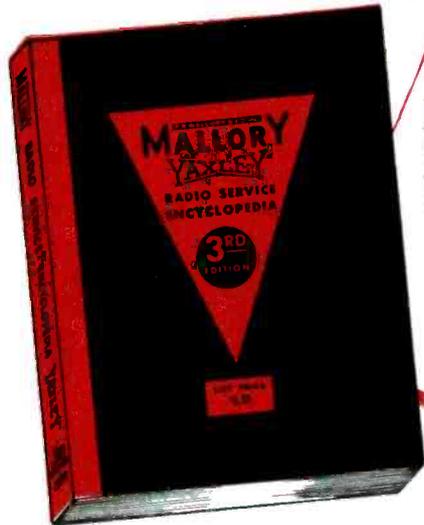




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Let's all go on a profit standard this Fall.

**T**HE feature article in this issue was to give a complete survey of all 1940 receivers. We have been gathering this material for many months and have spent considerable time in studying design trends. In spite of all this effort, however, there are many circuits already in our hands and others promised in the near future which have not been covered in the article. It is our intention, therefore, to continue discussing receiver trends for 1940 in an early issue.

## CONTENTS

Ask for It. <i>By John H. Potts</i> .....	431
Converting Battery Sets to 1.4-Volt Tubes. <i>By Leland S. Hicks</i> .....	425
Crosley 119 Facsimile Kit Assembly Details .....	428
G. E. HM171 Television Receiver Circuit .....	434
Receiver Trends for 1940. <i>By Henry Howard</i> .....	419

### CIRCUITS

<i>Complete Circuits</i>	
Arvin 40, 40A .....	424
Cornell-Dubilier BN Capacitor Bridge .....	445
Crosley 118, 119 Facsimile Printer .....	429, 442, 444
G. E. HM171 Television Receiver .....	434
RCA OSC22 Wireless Record Player .....	420
Silvertone 126.210 Wireless Record Player .....	419
Stewart-Warner A6 .....	Front Cover

### *Partial Circuits*

Belmont 551B .....	420
Converting Battery Sets .....	425, 426
Fada P40 .....	441
G. E. H600, H610, H611 .....	420
G. E. H625 .....	420
Philco 40-120 .....	421
Philco 40-150, 40-155 .....	421
Philco 40-180, 40-185, 40-190 .....	441
Philco 40-205 .....	420
Philco 931, 932 .....	420
RCA 5X5 .....	424
RCA M50 .....	420
RCA M60 .....	421
RCA T80 .....	421
Silvertone 101.573 .....	419
Silvertone 101.579 .....	419
Silvertone 110.987 .....	419
Sonora N2110 .....	420
Stromberg-Carlson 410 .....	421
Stromberg-Carlson 411 .....	420
Stromberg-Carlson 440 .....	421
Stromberg-Carlson 450 .....	420

<b>Associations</b> .....	<b>453</b>
<b>Book Reviews</b> .....	<b>449</b>

### Case Histories

Philco 39-55. <i>By Willard Moody</i> .....	426
Philco 45XX. <i>By Willard Moody</i> .....	426
Stromberg-Carlson 400 Series .....	446
Stromberg-Carlson Labyrinth Models .....	448
Westinghouse 675. <i>By Willard Moody</i> .....	446

### Cover Diagram

Receiver Trends for 1940. <i>By Henry Howard</i> .....	419
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<b>Highlights</b> .....	<b>450, 452</b>
-------------------------	-----------------

<b>Manufacturers</b> .....	<b>436, 437, 438, 453</b>
----------------------------	---------------------------

### Television and Facsimile

Crosley 119 Facsimile Kit .....	428
G. E. HM171 Television Receiver Circuit .....	434
JFD Television Antennae .....	448

### Test Equipment

Cornell-Dubilier BN Capacitor Bridge .....	445
Standard Frequency Service .....	446

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**NATIONAL UNION RADIO CORPORATION**

57 State Street

Newark, N. J.

# RECEIVER TRENDS FOR 1940

By HENRY HOWARD

IT LOOKS as if the radio industry is coasting—in so far as the broadcast receiver is concerned. After studying the 1940 press releases and the design data of the most prominent manufacturers with the hope of uncovering another milestone in development, one finds no startling new discoveries. A parallel might be drawn to the automobile industry where we see new body shapes and colors, new headlight design and new kinks—but the same reliable motor and works. But there is ample activity; myriads of new kinks and clever nicknacks. Don't forget, that there's also considerable activity in Major Armstrong's pet frequency modulation system with G. E.<sup>1a</sup> and Stromberg Carlson already marketing a series of receivers; and then there's television developments and more facsimile—so there is plenty to look into. To give you a rough idea, let's run over just a few of the trends.

There are a great deal of new cabi-

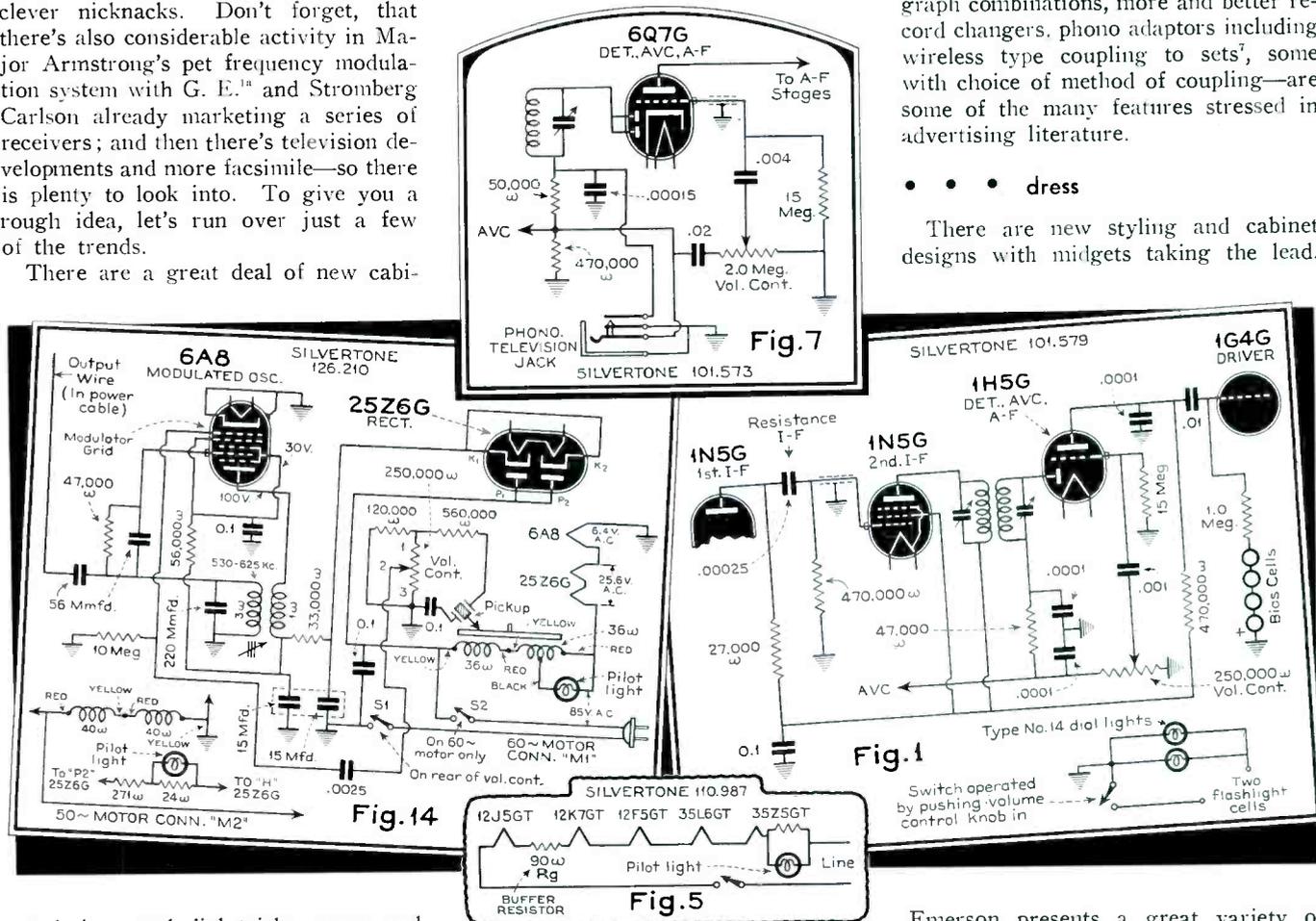
tone control systems are featured especially in higher-priced sets. Underwriter's approval has been secured for many more sets, even pee-wees and two tubers. Tuning eyes have returned on a large scale. More bias cells are used, both singly and in groups.

Portables are still going strong with a-c, d-c operation included or made possible by special accessory power units with more portable phonograph combinations. A great acceptance is given loops<sup>1</sup> even in multiband sets of all types

traps both series and shunt, special condensers and circuit tricks for temperature and humidity compensation of important circuits (oscillator only in most cases). 455 kc is rapidly becoming the standard for i-f. More auto sets with some noteworthy improvements. Loktal tubes<sup>2</sup>; permeability tuning<sup>3</sup>; resistance-capacity filters<sup>4</sup>, eliminating the filter choke; smaller auto sets, some in two units; ratchet push buttons for safer driving<sup>5</sup>; resistance, impedance and transformer coupling (iron core) between the r-f stage and mixer; phonograph combinations, more and better record changers, phono adaptors including wireless type coupling to sets<sup>7</sup>, some with choice of method of coupling—are some of the many features stressed in advertising literature.

• • • dress

There are new styling and cabinet designs with midgets taking the lead.



net designs and dial tricks—more and better push buttons—more remote controls, with motor tuning left to the ages except in a few expensive models. Wheel drums have been reincarnated. There are more jacks for phonograph operation and for television sound. New

and sizes. Similar acceptance is accorded single-ended tubes<sup>2</sup>, p-m speakers, also iron-core coils for antenna and oscillator push button positions<sup>3</sup>, i-f wave

<sup>1a</sup>Loop Antennae, by Mark and Edward M. Glaser, SERVICE, August, 1939, p. 375.  
<sup>2</sup>Tubes, by D. Bee, SERVICE, February, 1939, p. 62.

Emerson presents a great variety of models with emphasis on eye appeal

<sup>3</sup>Iron-Core Coils, by J. J. O'Callaghan, SERVICE, January, 1939, p. 7.  
<sup>4</sup>Permeability Tuning, SERVICE, March, 1939, p. 120.  
<sup>5</sup>R-C Filters, by Allan S. Roberts, SERVICE, July, 1939, p. 347.  
<sup>6</sup>Ford-Philco F1640, by Eugene Triman, SERVICE, June, 1939, p. 284.  
<sup>7</sup>Wireless Record Players, by Ray Rettenmeyer, SERVICE, February, 1939, p. 68.

<sup>1</sup>Frequency Modulation, G. E. HM80 Receiver, SERVICE, August, 1939, p. 388.



Bob Hope admires Majestic 130.

rather than new circuit features. Arvin has some baby models with metal cabinets finished in ivory and walnut. These are approved by Underwriter's Laboratories (see Fig. 16). Stewart Warner has a very large moulded job in the Model 03-5E1, as shown in the accompanying illustration. Zenith has moulded an entire chassis, including sockets, trimming and padding condensers and insulated terminals. There are many novelties including the 3½ lb., 3 tube, super-midget of Majestic and the shoulder belt camera case Motorola Sporter, both battery portables. (Shown in accompanying illustrations.) Kadette has a new compact which is claimed to be the first

non-directional midget on the market. The cabinet looks the same front or back. It utilizes an inverted speaker with a secondary cone above the speaker to transmit the sound waves equally in all directions. Kadette also has a portable with a rolling slide to cover the speaker and dial when not in use. Stewart Warner features a 3-tube, a-c, d-c super (see front cover) which takes



Fada L56MA.

advantage of the various combination tube types.

Console models are featuring new dials. Large horizontal or vertical slide-rule dials are most popular. Edge lighting is used on many of these sets with an adjustment for setting the pilot lamp in the correct spot. This latter is rather critical for proper effect where glare is absent. Stromberg-Carlson and Westinghouse have edge-lighted dials. Farnsworth

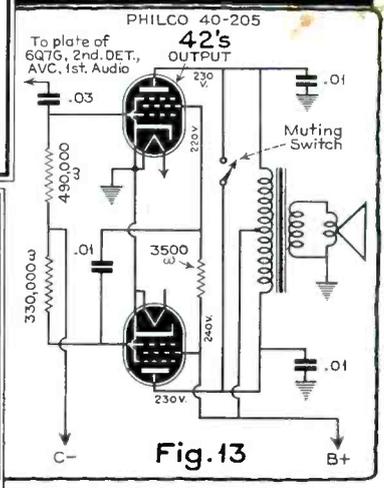
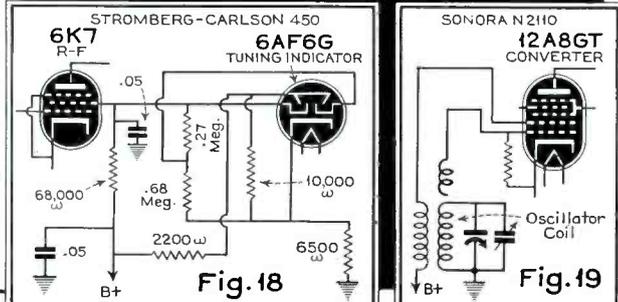
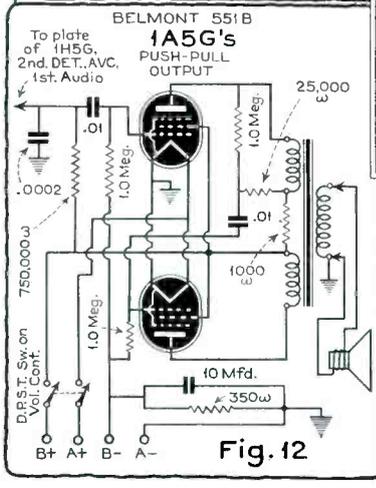
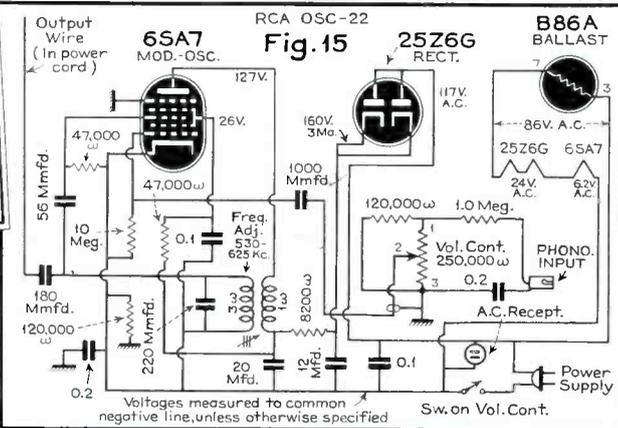
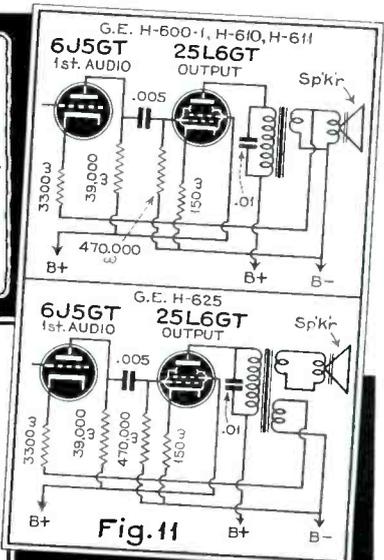
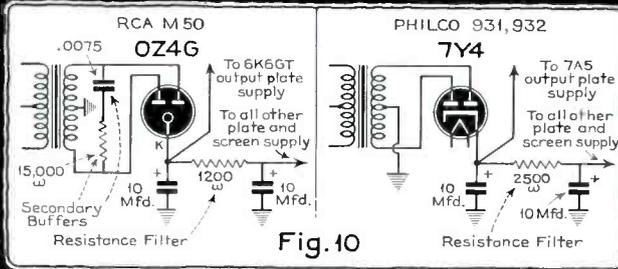
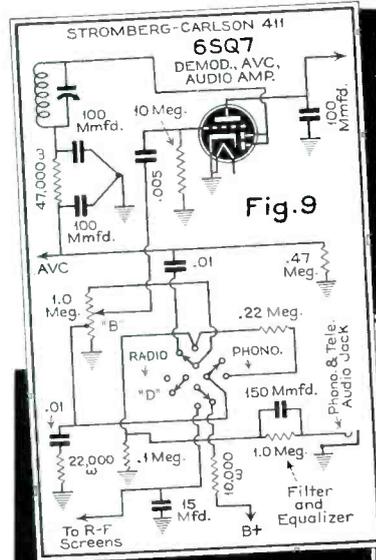
worth has a new Flo-Lite dial made of a transparent material which transmits light while magnifying all dial numbers for easy tuning. Large rotary drum dials with thumb operated wheels are appearing once again. A second, similar wheel sometimes operates the volume control and switch. Escutcheons and windows are made in one piece. Sonora calls them Integra-Dials and claims them glare-proof. Sonora also has a Magni-Glas button face for push-buttons which magnifies the station call-letter tabs.

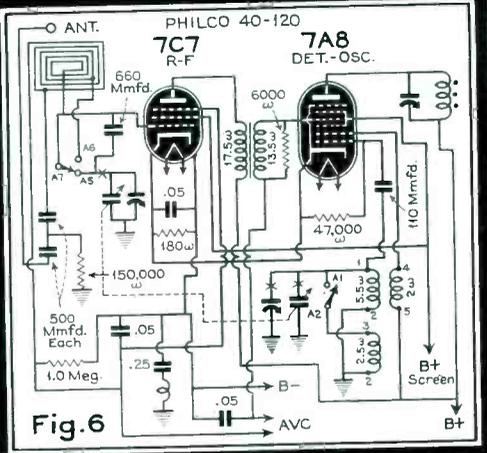
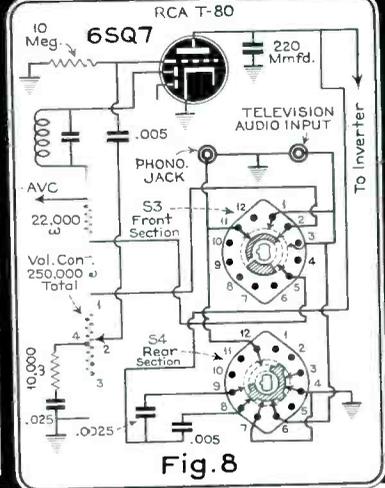
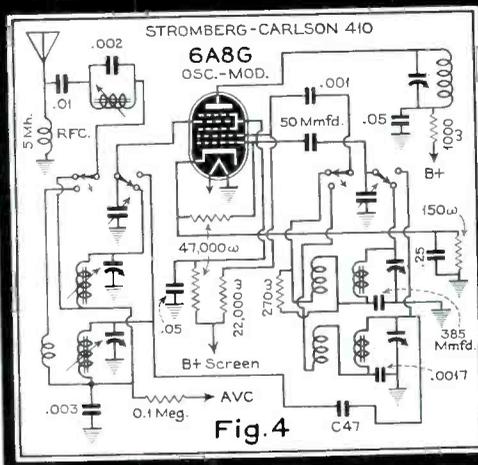
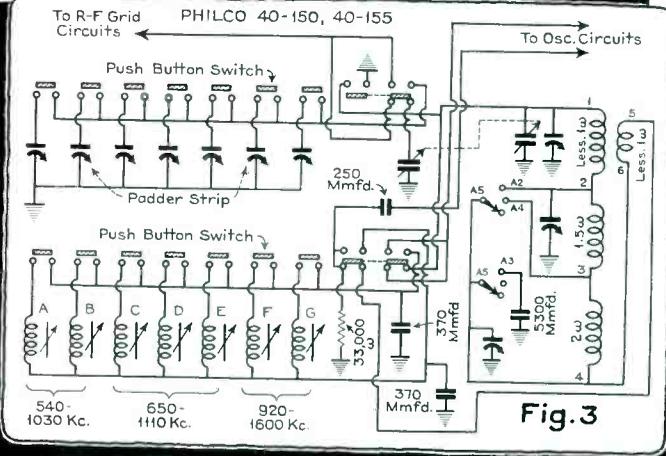
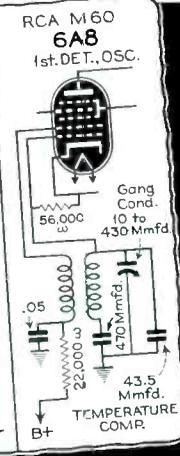
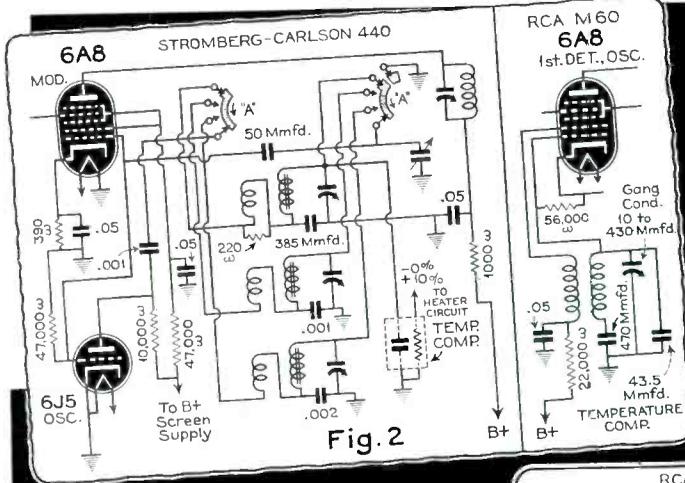
Portables now have well-lighted dials!



Arvin 602A.

Sears Roebuck and Sentinel have a switch on the tuning knob which lights the dial when tuning. A flashlight battery is used so as not to drain the precious A battery. (See Fig. 1.)





• • • r-f and i-f

Stability is featured in many of the better sets. Temperature compensation and more protection against humidity are common. Stromberg goes into it heavily using a compensating condenser (as the others do) and, also, a combination resistor and condenser, the resistor

G. E. H630.



being connected across the filament circuit. See Fig. 2. Iron-core coils are used on all of Stromberg's push-button sets and most of Philco's. The cheaper sets use iron for the oscillator coils only and condensers for the antenna circuit. (See Fig. 3.) More expensive sets use iron for both circuits. (See Fig. 4.) Many more iron-cored i-f coils are found.

Philco is using 2-gang tuning condensers with some models having r-f stages. (See Fig. 21.) Combined impedance and resistance coupling is used between the plate of the r-f amplifier and the grid

of the mixer. One model, 40-120, uses an untuned iron-core transformer. (See Fig. 6.) If a 2-gang condenser is a necessity, this stunt with the r-f tube is preferable to adding an extra i-f stage since the signal to noise ratio is increased. This is occasioned largely because of reduced tube hiss. Some sets are featuring two i-f stages with resistance coupling in one of the stages. (See Fig. 1.) Many loops are used in multi-band sets, taps or separate loops being provided. (See Fig. 6.) Loading coils also come in handy to help cover wide ranges. Afc is quite absent. The Sparton 1160 still features it, though.

G. E. H634.



• • • a-f

Television and phonograph jacks, sometimes a single jack, sometimes separate ones, accompany a great many sets. (See Figs. 7, 8, 9.) Resistances are taking the place of the faithful filter choke. This is made possible by larger electrolytics, hum bucking schemes and more resistance capacity filtering of low level stages. (See Fig. 10.) Bias cells

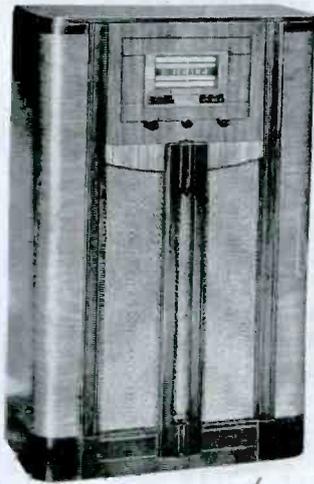
are still with us. (See Fig. 1.) In the G.E. 600 series an extra a-f stage is used permitting a considerable amount of degeneration. Feedback is obtained from the voice-coil winding or from a separate winding on the output transformer. (See Fig. 11.)

Belmont uses a pair of 1A5s in push-pull (Fig. 12) with a filament drain of 100 ma, the same as a 1C5 which most manufacturers are using but with the greater advantage of push-pull operation. Inverter tubes, sometimes called balancers, are still feeding most push-pull stages although a few center-tapped chokes are seen and screen-grid inversion is appearing. The combination of a 3500-ohm resistor and an 0.01-condenser provide inversion in this system.

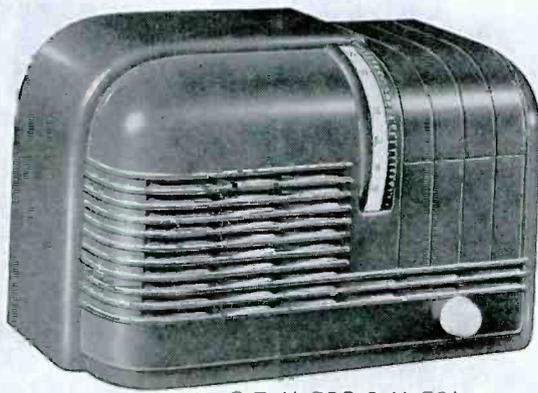
Motorola 41S.



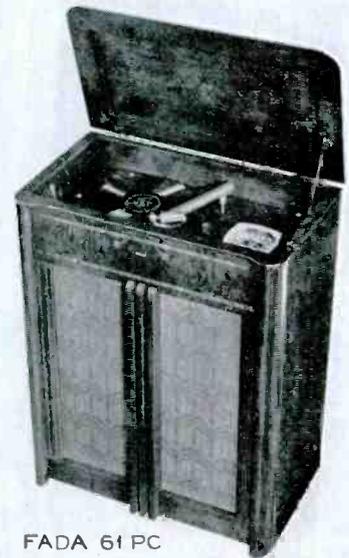
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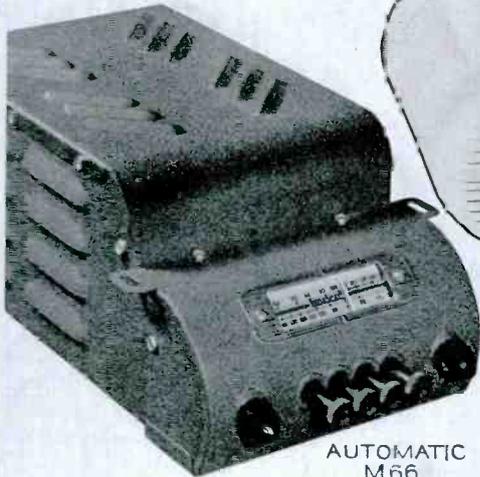
RCA K50 X



G.E. H-500 & H-501



FADA 61 PC



AUTOMATIC M66



STEWART-WARNER D7-513-1Q



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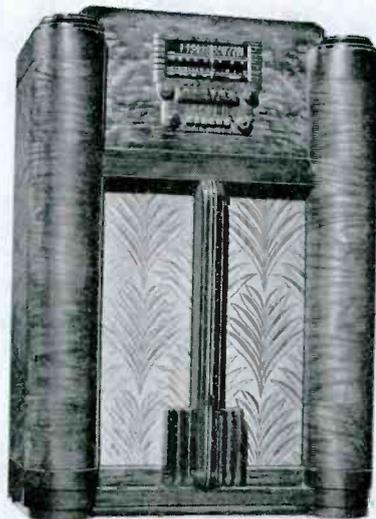
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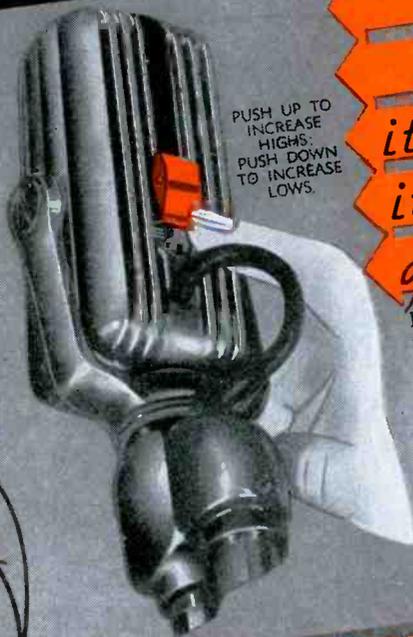
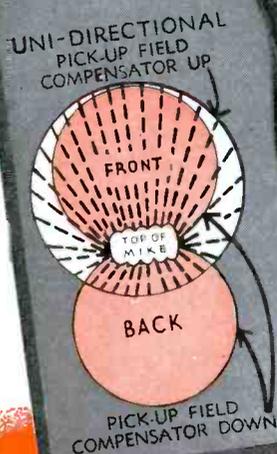
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VELOCITY

# AMPERITE

MICROPHONES



# CONVERTING BATTERY SETS TO 1.4 VOLT TUBES

By **LELAND S. HICKS**

THORDARSON ELECTRIC MFG. CO

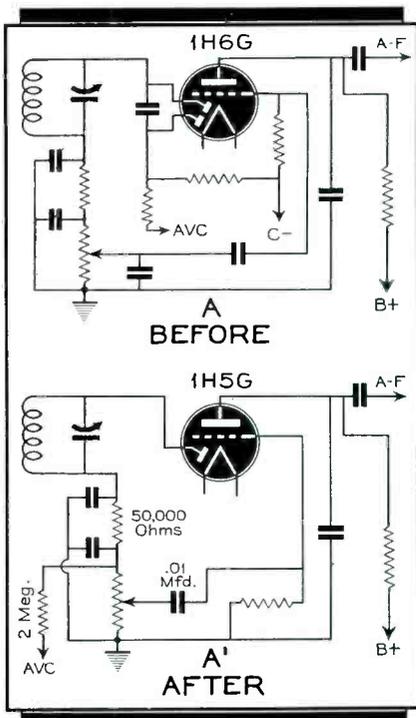
**I**N RURAL areas where battery receivers are the order of the day, converting the more recent crop of two-volt receivers to the newer and more economical 1.4-volt tubes<sup>1</sup> can provide a definite source of added income. The job is an easy and profitable one, especially since many of these sets are already equipped with octal sockets which readily accommodate the 1.4-volt types.

• • • **definite economy**

The 1.4-volt types consume only about half as much filament current as the 2.0-volt series. They are not as critical as to the exact voltage and can be operated directly from a 1.5-volt battery without the use of a ballast resistor or tube. There is also a worth while saving in plate or B battery current. The voltage required is only 90 instead of the 135 needed for the 2.0-volt tubes. In practically every case the C battery can be eliminated. The newer tubes are designed to operate with the full 90 volts on both plate and screen. This feature

<sup>1</sup>Tubes, by D. Bee, SERVICE, February, 1939, p. 62.

Fig. 2A. Where the 1H5G is to be used in the conversion it is usually possible to adapt the circuit for its proper operation.



eliminates the need for taps on the B battery. With the exception of the power output stage they operate at zero bias. A resistor connected in series with the negative return of the B supply can be used to bias this stage.

In terms of dollars and cents the simpler batteries are also much less expensive. These are substantial savings and should influence the set owner greatly in favor of conversion. Combined A and B batteries are also available at moderate prices for those who want the utmost in compact installation.

• • • **problems involved**

The actual work of conversion is comparatively simple. The older the receiver the more difficult the work, especially since sockets must be changed in those sets which are not already equipped with octals. Conversion of a recent 6-tube model, which required new sockets, took only 3¾ hours from the time work was started until all the bugs were eliminated. As a general statement we can say that changing of sockets will require more time than any necessary circuit changes.

• • • **available tubes**

Equivalent tubes in the 1.4-volt types are already available for practically all of the types used in 2-volt receivers. The newer types and the 2.0-volt types they replace are shown in Fig. 1. The octal equivalents, shown in the column adjacent to the 1.4-volt tubes, have the same terminal connections unless otherwise shown. The equivalent socket terminals of the four, five or six prong tubes are shown in a third column.

Where the 1H5G, a single diode-triode, is to be used in the conversion it is usually possible to adapt the second-detector-avc-first-a-f circuit for its proper operation. The 1H5G can be used to replace even a 1F6 or 1F7G which has a double-diode-pentode. This is possible because the triode section of the 1H5G will have sufficient gain to drive the 1G4G which in turn will drive the Class B output tube. Suggested conversion circuits are shown in Figs. 2A and 2B.

• • • **suggested routine**

Before beginning the conversion study the circuit diagram carefully to deter-

1.4 VOLT OCTAL	EQUIVALENT OCTAL	EQUIVALENT STANDARD
 1N5G	1D5G 1E5G (Base connections same as 1N5G)	 1A4
 1A7G	1C7G 1D7G (Base connections same as 1A7G)	 1A6
 1H5G	 1H6G	
Use 1H5G shown above	 1F7G	 1F6
 1G4G	1H4G (Base connections same as 1G4G)	 30
 1G6G	1J6G (Base connections same as 1G6G)	 19

Fig. 1. Equivalent tubes in the 1.4-volt types are already available for practically all of the types used in 2-volt receivers.

mine which tube types will be needed, what circuit changes are advisable and to note any freak circuits that must be considered. Make a careful sketch of the new circuits. Next assemble all the necessary parts such as sockets, resistors, condensers and tubes.

When changing sockets be certain that one filament lead is grounded and one carried through to the A supply for each tube. In some receivers the hot A lead is not entirely open to ground, even though the tubes are not in their sockets. In these sets one or more resistors are shunted across the A supply. Philco's Model 643 is an example of such a circuit.

After all the connections have been completed, but before the tubes are inserted in their respective sockets, make a complete continuity test between all filament and plate circuits and all plate and screen circuits and the ground. Connect the batteries carefully and make a thorough voltage analysis before inserting the tubes. These many precautions

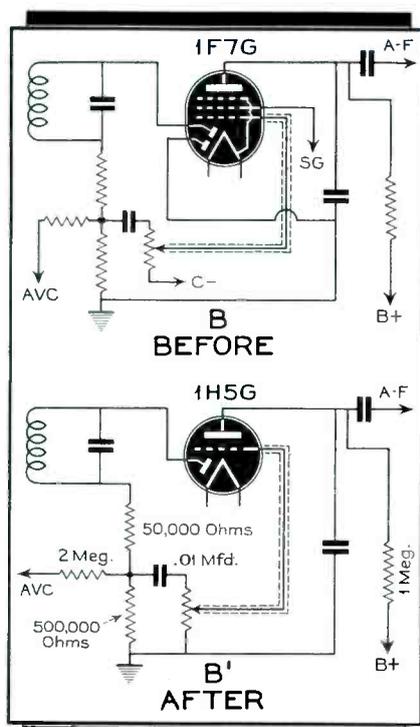


Fig. 28. The 1H5G can be used to replace even a 1F6 or 1F7G which have a pentode section as well as the diode or double diode.

will be well worth the effort.

After the tubes are inserted and the receiver is operating realign the i-f and r-f stages in accordance with the manufacturer's original instructions. This is necessary in all cases because the inter-electrode capacitances of the 1.4-volt types are not the same as those of the tubes they replaced. After alignment the bugs should be removed.

#### • • • circuit constants

In most cases the resistors and condensers in the receiver need not be changed. It is well to be sure, however, that certain strategic resistors have the values recommended by the tube manufacturers for optimum reception.

The 1N5G and the 1A7G should have a 2-meg resistor in the avc return. Since the newer tubes are designed for zero-bias operation, several variations in load resistors are necessary. The recommended value for the grid leak is 2 meg; the plate load: 1 meg, and the screen resistor: 70,000 ohms.

The 1G4G, usually used as a Class B driver, requires -6 volts bias. This can be obtained by connecting a resistor of the proper value in series with the B- leg of the battery as shown in Fig. 3. The value of this resistor will depend upon the total current drain of the receiver. The approximate drain can be computed by adding the plate and screen current ratings of all the tubes. Then calculate the value of the resistor (R) from the formula  $R$  equals  $E/I$ , where  $E$  is the bias voltage and  $I$  the

total current drain. Choose a resistor of a higher value but with an adjustable slider and make any final bias adjustment so that the tube in question will draw normal plate current.

#### • • • output transformers

Many battery receivers have Class B output stages, with a 19 or 1J6G tube. Either type requires a plate to plate load of 10,000 ohms and sets employing them have output transformers with a turns ratio to reflect this value from the voice coil to the plates. The new 1G6G should have a plate to plate load of 12,000 ohms to meet the tube manufacturers' specifications. It is not necessary to meet these requirements exactly, however. The use of the 10,000-ohm load will attenuate the output slightly but not enough to be noticeable to the average ear. At the same time the mismatch is in the right direction to reduce the third harmonic distortion. The average customer would not be able to tell the difference between the two transformers by listening to the receiver.

Some receivers, such as Philco 38-33, do not use a Class B output. In a receiver of this type the 1H4G phase inverter was eliminated and a 1Q5G beam-power tube substituted for the 1E7G with good results. The output was noticeably less but still more than sufficient for the average room. In this case it was necessary to change the output transformer, however.

The 1Q5G is recommended over the 1C5G or 1A5G for all receivers not using a Class B output stage. Its output is rated at 270 mw which is usually sufficient.

Since a C battery is not used in the converted receiver, the cable leads that would normally be connected to it can be cut off inside the chassis. The receiver ends are grounded for the zero-bias tubes and connected to the bias resistor in those circuits where bias is necessary.

The new tubes require 90 volts on both the plate and screen, so the usual 135-volt lead and the 67.5-volt lead are joined and connected to the 90-volt tap of the battery. The cut leads may then be left in the cable and the ends taped to insure a neat appearance.

#### • • • summary

The next time a battery set owner calls you to his home or comes to the shop for a new set of batteries or battery tubes, sell him a complete conversion. Contact dealers who have trade-ins that are hard to dispose. Just look around and you will be surprised at the number of profitable extra money conversions that are ready and waiting for you.

#### PHILCO 39-55

*Stations skip:* If stations skip, without control from the remote box or at the receiver, adjust the sensitivity knob on the rear chassis apron for low sensitivity. This will reduce the effect of noise or static impulses on the normal operation of the receiver.

If when a station is dialed, the call letters of the desired station are illuminated on the receiver and then the call letters immediately preceding the desired position are lit up, as the mechanism seems to drop back or fail to make the grade, look for trouble in the station selecting switch assembly (Philco Part No. 42-1468). This part is a three point, rotating switch with an adjustable arm that may be raised or lowered upon the contacts of the switch. To get at it, it is necessary to take out the self-tapping screws which hold the fixed tuning condensers and their mounting assembly in position. The whole assembly can then be pushed out of the way. Caution is necessary, to prevent breaking any delicate leads to the fixed tuning assembly and also to see that the contacts of the switch make good contact but not too tight contact with the switch points. Sometimes, where the points are dirty, ordinary rubbing alcohol or pure grain alcohol can be used to clean them.

When installing the Mystery Control receiver, keep in mind that the circle of operation has a radius of 25 feet. If the receiver is placed against the wall of the room facing outside the home, half of the operating area alone will be within that room and available for Mystery Control.

Where microphonic disturbances are encountered, check first the output tubes (a pair of type 42 pentodes), which often give this sort of trouble. They may have been damaged in shipment or in delivery to the customer.

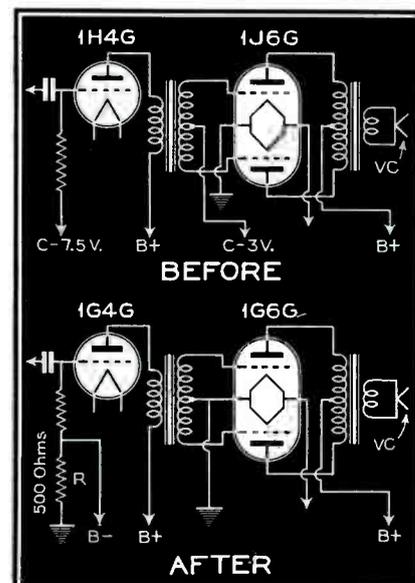
Willard Moody.

#### PHILCO 45XX

*Intermittent reception:* Intermittent reception may be the result of a defective volume control. When the push buttons are noisy in operation, pull out the chassis and clean the contacts of the push button switch. If necessary, tighten up on the contacts by bending (with caution) to ensure firm contact.

Willard Moody.

Fig. 3. The 1G6G is recommended for those battery sets which use a type 19 or a 1J6G Class B output stage.



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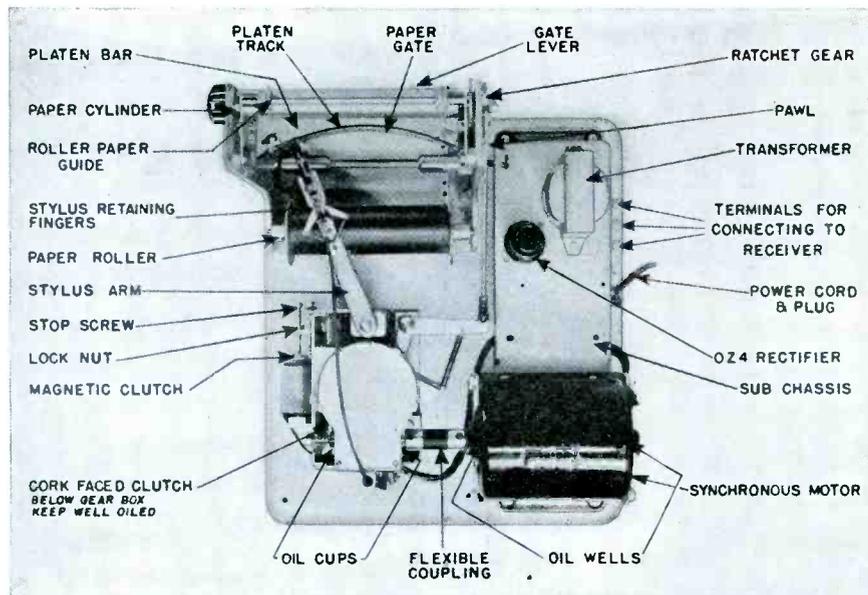
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The Crosley 118, 119 facsimile printer consists of a synchronous motor drive, a worm gear arrangement and a cam mechanism.

# CROSLLEY 119 FACSIMILE KIT

THE Crosley Model 119 Reado printer is a home facsimile recorder in kit form designed to operate from a 60-cycle, 115-volt power supply. It is similar to the Model 118 Reado printer, factory wired, which was described in SERVICE in the March, 1939 issue.<sup>1</sup> These recorders require a radio receiver to supply the necessary audio signal for the printer.

## • • • printer

The printer consists of a synchronous motor drive, a worm gear arrangement and a cam mechanism. The transmitted signal is received and amplified to the proper level. The signal is rectified by means of an OZ4 full-wave rectifier and the rectified current is connected to one contact of a cam operated spring switch. A filter that by-passes 2000 cycles is shunted across the secondary of the transformer that feeds the rectifier and is also connected to the spring switch. When the friction drive is locked, no 2000-cycle current is rectified and no d-c reaches the switch until the 500-cycle note is received. When the 500-cycle note is received and rectified, d-c reaches the switch and from this point is connected to a magnetic release which starts the cam shaft in motion. The start of this motion opens the magnetic release circuit, removes the by-pass from the 2000-cycle circuit and connects the recording pen in the circuit. The 2000-cycle signal is then rectified and connected to the recording pen, the pen sweeps across the paper and, as it does so, the intensity of the

<sup>1</sup>Crosley 118 Reado Printer, Service, March, 1939, p. 118.

voltage on the pen is varying in accordance with the amplitude of the 2000-cycle note, with this amplitude dependent on the density of the printed matter of the original. At the end of the stroke, the signal is cut off at the transmitter and the printing stops.

A third cam operates a ratchet mechanism which in turn advances the paper 0.01 in for each sweep of the arm. The advance is made on the return stroke of the arm when no signal is received.

About half way back the spring switch can move the switch to place the magnetic release in the circuit, close the by-pass circuit and also removes the pen from the circuit. At the close of the stroke the friction drive is again held

until the synchronizing pulse is received, and then the action is repeated. If the recorder is running in synchronism with the transmitter, the synchronizing pulse will come at the exact time that the friction drive is released and the machine will be essentially free running. If the recorder leads the transmitter the recorder will be synchronized at the beginning of each stroke. If the recorder lags behind the transmitter, the recorder will fall out of synchronism entirely.

## • • • printing

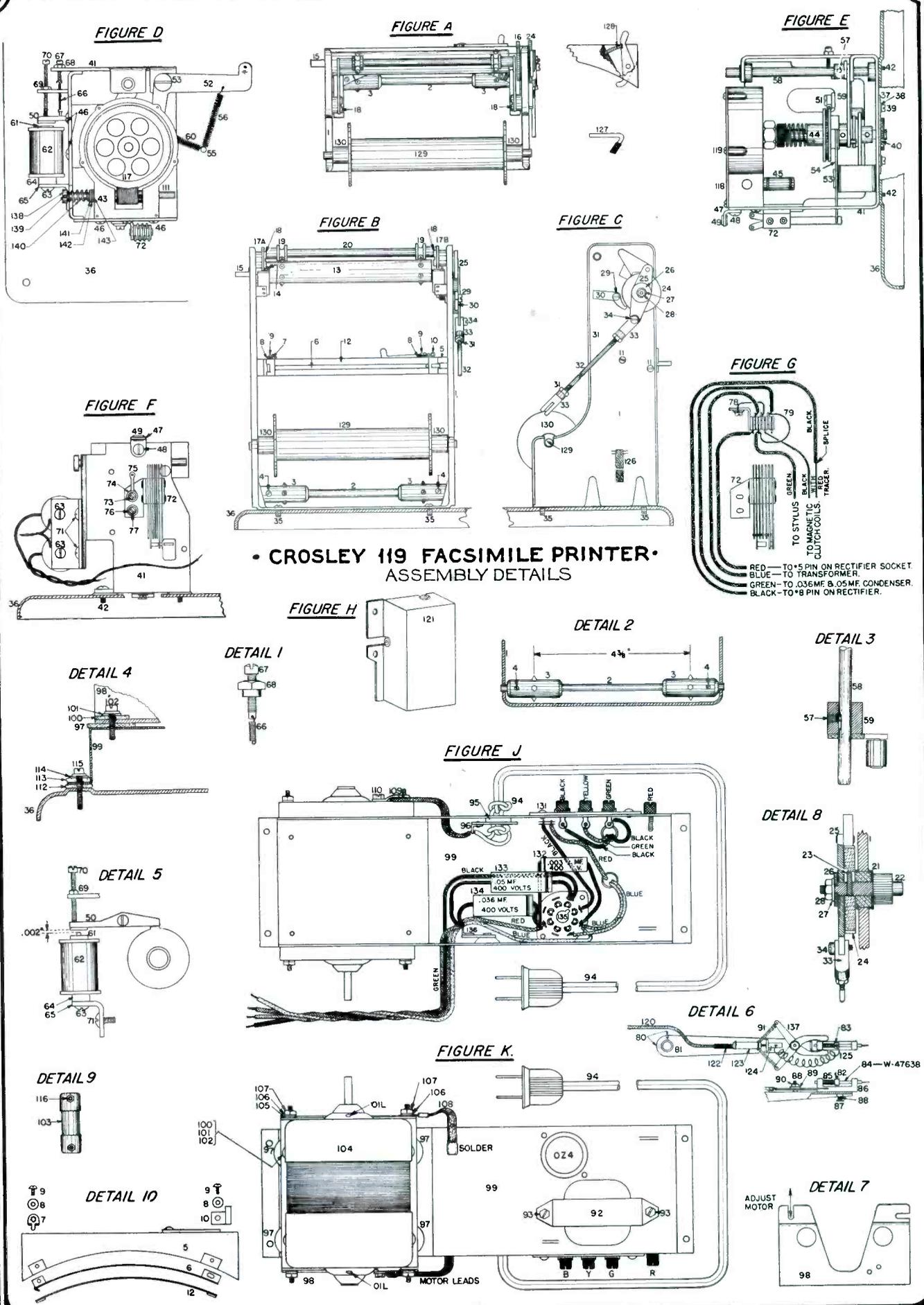
The actual printing is electro-chemical. When the rectified voltage is supplied to the pen, it comes in contact with a coated carbon impregnated paper, the current through the paper is a function of the applied voltage and the consequent removal of the surface coating is also a function of the applied voltage. The voltage is dependent on the amplitude of the 2000-cycle signal which is in turn dependent on the density of the printed matter.

The paper feeds through the machine at the rate of 1/100 inch per second, which means that three feet of copy should be received from the usual hour broadcast from WLW or any other stations using the Finch system of facsimile.

## • • • synchronizing

Since even such small type as 6 or 8 point is from .040 to .060 inch in height, it is apparent that in the transmitter the small light spot from the scanner will have to make from four to six journeys from left to right to complete  
(Continued on page 442)

ITEM	NAME	ITEM	NAME	ITEM	NAME
1	Paper Carriage Bracket	48	Screw #8-32 x 1/4"	96	Junction Block (3 Contacts)
2	Lower Paper Guide Shaft	49	Rubber Grommet	97	Rubber Washer
3	Sleeve (4 Pins)	50	Clutch Arm	98	Motor Bracket
4	Set Screw	51	Screw	99	Sub-Chassis
5	Platen Bar	52	Ratchet Arm	100	Felt Washer
6	Platen Track	53	Screw	101	Steel Washer
7	Solder Lug	54	Switch Arm	102	Sq. Hd. Screw #8-32 x 5/8"
8	Flat Washer	55	Screw Stake	103	Flexible Coupling
9	Screw #4-36 x 1/2 RH	56	Spring	104	Motor
10	Brush Holder	57	Allen Set Screw #8-32 x 3/16"	105	Steel Washer
11	Screw #4-36 x RH	58	Shaft	106	Shakeproof Washer
12	Paper Gate	59	Cam Arm	107	Nut
13	Paper Roll Cylinder	60	Spring	108	Ground Braid
14	Set Screw #6-32 x 3/16	61	Pole Piece	109	Cable Clamp
15	Cylinder Roll Shaft	62	Coils	110	Self Tapping Screw #8 x 5/16 P.K.
16	Brass Gear & Set Screw	63	Screw #8-32 x 1/2" Binder Head	111	Gear Box Shaft
17-A	Left Paper Guide Arm	64	Yoke Bar	112	Felt Pad
17-B	Right Paper Guide Arm	65	Yoke Bracket	113	Felt Washer
18	Screw	66	Spring	114	Steel Washer
19	Paper Guide Pulleys	67	Screw	115	Sq. Hd. Screw #8-32 x 7/32
20	Paper Guide Shaft	68	Brass Nut (Special)	116	Allen Set Screw #6-32 x 3/16
21	Brass Washer	69	Nut	117	Gear - Part of Cam Shaft Assembly.
22	Pinion Gear	70	Screw #8-32 x 1-3/8" F11. Ed.	118	Housing Cover
23	Ratchet Gear Pin	71	Screw #8-32 x 1/4" Binder Head	119	Screws #4-48 x 3/16 RH
24	Ratchet Gear	72	Switch	120	Green Wire #4" Long (Stylus)
25	Rocker Arm Assembly	73	Screw #6-32 x 1/4" Sq. Hd.	121	Switch Cover
26	Flat Steel Washer	74	Washer	122	Tubing 3/4" Long
27	#6 Shakeproof Washer	75	Solder Lug	123	Resistor 4500 Ohms
28	Nut #6-32 Hex	76	Washer	124	Junction Block (On Stylus Arm)
29	Screw (Pawl)	77	Screw	125	Spiral Wire (9" of #36 DCC Wire)
30	Pawl	78	Bare Wire 1-1/2" Long	126	Ground Braid
31	Nut	79	Bare Wire 1" Long	127	Cleaning Brush
32	Rod	80	Allen Set Screw #8-32 x 3/16"	128	Spring
33	Yoke	81	Stylus Arm	129	Paper Roller
34	Yoke Screw	82	Set Screw #8-32 x 1/4"	130	Paper Roller Flange
35	Screw #10	83	Collar	131	Terminal Board
36	Base Plate	84	Stylus	132	.005 MF 400 Volt Condenser
37	Bearing Bracket	85	Spring	133	.05 MF 400 Volt Condenser
38	Flat Washers	86	Holder	134	.035 MF 400 Volt Condenser
39	Sq. Hd. Screw #8-32 x 5/16"	87	Stud	135	8 Prong Socket
40	Oil Pad	88	Spring	136	Junction Block (1 Contact)
41	Gear Housing Bracket	89	Flat Washer	137	Holder Clamping Fingers
42	Screw #10-32 x 1/4"	90	Nut #4-36 Hex	138	Collar
43	Gear Box Assembly	91	Spring	139	Allen Head Set Screw #6-32 x 3/16"
44	Cam Shaft	92	Matching Transformer	140	Spring
45	Oil Cups	93	Self Tapping Screws #8 x 5/16"	141	Finished Washer
46	Screws #8-32 x 1/4"	94	Power Cord	142	Thrust Bearing
47	Right Angle Bracket	95	Fibre Insulator	143	Finished Washer





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# ASK FOR IT

By JOHN H. POTTS

**T**HE best way to get anything is to ask for it . . . and that includes service business. There are various ways in which this asking may be done and some are more effective than others. There is nothing magical about the plans discussed here. The results which they have produced are due in large measure to the effort and perseverance of those Service Men who used them. The business getting idea in itself will not bring in the jobs automatically. Other ideas may even prove better in the long run, but the ambitious use of these methods, which already have proved themselves, can produce exceptional results and a great deal of waste effort can be eliminated.

## • • • canvassing

The oldest, and still one of the best methods of getting new business is by cold canvassing. The mere thought of this will cause most Service Men to shudder. It's undignified, unprofessional, unethical, no doctor, dentist or other professional man would think of such a thing . . . these are common arguments against cold canvassing. In back of these arguments we have what psychologists might classify as a defense mechanism; finding an excuse for not doing what we don't want to do. To this might be added a certain amount of intellectual snobbery which infects a number of Service Men. The fact is that radio servicing is a business, and a good business when it is profitably conducted.

Cold canvassing is a perfectly sound method of getting business if you go about it properly. You have only to watch Fuller brush salesmen do their stuff to see how cold canvassing should be done. They forestall rebuffs with a smile, are so grateful for being turned down that they give you a brush for nothing. Before you know it you change your mind and buy something. That's cold canvassing deluxe, and it pays!

One way of applying cold canvassing which has paid out is used by a Service Man in a busy town in New Jersey. He sets himself a quota of 200 personal calls a day. At each place he simply hands his card to the person who answers the door, telling him that he is in the neighborhood and will be glad to be of service if the radio is not working as it should. Sometimes the card is torn up and thrown in his face. He returns the following week and hands another to the same person. This time it is not

torn up. The third week he again repeats this procedure—and often walks out with the chassis. (Most people are courteous, however, so the thought of facing such a reception need not deter you from trying this plan.) His average net earnings during the past year have been eighty dollars a week. Not bad, when you get right down to it.

Many Service Men realize the value of house-to-house canvassing, but, since most of us are rather timid, prefer to send some one experienced in this sort of solicitation to do the job for them. Men who do this professionally are usually thick-skinned individuals with a plentiful supply of gall. Too often, when they work on a commission basis, they do not hesitate to use any sort of subterfuge to get business. This is bad business and, unless you know the man you employ, will undoubtedly do more harm than good.

Try and do the job yourself. It is no crime to ask for business. Don't resort to subterfuges, such as fake surveys,



The oldest and still one of the best methods of getting new business is by cold canvassing.

glittering free offers, or any of the other countless plans which are designed to hoodwink the public. That's why many Service Men fall into disrepute and thereby hurt all. Don't make any offer, even in perfectly good faith, which might be misinterpreted. Don't bother preparing any special sales talk . . . it never sounds sincere, no matter how well meant. Most people want to be friendly and will be if you give them half a chance.

You can link in your canvassing with referred leads from satisfied customers. When you finish a job, if the customer is pleased, try and get names of friends or relatives from him to whom you may

call attention to your service. You will be surprised to see how willing most people are to co-operate.

Carry plenty of business cards and keep them fresh and spotless. Too often a card is pulled out and passed to a customer which is dirty, creased or stained. Such cards do more harm than good. If, when you are tracking down a case of noise, you visit neighbors' homes to check up on reception, get your mind off the job long enough to hand out a card and tell whose receiver you are servicing . . . it helps.

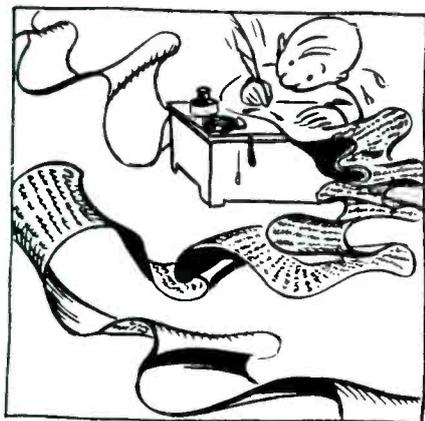
A modified form of cold canvassing for Service Men who are already well established in a neighborhood is to call on neighbors when returning a repaired chassis to a customer. Just tell the person who answers the door that you have just finished repairing Mrs. Whois's set and, while you are in the neighborhood you will be glad to look over her set without obligation. The fact that you have just repaired a receiver for some one known to your prospect helps greatly to smooth the way. If you are asked to inspect the receiver, make an estimate. If turned down, follow the Fuller brush technique by making a minor repair free of charge (such as tightening a ground clamp or arranging an antenna lead so it looks less sloppy). Most of your dealings are with women and they invariably are favorably impressed by any little service which improves the appearance of the home. Often a little thoughtfulness such as this will break down the most advanced case of sales resistance.

## • • • advertising

Advertising messages are far more welcome if they are printed on something which is of use to the customer. Take blotters, for instance—nobody ever throws them away without putting them to use. And while they are in use, your name and business is constantly brought to the prospect's attention. Others in the same category are calendars, suburban train time tables, and for selected distribution, bridge score pads. One Service Man has corralled most of the radio-phonograph combination and record-player business in his territory by supplying each owner with a test record which tells them about his shop and includes a few recorded tones in the low, middle and high-frequency portions of the audio range. He asks the customer to note how these tones now sound and to check the apparatus periodically by listening for any change in the character of reproduction of these notes. If so, of course, he'll be glad to call.

In preparing printed matter for distribution, remember that you must do everything possible to make it attract

the attention of the person who receives it. The first step in this direction is the choice of stock color upon which the message is to be printed. It has been found that black printing on red stock has far greater psychological attraction than many other color combinations. You can't use this for business cards, of course, because in these you want to convey the impression of conservatism and dignity, but for special offers, direct-mail solicitation, blotter ads, etc.,



Advertisements have the most punch which compress the maximum essential information in the fewest possible words.

the black-red combination is the most effective.

Advertisements have the most punch which compress the maximum essential information in the simplest and fewest words. Then they may be most quickly read and the message is more likely to go over. Name, business, address and telephone number comprise these essentials. Catchy illustrations help. Don't bother having a special one drawn for you. That usually costs plenty if it's a good job. You can procure, free of charge, advertising mats from many manufacturers which include decorative borders and good illustrations. You can have your printer use only the illustration or border and include your own message, if you so desire. Be fair about it, though. Run the mat as is once in a while and give the manufacturer a break.

Self-addressed return cards, distributed by small boys throughout your service area, bring results. These can be bought for around eight dollars a thousand and distributed from one to two dollars a thousand. The return which may reasonably be expected varies in different localities from 1 out of 25 to 1 out of 50. Coordinated with other forms of business solicitation, this will help to keep the cash register ringing.

Newspaper display advertising is all right for large service organizations and dealer service shops, but seldom pays for individual Service Men. For the latter, it is too costly compared with

the results which may be obtained by other forms of business solicitation. For small Service Men who belong to associations and really cooperate for the general good of all members, group advertising has been used successfully. All Service Men in the area place a joint display advertisement in the newspaper and run it consistently. The advertisement will stress the strength of the group and its reliability and competence.

For individual Service Men, classified ads have proven worthwhile. An inch of space run every day or three times a week is much better than space costing the same amount run only once a week. Consistent running of small ads keeps the name before the public. This type of advertising is particularly effective in foreign-language newspapers. If you speak any language besides English, don't neglect to capitalize on this accomplishment. Customers always have greater confidence in those who speak their own language.

Business solicitation over the telephone is coming more and more into use. For this purpose, you can rent from the telephone company a book which lists the telephone numbers according to location. Solicitation is best done by an experienced woman with a pleasant voice.

Objects in motion attract the eye. This principle forms the advertising basis of modern electric signs and window displays. In radio servicing, it can be applied to the car sign and thus keep your name before the public while going to and from calls. It is strange that so many Service Men neglect this, except when they use a truck. If you hesitate to have your car painted up because you also use it for pleasure, detachable signs on each door have proven useful and eliminate the objection to permanently-placed signs. Another way out is to have your name, telephone and business painted on the spare tire cover.

#### • • • other jobs

Rightly or wrongly, the general public is under the impression that any one who can fix a radio can fix anything. There is a good deal of truth in this, since most electrical appliances of even the more elaborate types are simple to repair compared with radio jobs. There is no reason why you should not take advantage of this prevailing opinion to build more business. Vacuum cleaners, electric irons, toasters, and washing machines are common trouble-makers for the busy house-wife and if she is advised that you are able and willing to take care of such apparatus you will find there is plenty of such business to be had. Any customer would rather deal with one person for several jobs than have to look up a man for each type

of job that needs attention.

Replacing burnt-out fuses is an accomplishment which most housewives already have acquired and exercise. As long as the burn-out is not the result of a permanent short-circuit, they need no further help. But often electric iron or vacuum cleaner cords develop permanent shorts and then fuses pop fast and consistently. This same condition occurs when babies' bottles are being heated and forms the basis for an emergency service which many Service Men use. Customers with babies are advised that immediate service will be given for correction of short-circuits in appliances which blow fuses. Nothing makes a mother more panicky than the knowledge baby's feeding may be delayed due to failure of electric service and, too often, calls to the public utility for emergency service necessitate an exasperatingly long wait before help arrives. By keeping his office informed of his whereabouts at all times, any Service Man can take advantage of the profit and good-will which results from prompt service when it is most needed.

Some Service Men use the cathode-ray oscilloscope constantly in servicing. Others don't seem to get the hang of it. At any rate, when it is not in use in servicing, it makes an ideal means of attracting the attention of passersby if placed where readily seen. Just connect it to the voice coil of an operating receiver which is tuned to a local broadcast signal. The constant movement of the wave upon the screen fulfills the principle of subjects in motion as a means of creating interest. The 'scope itself looks awesome and mysterious to



Some Service use the c-r oscilloscope constantly. Others just don't seem to get the hang of it.

the general public and tends to create a valuable atmosphere of scientific precision for any service shop.

Getting new business is important. But it is even more important to hang on to the customers you already have. For, after all is said and done, there is no gainsaying the fact that the best advertisement for any business is a satisfied customer.

# NRPDA

## Swings into Action . . .

### FOR DEALERS AND SERVICEMEN

Despite the wide publicity given the aims and aspirations of the NRPDA, many Dealers and Servicemen have asked "How is this going to affect me?"

Primarily the aim of the Association is to return to the Distributor, the Dealer and the Serviceman the profits which are legitimately HIS! This only can be accomplished by raising the standards of ethics of merchandising within the Industry.

It is the pledge of your Association Jobber to interest himself in Industry problems as they affect your pocketbook. He desires to eliminate conditions which take away profits which are legitimately yours. He desires to sell you only recognized, advertised brands of radio parts at a price which will give *him* a normal profit and you the opportunity to make a decent livelihood. He intends to fight shoulder to shoulder with you in removing destructive price competition.

The only way to accomplish these aims is to deal with Jobbers who display the NRPDA Emblem—"the mark of an Ethical merchandiser of advertised brands." Do it for your own protection! Names of Member Jobbers in your territory will be supplied if you will address the Executive Secretary of the Association.

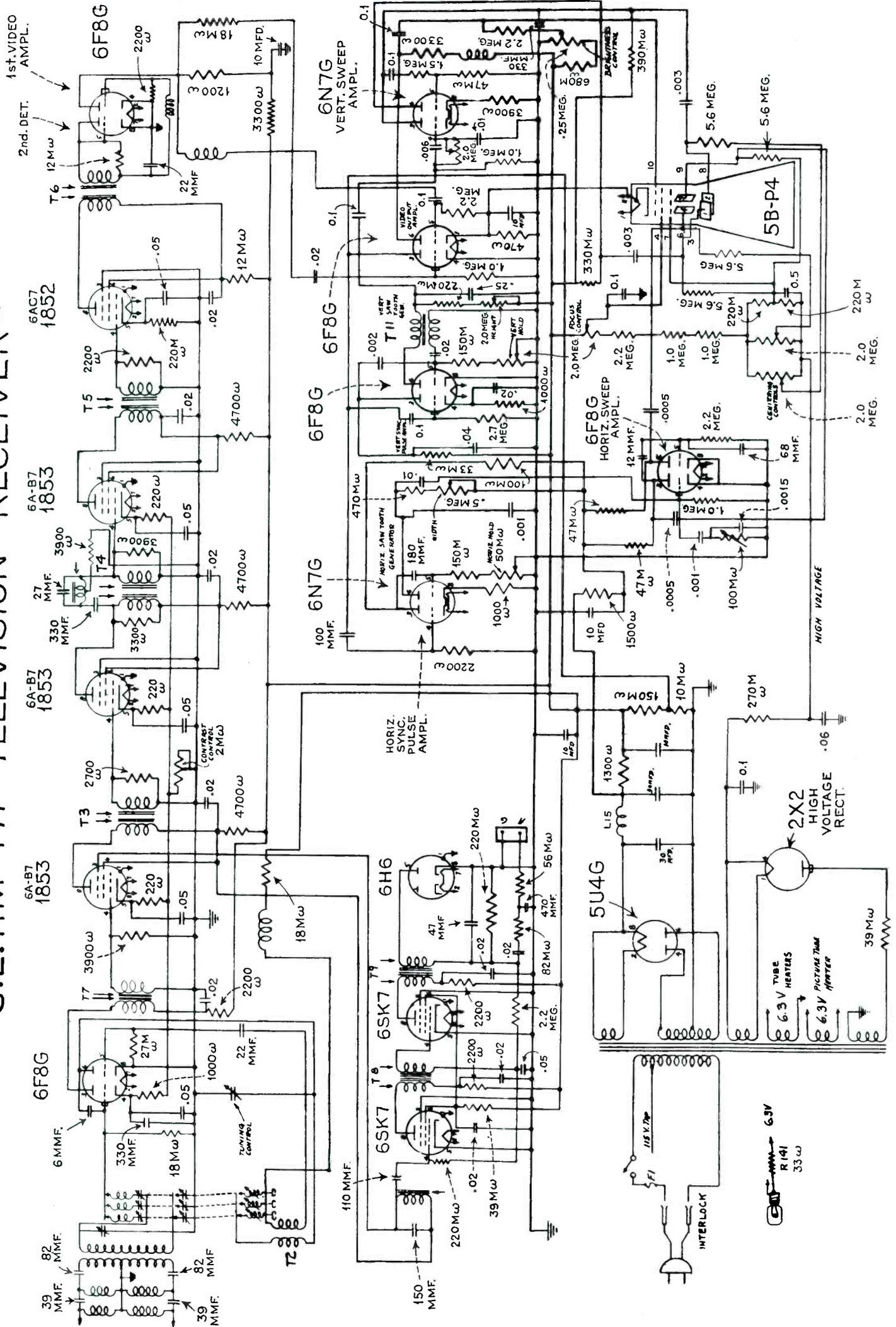


*the mark of an ethical merchandiser of advertised radio brands*

TEMPORARY OFFICE OF THE EXECUTIVE SECRETARY  
5 WEST 86th STREET NEW YORK, N. Y.

SERVICE, SEPTEMBER, 1939 • 433

# G.E. HM-171 TELEVISION RECEIVER



**YOU SAVE \$ 1 00**

by using the

**Group  
Subscription Plan**

OUR GROUP SUBSCRIPTION PLAN enables you and three or more of your co-workers to subscribe to SERVICE at one-half the regular yearly rate. In other words it will cost you and your friends only \$1.00 each for twelve issues of SERVICE. The G-S-Plan low rate only applies when 4 or more subscriptions are ordered at one time. (Foreign \$2.00.)

*Speak to three or more of your friends . . . let them sign up with you and then you can remit for the whole group. (Renewals or extended subscriptions are acceptable as part of a group.)*

**TEAR OUT AND MAIL**

SERVICE—19 E. 47th St., N. Y. C.

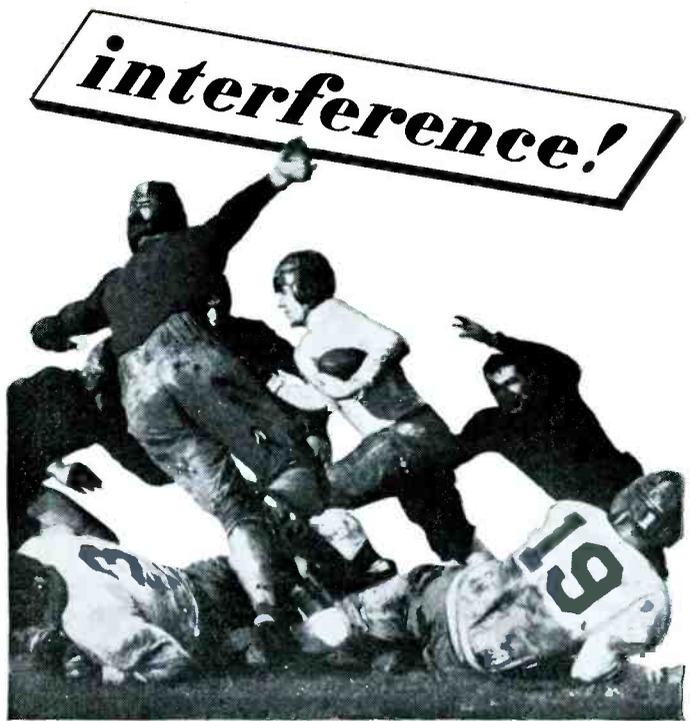
Please enter annual subscriptions (12 issues) for each of the undersigned for which payment is enclosed at the rate of \$1.00 each; foreign \$2.00. (This rate applies only on 4 or more subscriptions when occupations are given.)

Name .....  
Address .....  
City-State .....  
Occupation .....  
Employed by .....  
State whether Employer is a Service Organization, Dealer, Jobber  
or Manufacturer .....

Name .....  
Address .....  
City-State .....  
Occupation .....  
Employed by .....  
State whether Employer is a Service Organization, Dealer, Jobber  
or Manufacturer .....

Name .....  
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or Manufacturer .....

Name .....  
Address .....  
City-State .....  
Occupation .....  
Employed by .....  
State whether Employer is a Service Organization, Dealer, Jobber  
or Manufacturer .....



**THRILLING on the Gridiron**

*Tragic* **IN YOUR BUSINESS**

If you as a radio tube dealer are losing sales to cut-price competition — you need the Tung-Sol plan which provides interference FOR you — not AGAINST you!

You qualify under this *protected profit* setup . . . and secure an adequate supply of Tung-Sol tubes without buying them,

**IF**—You now operate a growing radio service business free from interference with already established Tung-Sol dealers.

You can turn over a profit-protected tube stock three or four times a year.

You will make use of attractive displays and other advertising material for increasing sales.

You have a reputation for maintaining standard prices.

**IF YOU HAVE "WHAT IT TAKES" — WRITE US TODAY**

TUNG-SOL LAMP WORKS INC.  
DEPT. D RADIO TUBE DIVISION

**TUNG-SOL VIBRATION-TESTED RADIO TUBES**

SALES OFFICES: Atlanta • Chicago • Dallas • Denver  
Detroit • Kansas City • Los Angeles • New York  
General Offices: Newark, New Jersey

**THEY CAN'T  
COME**

**Too  
Tough**

**FOR THIS  
SET TESTER**

**TRIPLET**

**MODEL 1604**

**\$49.84**

Net Price

**T**HE Set Tester with Everything . . . Triplet quality-made—with features that give the serviceman everything he will want—a definite conclusion and speedy location of RF, IF, AF and power circuits. Twelve AC and DC Voltage ranges, DC at 25,000 ohms per volt . . . Nine Direct Current ranges; Low and High Ohms ranges; Complete Free Point Tester makes all series and parallel meter connections through seven sockets, including Loctal and Bantam Jr. types; Condenser Tester and provisions for Decibel readings make the Model 1604 the outstanding Multi-Purpose Set Tester of them all.

Large Modernistic Indicating Instrument

with RED•DOT Lifetime Guarantee against defects in materials or workmanship. Exclusive Resistance Measurements Circuit (Patented)—The ohmmeter zero adjustment is unique in this tester. There is but one adjustment for all resistance ranges. This is more accurate and does not require re-setting of zero when reading different ohmmeter scales. The only tester which can employ this remarkable proven circuit. Model 1604 . . . Complete in Attractive Quality Case of heavy steel with black suede baked enamel finish. . . . Snap-on metal cover . . . with all accessories. . . . Dealer Net Price . . . . . \$49.84

WITH NEW  
FOLDEX  
TUBE  
CHART

A folding "card-index" system, giving quick and complete tube data with the additional advantage of new tube supplements mailed free to registered users.



**Check This Tube Tester Value**

Model 1213 contains all the sockets to test present-day tubes, including Loctals, the new Bantam Jr., the High Voltage series recently announced (including the 117Z6G) and Gaseous Rectifiers . . . Ballast Tube Continuity Tests. Will not deactivate 1.4 volt or other type tubes—a positive assurance with any current Triplet Tube Tester. Filament Voltages from 1 to 110 . . . Neon Shorts Test . . . Separate Line Voltage Control Meter . . . With RED•DOT Lifetime Guaranteed Instrument. Dealer Net Price

**Model 1213  
\$22.00**

WRITE FOR CATALOG . . . Section 179, Harmon Avenue

**THE TRIPLET ELECTRICAL INSTRUMENT CO., Bluffton, Ohio**

**SAVE \$1.00 !!!**

- The Group Subscription Plan for *Service* enables a group of service men, dealers or jobbers to subscribe at one-half the usual yearly rate.
- The regular individual rate is \$2.00 a year. In groups of 4 or more, the subscription rate is \$1.00 a year. (In foreign countries, \$2.00.)
- Each subscriber should print his name and address clearly and state his occupation—whether a dealer, jobber, independent service man, service organization, etc.

**Remember this Group Plan when Your Subscription Expires**

**SHURE COMMUNICATIONS MIKE**

Shure Brothers, 225 W. Huron St., Chicago, have introduced their Streamliner microphone and desk stand for both crystal and dynamic models. These types are insulated from the operator for safety and



contain a built-in filter to protect them from r-f burn out. Additional information and prices may be obtained directly from Shure Brothers.

**NEW SOLAR CONDENSERS**

Solar Mfg. Corp., Bayonne, N. J., makers of capacitors, have added several new types to their line.

The Solarex Type O is an oil-filled filter



capacitor for general amateur transmitter use. This unit, available in standard values, is built of paper sections which are oil-impregnated under high-vacuum. They are assembled in insulated round metal cans, oil-filled and hermetically sealed. Terminals are porcelain stand-off insulators. Mounting is accomplished by means of detachable rings.

Solar type DY is a dry electrolytic for use as original equipment in receivers and



for service work. A new type of mounting is incorporated with base prongs which fit chassis slots and are fastened by twisting. Additional information on these and other Solar capacitors may be obtained directly from Solar.

### TRIUMPH TUBE TESTER

The Triumph Automatic Visograph tube tester is designed for counter testing of all types of tubes, including GTs, loktals and 117-volt types, as well as plug-in resistors and ballasts. An illuminated colored tube facsimile indicates the condition of the tube



under test. The unit is push-button operated and tube data are selected from a roller chart. Additional information may be obtained directly from Triumph Mfg. Co., 4017 W. Lake St., Chicago.

### ELECTRO-VOICE MIKE

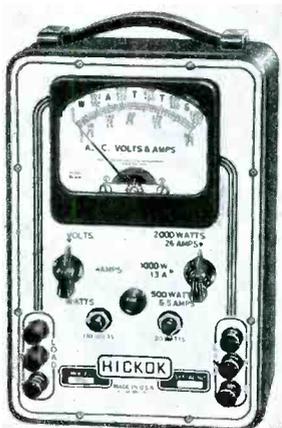
The Electro-Voice Model V-1 velocity mike has a substantially flat frequency response from 40 to 10,000 cycles when placed 6-in. or more from the sound source, it is



said. An output of -65 db is claimed. Additional information may be obtained directly from Electro-Voice Mfg. Co., Inc., South Bend, Ind.

### HICKOK APPLIANCE TESTER

The Hickok Model 900 all purpose appliance tester has ten ranges of a-c volts, amperes and watts. It is primarily de-



signed to indicate the wattage consumption, amperage and voltage of a-c appliances and radio receivers. It is available in either 60 or 25 cycle models. Detailed information may be obtained directly from Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland, Ohio.

# VOL. X RIDER MANUAL

1650  
PAGES  
\$10.00

# 30% MORE MODELS

*Just Out!*  
NOW AT YOUR JOBBER

**XTRA NUMBER**—of models are covered in Volume X. Because of the tremendous increase in the number of models being issued by manufacturers, Volume X will cover more than 2600 models. This is over 750 more than any previous edition.

**XTRA INFORMATION**—Television—Facsimile—Wireless Record Players—you must have the manufacturer's instructions when you install or service any of these new instruments. You'll find every bit of the latest available information on these important new developments in Volume X.

**XTRA DATA**—Because servicemen need the greatest possible amount of essential data, Volume X has been carefully edited to eliminate all the commonly known data and the space used to present more of the wanted material.

**XTRA SECTION**—New revised 64 page "How It Works" section gives easy to understand explanations on the theory of Television—Facsimile—Wireless Record Players, etc. Many servicemen regard this section to be as valuable as the manual itself. Volume X index covers all 10 Rider Manuals.

NEW — "SERVICING BY SIGNAL TRACING"

"SERVICING  
by SIGNAL  
TRACING"

Use the system of servicing which is fastest—most modern—the system you can apply to all receivers regardless of age, type or make— independent of the kind of circuit or tubes used— independent of every limiting factor heretofore encountered. 360 pages.....\$2.00

ORDER  
TODAY



**YOU NEED ALL 10 RIDER MANUALS**

✓ **CHECK THIS LIST**

Volume	Price	Covering
IX.....	\$10.00	1938-39
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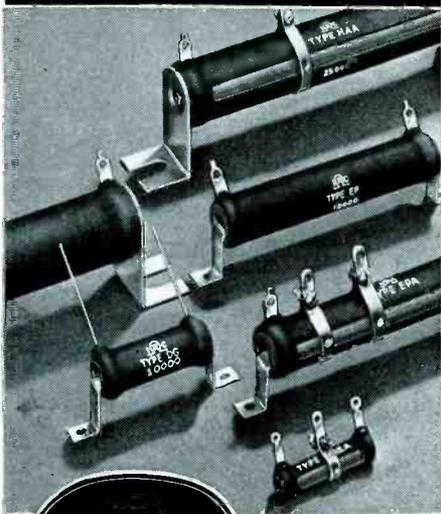
*John F. Rider* Publisher

404 Fourth Ave., New York City

Export Div.: Rocke-International Electric Corp., 100 Varick St., N. Y. C.

Cable: ARLAB

# EXTRA PROTECTION!

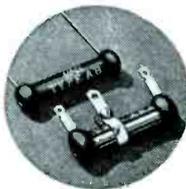


## IRC POWER WIRE WOUND RESISTORS (Cement Coated)

That special cement coating on IRC Power Wire Wound Resistors is just as rough and tough as it looks. It is the most durable coating yet developed. It is practically impervious to moisture and heat. It doesn't peel, chip or crack. It offers EXTRA PROTECTION against the most common causes of resistor failure. It gives you true airplane—submarine resistance dependability—at not one cent of extra cost. Its amazing superiority can be demonstrated by any test you care to name. Ask your jobber. Insist on IRC Power Wire Wounds—the only resistors having this exclusive feature.

### A 10-WATT SERVICE HINT

Hundreds of servicemen and amateurs save time and money by using these little 10-watt IRC Power Wire Wounds universally for all low wattage resistor requirements. The 10-watt adjustable (Type ABA) is especially handy. Any desired range up to the maximum of the resistor can be tapped off by moving the adjustable band. A few popular ranges equip you for literally hundreds of jobs.



## INTERNATIONAL RESISTANCE CO.

401 N. Broad Street, Philadelphia, Pa.

### BRUSH CRYSTAL MIKE

The Brush Development Co., 331 Perkins Ave., Cleveland, Ohio, have introduced their Model US crystal mike which is designed to meet the demand for a sensitive microphone with a high output, it is said. The output level is -44 db for close speaking. The US is housed in a moulded plastic case. Additional information may be obtained directly from Brush.

### AEROVOX CONDENSER CHECKER

A radically new means of testing condensers and coils in the r-f range under actual operating conditions is offered in the Aerovox Model 95LC checker, it is claimed. The instrument determines the effectiveness of a condenser or coil without disconnecting it from the circuit in which it is used. It is self-powered. Additional information may be obtained directly from Aerovox Corp., New Bedford, Mass.

### RCA TEST INSTRUMENTS

Three new pieces of television test equipment, a piezo-electric calibrator, a 5-in. wide range oscillograph and a television alignment oscillator have been announced by RCA Manufacturing Co., Inc., Camden, N. J. The instruments have been designed primarily for servicing RCA television receivers but may be adapted readily to other present day sight and sound receivers.



The alignment oscillator is a newly developed instrument for visual alignment of the r-f and i-f circuits in television receivers. The calibrator and the oscillograph have many applications for other high frequency work, it is said. Additional information may be obtained directly from RCA.

### TURNER CRYSTAL MIKE

The Turner Model 22X is a satin-chrome plated crystal mike with a comparatively flat output from 30 to 7,000 cycles and a level of -52 db, it is said. The 90° tilting-head range allows semi and non-directional pick-up. Additional information and prices may be obtained directly from Turner Co., Cedar Rapids, Iowa.

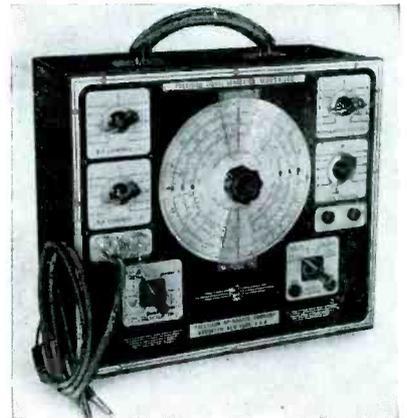
### WEBER INSTRUMENTS

Earl Webber Co., 1313 W. Randolph St., Chicago, announce their 1940 line of test equipment. Included in the line are the Series 210 Imperial service estimator, the Series 220 Imperial multimeter and the Automatic tube tester. The 210 is a combination tube tester and volt-ohm-milliammeter. The 220 is a push-button operated multimeter with 38 ranges and a 6½-in. meter. The Automatic tube tester is a modern instrument available in several

styles for counter or portable use. Additional information and prices may be obtained directly from the manufacturer.

### PRECISION SIGNAL GENERATOR

The Precision Series E200 signal generator features avc substitution method of receiver alignment. The instrument supplies avc voltage. Six bands are provided which cover the range from 110 kc to 72 mc. A direct reading dial is employed. The accuracy is 1% on all bands, it is said. An



independently controlled, 400-cycle modulator enables 0 to 100% audio modulation at will. Additional information on this and other precision test equipment may be obtained directly from Precision Apparatus Co., 647 Kent Ave., Brooklyn, New York.

### RIMCO DYNALYZER

The Radio Instruments Mfg. Co., Inc., 625 W. Monument St., Jackson, Miss., have announced their Model 701 Dynalyzer which is designed for complete dynamic testing of a modern receiver or amplifier, it is said. The instrument contains an r-f section which measures frequencies from 95 kc to 15 mc; an electronic voltmeter with an illuminated dial with ranges from 0.2 volt to 500 volts and a built-in dynamic speaker for listening-in tests. Additional information on this and other Rimco test equipment may be obtained directly from the manufacturer.

### MICAMOLD KODACAPS

Micamold Radio Corp., Flushing and Porter Aves, Brooklyn, New York, have rounded out their line of Kodacap tubular condensers. The Kodacap uses a new specially processed cellulose derivative as the dielectric. This new material is said to be extremely uniform and homogeneous and is substantially non-hygroscopic.

Kodacap condensers are now available in 11 capacity ranges, viz: 0.001, 0.002, 0.003,



0.005, 0.006, 0.01, 0.02, 0.05, 0.1, 0.25 and 0.5 mfd. They are all rated at 1,000 volts, d-c working voltage and 3,000 volts test. The Kodacap is somewhat smaller in size than the average 600-volt paper dielectric tubular.

Additional information and prices may be obtained directly from Micamold.

# Delivery Now!



**Model 560 Vedolyzer**

The recent announcement of the 560 Vedolyzer, 561 metered output A.F. and R.F. Signal Generator, and 562 Audolyzer has created more interest, and has been received with greater acclaim than any equipment since the beginning of radio service. Thousands of service men have written in or called their jobbers for information. More than a hundred orders were placed before prices were announced.

This splendid reception is not strange or unusual, for the service industry realizes that true dynamic testing is much broader and far more comprehensive than so-called channel testing or signaling. It is not enough to merely locate the stage wherein the trouble lies—it must actually show the serviceman the exact part or component of the stage which is defective. It must be able to analyze and take into account such factors as distortion, overloading, power handling capability, and a host of other factors vital to the proper operation of the set.

Servicemen have been quick to realize that no other equipment, or combinations of equipment, can equal the versatility and utility of these new Supreme Instruments.



**Model 562 Audolyzer**

You can have DELIVERY NOW! Production is in full swing. Shipments are daily going to leading parts jobbers in every state in the union.

So WRITE US TODAY and we will advise you by return mail the name of the jobber for you to see—the jobber in your own locality who actually has these instruments in stock—and who will be glad to show them and demonstrate them to you without obligation.

We want you to actually see and inspect these three new instruments. Have the story first-hand. Get the "feel" of this complete, amazingly different laboratory equipment, which already has the endorsement and approval of well known radio engineers wherever demonstrated.

You will be interested in this new equipment which you may purchase without fear of obsolescence. Not just for this season or next year, but for years to come—year after year of complete, MODERN service.

PROVE IT TO YOURSELF—5 DAYS FREE TRIAL IN YOUR OWN SHOP.



**Model 561 Signal Generator**

## SUPREME

**SUPREME INSTRUMENTS CORP.  
GREENWOOD, MISSISSIPPI, U. S. A.**

EXPRT DEPT., Associated Exporters Co., 145 W. 45th Street, New York  
Cable Address: LOPREN, N. Y.

**MAIL COUPON TODAY!**

SUPREME INSTRUMENTS CORP., Dept. S-10,  
Greenwood, Miss.  
Advise name of my nearest jobber who can demonstrate  
SUPREME's New Models 560, 561, and 562.  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

Today's Best  
Multi-Purpose  
Tester Buy  
only . . .

**\$26.85**

DEALER NET



Model  
432-A-742

**Readrite**  
**RANGER**

with **RED • DOT** Lifetime  
Guaranteed Instrument

- Complete Volt-Ohm-Milliammeter, 16 Ranges.
- Sockets for All Tubes . . . Filament Voltages from 1 to 110—A Safeguard Against Obsolescence.
- Precision Indicating Instrument with Two Highest Quality Sapphire Jewel Bearings.
- Separate Line Control Meter.
- Neon Shorts Test.
- Approved RMA Circuit.
- Portable Rich Black Leatherette Covered Case—Professional in Appearance. Etched Panel.

Model 432-A-742 is a combination Tube Tester (Model 432-A) and Volt-Ohm-Milliammeter. Volt-Ohm-Milliammeter section is a separate panel with range selector switch, ohmmeter zero adjuster and jacks, with ranges as follows: AC-DC Volts 0-10-50-250-500-2500 (DC at 1000 ohms per volt); DC Milliampere 0-1-10-100; Resistance—.5 to 500 with 25 ohms at center scale; 0-100,000 ohms and 1½ megohms. Complete, less Batteries . . . . . \$26.85 Net

**MODEL 511**

A Handy All Purpose Pocket Size DC Volt-Ohmmeter with square Readrite meter having full open dial for reading 0-3-30-300 DC Volts and 0-10,000 ohms. Furnished in Black Wood Case, complete with self-contained 3-volt battery. Dealer Net. \$2.85



**MODEL 739**

Pocket Volt-Ohm-Milliammeter with Selector Switch. Molded Case . . . Precision 3-Inch Meter with 2 Genuine Sapphire Jewel Bearings. AC and DC Volts 0-15-150-750-1500; DC MA. 0-1.5-15-150; High and Low Ohms scales. Dealer Net . . . . . \$9.90



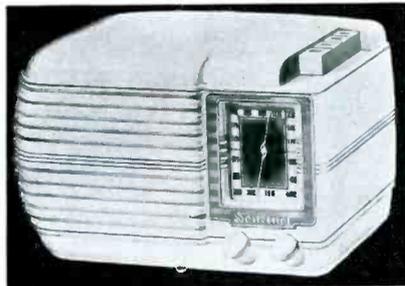
**WRITE FOR CATALOG!**  
Section 917 College Dr.

**READRITE METER WORKS, Bluffton, Ohio**

**RECEIVER TRENDS**

(Continued from page 424)

sleep. A Maestro tone control operating on separate amplifiers for bass and treble allows real and complete control of tone. Philco also has a new record changer capable of playing 10 and 12 inch records intermixed; so has Gar-



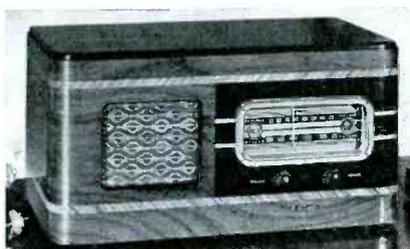
Sentinel 195ULT.

rad. The latter plays 8 records. Home recording is pushed by a few manufacturers. RCA has six new aluminum-cored recording blanks ranging from 6 to 16 inches in diameter.

The RCA Little Nipper (Fig. 17) is popular as a combination broadcast receiver and remote control unit for another receiver<sup>10</sup>. In the remote position, the received program is rebroadcast on a set channel to the main receiver. The channel is selected where there is no interference.

• • • tubes

The trend of tubes is toward more tubes, if you don't mind! The single-ended S tubes<sup>9</sup> are rapidly replacing the clumsy cap types in both r-f and audio applications. Loktal tubes seem limited to Philco and Motorola. Philco has even battery type loktals! The 0Z4 and 0Z4G are becoming very popular in auto



RCA BT42.

sets, rapidly replacing heater types, mainly the 6X5. In some sets, either may be used. The 0.15 ampere series continues to expand. So many heater voltages are available that it is a simple matter to select any reasonable tube combination to add up to the line voltage.—Which reminds us, if we get 115 volt heaters in a power tube, where will

<sup>10</sup>RCA 5X51, 5X5W Multiplex Receiver, SERVICE, June, 1939, p. 282.



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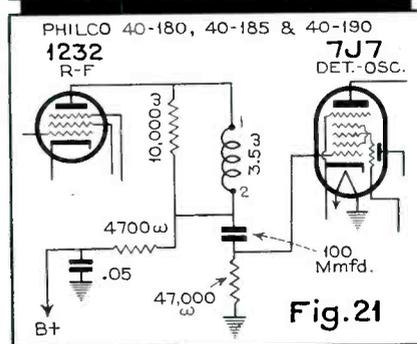
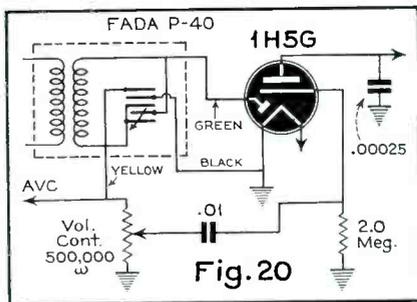
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518 S. PEORIA ST., CHICAGO, ILL.

we put the other tubes—so why bother? When 0.15-ampere series was first introduced, a buffer resistor of 60 to 100 ohms was recommended in series to ease the overload when the set is turned on. (See Fig. 5.) If one tube in the set had an uneven filament coating, a bright spot might form and that tube would give up quite early in the game. The buffer resistance prevented that. However, the resistor is now omitted in more recent models so the trouble must have been licked. The 6K8 triode-



pentode converter is used in sets specializing in the very high frequencies—around 5 to 10 meters. Philco uses the 1232 television tube freely in the r-f stages. The 1852 series is finding many applications besides wide-band amplification.

The 1.4 series is bubbling with activity. A complete audio amplifier including detector has already been mentioned, the 1D8GT. The 1P5 is replacing the 1N5 as an i-f amplifier where remote cut-off characteristics seem preferable. Hytron has a bantam Jr. for extra-portable applications such as pre-amplifiers, acoustic aids, etc. A new beam-power output tube, the 1T5, which draws only 50 ma and gives 175 milliwatts. A new converter tube with higher  $G_m$  will provide plenty soup at high frequencies. A 3-volt power tube with tapped filament for operation at 1.5 volts will be greeted by the battery, a-c, d-c group.

There will be more on tuning eyes. The 6AF6G has two apertures, one for strong signals and one for weak signals.<sup>11</sup> The weak one closes at 100,000 microvolts and the other at 2 or 3 volts. This looks like the real solution for eye

<sup>11</sup>Visual Indicators, by R. Lorenzen, SERVICE, November, 1938, p. 10.

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for trucks or  
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RCA Mfg. Co., Inc., Camden, N. J. • A Service of Radio Corp. of America

trouble. Stromberg-Carlson is using the 6AF6G in many models. (See Fig. 18.)

### • • • parts and stuff

P-m speakers are going places. No more hum-bucking coils. A 2-inch P-m has been announced. To accommodate push-buttons, an 80° variable condenser tuning unit has arrived. We also have downward push buttons instead of horizontal ones (to preserve the plaster on the wall back of the set). (See the Sentinel 195 ULT.) G.E. has a compromise device with the push mostly downward in the H630 and H634. (See accompanying illustrations.) DeWald has an effortless 3/8-inch stroke in the

600-700 series. So has Sonora. Stromberg-Carlson has a special design variable condenser unit which gives additional spread at the high-frequency end.

Electrolytics with 20, 30 or 40 mfd capacity are more common than 4s and 8s. We hope this means less hum and more respectable low notes. Sonora has a substitute for a grid condenser in a few odd turns of wire. (See Fig. 19.) Combination condensers are here. Witness the combined diode trimmer and by-pass in Fig. 20.

Additional details concerning 1940 receiver trends, including television and communication receivers, will be discussed in an early issue.

# THE STORY OF THE 7 WISE GUYS



## WHO WERE LICKED BEFORE THEY STARTED

Seven blind fakirs tried to describe an elephant. One grabbed the tail and said: "It's like a snake."—Another felt an ear and said: "It's like a plant."—Another threw his arm around a leg and said: "It's like a tree." So—unable to see the whole big picture at one time they were licked before they started.

Today, there are servicemen equally blind, who think their business is the repairing of radios only. There are others who think that work on P. A. systems will offset the losses due to cheap receivers. There are others who think that television will be their salvation. The truth is that individually they are wrong—yet collectively they are right. The successful service business of tomorrow will do all those things—and more.—And, the serviceman who doesn't broaden himself to match the expansion of his industry will be licked by his own "blindness".

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Use the system of servicing which is fastest—most modern—the system you can apply to all receivers regardless of age, type or make— independent of the kind of circuit or tubes used— independent of every limiting factor heretofore encountered. In this new book you learn what happens to the signal currents—the development of control voltages—and how all receivers are brought to a common servicing level. There is one thing that is common to every radio set—the signal. Read this book and you will be able to service the most complicated set with greater speed and less effort.

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### —AND REMEMBER...

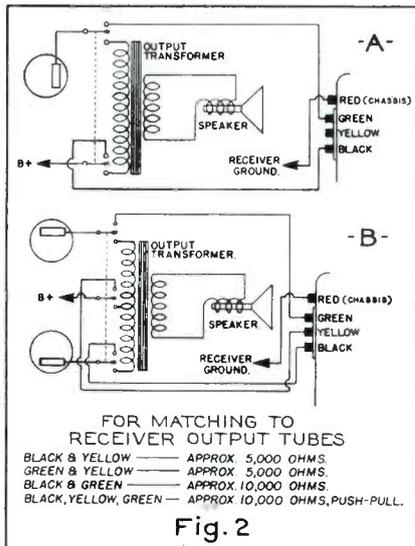
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## CROSLLEY 119 KIT

(Continued from page 429)

one line of type. In a like manner in the Reado printer the small stylus which travels from left to right across the recording paper is only 1/100 inch in diameter, and therefore must make the same number of journeys from left to right to print the same line of type. Both the spot of light and the recording stylus must move across the paper in



synchronism, if the characters are to be built up as they appear in the original copy.

Various systems of synchronism have been used in facsimile. One of the simplest systems makes use of the fact that two synchronous motors running on the same power line will run exactly at the same speed, and therefore if both are started at the same instant, will remain together. However, if the scanner and printer are on separate power lines, serious distortion occurs since one or the other may be going faster or slower. In the Reado system, the printer is geared to run 2 percent faster than the scanner. It will, therefore, complete one journey from left to right and back from right to left in a shorter time than will the scanner. The stylus arm is held over at the left side of the copy by slipping

a clutch between the motor and the stylus arm. This clutch is released by a small pulse of 500 cycles which is set up by the transmitter scanner just before it starts on the journey from left to right across the copy, thereby insuring that both the small spot of light at the transmitter and the stylus needle at the receiver start on their journey in synchronism. However, since the recording stylus travels 2 percent faster than the small spot of light, it will arrive at the right side of the copy sooner, but this difference in speed is constant and so slight that distortion is negligible.

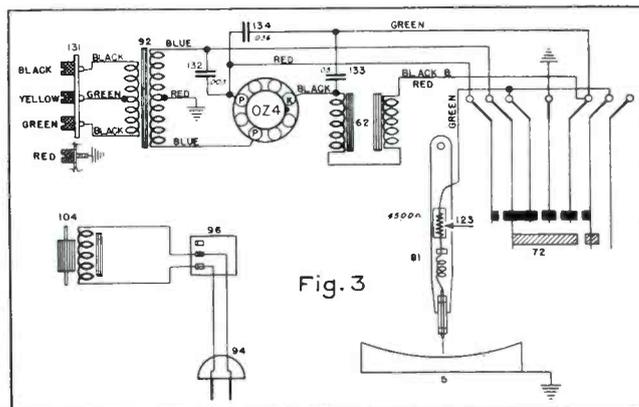
Two small coils are on the left side of the printer which actuate the small pawl to release the clutch, which makes possible the synchronization of the printer and scanner.

### • • • checking

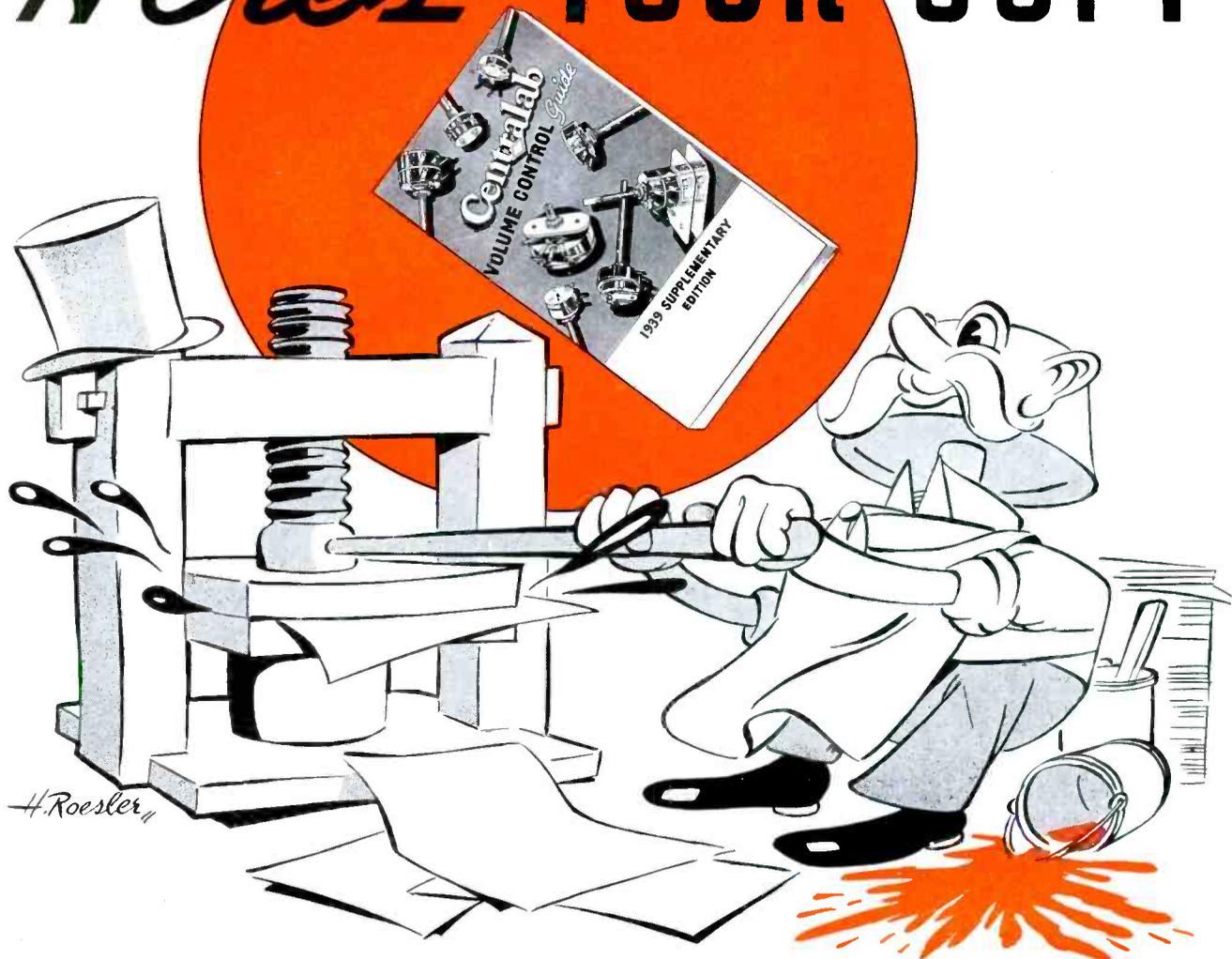
To electrically check the operation of the 118 and 119 printer, it should be connected to a receiver as shown in the accompanying circuits. Connect a signal generator modulated with any audio frequency less than 500 cycles to the antenna of the receiver and switching the output from the receiver to the printer, with the motor running, turn up the level control on the receiver slowly until sufficient voltage appears across the synchronizing coils on the printer to actuate the clutch release. This will release the stylus arm at this same level setting and the modulation should mark lightly on the paper. Increasing the level setting should bring up the blackness of printing to the point just below where the paper begins to smoke, which is the desirable printing level. As the level of the receiver is reduced the printing should become lighter and lighter and as the level is further reduced the clutch pawl will hold in and the arm should stop over at the left side of the paper.

Measuring across the relay solenoid with a 1000-ohm-per-volt d-c meter synchronization should occur between 45 and 55 volts. In cases where this does not hold true the OZ4 rectifier should be checked. It will be noted from circuit

When the rectified voltage is supplied to the pen (81) it comes in contact with a carbon coated paper, the current through the paper is a function of the applied voltage and the consequent removal of the surface coating is also a function of the applied voltage.



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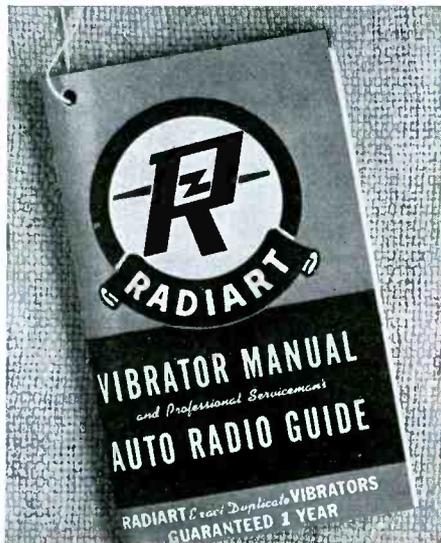
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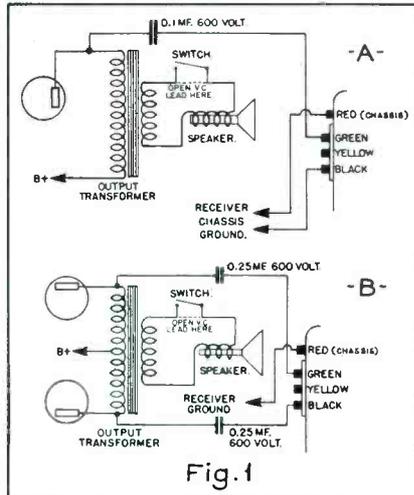


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diagram this tube is switched in the circuit only for synchronization, that is, to rectify the 500-cycle pulse for the relay coils. If the trouble is not found in the tube, the circuit should be checked for opens or shorts and the switch points



back and forth across the paper. When printing at the desired level on average paper, the voltage reading should pick up to between 200 and 250 volts. If the paper is in doubt, turn the stylus so that it does not touch the paper and connect 18,000 ohms from stylus to ground, turn the motor off and rotate the shaft by hand until stylus arm is half way across on its way from left to right. Measure the voltage across this resistor. The voltage should read between 200 and 250 volts as above.

• • • adjusting clutch

Turn motor coupling by hand in direction of normal rotation while holding clutch arm against magnet pole pieces, until stop on lower clutch plate is just completely under clutch arm. Loosen mounting screws for magnet bracket and slide bracket and coils forward until the pole pieces come within the thickness of a piece of writing paper of touching the magnetic armature on clutch arm. Tighten bracket screws.

Plug motor in and adjust armature adjustment screw until clutch arm just stops lower clutch plate. Repeat to make sure that clutch arm engages just enough to stop clutch, as more movement of armature than is necessary only requires more power to synchronize. Tighten lock nut, being careful not to change adjustment while so doing.

inspected and cleaned. If the circuit and the voltages are found okay and the printer still refuses to operate properly, the clutch arm should be adjusted according to instructions given below.

To measure the printing signal, connect a 1000-ohm-per-volt a-c meter across the stylus to ground at the switch and advance the level control of the receiver until the stylus is sweeping

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THE Cornell-Dubilier Model BN capacitor bridge is designed to measure all types of capacitors between the limits of 0.00001 and 50.0 mfd. It also indicates power factor of electrolytic capaci-



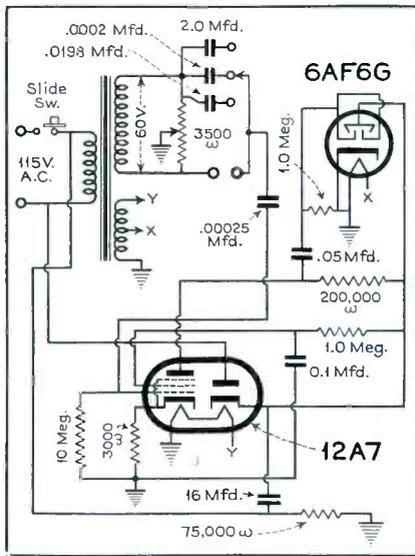
The Cornell-Dubilier type BN capacitor bridge is a compact instrument designed chiefly as a direct reading device for the service bench.

tors and can be used as a continuity meter. The scale is calibrated directly in microfarads. The instrument employs a Wien bridge circuit for all measurements. It operates from the 60-cycle, 115-volt power lines. A 12A7 tube acts as rectifier and amplifier and a 6AF6G visual indicator indicates a balance condition.

• • • specifications

Finish: Walnut bakelite.  
 Controls: 3-position range selector; calibrated variable bridge arm and on-off switch.  
 Ranges: 0.00001 to 50 mfd.  
 Power supply: 60 cycles, 115 volts.  
 Tubes & functions:  
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Sixty volts a-c are impressed upon the input terminals of the bridge from the self-contained transformer. This transformer also supplies the filament voltages.



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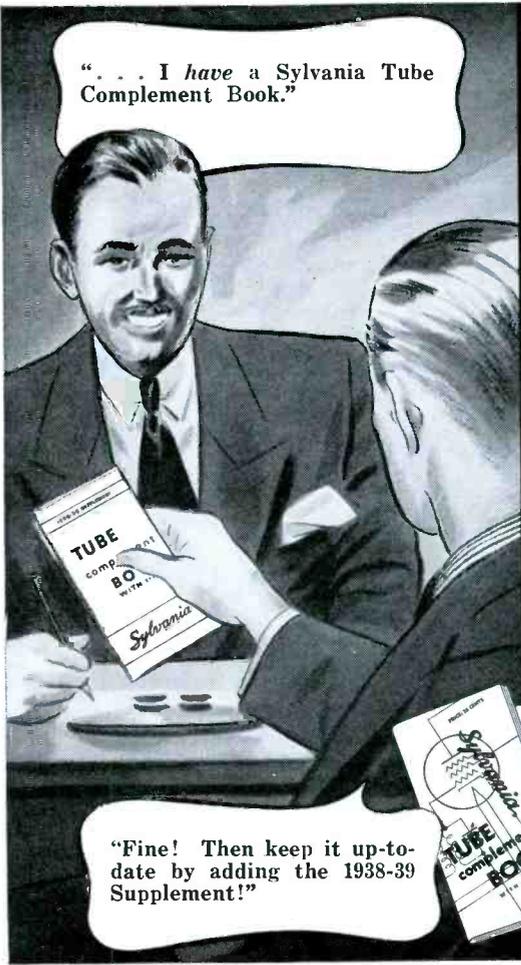
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8-8	200	3/4 x 2-5/16	.80
8-16	200	13/16 x 2-5/16	1.00
16-16	200	7/8 x 2-5/16	1.15
8-8	150	3/4 x 2 1/2	.80
8-16	150	7/8 x 2 1/2	.85
20-20	150	7/8 x 2-3/16	1.05
10-10	50	11/16 x 1-11/16	.80
10-10	25	3/4 x 1 1/2	.60

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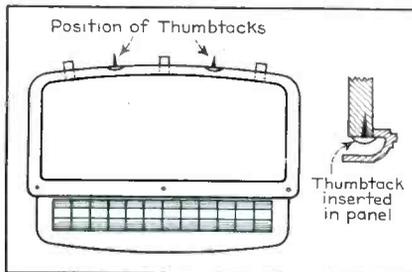


### STANDARD FREQUENCY SERVICE

Station KFI, Los Angeles, at the conclusion of each Saturday's broadcasting day, transmits a series of audio frequencies which may be used by Service Men, amateurs, experimenters and others interested in making measurements on their broadcast receiving sets. These frequencies are transmitted at a constant level, or if they are not, an announcement will be made stating the amount they vary with reference to 1,000 cycles. Each frequency will be for one minute and an announcement will be made as to the frequency to be transmitted. The audio oscillator to be used has an accuracy of 2% over the entire range.

### STROMBERG-CARLSON 400 SERIES

*Dial escutcheons:* Stromberg-Carlson dial escutcheons are made of Tenite. This is a molded plastic developed by the Eastman Kodak Company and first produced in their Tennessee Factories. It has a number



of properties which make it a very desirable plastic to use. For instance, it has a very high textile strength and yet is sufficiently flexible to withstand bends and blows without breaking or cracking. Then, too, it can be produced in attractive colors and it feels soft and pleasant to the touch. However, Tenite has one drawback. If it is exposed to a high temperature for a sufficiently long time (on a radio in a store window in full sunlight, for example), it will soften slightly and tend to sag unless it is supported at frequent intervals.

On most of the 400 series sets, this escutcheon is supported across the top by three spring clips. However, the escutcheon must be removed to adjust the push buttons and, unless this is done carefully by pulling the escutcheon outward at the bottom and then pulling downward, the spring clips may be bent so that they lose their holding power. Then, if the set is exposed to the direct rays of the sun, or heat from some other source, the top of the escutcheon may sag away from the cabinet.

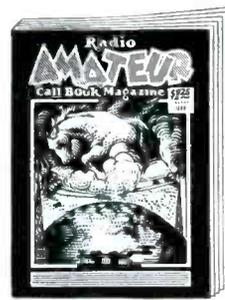
To correct this, or to prevent it, push two ordinary No. 3 thumbtacks up into the cabinet so that the head projects about 1/16 inch on the outside of the cabinet. Then, when the escutcheon is put on, the head of the thumbtack will catch under the ridge in the escutcheon and keep it from coming down. The accompanying sketches indicate how this should be done.

This condition will be corrected on sets produced after Aug. 15, 1939.

### WESTINGHOUSE 675

*Dial slips:* If the dial slips, check the dial front which carries the kilocycle calibration. Loosen the set screws at its base and relocate the dial so that there is no friction load on the tuning condenser shaft which may be hitting the dial. Check and lubricate tuning condenser bearings. Use a graphite lubricant.

Willard Moody.



## SERVICEMEN

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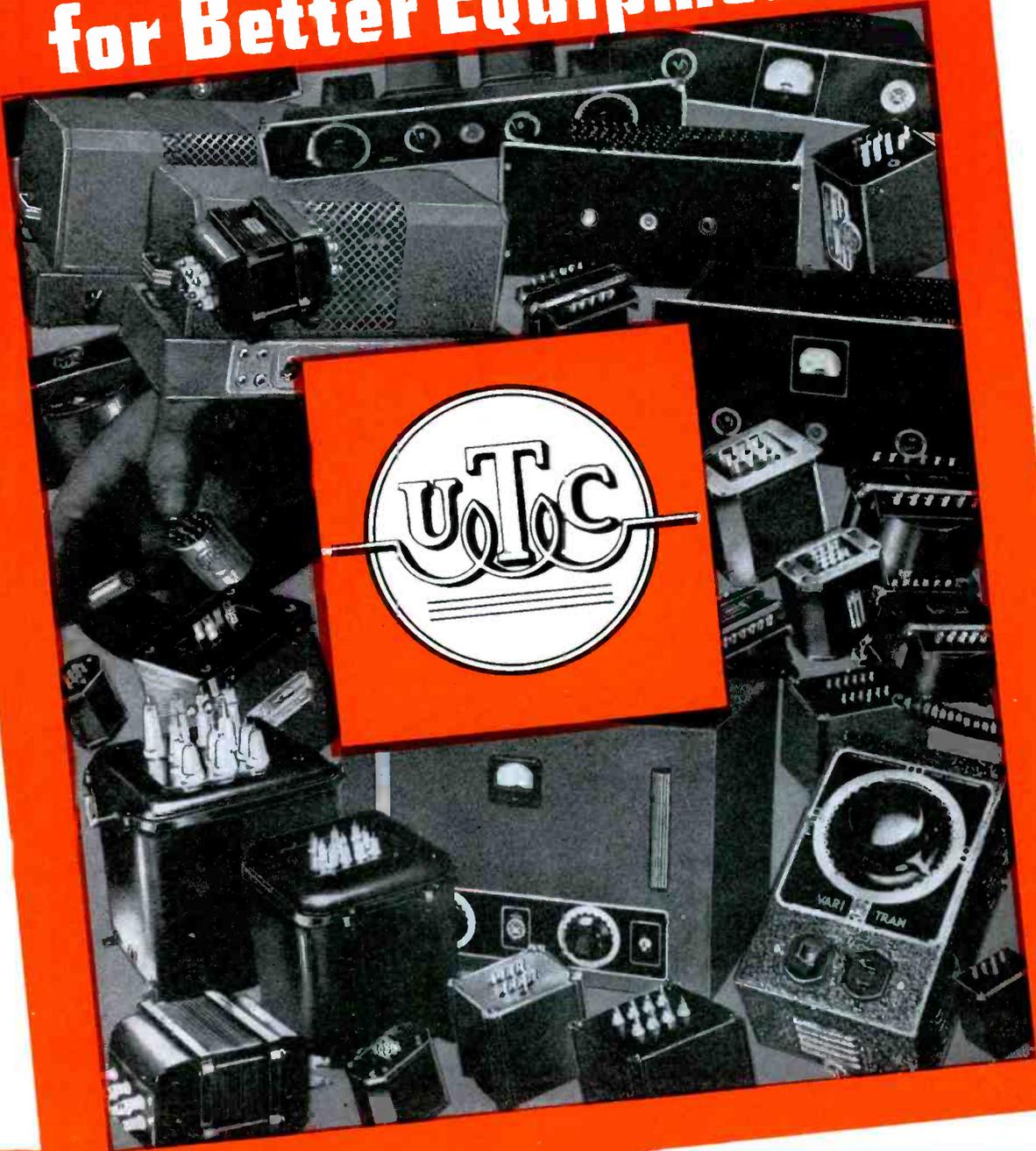
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## *First . . . and still Foremost*

It is significant, that on the whole, difficult transformer jobs find their way to UTC—jobs requiring unusual engineering ingenuity; improved design methods; advanced production technique and equipment.

The same advanced technique used in these special items is employed in the standard units produced by UTC for Service and PA work . . . the choice of the discriminating . . . at no higher cost.

# UNITED TRANSFORMER CORP.

150 VARICK STREET

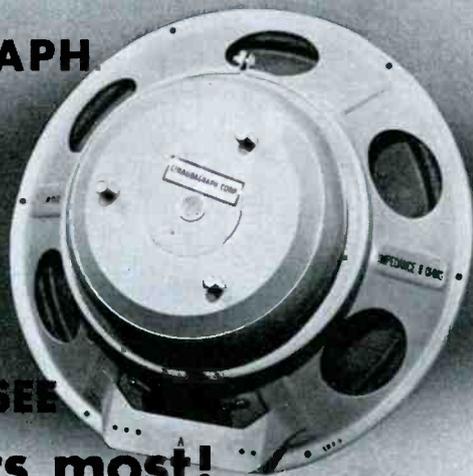


NEW YORK, N. Y.

EXPORT DIVISION: 100 VARICK STREET NEW YORK, N. Y. CABLES: "ARLAB"

# IN CINAUDAGRAPH SPEAKERS

it's what  
you DON'T SEE  
that counts most!



There's more to Cinaudagraph's success than what you see in the speaker unit. It's what stands behind this complete line of permanent magnet and electro-dynamic speakers that counts. The years of research, of design, assembly and laboratory testing—all performed under one roof by Cinaudagraph's trained engineers.

Profits come biggest where volume sales come quickest. Cinaudagraph speaker turnover is fast because every sale means a satisfied customer. And you know what they say about satisfied customers—"your best advertisement."

There is a Cinaudagraph Speaker for every indoor and outdoor job, in both electro-dynamics and permanent magnets, from 5" to 27". Send for new catalog today.

**CINAUDAGRAPH CORPORATION**  
STAMFORD • CONNECTICUT

**NEW**

**Micamold**

**KODACAP**  
THE VOLTRUF CONDENSER



A new and greatly improved type of tubular condenser employing a new insulating medium, a cellulose derivative that is treated by an exclusive MICA-MOLD process.

KODACAPS are characterized by their ability to stand very high voltages for long periods of time.

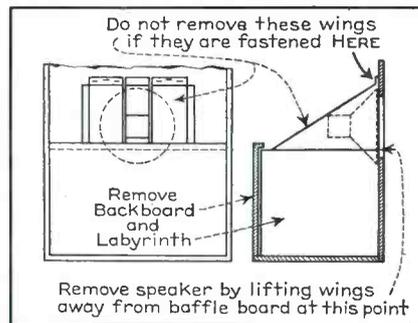
On one test, still running, a group of KODACAPS have been on 1800 V.D.C. continuously for over 3600 hours without a single breakdown.

- ★ THEY COST NO MORE . . . and are SMALLER than standard 600 V. tubulars . . .
- ★ CONSERVATIVELY RATED at 1000 V.D.C.—each KODACAP is tested at 3000 V.D.C.
- ★ They are "VOLTRUF" and will withstand ANY VOLTAGE in radio receivers and sound equipment.
- ★ Because of this UNIVERSAL APPLICATION feature, you need only consider the capacity required . . .
- ★ Only eleven capacities from .001 mfd. to .5 mfd.
- ★ KODACAPS are practically unaffected by highly humid conditions.

**MICAMOLD RADIO CORPORATION**  
FLUSHING & PORTER AVENUES, BROOKLYN, NEW YORK

## STROMBERG-CARLSON LABYRINTH MODELS

*Removal of speaker:* The removal of the speaker from certain labyrinth equipped sets can be greatly simplified. If the wings, which cover the back of the speaker, are stapled to the cabinet or fastened only at the top, it is not necessary to remove them at all. Simply remove the backboard and



then slide the Labyrinth out separating it from the wings or hood.

Remove the speaker mounting bolts and remove the speaker by lifting the wings or hood slightly away from the baffle board at the bottom. The speaker and labyrinth can be reinstalled by reversing this process.

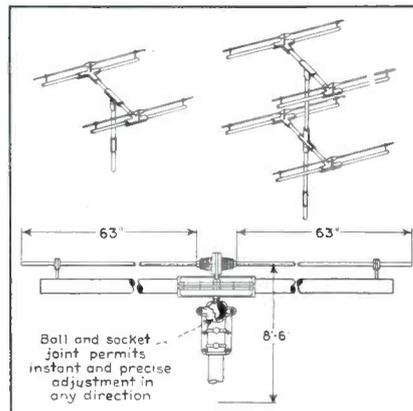
## JFD TELEVISION ANTENNAE

The ball and socket universal joint, a feature of the JFD television antenna, can be tilted for the best reception and for orientation of the dipole to provide optimum results.

The rods are made of 3/8-in brass tubing, nickel plated. All standards and cross arms are of hardwood, lacquered and all metal parts, such as the brackets and ball and socket, are of cast aluminum. The insulators are of porcelain.

The rods are cut to frequency. For other than one channel reception, however, they are ruled and stamped for two other channels, namely: 45 in for the 66 to 72 mc channel and 38 in for the 78 to 90 mc channel.

The type TA18 utilizes a parasitic reflector which results in a gain 3 db over a single half-wave dipole (TA16) and also increases the directivity which results in a decrease of noise and reflections. The double dipole (TA22) is designed for use



in locations with high noise level and low signal strength. It consists essentially of two dipoles and two reflectors, properly spaced. Tests have resulted in excellent pictures in locations where serious problems of interference or multipath images were encountered, it is said.

## BOOK REVIEWS

*THE ENGINEERS' MANUAL, Second edition, by R. G. Hudson, published by John Wiley and Sons, Inc., 440 Fourth Avenue, New York City, 1939, 340 pages, price \$2.75.*

The revised edition of this popular manual is, like its predecessor, divided into five parts: Mathematics, Mechanics, Hydraulics, Heat, and Electricity. The flexible binding, as well as the convenient size of this book make it suitable for carrying in one's pocket, if desired. Although it is highly unlikely that advantage will be taken of its portability, it is nevertheless true that this small format is a very useful attribute for a manual to possess.

The formulas selected for inclusion in this volume are well chosen and the mathematical tables are those frequently used. So true is this, together with its ease in handling, the reviewer must admit that when he is in need of a manual his hand automatically reaches for Hudson.

D. B.

*PRODUCTION AND DIRECTION OF RADIO PROGRAMS, by John S. Carlisle, with drawings by Arthur Thompson, published by Prentice-Hall, Inc., 70 Fifth Ave., New York City, 1939, 397 pages, price \$3.75.*

This book takes each of the standard types of radio program, from the time it is merely a wicked gleam in the advertising man's eye until it reaches the microphone, and describes what is done, who does it, and why he does it. The author, who is the production manager of the Columbia Broadcasting System, believes that everyone connected with radio should know a little of the other men's work and problems, and his book is, within the field indicated, well suited to convey such information as might prove valuable.

*SCIENCE AND MUSIC, by Sir James Jeans, published by The Macmillan Company, 60 Fifth Avenue, New York City, 1938, 258 pages, price \$2.75.*

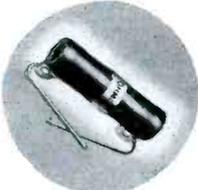
The ability to write of technical subjects, particularly those pertaining to the physical sciences, without resorting to mathematical formulae is possessed by relatively few men. When, coupled with this ability, the style of writing is characterized by its clarity and literary merit the number of men so fitted becomes vanishingly small. That Sir James Jeans belongs to this select group is once again proven by the appearance of his latest book, *Science and Music*.

The title of the book is somewhat deceptive, giving as it does the impression that its contents are devoted to an exposition of the sociological and cultural implications of science as it applies to music. This, however, is not the case, for this volume deals with the science of sound and covers substantially the same material that would be embraced by any book on this subject.

For many years the science of sound has been neglected and has not received the attention it deserved. In relatively recent years this subject has been receiving more and more attention, largely due to its importance in communications. You will find *Science and Music* an interesting and valuable introduction to this field. It should be kept in mind that the reasons why communication equipment should

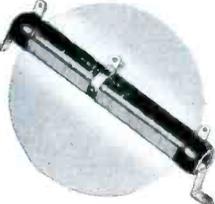
# SERVICEMEN EVERYWHERE

## Depend on Ohmite Resistors



**Ohmite  
Brown Devil**

Popular, time-proved, extra-sturdy, wire-wound resistors for voltage dropping, bias units, bleeders, etc. Built right and permanently protected by Ohmite Vitreous Enamel. 10 and 20 watt sizes; resistances from 1 to 100,000 ohms.



**Ohmite  
Dividohm**

Mighty handy for quick replacement or change of resistance value. Easily adjusted to exact resistance—or tapped where needed. Ideal voltage dividers. Ratings from 10 to 200 watts. Resistance values up to 100,000 ohms.



**Ohmite  
Cordohm**

Line cord resistor designed to replace the internal voltage dropping resistors in A.C.-D.C. radio sets, thus eliminating the heat from the set and insuring more satisfactory operation.

**OHMITE**

parts available from Ohmite Jobbers everywhere.  
Send now for your copy of Ohmite Catalog 17.

**OHMITE MANUFACTURING CO.**

4879 Flournoy St., Chicago, Ill., U. S. A.

Send FREE CATALOG 17.

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Address .....

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

Occupation ..... S-9

# Be Right with OHMITE

RHEOSTATS \* RESISTORS \* TAP SWITCHES

meet certain requirements is equally as important as the reasons why his equipment is able to meet these requirements.

R. L.

*TESTING TELEVISION SETS, by J. H. Reyner, published by Chapman and Hall, Ltd., 11, Henrietta St., W. C. 2, London, England, 1938, 128 pages, price 9/6.*

Hitherto, information regarding the servicing of television receivers has only appeared in scattered articles or in a single chapter of a book. Accordingly, Reyner's "Testing Television Sets" is a valuable addition to the television Service Man's library, since it is, thus far, the one and

only book devoted exclusively to actual television receiver service.

Among the subjects covered are: apparatus required, location of trouble, cathode-ray tube faults, time-base faults, synchronizing faults, receiver faults, interference, and laboratory technique.

One precaution must be observed while reading this book. British television practice differs in a few minor respects from that employed in America. Accordingly, some of the statements and tests will not apply to American television receivers. The occurrence of such cases which are inapplicable to American receivers is of sufficient rarity, however, as not to detract from the value of this excellent book.

R. L.

# Save on the day you buy

## AND SAVE EVERY DAY YOU USE

## RCP TEST EQUIPMENT

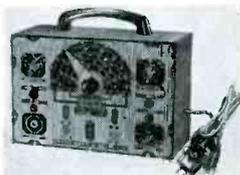
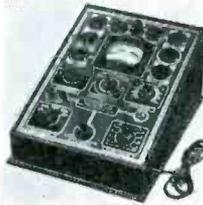
You've started a savings account the moment you switch to RCP test equipment. RCP has proved to the industry that it was possible to build accurate testers, outstanding in performance—at reasonable cost. You save money the day you invest in an RCP test instrument. And it's a real saving, too!

RCP makes even bigger news, though, with the amazing versatility it has packed into this low-cost test instrument line. For here are combination testers that do the job of many instruments. Not just 2 or 3, but as many as 25 and 33! So you save even more important money on this. And because all RCP test equipment is designed to save the serviceman time, you avoid hours of labor and guesswork every working day. Decide right now to join the "Servicemen's Saving Club"—be one of the smart ones investing in RCP test equipment.

Bank the savings—and the profit!

### RCP Dynoptimum Tube Checker Model 308

Tests (under R. M. A. specified plate voltages and loads) 35-45-50-70 up to 117 volt tubes all metal, M. G., glass, 0Z4, cold cathode rectifiers, octal, loctal and single end tubes. Also pilot, Xmas tree lights, etc. Tests all ballast tubes (separate chart included). Hot interelement short and leakage test between ALL INDIVIDUAL ELEMENTS. Provision for audible test of noisy tubes. Net. . . . \$16.95



### RCP Signal Generator Model 702

EVEN FINER PERFORMANCE than RCP's former signal generator, and that was an outstanding buy! Has all latest improvements in circuit and mechanical design. Extremely wide all-wave coverage continuously variable from 95 kilocycles to 100 Megacycles. Output modulated at will. Triple shielded 30% modulation at 400 cycles. Signal wave from self-contained independent 400 cycle circuit. Can be used with outside sweep circuit and wobulator for all forms of oscillographic wave analysis. Attenuation in approximate microvolt calibration by means of five step ladder attenuator. Highly attractive professional appearance. A.C. operated. Net. . . . \$22.95

### RCP Combination Tube and Set Tester Model 801

NOWHERE COULD YOU BUY these two essential instruments individually and get the same high quality at the same low price. Tests all new and old tubes and ballast tubes; hot interelement short and leakage tests on each individual element. Smooth line voltage regulation 103 to 135 volts with direct meter indication. As multimeter, Model 801 provides four range D.C. voltmeter 0/10/50/500/1000 A.C. voltmeter 0/10/50/500/1000; D.C. milliammeter 0/1/10/100/1000; D.C. amps 0/10. Four range ohmmeter up to 10 Megohms. Also D.B. meter and output meter. Fused D'Arsonval Meter Alnico Magnet. Compact, light, with slip hinge cover case. Complete with tube, battery and test leads. Net. . . . \$27.95



### RCP Universal Trouble Tracer Model 456

TOPS IN A FINE AC-DC volt., ohm., d.b., and milliammeter. Special ohmmeter shorting switch—no fussing with leads or jumpers. Movement: 1 Milliampere or 1000 ohms per volt. D.C. volts 0/5/50/500/1000; D.C. Milliamp 0/1/10; Ohms 0/5000/500,000. D.B. —12 to —8/8-28/28-48/34/54. Attractive hardwood case. Net. . . . \$7.95

# RADIO CITY Products Co.

88 PARK PLACE NEW YORK CITY

Write today for new free catalog No. 121 describing the complete line of Dependable and Master RCP instruments.

### DUMONT TELEVENTS

Allen B. DuMont Labs., Inc., Passaic, N. J., are issuing "Televents" each week to DuMont dealers. "Televents" are illustrated television programs on heavy card stock, for use in the dealer's window or on his walls. All programs to be transmitted by station W2XBS (Empire State Tower) in New York City are listed day by day for the forthcoming week, in a manner calculated to whet the entertainment appetite of the public.

### GARRARD CATALOG

Garrard Sales Corporation, American sales representative for Garrard Engineering and Manufacturing Co., Ltd., Swindon, England, has announced a new 16-page catalog describing and illustrating the new, complete Garrard line of automatic record changers, motors, pick-ups and turntables. Copies of the new catalog may be secured without charge by writing to Garrard Sales Corporation, 296 Broadway, New York City.

### TELEVISION APPLICATION

Abraham and Straus, Inc. and Bloomington Bros. Inc., New York City, have applied to the Federal Communications Commission in Washington for a license to construct a station for transmitting television programs. The application for the license was filed by Metropolitan Television, Inc., a subsidiary of the stores which was specially organized for the transmission of television programs. The Allen B. DuMont Laboratories, Inc., are listed as consulting engineers in the application of the Federal Communications Commission.

### CREI CATALOG

With the inclusion of more than twice as many photographs and a complete outline of both the Practical Radio and Television Engineering courses, the new C.R.E.I. catalog should be of interest. This booklet will be gladly sent to any interested person. Simply mail your request to The Capitol Radio Engineering Institute, 3224 Sixteenth Street, N. W., Washington, D. C.

### NEW OFFICES FOR "RADIO"

Radio Ltd., technical publishers, and the Editors of "Radio", announce their removal to 1300 Kenwood Road, Santa Barbara, Calif.

### MAGNAVOX APPOINTMENT

The Magnavox Co., Ft. Wayne, Indiana, have announced the appointment of Mr. Joseph Sprung, 254 W. 31 St., New York City, as their representative for the Metropolitan New York territory. Mr. Sprung has been known to the radio trade for a number of years.

### GENERAL INDUSTRIES BULLETIN

The General Industries Company, Elyria, Ohio, have released a bulletin announcing their new models RX and KX electric motors, new Master Junior and Majestic spring wound motors, and ACX and AKX assemblies. Prices and technical information are given in the bulletin. Write to the above organization.

### AMERICAN MIKE BULLETIN

American Microphone Co., Inc., 1915 S. Western Ave., Los Angeles, Cal., have issued a bulletin illustrating and describing the type D5 and D5T dynamic microphones. Specifications, prices, frequency response and directional characteristics are given. Copies may be obtained directly from the manufacturer.

### STANCOR APPOINTMENT

Standard Transformer Corp., 1500 N. Halsted St., Chicago, Manufacturers of Stancor transformers, announce the appointment of William Carduner, 296 Broadway, New York City, as exclusive representative for the Eastern territory.

### WIRE BROADCASTING APPOINTMENT

Jarold West, president of Wire Broadcasting Corp. of America, has announced the appointment of L. F. Cramer as General Sales Manager. Mr. Cramer, who will immediately embark upon an active campaign to open up additional outlets for Wire Broadcasting, was formerly with the Allen B. DuMont Laboratories, Inc., as General Sales Manager.

### JOHN MECK INDUSTRIES

John Meck, formerly president of Electronic Design Corp., has announced the formation of John Meck Industries, 430 W. Erie St., Chicago. The organization will manufacture sound equipment. Sales of this equipment are to be made through the regular jobber-dealer channels.

## RECEIVER ALIGNMENT SIMPLIFIED



A Crystal Calibrator cannot be beat for rapid accurate receiver alignment—it is indispensable for a quick check of sensitivity and alignment. Your Bliley Distributor can supply the SMC100 Crystal Unit for only \$7.75. Bulletin E-7 (free) contains complete information. Bliley Electric Co., Erie, Pa.

**BLILEY DUAL FREQUENCY CRYSTAL**

## A GOOD NAME GOES A LONG WAY



Look for the Ken-Rad trade mark on your radio tubes. It is your best assurance of dependability and performance.

KEN-RAD TUBE & LAMP CORPORATION  
Owensboro, Kentucky

**KEN-RAD**  
DEPENDABLE RADIO TUBES

## How Do You Do It?

How do you solve the many servicing problems with which you have to contend . . . what special kinks have you worked out which help you in servicing receivers . . . have you developed shortcut schemes for testing, or built test devices that do the work better and faster?

No matter what the scheme or the device, there are many, many Service Men who would like to know the how's and why's—just as you would like to know about the schemes and devices employed by others.

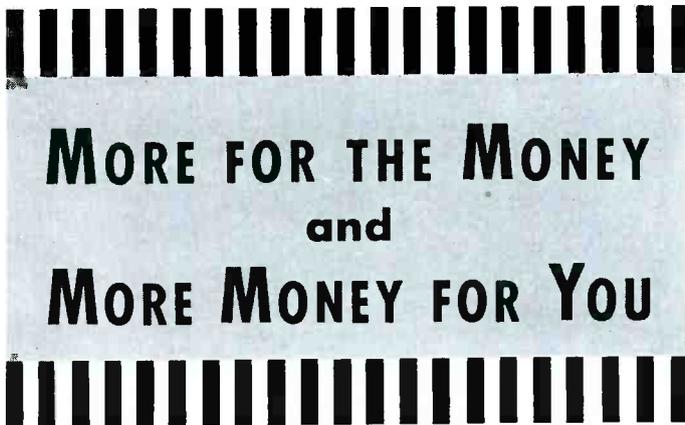
## SERVICE WANTS TO KNOW!

If you have clever ideas and clever devices, we want to know about 'em as much as do our readers. Regular space rates are paid for all material accepted for publication.

All you have to do is give us the outstanding points, and a rough pencil sketch of the device if it happens to be such—and we will do the rest.

Come on, now, and kick in. Write up those ideas now and send them in to the . . .

**ON THE JOB DEPARTMENT**



## MORE FOR THE MONEY and MORE MONEY FOR YOU



No. 20F—Here's your 1½ volt power supply. Convenient size, rugged, economical. Designed to give 1000 hours or more of service.

*- when you sell*  
**"CHROME PROTECTED" BATTERIES**



No. 2308—The popular size "B" battery. Highly efficient—assures long, trouble-free operating life.



No. 17GD60—The ideal pack for the 1½ volt set. Provides 1½ volt "A" and 90 volt "B" current. Assures low cost per hour.

YOU'LL FIND BUSINESS IS GOOD IN PORTABLES. And you can make lots of profits selling batteries for them.

So why not sell fresh batteries that assure satisfaction? Sell quality batteries, backed by long experience in the battery business—sell Burgess.

Burgess batteries have been built for radio service for over 20 years. They are protected by chrome for long shelf life and dependable performance. They are backed by a name that gives them ready acceptance with your customers and guarantees satisfactory service and profits.

Burgess has a battery for every farm radio too—for use with the old type or new 1½ volt tubes. Why not write for complete information and get the latest Burgess reference chart for portable radios?

Burgess Battery Company  
Freeport, Illinois



**BURGESS**  
CHROME PROTECTED  
RADIO BATTERIES

Burgess Battery Company, Freeport, Illinois

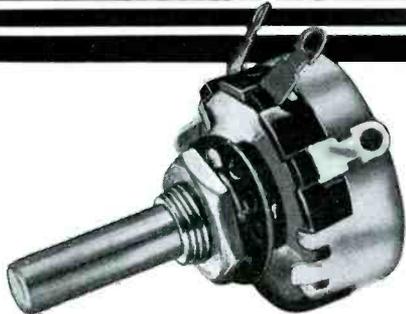
Please send at once complete information on the Burgess profit-building line of radio batteries. Also your new portable battery reference chart.

Name.....

Company.....

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

# The easiest way to spell Profits



Provable economies and convenience go along with the use of CLAROSTAT controls and resistors. You can't afford to overlook them.

## Here's why . . .

- ★ CLAROSTAT offers the most extensive line of standard and exact-duplicate controls. You can do that servicing job right.
- ★ CLAROSTAT has the most up-to-the-minute listings of all control replacements for standard sets. No guesswork. No make-shifts. No comebacks.
- ★ CLAROSTAT has wire-wound as well as composition-element controls.
- ★ CLAROSTAT also offers largest line of plug-in resistors and voltage-dropping power cords—big replacement items.
- ★ CLAROSTAT cement-coated power resistors are the toughest things used today. Found in the very best assemblies. Yet cost no more.
- ★ CLAROSTAT is represented locally by the jobber who can render you outstanding service. Get to know him better!

## New MANUAL!

Just off the press. Controls for all standard sets listed under brand name and model. Convenient. Accurate. Complete.

Ask your local CLAROSTAT jobber for your copy.

And be sure to start using CLAROSTAT products for greater profits.



**CLAROSTAT**  
MANUFACTURING CO.  
Incorporated  
285 North Sixth St.  
Brooklyn, N. Y.

### STANCOR HAMANUAL

The 1940 edition of Stancor's Hamanual will be available for distribution by Oct. 1. In addition to the complete catalog section the Hamanual contains circuit diagrams and descriptive material on 7 transmitters, 4 amplifiers and power supplies. Useful formulas and charts are also given. Copies of the Hamanual may be obtained only from your Stancor jobber.

### RIDER TO LECTURE

Arrangements have been made with John F. Rider, author, publisher and lecturer, to personally conduct a nation-wide series of meetings for Service Men in more than 35 cities in the United States during the Fall months, it has been announced by L. W. Teegarden, manager of the RCA Tube and Parts Division. Each meeting will be under the joint sponsorship of the RCA Manufacturing Co. and RCA parts distributors in the various cities.

Mr. Rider will conduct the lecture course, with the assistance of capable RCA engineers, and will demonstrate many of the uses of various types of test equipment. A meeting will consist of an evening lecture period and demonstration.

### SPRAGUE CATALOG

Sprague Products Co., North Adams, Mass., have issued their 1939-40 condenser catalog. The catalog lists the numerous items of the Sprague line, such as Atoms, electrolytics, tubulars, paper sections, metal cased types, auto-radio vibrator types, television condensers, mica and transmitting condensers, etc. Copies may be obtained directly from Sprague.

### NASH CATALOG

Nash Radio Products Co., 5437 Lisette Ave., St. Louis, Mo., have issued catalog 30A listing their line of cements, radio finishes, recording and record reproduction accessories and hardware. A hardware and Service Men's section is included. Copies may be obtained directly from Nash Products.

### AMPHENOL CATALOG

American Phenolic Corp., 1250 W. Van Buren St., Chicago, have issued their catalog 57J which lists the Amphenol line of sockets, plugs, connectors, insulators, coaxial cable, etc. Copies may be obtained directly from Amphenol.

### RADIO WIRE TELEVISION CATALOG

Radio Wire Television, Inc. (formerly Wholesale Radio Service Co., Inc.), 100 Sixth Ave., New York City, have issued their 1940 Master catalog. Its 188 pages include home, portable and auto radios and accessories; public-address equipment; parts; tools and ham supplies. Copies may be obtained directly from Radio Wire Television, Inc.

### KEN RAD BULLETIN

The Ken-Rad Tube & Lamp Corp., Owensboro, Kentucky, announce a new and up-to-date bulletin, dated August 15, entitled "Essential Characteristics of Metal and Glass Radio Tubes." The bulletin carries essential technical data for tube types with 4, 5, 6 and 7 pin bases and octal bases, a chart of base connections, and outline drawings of various tube types. Service Men can obtain copies directly from Ken-Rad.

## Make More Profitable Sales with the NEW TURNER Model 22 X Crystal Microphone



The only Mike at low price with tilting head, allowing cable set change without opening mike. **\$16.50** List

You can offer better appearance, performance and more features for the money with this new Turner 22X. Equal to many \$25 units, it gives you a chance to make more sales and more money. A mike that's smooth for both voice and music.

Satin-chrome plated all over. 30-7000 cycles. High level -52dB. Complete with 7-ft. cable set.

Write for Full Details  
**The TURNER CO.**  
906-17 Street, N.E.  
CEDAR RAPIDS, IOWA  
Licensed under Patents of The Brush Development Co.

## AT LAST A Mobile Unit

WITH Remote Mixer Control Stand-by Switch in Handle of Remote Microphone Four Inputs Dual Tone Control

Conveniences never before offered in a commercial mobile amplifier!

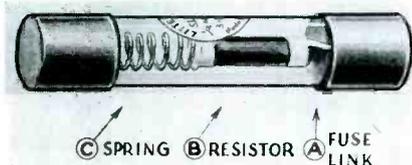


Webster-Chicago MASTER MOBILE systems feature REMOTE MIXING ● Connect to A.C. supply or 6 v. battery ● Sit in the audience and control microphone mixing from there—then you're sure it's right ● Turning off microphone automatically shuts off plate supply, saving battery current ● Yet THEY COST NO MORE. Send coupon today for new Webster-Chicago Sound Catalog and name of nearest distributor.

THE WEBSTER CO., Sec. S-5  
5622 Bloomingdale Ave., Chicago  
Send the new No. 139 Sound Catalog.

### SLO-BLO FUSES

Slo-Blo fuses are designed to carry inductive or capacitive surges and overloads for a reasonable period of time, but to blow before the danger point is reached. They are a dual purpose fuse with a simple fuse link and a resistor element which



provides the heat inertia or time lag. The fuses are offered in the 3AG size, 1 1/4 in long by 1 1/4 in diameter. There are 9 ratings available in the range between 1 amp and 1/100 amp. Additional information may be obtained directly from Littelfuse, Inc., 4238 Lincoln Ave., Chicago.

### G. E. TELEVISION OSCILLOSCOPE

General Electric engineers have developed an oscilloscope, with means for both horizontal and vertical deflection, capable of handling the range of frequencies encountered in television work. The instrument uses a 9-in. tube. The horizontal sweep circuit operates over a range from 10 to 100,000 cycles. Additional information may be obtained directly from G. E.

### ALDEN MOULDED PRODUCTS

Alden Products Co., 715 Centre St., Brockton, Mass., have added a series of moulded products to their line. Among these are the Nos. 90, 91 and 92 series of insulated tube caps for all types of receiver, tester and television applications; and the No. 4002 series of power outlets which require minimum chassis space. Additional information may be obtained directly from Alden.

### DRAKE SOLDERING IRON

The Drake No. 400 soldering iron shown in the accompanying illustration, is only 8-in. long overall, weighs 8 ozs. and is



rated at 60 watts. It is fitted with a 1/4-in tip. The iron is designed for light soldering and to get into small corners. Additional information may be obtained directly from Drake Electric Works, Inc., 3654 Lincoln Ave., Chicago.

# Triumph Marches On



Model 440



Model 130



Model 330

Year after year, building fine test equipment at economical prices has built for Triumph a reputation of dependability and quality—quality reflected in government and industrial orders for the same equipment you can obtain from your radio parts distributor!

Modernize your service business with these new Triumph instruments.

Model 440, the latest type tube tester on the market, tests all radio and video tubes, including cathode ray and gas rectifier types, ballast tubes and pilot lights, with provisions for next year's multi-section battery tubes which will be used in pocket portables! Only \$32.95.

Model 130 Signal Generator combines precision and utility in one instrument with a range of 100 kc to 96 mc! And the cost is amazingly low, only \$29.95.

Model 330 Speed-Button 32 Range Meter with four ohm ranges to 10 megohms and built-in 15-volt battery, complete \$21.95.

Write for full information on these and other Triumph instruments. Jobber territories open!

## TRIUMPH MFG. CO.

4019 West Lake St.

Chicago, Illinois

## ASSOCIATIONS

### RSA

• • • rochester

In place of the regular business meeting, Aug. 7, the Radio Technician's Guild of Rochester met downtown and formed a motorcade to the 50-kw transmitter of station WHAM at Victor, N. Y. Chief engineer, John Long, was unavoidably absent, so operator Al Bolling did the honors of showing the boys around the station, while Operator Silor stood by. To say that we enjoyed the trip and that Mr. Bolling did a swell job is putting it mildly.

This trip along with several others were planned by our Speakers Committee in place of meetings during the summer months. They have

proved very successful and interesting.

Two weeks ago we had the pleasure of visiting the observatory on top of the Bausch & Lomb Co.'s plant. We got intimate with the planet Mars, the Moon and several stars. Some of us picked ourselves a vacation spot in the mountains on the Moon.

A word or two about our informant, May 28 . . . from all angles it was a great success. The attendance met our expectations and the ground covered surpassed them. Ninety per cent of the men attending were there at the opening session and were still there at the end of the closing session.

Bertram L. Lewis, correspondent

### OTHER GROUPS

• • • california

The world's most modern and efficient short wave station was the subject of a talk by Mr. Scholes of the General Electric Company at our meeting Aug. 7, at 829 Harrison Street, Oakland, Cal. The station is located on Treasure Island. At this same meeting Wave Miller delivered the second of his salesmanship talks. They are becoming increasingly popular.

The long promised biographies were started at last. To sort of arouse a little curiosity, do you know which member is a former moving picture operator, which once played in an orchestra? Attend the future meetings . . . you'll be shocked, surprised, enlightened and amused.

At the last meeting two members

were elected to the executive board. They were Homer Eldridge and Cliff Fox.

The date for the annual picnic is set . . . Sept. 10, at Tildon Park. Bigger and better games are promised and fun is guaranteed for everybody.

Wm. Appleton, secretary

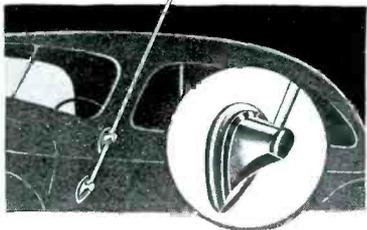
• • • nriaa

The New York chapter of the National Radio Institute Alumni Association holds its meetings every first and third Thursday of each month at Damasek's Manor, 12 St. Marks Pl., New York City. A complete program of speakers is planned for the second meeting of each month for the fall and winter months.

We have just finished installing a modern service bench for the use of our members.

L. Kunert, secretary

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## Index to Advertisers

A	
Aerovox Corp.	446
Amperite Co.	423
Astatic Microphone Lab., Inc.	440
B	
Bliley Electric Co.	451
Brach Mfg. Corp., L. S.	454
Burgess Battery Co.	451
C	
Centralab	443
Cinaudograph Corp.	448
Clarostat Mfg. Co., Inc.	452
Consolidated Wire & Associated Corps.	440
H	
Hygrade Sylvania Corp.	445
I	
International Resistance Co.	438
J	
Jackson Electrical Inst. Co.	454
K	
Ken-Rad Tube & Lamp Corp.	451
M	
Mallory & Co., P. R., Second Cover	430
Meissner Mfg. Co.	445
Micamold Radio Corp.	448
Montgomery Ward & Co.	446
N	
National Union Radio Corp.	418
NRPDA	433
O	
Ohmite Mfg. Co.	440
P	
Precision Apparatus Corp.	427
R	
RCA Mfg. Co., Inc.	441, Back Cover
Radiart Corp., The	444
Radio Amateur Call Book, Inc.	446
Radio City Products Co., Inc.	450
Radio Servicemen of America, Inc.	444
Radio Wire Television, Inc.	415, 454
Readrite Meter Works	440
Rider, John F., Publisher	437, 442
S	
Solar Mfg. Corp.	Third Cover
Supreme Instruments Corp.	430
T	
Thordarson Elec. Mfg. Co.	454
Triplett Elec. Inst. Co., The	436
Triumph Mfg. Co.	453
Tung-Sol Lamp Works, Inc.	435
Turner Co., The	452
U	
Utah Radio Products Co.	417
United Transformer Corp.	447
W	
Webster-Chicago	452
Y	
Yaxley Mfg. Division	Second Cover, 430

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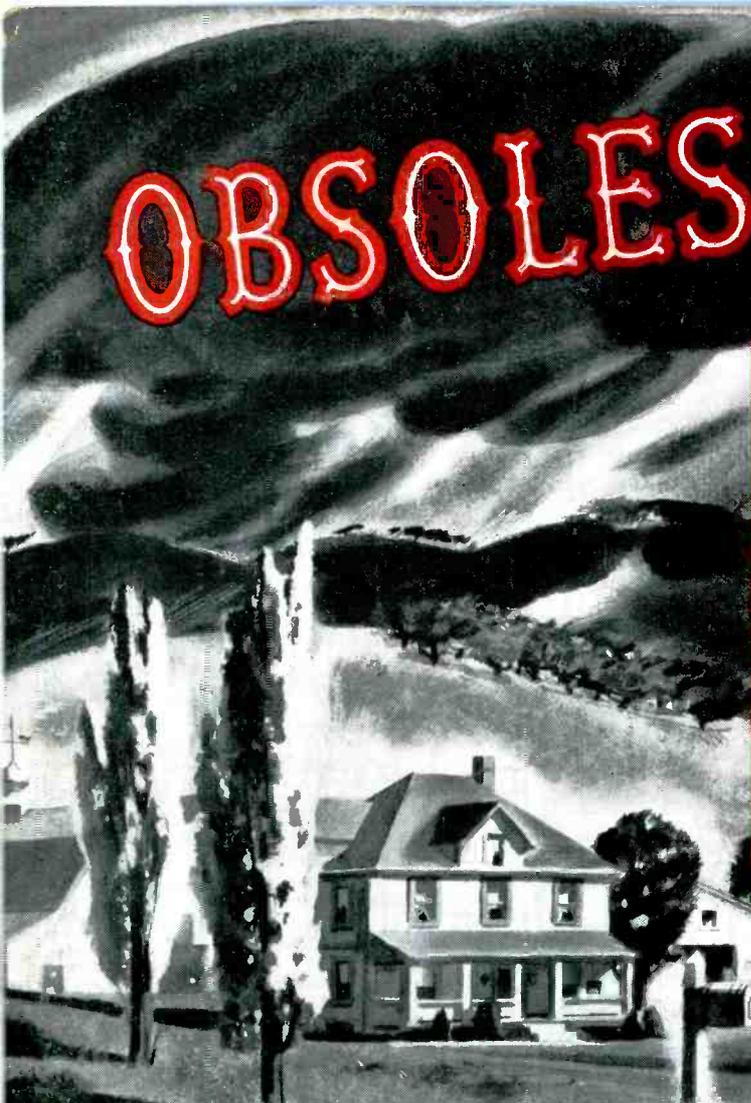
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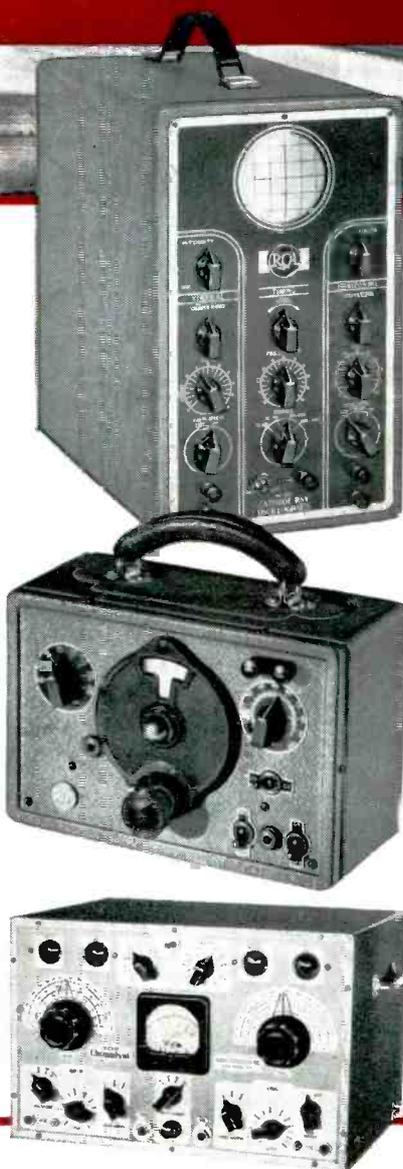
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