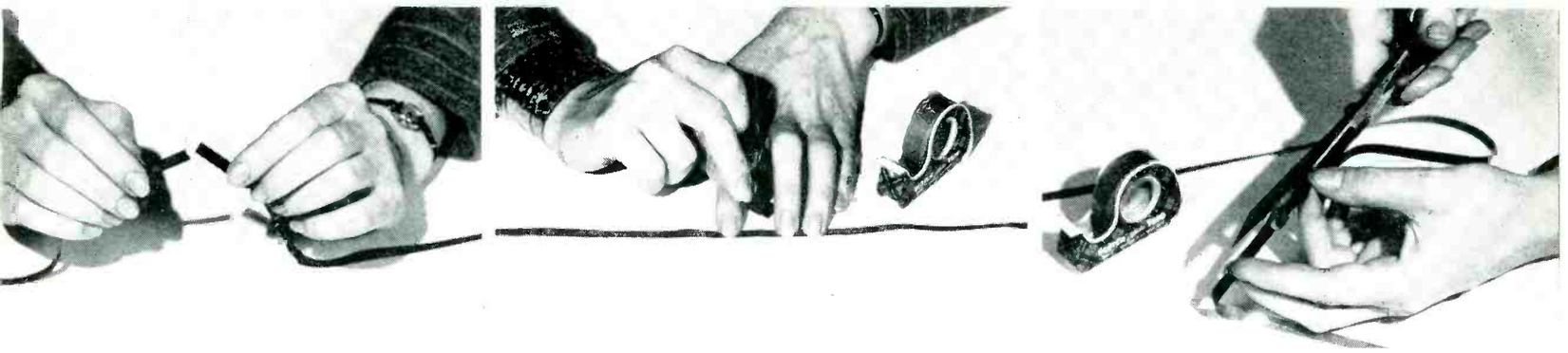


Fig. 8—Herring bone distortion pattern caused by diathermy or ignition fields



Magnetic tape, having a paper or a plastic base, can be readily edited by taking out or adding lengths of tape as desired. A butt-joint splice is made by joining the two ends (Fig. 1A, left) and placing a small piece of clear scotch tape on the back (uncoated side) of the magnetic tape (Fig. 1B). The excess Scotch tape is then trimmed with a scissors (Fig. 1C, right) so that is is no wider than the original magnetic tape. A splice made in this manner will not add any spurious noise to the reproduction. For professional applications a modified 8mm film splicer makes it possible to undertake the operation more expeditiously.

Magnetic Tape Recording

THIS NEW TYPE OF EQUIPMENT AFFORDS SALES, INSTALLATION AND SERVICE OPPORTUNITIES TO INDUSTRIAL-MINDED SERVICE DEALERS

AS a magnetic material, "Hyflux" is the result of more than two years' research on the part of The Indiana Steel Products Company and coordinated sponsored projects at the Battelle Memorial Institute of Columbus, O. The work was carried on under the direction of W. E. McKibben, Director of Research and Development, and Hugh A. Howell, Research Engineer, both of The Indiana Steel Products Company.

Specifications of "Hyflux" tape as applied to its tape recorder use are as follows: (1) Composition—metallic powder coated on paper tape. (2) Tape dimensions—width ¼ inch; Thickness —0.002 (including Hyflux coating thickness 0.0005 inches). (3) Break load of tape—6 pounds.

Recording on this tape is attained by coordinating its inherent magnetic capacity with the specially designed recording head and associated circuits which utilize its high coercive force to maintain a high signal-to-noise ratio. By using higher tape speeds, very high fidelity can be reached at extreme frequencies which would include the third harmonics. This, however, is not considered the normal operational range of "Hyflux" tape because of the sacrifice in recording time to achieve such extremely high fidelities. The frequencies best suited for music are from 100 to 5,000 cycles, but experiments have proven that most people, unless their ears are educated to appreciate the higher ranges prefer those at the lower end of the scale. This is why the tone control on most radios is kept turned to "bass".

Front view of the magnetic tape recorder machine developed by Indiana Steel Products Company. Reels contain magnetized paper tape.

At this time the tape will operate satisfactorily for most recording purposes at frequencies up to 6,000 cycles with a tape speed of 8 inches per second. While further development may permit a wider frequency range or lower tape speed, this is considered adequate for home and commercial needs.

A new tape recorder was designed which would not only best utilize this revolutionary magnetic recording material, but would also be simple to operate, economical to manufacture, and would also be within reach of the average consumer.

The resulting tape recorder is the combined work of The Indiana Steel Products Company and the Physics Research Division of the Midwest Research Institute, Kansas City, Mo. It is the integrated result of research in magnetics, electronics, mechanics and acoustics, as well as experienced practical engineering directed toward making the unit simple to operate and economical to build.

Variety of Models

Several models of the basic tape recorder have been made. One, the "drawer" model, consists of a low, flat box which can serve as a base for all types of table model radios. In this base, or drawer, is housed all the driving mechanism, the reels, the magnetic recording and pickup unit, and necessary electronic circuits.

For good performance, the amplifier of the radio itself can be used for both recording and playback. For still better performance, however, the recording can be made with a very sim-

[*see page* 34]

SPRAGUE TRADING POST

FOR SALE—Triplett Multitester 625-N, hardly used, $32. Also chromium plated bug like new, $6.50. Francis Conlogue, 5 Norfolk St., Roxbury 19, Mass.

FOR SALE—8-10 watt amplifier-audio. 2 6v6 driven by 1 6c8 power 5y3, in good shape. Feed back in every stage. $20. E. L. Cox. 2035 Academy St., Winston Salem, N. C.

WILL TRADE—Savage Mod 23D .22 Hornet w/6x scope, pair 8x24 Habicht binoculars. Want late model tube tester and other test equipment. H. F. Magee, Jr., Claremont, Va.

FOR SALE—New Hickok signal generator 288x; Sylvania tube checker 139 used very little. All inquiries answered. W. S. Moore, Box 203, Allen, Okla.

WANTED—6AK6 tube and two 50 millihenry R-F chokes and two portable typewriters. Will pay cash. Robert F. O. Nowak, 24 Spruce St., Malone, N. Y.

FOR SALE—Hickok 203 electronic meter, like new, $72. Hickok 9" Jumbo 210x infinity ohms per volt-meter, $45. E. Sujak, 4209 Elston Ave., Chicago 18, Ill.

FOR SALE—Universal velocity microphone, high impedance. In perfect condition—used very little. No cable or stand. Will ship postpaid for $15. Glenn S. Pidge, U. S. Veteran's Hospital, San Fernando, Calif.

SELL OR TRADE—New 15-watt amplifier for tube tester with roller tube chart. Chester Wegrzynowski, 104 Beck St., Buffalo 12, N. Y.

FOR SALE—Pen-oscil-lite test oscillator with instructions. Little used, $4. T. Popel, 1223 Elm Ave., Brooklyn 30, N. Y.

FOR SALE—BC-312 Superhet receiver converted 110V. A.C. Coverage 1500kc to 8000kc in 6 bands with 2-r.f.; 2-i.f.; 2-audio stages. Good condition, $55. Chas. D. Hall, 1125 19th St., Des Moines 14, Iowa.

WANTED—Used signal generator and tube tester. Give brief description, condition and price. Dennis Dowling, 806 S. Ashland Blvd., Chicago, Ill.

FOR SALE—Model K portable recorder (Presto), also new coin-operated hotel radio. Both perfect condition. Electronic Sales & Service, 104 Conklin Ave., Syracuse 6, N. Y.

FOR SALE—15-watt amplifier, Racon Giant Units, Gene-motor, Neon sign. Write for price. Carr's, 17 Kelley Square, Worcester 4, Mass.

SELL OR TRADE—35mm sound projector less amplifier from S.S. Normandie. Will trade for tube tester or test equipment. William E. Goewey, 658 Spring Rd., Elmhurst, Ill.

FOR SALE—Radio City 802N tube-set tester never used, $57.50; also never used Stancor tube checker, transformer 19 steps, $5.50. L. J. May, Box 169 Canal Sta., New York, N. Y.

FOR SALE—Dumont 274 5" scope in perfect condition, $70; Modern Radio Servicing, new $4; new Rider Manuals 1-5 abridged, $13; #6-8, $15-$13. All in perfect condition. John Raposa, 167 Washington St., Fall River, Mass.

WANTED—Would like to purchase or borrow all available data on the H.M.Z. L. 34/K-II Philips Radio, made in Holland. Louis F. Kralik, 522 Paine Ave., Toledo 5, Ohio.

FOR SALE—Hickok 3" oscillograph, late RF05—early 305, $100. E. Sujak, 4209 Elston Ave., Chicago 18, Ill.

FOR SALE—Radio tubes 6A8, 6B7, 6B8, 6V6GT, 6K5GT, 6SQ7GT, 6SN7-GT, 6SL7GT, 6SA7GT, 6SJ7GT, 7C7, 7C5, 7B8 7B6, 7A7, 6L6G, 5V4G. 5Y4G, 1T4, 1T5, 2B7, 1S4, 1Q5, 1A4, 1Q5, 1A4, 1B4, 50L6GT, 35L6-GT, 25L6GT, 35Z4GT, 25Z6GT, 12SR-7GT, etc. 40% off list. D. & M. Radio, Franklin, New Hampshire.

FOR SALE—S.G. 070 in good condition very little used, $30; RCA 3" scope TMV-122 B. good condition, $50; Pilot Radio H-11 converted to ac-dc battery operated with selenium rectifier. $25; 2-band switch for RCA radio 118, $1 and many additional items. Franklin C. J. Slay, 243 W. 107 St., Ntw York 25, N. Y.

WANTED—Volume 1 of Rider Perpetual Trouble Shooters Manuals, new or used. Roger LaFrance, 18 Highland Ave., Sanford, Me.

FOR SALE—Precision tube checker and multitester, never used, $70; new E-200 signal generator, $50; almost new Supreme 333 deluxe analyzer, $35 and Precision 500 tube checker modernized like new, $40. All instruments guaranteed. M. J. Difini, 1698 Lexington Ave., New York 29, N. Y.

WILL TRADE — 10-tube, 6-channel, high-fidelity Thordarson 5-watt broadcast preamplifier; also RCA 15-watt PP6L6 amplifier. Want U. S. stamps. Bernard Grossman, 105-14 Crossbay Blvd, Ozone Park 17, N. Y.

FOR SALE—National NC46 receiver with speaker used only 3 months, $80. Donald Geib, 715 E. 4th St., Dover, Ohio.

WANTED — Thordarson transformers T33A91; T75D10; T11M77; T75R50; T19F96; T19P59; T19P62; T19F90; T19C36; T19C43 and others. Must be nearly new. Also need large assortment meters, unpunched chassis and panels. Edward Howell, 501 W. Harden St., Graham, N. C.

SELL OR TRADE—75-watt E.L. inverter, Philco VTVM-VOM, one ea. 10, 15, 25, 30-watt audio amps., record player B-10 arm, flyer motor, NC-81X receiver, Trans. Parts and tubes, 807, 814, FG-19, 1619, 1624, RK's, etc. Rc 6-H6, J7, S17, K7, SK7, F6, V6, L7, N7, SN7, L7, C5, J5, etc. Want laboratory or transcription equipment. George Hoffer, 1275 Nelson Ave., Bronx 52, New York.

WANTED—New or used 50Z7G tube. J. G. Collins, 2632 Washville St., Pittsburgh 4, Pa.

FOR SALE—NRI four-tube radio kit practically built. Cost $14. Jones Radio Co., Box 93, Douglassville, Pa.

SELL OR TRADE—Supreme signal generator and frequency modulator #581; Supreme diagnometer 585, Deluxe series. Both in perfect condition. Need short-wave receiver and transmittr or what have you? Roy Ben Bridwell, #2 Chestnut St., Box 206, Tucapau, S. C.

FOR SALE—Astatic B-10 arm with new B-2 xtal. Powerful RCA gear-drive phono motor & 9" table; needs $\frac{3}{8}$" shaft coupling, $20; also Jensen A-12 PM speaker used 2 months, $30. All in excellent condition—postpaid. D. A. Forsberg, 12023 Dayton Ave., Seattle 33. Wash.

WANTED—Set of Rider's manuals; will buy single books or whole sets. Russell Benedict, 437 Crystal St., Jacksonville, Fla.

WILL TRADE—3 line cushion, index, rubber stamp with not more than 30 letters to a line. Want one new or two used 1A7, 1N5, 1H5 or 1A5 tubes. Cookson, Lock Box 0, Puxico, Mo.

WANTED—200-watt, 50 to 10 amp. rectifier that will change a-c to d-c at 12 volts for use with 100-watt Lionel train transformer. Charles R. Graff, Mt. Alt. Sanatorium, South Mountain, Pa.

FOR SALE—New radios, phono combinations, small appliances, etc. still in cartons. Standard merchandise. Inquire on your letterhead. Need Dumont 5" scope. Jack's Radio Service, 111 West Hoffman Ave., Lindenhurst, L. I.

FOR SALE—Viewtone television receiver chassis complete with tubes and 7" C.R.T. unaligned, less 19 tubes, $70. G. Pollack, 1424 Walton Ave., Bronx 52, N. Y.

SELL OR TRADE—12 Valpey crystals XLS, 80-86kc; 2 Bliley crystals F.M. 6 80-86kc; 3 Bliley crystals AR21W—100kc; 2 RCA crystals VC-5-K-S 100kc; 2 Simpson 0-500 milliampere meters; 2 D.C. 0-500 microampere meters; 1 D.C. 0-10 milliampere meter and 1 RCA 0-500 d-c voltmeter. Frank H. Ratliff, 3117 N. Hope St., Phila. 33, Pa.

FOR SALE—Westinghouse RC receiver, 307215, 3 tubes, ALLUV-201, in good condition. C. S. Healey, 2719 Octavia St., New Orleans 15, La.

FOR SALE—New 6J6 and 9001 miniature tubes in bulk pack, 29¢ ea. Also Green Flyer, 50 cycle motor and turntable or trade for equal 60 cycle motor. Robert L. Wenk, 2714 Valley Pike, Dayton, Ohio.

YOUR OWN AD RUN HERE FREE

The Sprague Trading Post is a free advertising service for the benefit of our radio friends. Providing only that it fits in with the spirit of this service, we'll gladly run your own ad in the first available issue of one of the six radio magazines in which this feature appears. Write CAREFULLY or print. Hold it to 40 words or less. Confine it to radio subjects. Make sure your meaning is clear. No commercial advertising or the offering of merchandise to the highest bidder is acceptable. Sprague, of course, assumes no responsibility in connection with merchandise bought or sold through these columns or for the resulting transactions.

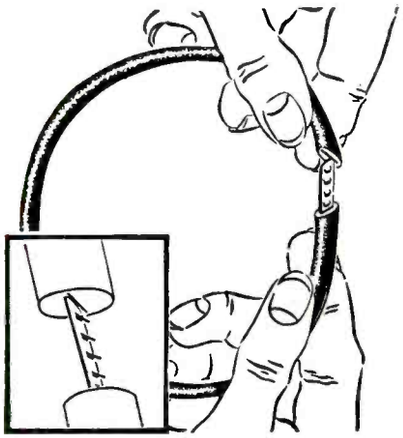
Dept. RSD-87, SPRAGUE PRODUCTS CO., North Adams, Mass.

(Jobbing distributing organization for products of the SPRAGUE ELECTRIC COMPANY.)

NEW PRODUCTS

Walsco Universal Dial Belt

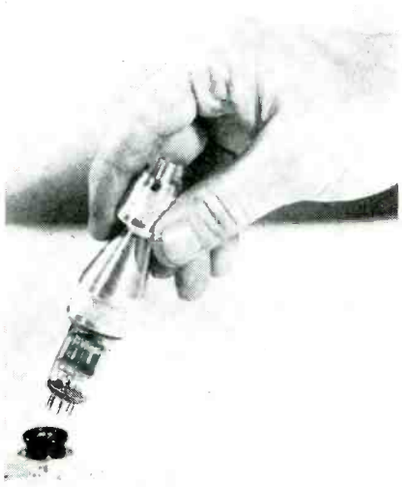
A universal dial belt that eliminates the need for the 96 different sizes required to fit all radio models is announced by Walter L. Schott Co., Beverly Hills, Cal. This new "Uni-



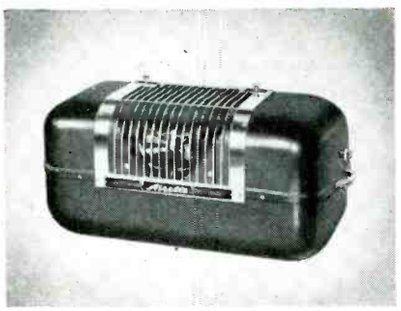
belt" comes in continuous lengths on spools containing belting for from 5 to 8 dial replacements. By using a patented, zipper-like connector that is inserted in each end of the Unibelt quick installation without taking the dial mechanism apart is possible. Latex covering prevents slipping and the thin flexible stainless steel core makes stretch impossible. Available at all jobbers.

New Miniature Tube Puller

By using an AMO miniature tube puller one can easily and safely insert or pull out miniature type tubes that are hot or in almost inaccessible



places. The unit slips onto a tube, automatically grips it tightly and does not release until the button is pressed. Completely fool-proof and indestructible. Full details available by writing Oliveri Tool Co., 4000 West North Ave., Chicago 39, Ill.



New Air Conditioner

Airette, a new portable air conditioning unit, cools, humidifies, heats, cleans and circulates air depending upon the wishes of the operator. Weighs 22 pounds, operates from a-c line; requires no plumbing or intricate installation. Cabinet dimensions 26" x 13" x 12". Airette can be used in homes or offices. Full particulars from Airette Mfg., Inc., 1041 N. Sycamore Ave., Los Angeles 38, Cal.

New Recordio

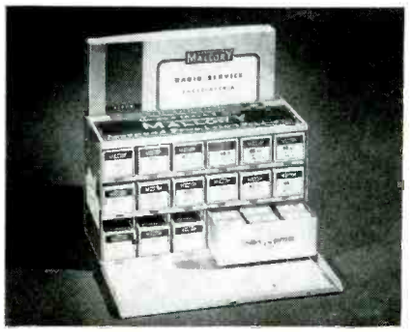
Wilcox-Gay Corporation announces a new small console Recordio. The new model called the "Manhattan" is equipped with an automatic record changer that glides out at a finger

touch and it makes recordings from its own microphone or self-contained radio.

Four Plexiglas Pushbuttons offer finger-tip selection of microphone recording, radio recording, phonograph, radio or public address system. A newly-designed pickup arm contains a sensitive crystal cartridge featuring a replaceable, spring-action needle. A storage compartment accommodates approximately 25 record albums. Available in three finishes, rich mahogany, desert blonde, or walnut. For further details, write Wilcox-Gay Corp., Charlotte, Mich.

New Mallory Kit

Service Dealers are offered a sturdy steel stock cabinet with an inventory and recorder guide and a rack for their copy of the Mallory Radio Service Encyclopedia at no extra cost with their purchase of an assortment of fifteen Mallory Controls and nine AC

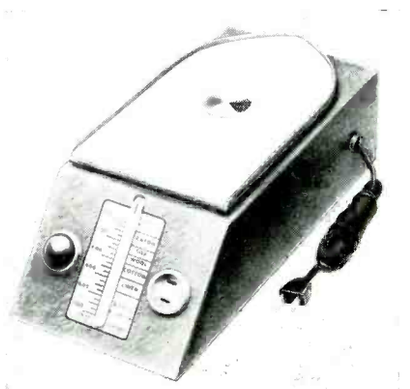


Switches. The assortment has been made up to permit flexibility in the selection of the particular controls which may be needed by the serviceman to meet the needs of his particular trade. It is estimated that the fifteen controls and nine switches which are recommended for this assortment will cover more than 90% of average requirements. Price of this assortment to the trade, including the steel cabinet is $14.85. Write P. R. Mallory & Co., Inc., Indianapolis, Ind. or any Mallory jobber.

New Automatic Iron Tester Designed For Appliance Repairmen

A fully automatic iron tester specially designed for the use of appliance repairmen is announced by the Hanlan Company, 1419 West Jefferson Blvd., Los Angeles 7, Calif.

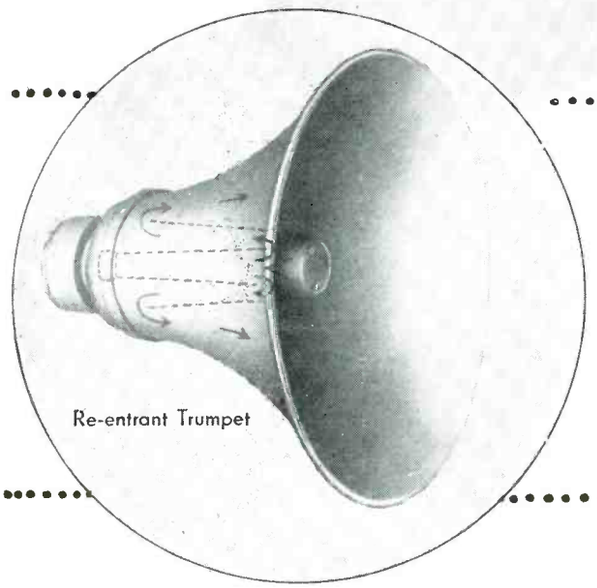
Designated as Model 70, the new test unit speeds accurate checking and



precise regulation of all types of automatic irons. A direct reading temperature scale registers from 200° to 700° F. A pilot light flashes on and off as thermostats cut in and out; full 3" easy-to-read temperature scale; heavy-duty specially designed precision thermometer; rugged, crackle finish steel case. Weight 2 lbs. 10 oz. An air space between the instrument

AUDIO ENGINEERING SUPREMACY

is built into every RACON Sound Reproducer



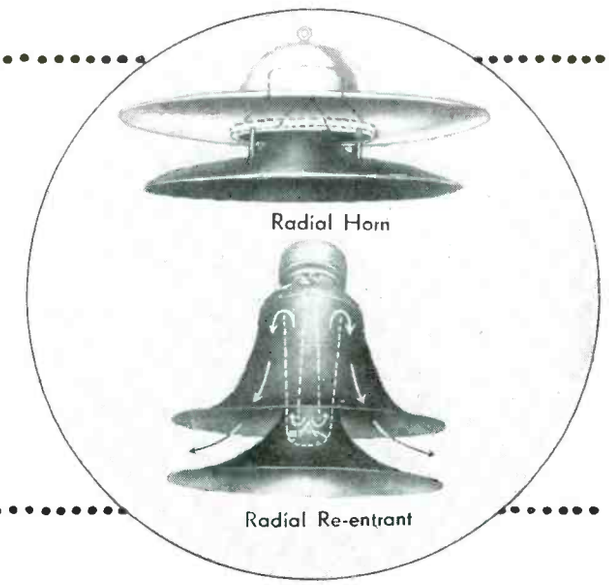
Re-entrant Trumpet

ACOUSTIC & STORMPROOF MATERIAL

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

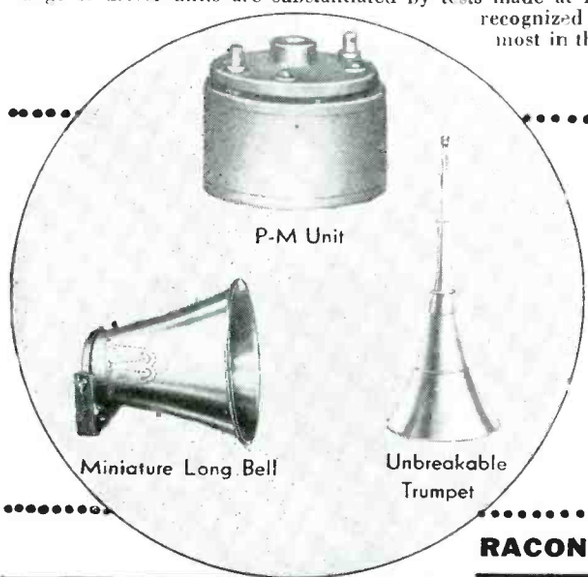
ADVANCED ENGINEERING & DESIGN

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



Radial Horn

Radial Re-entrant



P-M Unit

Miniature Long Bell

Unbreakable Trumpet

COMPLETE LINE TO CHOOSE FROM

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

SEND FOR FREE CATALOG

RACON ELEC. CO., INC., 52 E. 19 ST., NEW YORK, N. Y.

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Racon Elec. Co., Inc.
52 E. 19th St., New York 3, N. Y.
Gentlemen: Please send me a copy of your new free catalog.

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case and the iron testing plate facilitates cooling which results in great iron testing capacity per work day. For further details write the manufacturer.

IN AND AROUND THE TRADE

[*from page* 6]

of standard broadcast, variations may occur within five feet. Thus, in the average living room there are apt to be several spots where FM reception is dead. At the same time, there are apt to be several that are noticeably high. This is determined by watching the meter as the operator explores the room with the FactoMeter.

Dead spots occur when waves bound into each other out of phase, and thereby cancel each other out. High spots occur at a point where in-phase waves connect and move together in phase.

Further details about the instrument may be obtained by writing J. T. Dalton, general sales manager of Bendix Radio Div., Baltimore 4, Md.

Clune Joins Air King

David H. Cogan, President of Air King Products Co., Inc. — Division of Hytron Radio & Electronics Corp., manufacturers of radio and electronic apparatus, announced the appointment of J. J. Clune as Merchandise Manager of Air King Radios.

Mr. Clune was formerly associated with the National Union Radio Corporation of Newark, New Jersey for seventeen years in various capacities having directed the firms sales during the past few years.

TELEVISION R-F CIRCUIT APPLICATIONS

[*from page* 15]

transformer consists of three windings. L_1, the primary winding, is a low impedance coil which serves to effect a proper impedance watch with the low impedance antenna transmission line. L_2 is the tuned resonant unit of the transformer and is inserted with L_1 and L_3 into the receiver circuit by means of a bandswitch. L_3 is the grid winding which is tuned to resonance by the combined wiring capacitance, tube input capacitance, etc. of the first r-f circuit.

At the ends of the primary and secondary coils are located two adjustable brass rings, which are effectively shorted turns, and which vary these inductances L_1 and L_3 so that two resonant peaks are obtained on each side of the mid-frequency of the channel. Thus, tuning on a 44-50 mc signal results in L_2 being tuned to the center frequency, 47 mc. The overall response curve becomes that of *Fig. 15* by virtue of the overcoupled circuits and the adjustments made with the brass rings. Although the curve, as indicated, shows a decided attenuation (30% dip) at the center frequency, this is compensated for in the mixer stage by peaking its r-f circuit so that the overall response curve is practically flat over 6 mc.

Moving on the mixer circuit of the receiver (see *Fig. 16*) we find that the mixer r-f transformer consists of two windings, L_4 being the oscillator tank winding, and L_5 the tuned r-f coil. Tuning of this coil L_5, is effected by means of a brass ring located at one of its ends in much of the same manner as was described in the previous paragraph. To re-

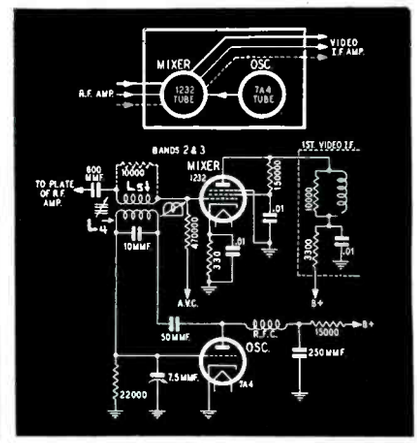


Fig. 16—The mixer circuit

peat, the coil L_5 is peaked by means of the brass ring so that its response curve is peaked at the center r-f frequency, thereby compensating for the attenuation at this frequency resulting from the adjustments made in the first r-f stage. This is shown in *Fig. 17*.

R.C.A. System

Like the Dumont Inductuner, and the Philco r-f unit, the R.C.A. radio-frequency tuner contains an extra tuned r-f stage. However, the circuit is radically different insofar as the components, which are the resonant elements of the circuit, can be considered as elements of a tuned transmission line.

To begin with the new R.C.A. television receivers contain a thirteen channel selector switch for coverage of the complete television channel. The tubes used for the r-f converter, and oscillator stages are all 6J6s. This tube has a high figure of merit (trans-conductance input capacitance) and therefore is particularly suitable for service in any of the three above-mentioned circuits. Each individuaal circuit contains 13 pairs of series inductances terminated by a suitable network at the far end. Each pair of these series inductances may be considered as a quarter-wave section of a balanced transmission line. The resonant frequency of the line at a particular position is determined by the setting of a connecting bar which is located on the band switch, and can be seen in *Fig. 18*.

The first transmission line, corresponding to channel 13, consists of a variable inductance. This corresponds to L_{25} and L_{26} for the r-f stage, L_{51} and L_{52} for the converter stage, and L_{77} *and* L_{78} for the oscillator stage. Channels 12 to 7 are tuned in by adjusting the switch contacts along the portion of the transmission line consisting of a metal strap. Channels 7 to 6 are tuned in by three sets of adjustable coils. Finally, channels 6 to 1 are obtained by switching in to three sets of figure-eight coils. In this manner incremental lengths of transmission line are added to each switch position as the frequency is reduced from channel 13 to channel 1.

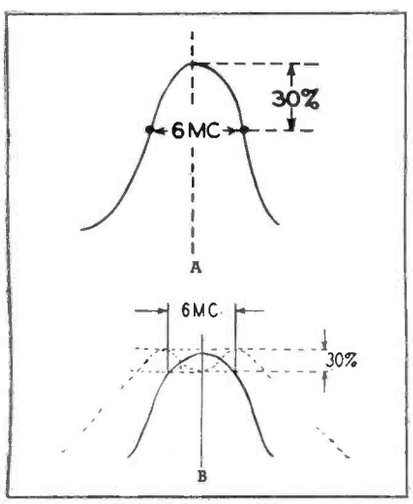
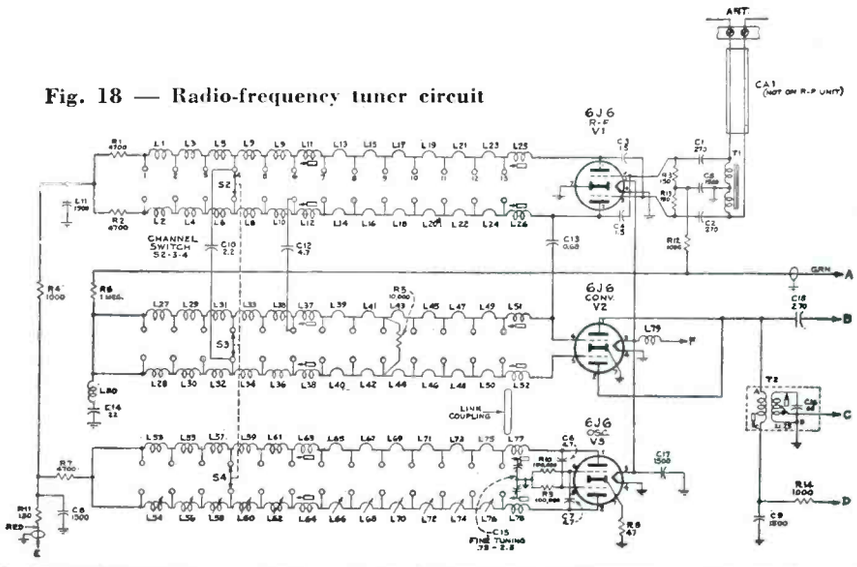


Fig. 17 — Local oscillator coupling transformer, response curves

Fig. 18 — Radio-frequency tuner circuit



Mandatory Television Service-Installation Plan Instituted by Stewart-Warner

A mandatory installation and service plan for Stewart-Warner television receivers, formulated to provide consumer confidence and to simplify the service responsibility of both distributor and dealer, was announced by N. J. Cooper, service manager.

"Our authorized television service stations will be independently owned companies engaged exclusively in radio service activity," Cooper explained. "However, a Stewart-Warner distributor may also qualify if his home office is located in a television transmitting area and if his service department is adequately equipped."

The services to be provided by an authorized station to the purchaser of a Stewart-Warner television receiver are specified in a mandatory "Customer's Installation and Service Policy." This calls for "normal home installation" of the receiver and an antenna plus all labor, materials, replacement parts and tubes (including the picture tube) that may be required to repair or maintain the receiver in normal working order for a period of one year.

The policy is sold for $55 by the dealer to the purchaser. When the dealer sells and delivers a new television set to the purchaser's home he merely notifies the service station and requests the installation. The service company is then remunerated for "normal home installation" and maintenance services by the distributor.

A "normal home installation" is defined by the customer's policy as "one which can be accomplished by two men in a time not to exceed 3½ hours and where the component parts of the standard Stewart-Warner television antenna kit (including 75 feet of ribbon type transmission line) are sufficient to accommodate the requirements of the particular installation."

If the installation is non-standard, the authorized service station will make a direct, extra charge to the set purchaser for any labor or material that may be required over and above that necessary for a normal home installation.

The service company also will install and adjust antennas and receivers to be used by dealers on their display floors, charging the latter on a straight time and material basis. Maintenance service on dealers' demonstration models will be provided without charge.

Stickle Now Westinghouse Advertising Manager

J. H. Stickle, a veteran of 20 years in the radio advertising field, has been appointed Advertising and Sales Promotion manager of the Home Radio Division of the Westinghouse Electric Corporation.

Mr. Stickle will take charge of the advertising and promotional campaign now being planned for the introduction of the new Westinghouse radio line in a nationwide series of meetings next month.

TECHNICAL QUIZ
No. 2.

[from page 20]

14. The stations over the higher frequency portion of the dial of a receiver are not received, while those over the lower frequency are. The trouble is due to:

A. A defective oscillator tube.
B. A shorted variable condenser.
C. Receiver misalignment.

15. A receiver sounds distorted. However, it *may* be partially or temporarily cleared up by placing one's fingers across grid and ground of the first audio tube. The trouble is due to:

A. A defective audio tube.
B. A leaky coupling condenser.
C. An open grid return resistor.

QUESTIONS 16 to 20

16. A receiver renders each loud audio passage with an accompanying marsh crackling background growl. The trouble is due to:

A. A defective power tube.
B. An open audio cathode by-pass pass condenser.
C. An open filter condenser.

17. A receiver operates poorly over the low frequency portion of the dial but well over the high frequency portion. The trouble is due to:

A. A shorted variable condenser.
B. An improper adjustment of the padder condenser.
C. A defective oscillator tube.

18. Some times it is possible to effect emergency repair of a partially burnt out 35Z5 by short circuiting prongs:

A. 2 and 7
B. 2 and 3
C. 3 and 7

19. The correct replacement for an audio compensated volume control connected in the diode circuit of a detector is:

A. A tapped 2-megohm volume control.
B. A 500,000-ohm volume control.
C. A 50,000-ohm volume control.

20. Listed below are six components in a typical receiver. Of these, three usually cause fading when defective. Enumerate three:

A. Tubes
B. Power transformers.
C. R-F coils
D. Volume controls.
E. By-pass and coupling condensers.
F. Loud speakers.

CORRECT ANSWERS ON PAGE 35

Ackley Joins Stromberg-Carlson

C. J. Hunt, Stromberg-Carlson sales manager of the radio and television divisions, has announced that Keith J. Ackley, has joined the company, as district merchandiser, and will cover the New England territory and northeastern New York state.

Warner and RCA Launch Joint Program on Large-Screen Television

Heralding an advance of far-reaching significance in the mass entertainment field, the RCA Victor Division of the Radio Corporation of America and Warner Bros. Pictures, Inc., announced the signing of a contact for a joint program of research on large-screen television.

New types of black-and-white large-screen television equipment have been developed by the RCA in its Camden, New Jersey and the first elements will be shipped immediately to the Warner Burbank Studio. Other components will be supplied later. In addition, RCA will provide technical and research information and the assistance of engineering personnel and field engineers

RCA first demonstrated large-screen television at the New Yorker Theatre early in 1941. At that time scenes televised from Madison Square Garden, Ebbett's Field and Camp Upton were projected on a 15 x 20 foot theatre screen.

Intensive laboratory research and development carried on since then by RCA scientists, working on applications of large-screen television for military purposes, has contributed to vast impovements in tubes. electronic circuits, and components, resulting in pictures of excellent quality by comparison with any previously demonstrated.

MAGNETIC TAPE RECORDERS

[*from page 26*]

ple low gain amplifier in the sound recorder drawer with the playback coming through the radio amplifier. This latter arrangement permits a high degree of equalization during recording without impairing the playing quality of the radio which can be listened to during recording.

Because of greater versatility in use, the complete recorder and playback unit is another model well suited to all types of educational work—especially for speech and music education. It is an ideal model for amateur entertainment purposes. When used with a radio, it would only be necessary to connect the output of the radio to the input of the recorder.

Varied Uses

Potential uses of the tape-recorder are almost unlimited, in home, office, or industry. Wherever there is a need for making a record, either permanent or temporary, of voice, music, or sound of any kind, the tape recorder can be utilized efficiently and economically. While its greatest appeal will be in the home-recording field, its applications to other uses is expected to

begin at once. A number of different manufacturers have already indicated they will start production shortly.

This tape recorder is especially suited for commercial uses such as factory music, public conveyances, and tavern and hotel dining room entertainment.

The railroad and aviation industries could provide the best entertainment to their passengers very inexpensively. Tape recorders could record favorite radio shows, musical selections, sports events and the like and the reels of tape be picked up at various points along the routes of travel and played back to the passengers.

Another application in the aviation industry would be in the testing of new planes where a tape recorder could provide not only the pilot's observations, but automatic models installed in various parts of the plane would record any audible defects. Thus the tape recorder could be used to supplement present remote control radio testing.

Police recording systems and automatic call systems in hotels, railroad, bus and air terminals could find effective low cost use of the paper tape recorder.

The use of an automatic wire recorder in connection with a telephone has already been marketed. Magnetic paper tape could be easily adapted to such use at a cheaper cost. It need not be confined to the acoustical field. Wherever phenomena can be translated into magnetic variations, this magnetic tape can be used to inscribe such data for future study or reference, whether the date be for temporary or permanent usage.

A half-hour program can be recorded on a 7 inch reel for 8 mm. film, or a whole hour's program can be recorded on a standard 16 mm. movie film reel. While specialized applications might require a larger reel (for longer recording time) the availability of these film reels makes them the most convenient sizes for general application.

TECHNICAL QUIZ No. 2 ANSWERS

Do NOT read or study these answers until you have finished marking down your answers to the "Quiz" given on pages 20 and 33 of this issue. When that is done, compare your answers to these correct ones.

ANSWERS

1-*C*; 2-*C*; 3-*B*; 4-*A*; 5-*C*; 6-*A*; 7-*C*; 8-*C*; 9-*C*; 10-*A*.

11-*B*; 12-*C*; 13-*B*; 14-*A*; 15-*B*; 16-*A*; 17-*B*; 18-*B*; 19-*A*; 20-*A,D.E.*

$1.00 to $5.00 PAID for "SHOP NOTES"

Write up any "kinks" or "tricks-of-the-trade" in radio servicing that you have discovered. We will pay from $1 to $5 for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor," RADIO SERVICE DEALER, 342 Madison Ave., New York 17, N. Y. Unused manuscripts cannot be returned unless accompanied by stamped and addressed return envelope.

Ad Index

ADDRESS CHANGES

Subscribers to RADIO SERVICE DEALER should notify our Circulation Dept. at least 3 weeks in advance regarding any change in address. We cannot duplicate copies of RADIO SERVICE DEALER sent to your old address. Old and new addresses MUST be given.

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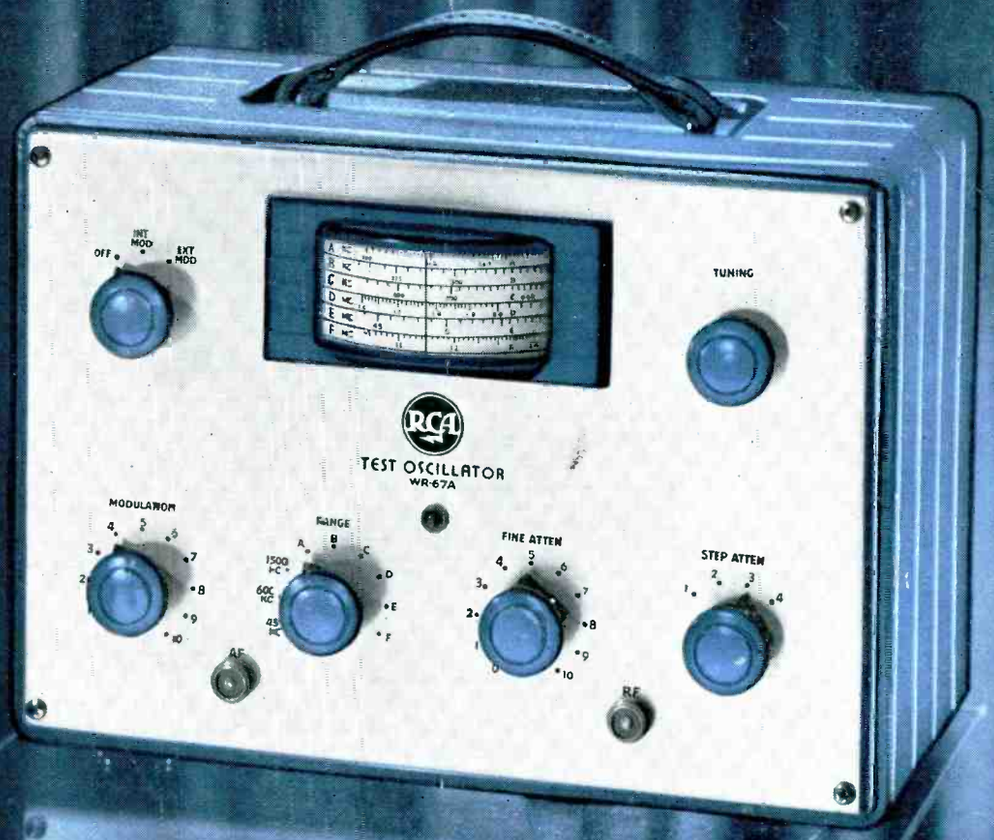
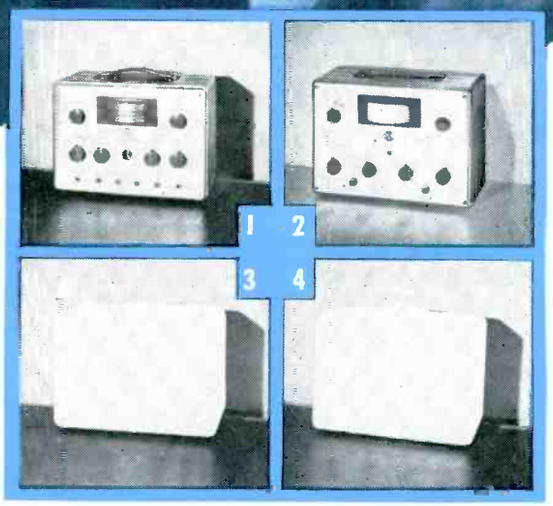
DESIGNED FOR THE BETTER SERVICE SHOP . . .



RCA's NEW TEST OSCILLATOR
. . . second unit of a revolutionary new line



ON THE WAY—a superior line of test equipment that puts time-consuming service jobs on a profitable, production-line basis . . . that anticipates all FM and television needs. Matched styling of all instruments permits attractive, convenient grouping. Watch for announcements of the other units in this new line.

Reduces testing and alignment time by as much as 50 per cent

● The WR-67A is a time-saver that adds *profitable* hours to your service day . . . puts you dollars ahead.

When aligning a receiver, for example, you can switch from a pretuned i-f signal to pretuned broadcast-band signals without dialing or retuning. The range switch gives you three fixed frequencies: 1500, 600, and 455 kc. It also permits instant switching to any other frequency you select between 100 kc and 30 mc by presetting the smoothly variable tuning control.

Other outstanding features include: a signal injection probe for high-speed servicing . . . a four-step attenuator with fine control . . . double shielding . . . miniature-type tubes throughout . . . a six-band drum dial with an easy-to-read, four-foot scale spread . . . adjustable modulation level for internal and external modulation . . . a two-stage power-line filter to minimize leakage, and a 400-cycle *audio* signal source.

Every RCA WR-67A is factory-tested with the finest precision measuring equipment. Heavy-duty components—plus the WR-67A's ability to withstand rigorous "drop," "shake," and humidity tests—add up to real on-the-job reliability. A new bulletin is yours for the asking. *Keep in touch with your RCA Test Equipment Distributor.*

TEST AND MEASURING EQUIPMENT

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ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

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"Sally Service," the high-powered little saleslady up there on the desk, is typical of the dynamic promotional support you get with time-tested RCA sales aids.

This new full-color cutout and a whole new group of eye-catching posters and displays, apply powerful display techniques to the job of stopping, reminding *and selling* prospects. They are designed by merchandising experts to give your store more *sell* and more profit.

Ask your RCA Distributor to give you the new RCA Sales Aids Booklet. It describes all of the business boosters that are available to you.

The point-of-sale support of RCA sales aids, is one more powerful reason why *you're in the lead with RCA.* So, push RCA tubes and watch your business grow!

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