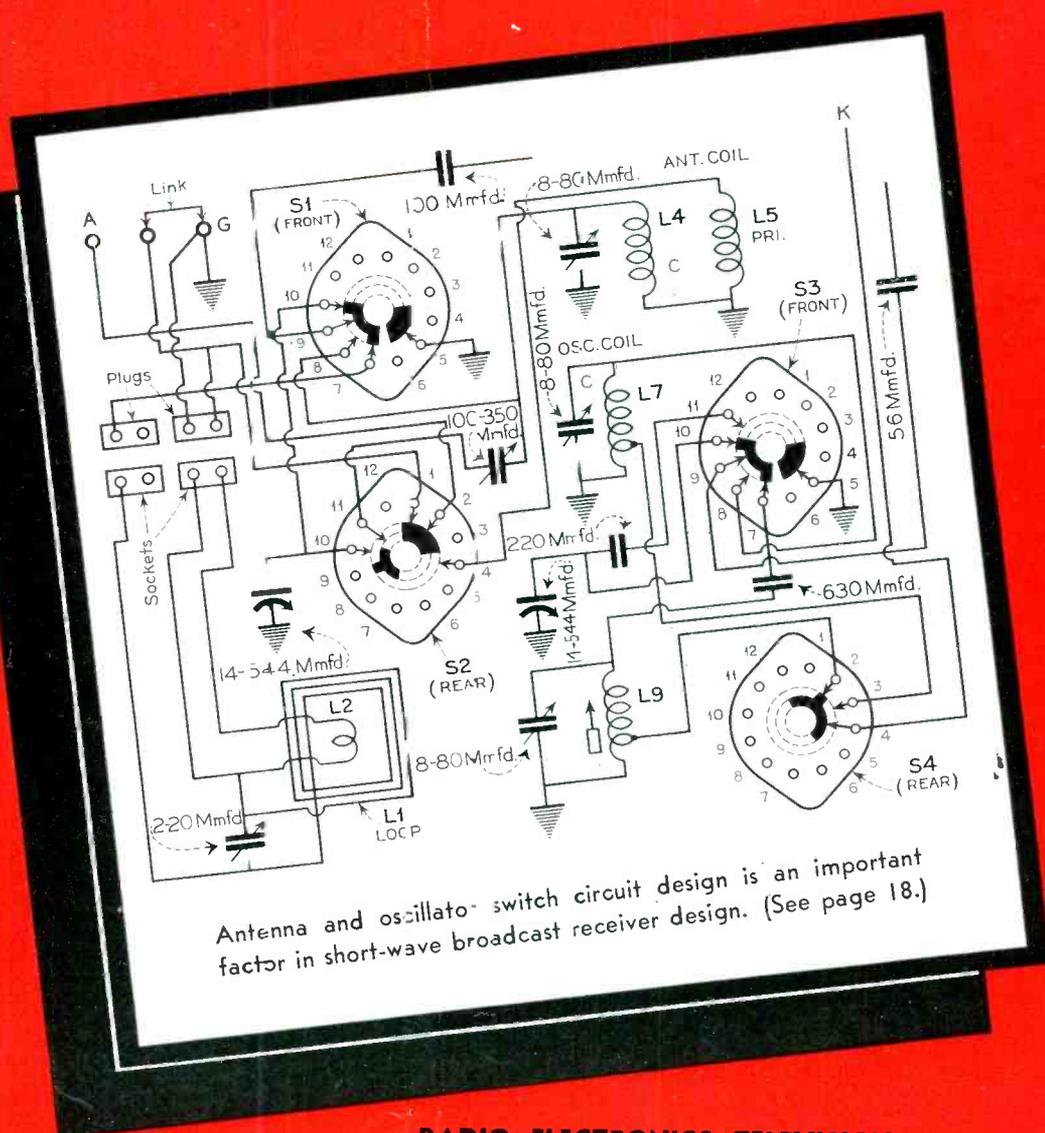
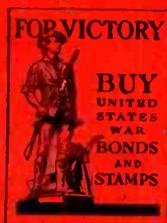


A MONTHLY DIGEST OF  
RADIO AND ALLIED MAINTENANCE

# SERVICE



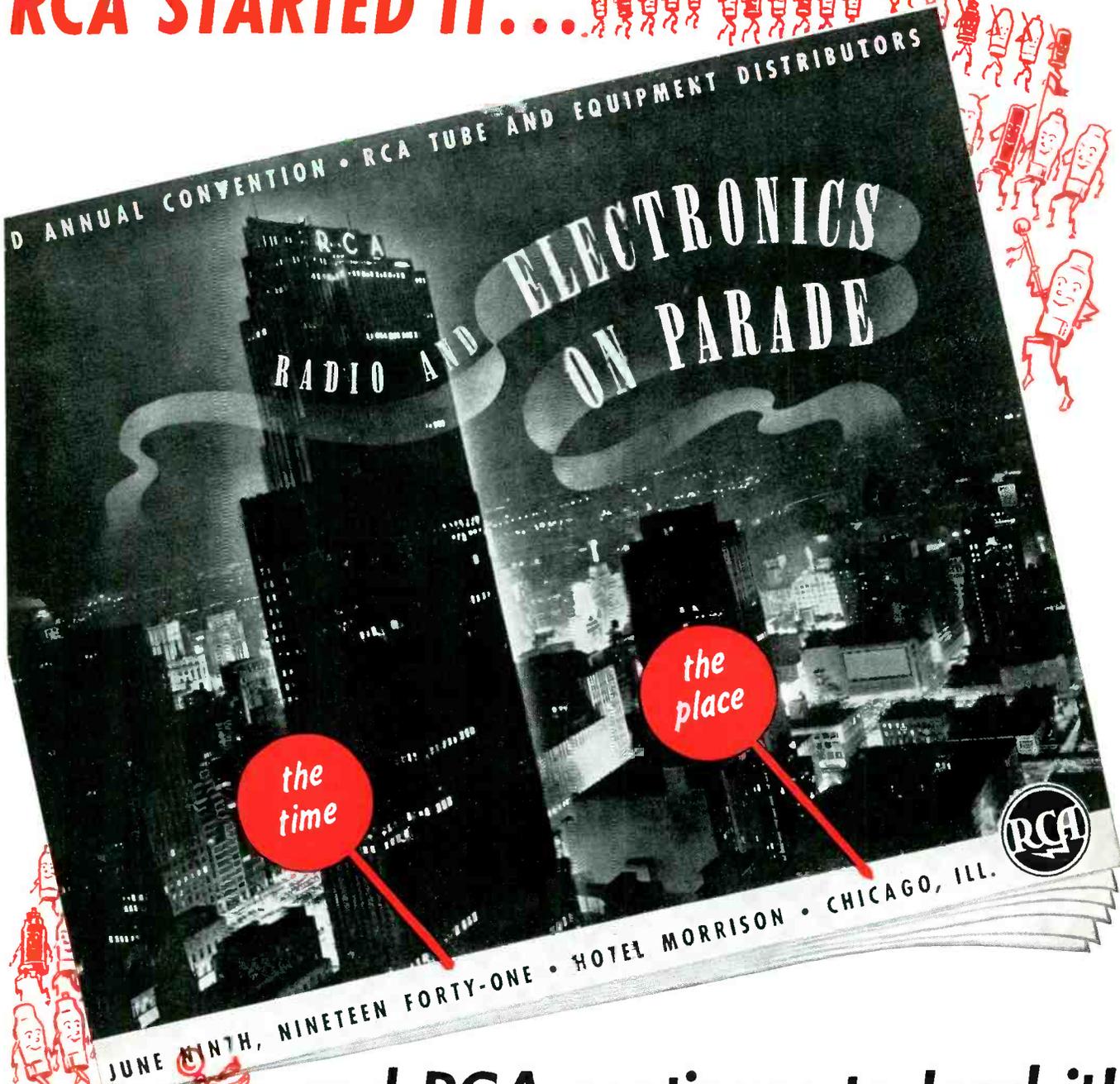
Antenna and oscillator switch circuit design is an important factor in short-wave broadcast receiver design. (See page 18.)



February  
1943

RADIO-ELECTRONICS-TELEVISION

# RCA STARTED IT...



## and RCA continues to lead it!

Two years is a long time in an industry as fast-moving as Electronics. Yet it has been almost that long since RCA Tube Distributors received a graphic demonstration of this field in RCA's now-famous presentation "Electronics on Parade." Long years before this, many of the Electronic developments now being heralded as "new" and "revolutionary" were a familiar story to RCA.

Remember: The *Magic Brain* of ANY Electronic equipment is an electron tube and, since the days when Radio itself was a scientific novelty, RCA has been the fountain-head of tube development. Wherever Electronics is already on the job, chances are, it has been RCA that led the way. Wherever Electronics will lead in the future, you can count on RCA to continue in the forefront of the parade!



# RCA RADIO ELECTRONIC-TUBES

RCA Victor Division, RADIO CORPORATION OF AMERICA, Camden, N. J.



“...Image is blurred  
on band four”



**S**OME BRIGHT DAY in the world of peace to come, Mr. and Mrs. America may be replacing television tubes as casually as light bulbs. You don't need Alladin's lamp to conjure up a household of new and fascinating electrical appliances to come after the war is won. And of this, too, you can be sure: When television-for-the-many is here, along with other new and brilliantly engineered products of electrical

science, Jackson will be making laboratory and service shop testing instruments to meet tomorrow's needs *in full*. Today, Uncle Sam's needs come first. And while we cannot fill your orders now, just remember that the name Jackson has earned a high reputation wherever fine test equipment is used.

1 1 1

JACKSON ELECTRICAL INSTRUMENT  
COMPANY, DAYTON, OHIO.

All Jackson employees—a full 100%—are buying War Bonds on a payroll deduction plan. Let's *all* go all-out for Victory.

  
**JACKSON**

*Fine Electrical Testing Instruments*

SERVICE, FEBRUARY, 1943 • 1

# EDITORIAL

**I**N view of the misguided practices of a few, an essential service of the Service Man has become the target of a price ceiling dispute. In Servicing today, it has become necessary in many instances to go many steps beyond the simple part replacement or repair, to "keep 'em playing." For many of the receivers require complete conversion and redesign. In this classification we have three groups. One concerns the receiver that requires remodeling because of the unavailability of certain parts. Another covers the reconstruction of antiquated receivers. And in the third group we find those receivers that are no longer useful because of the lack of accessories, etc. In the latter division, we have the battery portables and automobile sets.

It has been necessary, therefore, not only to overhaul, but rebuild these units, to provide constant reception for many. This of course has been a "custom-built" procedure with each "rebuild," a special project. And as such, the price for this service has been predicated on time and material, based on accepted price levels.

Unfortunately though, this "rebuild" practice has been used by some as a medium of selling "new" sets in mass lots, with utter disregard for price ceilings. Quantities of chassis have been collected, rebuilt and offered as "new" equipment. This, of course, violates the price ceiling ruling since it is necessary to establish a price for every complete unit produced in this "manufactured form." We say "manufactured form" since this latter procedure has been one of production rather than of individual "custom-built" character.

As long, therefore, as the Service Man converts or remodels receivers on an individual basis, and provides a charge in accordance with pronounced price levels for his time and materials, he can continue to offer this vital service. This viewpoint is acknowledged in Washington. The violation-rule-drive is against those who are in the manufacturing business and not in the business of Servicing.

# SERVICE

A Monthly Digest of Radio and Allied Maintenance

Reg. U.S. Patent Office

Vol. 12, No. 2

February, 1943

**ROBERT G. HERZOG**

Editor (On Leave)

**ALFRED A. GHIRARDI**

Advisory Editor

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"Here's How"

VOLUME CONTROL

Contest

**Pays \$500<sup>00</sup> in WAR BONDS**

Do you know how to make a sick radio sit up and *sing*? Would you swap a few minutes' time for a \$100 U. S. War Savings Bond? O.K. . . . if you live within the boundaries of the United States—you're qualified. Not only one, but FIVE, \$100 Bonds are offered! Let's go!

Nobody knows better than you how important the radio is to a democracy at war. And nobody knows better how difficult it is sometimes to get a radio into working order . . . what with the difficulty of getting exact replacement parts, etc. The question is: HOW DO YOU DO IT? IRC is going to pay a \$100 Bond each for five answers. Don't you agree one of them might as well be delivered to YOU?

### HOW TO WIN A BOND!

All that's required is a simple account, told in your own way, and your own words, describing:

**How you were able to replace a volume control and get the set working satisfactorily—when you couldn't obtain the volume control you would ordinarily have considered necessary for that particular make and model of radio.**

Name the make and model instrument you were working on. Tell what the VOLUME CONTROL trouble was. Describe exactly what you did and why, whether you made certain mechanical changes in the substitute control and/or electrical changes in the circuit.

IRC suspects that in these times radio service men are displaying more ingenuity and inventiveness and resourcefulness than most of us have any idea of. We'd like to uncover some of these stories.

### It's the IDEA that Counts

Remember, no one expects you to submit a literary masterpiece. Your spelling makes no difference; grammar doesn't matter. Just "let yourself go" and tell us how you licked the volume control problem you faced (it may have been as simple as filing down a shaft, or making a special shaft), and send the story in.

### You May ALREADY Have Won a Bond

What we mean is that some Volume Control job you've already done may be the one to cop one of those Bonds. It may be only a matter of putting down the detailed facts and mailing your entry!

### IDEAS to be Shared

In entering this contest you have the satisfaction of knowing that worth-while ideas will be publicized for the entire service profession. You yourself will benefit from the information made available by the results of this contest. This exchange of ideas is certain to help you keep radio sets going, through the use of standardized controls. These same sets might otherwise be kept out of service and become lost jobs for you.

### The Judges

Judges, whose decision will be final as to the five winning entries, include IRC's Chief Engineer, Jesse Marsten, and two "outside" experts—Joseph Kaufman, Director of Education of the National Radio Institute, and William Moulic, Service Editor of "Radio Retailing Today." If, in the opinion of the judges, winning ideas of equal merit are presented, duplicate awards will be made. It is understood, of course, that all ideas submitted become the property of IRC.

### WHAT HAVE YOU GOT TO LOSE?

Don't say, "Aw, the Volume Control job I'm thinking of was too easy—any good radio man would have done the same as I did." Remember this: ANY job looks easy when you know the answer. . . . And besides, even if someone else did have the same idea, HE may not tell us about it. So get busy yourself—surely a crack at one of those \$100 Bonds is worth *some* trouble! All entries must be in IRC's hands by April 10, 1943 when contest closes.

### FILL OUT THE COUPON

—and send it in with your entry this week—**TODAY** if possible. Don't put it off. Five men are going to be richer by a \$100 Bond—make one of them YOU!

### Uncle Sam's Men, Too

If you're now in Government service, in or out of uniform, you're still eligible in this contest. Maybe the job you did was handled before you went into the service.



**CLIP THIS—FILL IN—SEND IN WITH YOUR ENTRY**

**INTERNATIONAL RESISTANCE COMPANY**

401 N. Broad St., Philadelphia, Penna.

• Gentlemen: Here is my entry in your \$500 U.S. War Savings Bonds Contest.

MY NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

MY REGULAR DISTRIBUTOR IS \_\_\_\_\_

# The SPRAGUE TRADING POST

EXCHANGE — BUY — SELL

## WILL TRADE

—complete 1941 G-E 8-tube table model radio with F-M band only, 39.5 to 45. meg. Very good condition. Want Rider's Manuals, Marlin rifle model 39, or what have you. Rene Schwartz, 141 Bullard St., New Bedford, Mass.

## WANTED

—Dead V.O.M. and tube checkers. Meters either good or bad. Also want hi-powered binoculars & microscope. State full details including lowest price. Anthony Pusateri, 1101 Fleming St., Coraopolis, Pa.

## WANTED

—Radio tubes and parts for a.c.-d.c. radios. Also want small radio sets, new or used. Merritt Radio Shop, 3908 Sunset Blvd., Los Angeles, Cal.

## INSTRUMENTS WANTED

—Signal generator and oscillograph, good makes. Give full details and cash prices. Peters Music Shop, 1719 Mass. Ave., Lexington, Mass.

## INSTRUMENTS FOR SALE

—Rider Chanalyzer, \$100. Solar Condenser Analyzer, \$20. Good condition. Also Rider's Manuals, vols. 1 to 12, 25% off. Clark Ross, 2373 Kiesel Ave., Ogden, Utah.

## TUBES TO SELL

—Have 40 farm style radio tubes; 19 to 34 and 1A4 to 1F7, most of them in original cartons. Would like Zeiss or B. & L. 6x30 or 7x50 binoculars. Will pay difference or sell outright. Paul's Radio Service, 363 N. Canon Dr., Beverly Hills, Cal.

## INSTRUMENTS FOR SALE

—What am I offered for this complete outfit: Meissner Analyst, Model 10-1154, cost \$80; Hickok Dynamic Tube Tester, AC51, cost \$52; Supreme Radio Analyzer, Model 339 de luxe, cost \$40; C-B A. C. Oscillator, Model OC, cost \$40; Tube Condenser Analyzer, cost \$12. All in A-1 condition. S. Hulchanski, 119 Schroeder St., East Syracuse, N. Y.

## TUBE TESTER FOR SALE

—Hickok AC-51, just modernized last month, \$50. Would like 5" Oscilloscope. State price, number of hours tube was used. Also want Hickok Vacuum Tube Voltmeter, good slide rule, and good camera. F. M. Prentke, 1960 East 105th St., Cleveland, Ohio.

## METERS FOR SALE

—Have twenty 0-10 mill. D'arsonval type; 2 1/2" face, 3 1/4" O.D., moving coil, \$3 each. Also have 300 assorted meters iron vane type, 25c ea. or make offer. Want 16mm. projector. Jack's Radio & Music Shop, 14 Bellingham St., Chelsea, Mass.

## TUBES TO SWAP OR SELL

—Will sell or exchange the following tubes: 32L7; 48; 188; 182B, 89, 25B6; 12A7, 12A5, 34, 40, 30, 31, 32, 33, 55, 25A7, 6A4, 1A1, 1A5, 1A6, 1B4, 1C1, 1C5, 1C6, 1D5, 1D7, 1D8, 1E5, 1F1, 1F6, 1G4, 1J6, 1P5, 1Y1, 1Z1; 2A6; 2A7; 2B7. Traveltone Radio, 2014 Broadway, New York, N. Y.

## SIGNAL GENERATOR WANTED

—for cash. All-wave, A-C operated. Also 2" or 3" scope. W. A. Conklin, 70 Community Drive, Cranston, R. I.

## TUBES FOR SALE

—1-5E1; 1-1B7G; 1-272/G84; 2-6AF5G; 1-6H4GT; 3-6K5GT; 1-6ZY5G; 2-14A7/12B7; 1-182B; 1-183; 4-2A7S. Reliable Motor Parts, Inc., 1700 Seventh Ave., Beaver Fall, Pa.

## NEEDED AT ONCE

—I-T 124 Transmitting Tube, or two T12-5 tubes. Will pay cash. H. D. Bennett, B & B Radio Co., 4812 Euclid Ave., Cleveland, Ohio.

## FOR SALE

—Sets, chassis, and farm sets. Table models, combinations, etc. Write for details. Victory Radio & Record Shop, 1546 E. 53rd St., Chicago, Ill.

## TECHNICAL BOOKS WANTED

Want Rider's Manuals 7 to 13, also late technical books on radio and refrigeration. Name best price. Robison Radio Service, Ione, Wash.

## WILL BUY

—Oscillator, Ohmmeter and Manuals. Give details and price. Tube Tester for sale. John Honochick, 157 First St., Oneida, Pa.

## SWAP OR SELL

—Will sell on trade tube checker, channel analyzer, and over 300 tubes, parts and old radios. Need a Supreme or any good oscilloscope. Jos. M. Ortiz, 52 E. 103 St., New York, N. Y.

## WANTED

—Two 865 tubes; also one 6 amp. bat. charger. General Radio, 701 E. Las Olas Blvd., Ft. Lauderdale, Fla.

## WILL TRADE OSCILLOSCOPE

—Will swap 2" Supreme Oscilloscope Model 535 in excellent cond. for Vac. Tube Voltmeter, or new radio tubes, or will sell for \$20. Buck's Radio Service, 291 Home Ave., Mansfield, O.

## FOR SALE

—Jensen 12" series X speaker with 6 v. field coil; Wright-Deocoster 10" speakers (two) with 6 v. coils; Triplet Model 120 A Tube Tester in oak case; also Jannett C6 Rotary Converter. 110 v. a.c. to 110 v. d.c. All used. Howard F. Wampole, P.O. Box 45, Gwynedd, Pa.

## A WARTIME SERVICE TO THE RADIO PROFESSION

Is there something pertaining to Radio that you want to Buy—Sell—or Swap? If so, send us your Trading Post advertisement today. We'll schedule it for appearance here as soon as possible—at no cost to you, and providing only that your ad seems to us to fit in with the Trading Post Plan. Our aim is to cooperate with our friends throughout the trade with the object of helping keep the nation's radios working during these shortages of wartime days!

Address your ad to: Sprague Products Company, North Adams, Mass.

Your own ad run FREE!

## WANTED FOR CASH

—"RME" LF-90 low frequency expander, 90 to 600 kc. Radio & Electric Repair Service, 315 Beechwood Ave., Trenton, N. J.

## WATTMETER FOR SALE

—Weston Model 432 in bakelite case. 0-150 and 0-300 watts. \$30. Radio & Electric Repair Service, 315 Beechwood Ave., Trenton, N. J.

## WANTED FOR CASH

—Solar, QCA, or Exam-eter; Triplet 1200 VOM, 1000 ohms per volt. Also need 12S tubes, 5Y4G, 5Y3G, 50L6GT. Seymour Radio Service, 20 New St., Seymour, Conn.

## ANALYZERS WANTED

—Need Superior Channel Analyzer, and All-Meter (Jumbo) 6" meter in good condition. Also want Jackson Condenser Analyzer or similar apparatus. Dearth Radio Service, Augusta, Ohio.

## WANTED FOR CASH

—Scott Philharmonic FM-AM Receiver; Triplet Signal Generator Model 1632; Presto Recorder. State price, condition, and how long in service. Jahn Radio Service, 240 W. Maumee Ave., Napoleon, Ohio.

## CHANALYST WANTED

—or similar signal tracer such as Meissner or Jackson. Must be in A-1 condition. Cash. D. L. Ballengee, Chillicothe St., South Charleston, Ohio.

## 50L6GT TUBES TO SWAP

for a Bridge Condenser Tester. Will pay part in tubes, part cash. Leo the Radio Man, 4230 Lancaster Ave., Philadelphia, Pa.

## VOLTMETER FOR SALE

—Weston Milli-Voltmeter, Model 45, 5" needle sweep, scale in 10's graduated 0-1000. Wood case. Make offer. Mauk's Radio Service, 717 S. Brady St., DuBois, Pa.

## CHANALYST, VOLTOHMYST

for sale—Going into other business and offer following in first class cond. for best offer; Chanalyst; Philco Model 050 Tube Tester; Philco 077 Signal Generator; Rider's Manuals Vol. 1 to 12. F. L. Newton, 2112 Picher St., Joplin, Mo.

## WILL TRADE

—Radiola Model 64 complete, for small new sets or table combination. Gross Radio Shop, 6744 Stony Island Ave., Chicago, Ill.

## SIGNAL GENERATOR WANTED

—modern R.C.P., Philco, or RCA unit considered for cash or trade. Have plenty to trade. Wooster's Radio Service, Feesburg, Ohio.

## TUBE TESTER WANTED

—late model. Have fifty National Mazda lamps 300 watts, 220 v. will swap or sell for cash. Bill's Battery & Radio, 240 Blue Hill Ave., Roxbury, Mass.

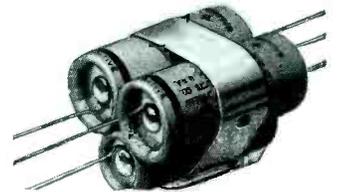


SPRAGUE PRODUCTS CO.

North Adams, Mass.

## THE CONDENSER YOU NEED . . . When You Need It!

Sprague Atom Midget Dry Electrolytics are still available—and, with them, you can handle practically any condenser replacement up to their rated values. You can get Atoms in many single-section as well as multi-capacity values—and you can make up hard-to-get replacements by strapping individual Atoms together. Atoms are smaller, cheaper, and fully as reliable as the big, old-fashioned condensers they replace. Use them *universally* on all of your jobs!



# SPRAGUE CONDENSERS AND KOOLOHM RESISTORS

Obviously, Sprague cannot assume any responsibility for, or guarantee goods, etc., which might be exchanged through above classified advertisements.

## SERVICING BANDSWITCHES

By **ALFRED A. GHIRARDI**

Advisory Editor

**F**OR the sake of history, the earliest bandswitching was not a method of obvious switching but, rather one or more means of covering a wide frequency range in the low-frequency region. We spoke of *wavelength* then, not frequency, and the populated band extended from about 250 to several thousand meters. The region below 200 meters which now carries so much of the world's business was unexplored. Large tuning coils of generous diameter (3 to 6 inches) wound with bare wire, or bared where necessary, were equipped with 1, 2 or 3 sliders for con-

were often bank-wound to cover a very wide band.

A radical idea in early bandswitching was the introduction of the honey-comb coil. These were the first plug-in coils which came in sets covering the entire populated radio spectrum. We first saw them in 1919 in the early deForest panel receivers. This general type of coil was called by a variety of names, such as duolateral, universal, etc., depending upon the style of winding. Plug-in coils have been very popular for bandswitching among experimenters and amateurs, and are still

widely used today, even in aircraft receivers.

In contrast, the advent of the all-wave, or multiband home receiver which was primarily a broadcast receiver and only incidentally a short wave receiver, called for a simple means of bandswitching. In some of these sets (where the reception of short wave stations was more of a sales feature than an actuality) the broadcast coils were simply tapped. Better designs used separate coils.

The plug-in coil exponents claim greater efficiency for their system. It cannot be denied that certain obnoxious troubles are avoided in this method of band change, notably contact troubles within the switch; stray magnetic and electrostatic coupling between coils, lead wires and parts of the switch; and extra capacity loading and losses due to the necessary lead wires. Contact troubles are present in plug-in arrangements, too, but they are much less severe than in bandswitches.

With all the foregoing theoretical advantages of plug-in coils, the convenience of simply throwing a switch to change bands overrides them for all but the most critical operators. Also,

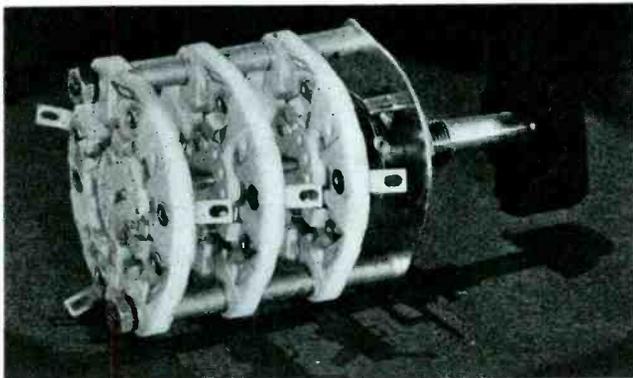
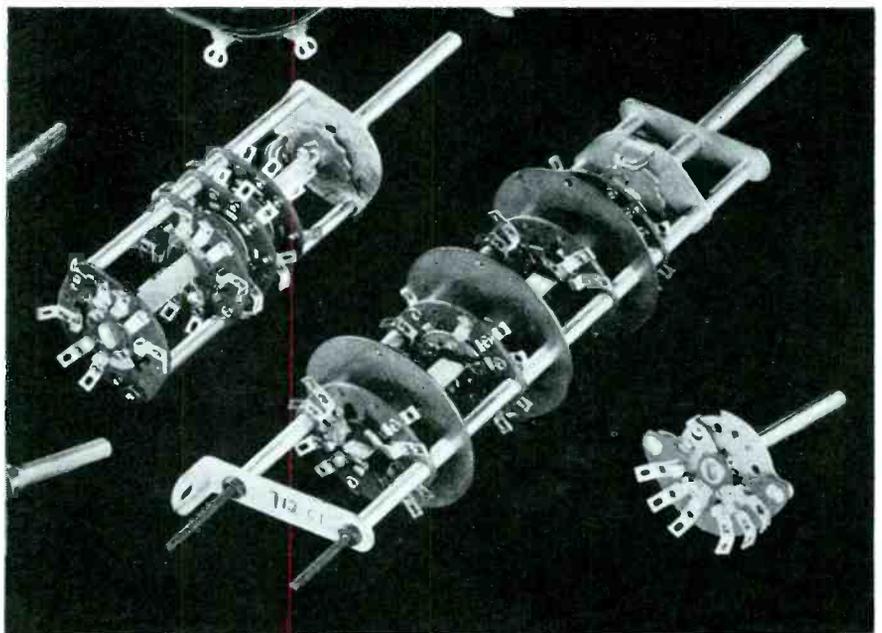


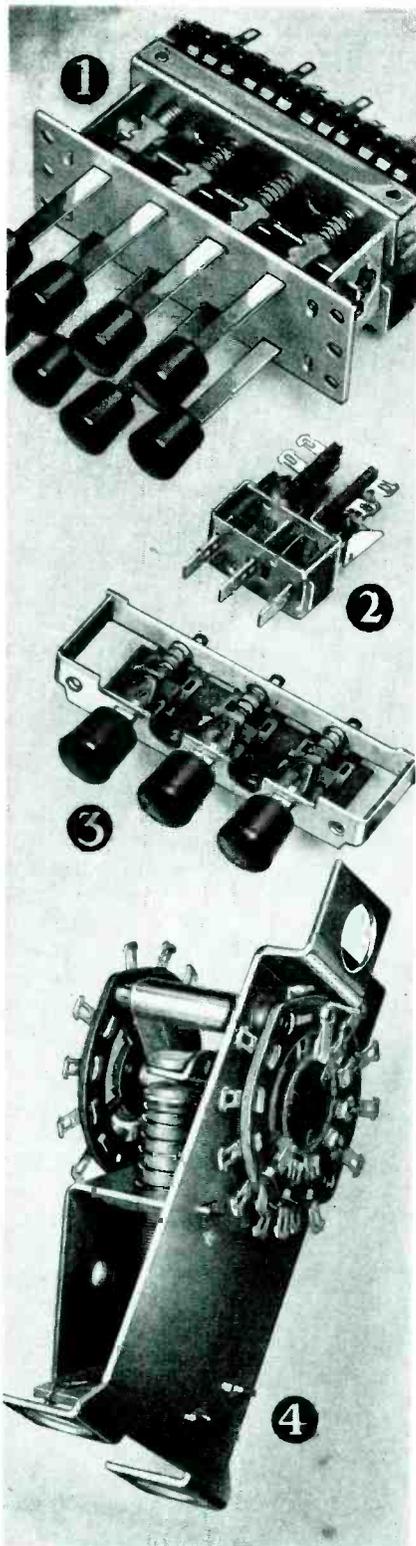
Fig. 1. A ceramic type switch (at left) used in the u-h-f receivers, in view of low-loss construction. Fig. 2. Below, multi-tap and multi-section bandswitches.

(Courtesy Centralab)

tact. The fact that the sliders sometimes shorted several turns wasn't particularly important, so broad was the tuning! Thus, any amount of inductance up to the full value could be introduced into the tuned circuit, covering a very wide band.

Fancier equipment in the de-luxe station consisted of a loose coupler—the forerunner of the antenna transformer as we know it now. The primary resembled the above mentioned slide tuning coil, while the secondary consisted of a tapped helical coil, arranged to slide in and out (axially) of the primary on rails for varying the coupling. Before variable condensers became available, these secondaries had a multitude of taps, often 20 or 25, the number being considerably reduced when tuning condensers came on the market. This was the forerunner of tapped-coil bandswitching used primarily in cheap sets. These loose couplers





(Courtesy Mallory)

Fig. 3. At (1), a selector switch designed especially for "ground side" switching. Contact shoe bridges three terminals or connects them to ground. At (2), small latching type of push-button switch, for tone control switching and applications requiring a single circuit insulated or two circuits grounded. At (3), switch for momentary solenoid operation of mechanical station selection. At (4), solenoid-actuated ratchet switch for remote station selection. This type is popular in auto-radio receivers.

the unused coils are apt to get dirty and banged up, changing their characteristics. Another angle is not to be overlooked—the time required to change frequency. With individual coils, the time required is sometimes an annoying factor. Where the coils are mounted in a sub-assembly rack or tray, the changeover is a lot faster, although still many times that needed to simply throw a switch.

An early diversion from the conventional systems was a continuously variable inductor device which consisted of two grooved spools, one of which was wound with bare wire. To obtain any desired inductance value, the wire was wound on the second spool, contact being made with a brush. Thus a variable inductance tuning was obtained but it was usually noisy and also sensitive to vibration.

One of the simplest early bandswitches for two-band sets was the two-circuit, two-position type with the arms grounded. It was very popular in midgets. The short-wave performance of some of these types was so bad that the switch was hidden somewhere at the rear of the set, perhaps with the hope that the customer would soon forget all about its existence. Where trouble is experienced in this type of receiver on the broadcast band due to circuits running through the bandswitch, it is expedient to cut out the switch entirely, thereby preventing any future trouble.

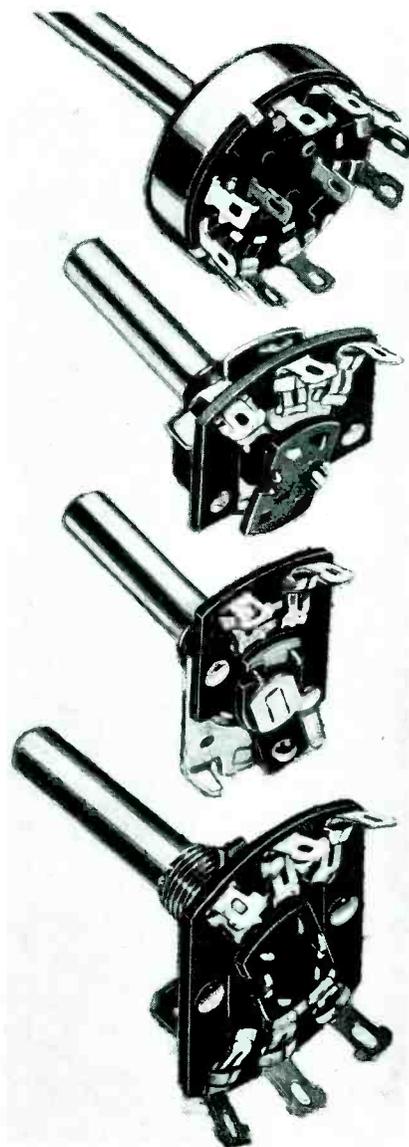
From the simple switch described above, bandswitches have progressed to extremely complicated panel operated devices, some with complex mechanical attachments designed to change dials, lighting or both. Where a single pointer covers a complex dial with several frequency ranges, it is hard for the less mechanical minded persons to find where they are; hence, the need for these devices to assist the operator in finding the desired frequency on the correct band. Simply switching a pilot lamp to the appropriate scale is usually sufficient to prevent ambiguity.

In order to service waveband switches in an intelligent manner, it is necessary to understand the associated circuits. Both typical and unusual circuits of many types dealing with switching have appeared frequently in SERVICE among the receivers described each month. These may well be consulted for anyone desiring to brush up on the subject. Some designers are always doing the unusual things; some of these things being clever and beneficial, others just different. However, there is one point to keep in mind in this subject of waveband switching; remember that, in superhets, the *i-f* can be equal to the signal frequency *plus* the oscillator frequency,

or to the signal frequency *minus* the oscillator frequency. This *plus* or *minus* (sum or difference) choice allows the oscillator to serve two wavebands without changing a single element in the oscillator circuit. This is one of the tricks employed to secure two bands from a set by simply changing the detector tuning, often with only a tapped coil. But this arrangement cannot be used for short waves; it can only apply to the band adjacent to the broadcast—from 1600 kc up—sometimes called the police and aviation band. In a pinch, this method could be used for short wave reception by using one of the harmonics of the oscillator to beat with the signal. But, for acceptable results, the oscillator waveform and power would have to be such that sufficient

Fig. 4. Below, top to bottom, a 12-position miniature size switch, and three small chassis type switches with a maximum of six terminals.

(Courtesy Mallory)



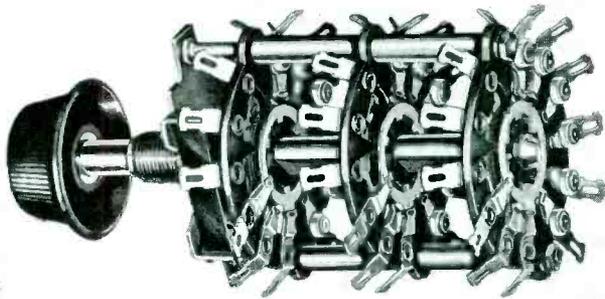
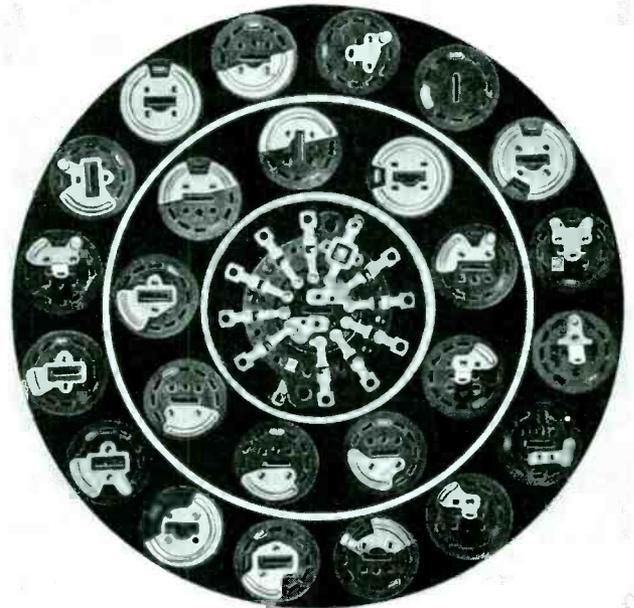


Fig. 5 (top). A double contact rotary type switch. This particular type of switch accommodates twelve terminals, that are spaced at 30 degrees. This unit is available in multiple sections and all terminal and circuit combinations. Fig. 6 (right). A single section of a rotary switch with the various contact shoes that can be used for a variety of circuit applications. (Courtesy Mallory)



harmonic voltage would be generated. This is not usually the case.

Another popular trick which allows more bands than the number of coils is one of the bandspread arrangements which use a fixed condenser in series with the tuning condenser in each section of the gang condenser. This is sometimes done with each set of short-wave coils and greatly facilitates tuning.

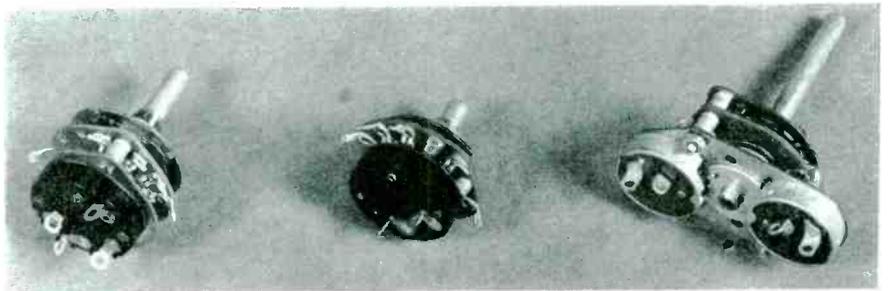
As mentioned before, the simplest method of extending the frequency range of the receiver is to tap the coils, short circuiting the unused portions. This system works, but it allows the shorted portions to absorb energy from the active parts. Thus, the r-f resistance of the coils is increased, cutting down the gain and selectivity. (The "Q" is lowered considerably.) Next best to tapping the coils is to wind several windings for the various bands on the same coil form but separated from one another by at least the diameter of the form. This isolation is to reduce the absorption, of course.

The unused coils are usually shorted, as before. The best arrangement for multi-band sets is the use of entirely separate coils individually shielded. If the chassis is well laid out with no compulsory crowding, it is possible to so place the coils that the individual shielding may be omitted.

As far as servicing is concerned, the following are the requirements to be sought in a bandswitch. . . . (1) Low resistance contacts—consistently. (2)

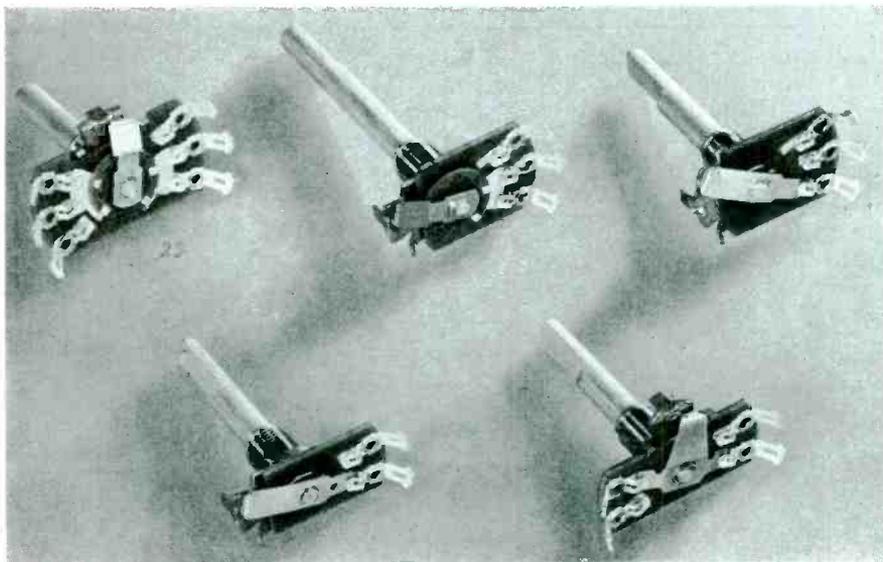
Negligible capacity and leakage between switch parts. (3) Designed for short leads to the coils.

Resistance is particularly important on the high frequencies. Many short-wave coils are wound with No. 22 or 20 wire to keep resistance at a minimum. The oscillator section of the switch is undoubtedly the most important, a small amount of contact resistance here being sufficient to cause noise and instability. Switching tapped coils is also a tough



Figs. 7 (top) and 8 (left). Top, rotary switches in combination with filament switches. Left, short, step and single and double-throw rotary switches. (Courtesy Oak)

(Courtesy Oak)



job because a very low resistance short is required on the unused portions. Most modern switches have either solid silver contacts or heavy silver plating to lick the resistance problem.

Probably the best cleaning agent to use on noisy switches is carbon tetrachloride (carbona). In a pinch, one of the mixed solvents sold for window panes, or alcohol, or benzine may be used. In bad cases, a fine abrasive cloth such as emery or crocus may be used but it is important to follow such procedure with another application of solvent or the abrasive particles may become im-

(Continued on page 21)

# ARE YOU OVERLOOKING INDUSTRIAL SOUND?

WITH the industrial effort of the entire nation turned to the production of war material, Service Men have a splendid opportunity to render a vital service to the war program. At the same time the problem confronts us of keeping civilian radios in working order, and our task is made doubly hard by lack of materials, and tubes. With many uncertainties from day to day, and with sons and husbands in strange parts of the globe, the radio is being used as never before to follow the affairs of the world.

Keeping millions of radios in daily use is of utmost importance to the national morale, and the Service Men of the industry have risen to the occasion, doing an outstanding job. In many cases, however, the income derived from service work alone has not been sufficient. Many Service Men have turned to *industrial sound* as a source of additional income.

The knowledge and specialized skill of Service Men everywhere can be of tremendous value to the war effort by installing sound systems in the factories producing war materials. This is a war of production, and the Axis had a start of several years. It can only be won by outproducing them, and it takes *time* to build equipment, and more *time* to get it to the fighting front. *Time* is the vital element—*time* which must be carefully conserved at every step and used productively to the last minute. And—

By F. D. WILSON

Sales Manager, Commercial Sound Division,  
Operadio Manufacturing Co.

the greatest time saver that can be installed in a war plant is a *voice paging system!* A few minutes delay in locating an executive, a foreman, or inspector at a critical time may result in complete stoppage of a production line. Those minutes lost may cause a shipment to miss a ship's sailing and be multiplied into weeks in reaching our boys in Africa, or in the Solomons.

In the first eight hours of operation of a *voice paging system* at an aeronautical plant, 650 paging calls were sent over the system. And, with paging over the entire plant, 95% of the calls were answered in *one minute!* Another large aircraft plant estimates their voice paging system saves them approximately 4,000 man-hours each month!

It takes little mathematics to see that in approaching an industrial concern on the subject of *voice paging*, a tremendously valuable saving in time can be offered to them. And, it is executive time that is saved . . . executive time that is both critical

Fig. 1. The rack and panel amplifier at one of the largest aeronautical manufacturing plants. This panel is installed in a special sound control room.

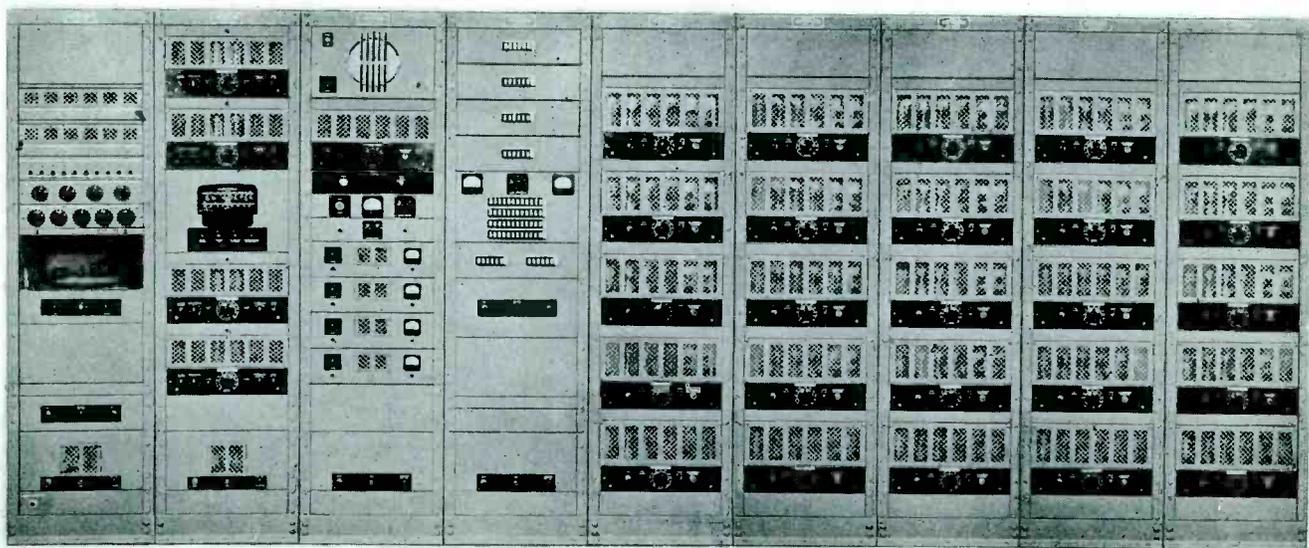
and expensive. Most concerns have double-checked and time-studied the entire shop to save production time, but often the waste motion in office and supervision routine has not been forcibly exposed. We have all been in plants at a time when the telephone operator was trying to locate a man who was "out in the plant," and we have seen how long it takes to find him by telephone, or even by a call bell system. A man often fails to listen for his bell signal, but he *always* hears his own name.

Unquestionably the *factory sound system* is a genuine necessity in every war plant to speed the flow of materials, and to coordinate factory and management.

In Fig. 1 appears a rack and panel installation now operating a huge network of loud speakers at one of the world's largest aeronautical plants. This installation is used to broadcast voice, music, time signals and other information all over the enormous plant at any hour of the day or night. Acres of activity, accessible to a voice!

Although this installation is basically a paging and amplifying system, it is engineered to give precedence to certain vital services or functions which at times must necessarily have the "right of way" over everything else.

There are six functions of the main system. In order of their precedence, they are . . . (1) *fire signal*; (2) *time*



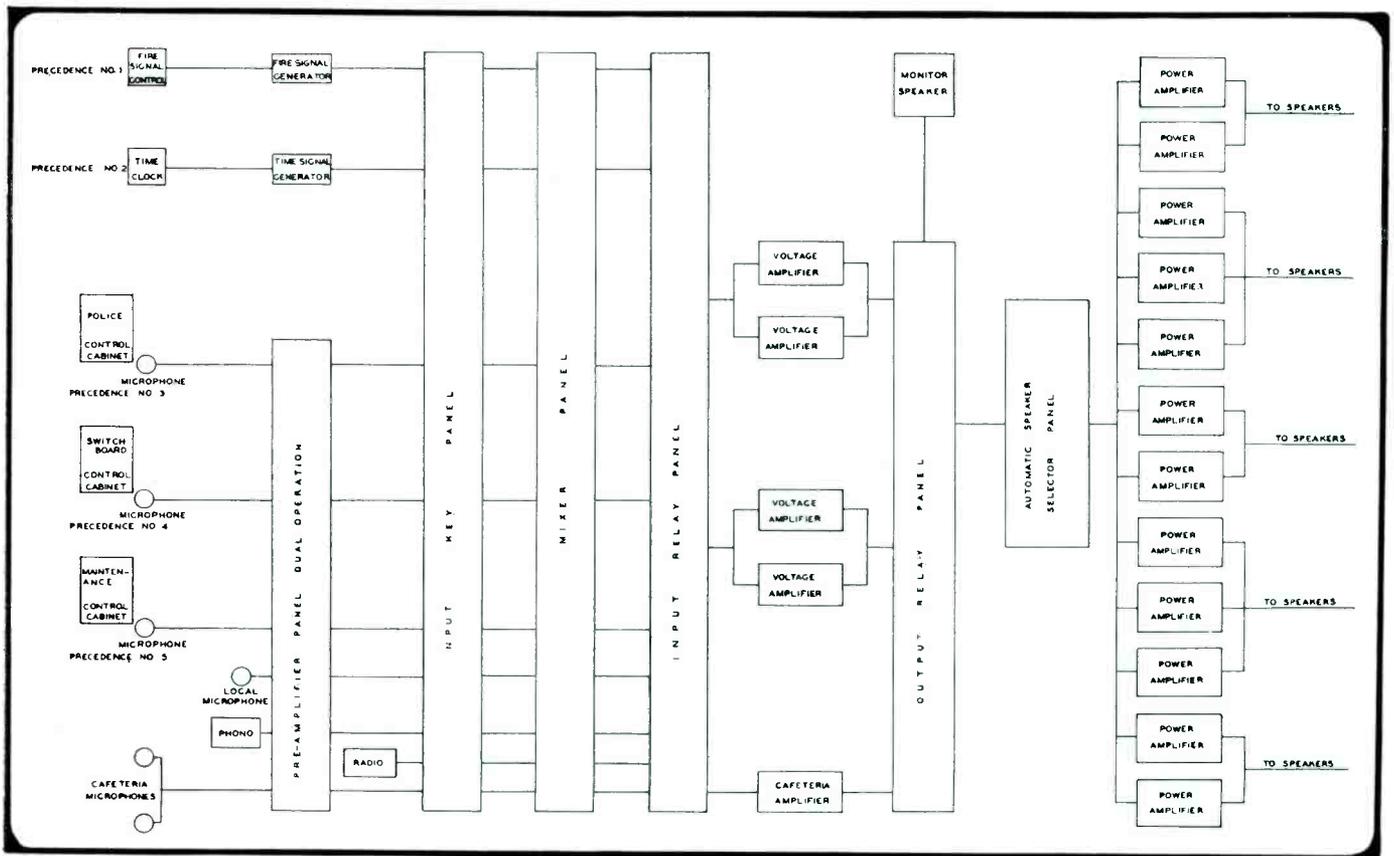


Fig. 2. Schematic of the amplifying system at the plant that feeds over 250 loudspeakers.

signal; (3) police; (4) switchboard paging; (5) maintenance, and (6) local operation.

Precedence is established automatically. If, for example, the fire signal is sounded, it will automatically lock out any other service that might be using the system. Similarly, switchboard paging (rated fourth) would automatically lock out maintenance or local operation. There are over 250 loud speakers and air-column horns in the installation. Included are standard assembly-room horns, heavy-duty speakers in test cells, office corridor speakers, and speakers for the cafeterias. In contrast to the large numbers of horns and speakers are the relatively few microphones located at central control points.

Actually, there are two different sound systems in this plant; the primary system for general paging and other emergency and control functions, and a smaller system for the specific purpose of bringing radio or phonograph music and any other special programs or material to the five cafeterias. (Three of the cafeterias are in the main plant and two are in the foundry, a separate building some distance away.)

The six different services or functions of the system already mentioned are as follows:

**Fire signal.** This is a distinctive tone generated by electronic oscillation.

From any of the fire boxes located throughout the plant a signal can be sent over the entire system, regardless of what other function or service may be in operation at the time. A code signal indicates the location of the fire box from which the alarm was turned in, and this enables the fire chief and his organization to go into action instantly.

**Time signal.** This is used for stopping and starting work on each shift. It has a tone different from the fire signal, and is sounded as a steady note rather than as a series of dots used for the coded fire signal. An automatic control doubles the signal volume when machines are in operation, affording adequate volume to carry above machine noise.

**Police service.** This is maintained by use of coded voice signals to guards stationed throughout the plant.

**Switchboard paging.** One microphone is in constant use in this service, with a reserve microphone for use as required. Such a large volume of paging service is required in the plant that one girl is employed full time to handle telephone requests for paging. The internal telephone system has a special dial number for

"paging service"; when this is dialed, the girl answering fills out a regular "paging requisition." This form is then passed to another girl who determines which of the various keys are to be selected for the paging. The entire system is used only when there is no way of determining in what part of the plant an individual may be.

**Maintenance.** The plant's chief of maintenance is provided with a panel similar to that in the police chief's office. Quick information on mechanical breakdowns will enable a repair crew to get on the job instantly. When, for example, a key machine is involved, and it becomes necessary or desirable to shut down certain other machines, instructions can be issued by voice paging from the chief of maintenance.

**Local operation.** Provision is made for making announcements direct from the location of the amplifier panel and rack in the "sound control room." This enables executives to make addresses or issue instructions to the entire factory personnel by plugging in the microphone at the control panel. Radio programs, phonograph music, and other recorded sound can be "piped out" through the entire system, or through any part of it desired.

As indicated by the circuit in Fig. 2, the more than 200 loud speakers

(Continued on page 18)

# SER-CUITS!

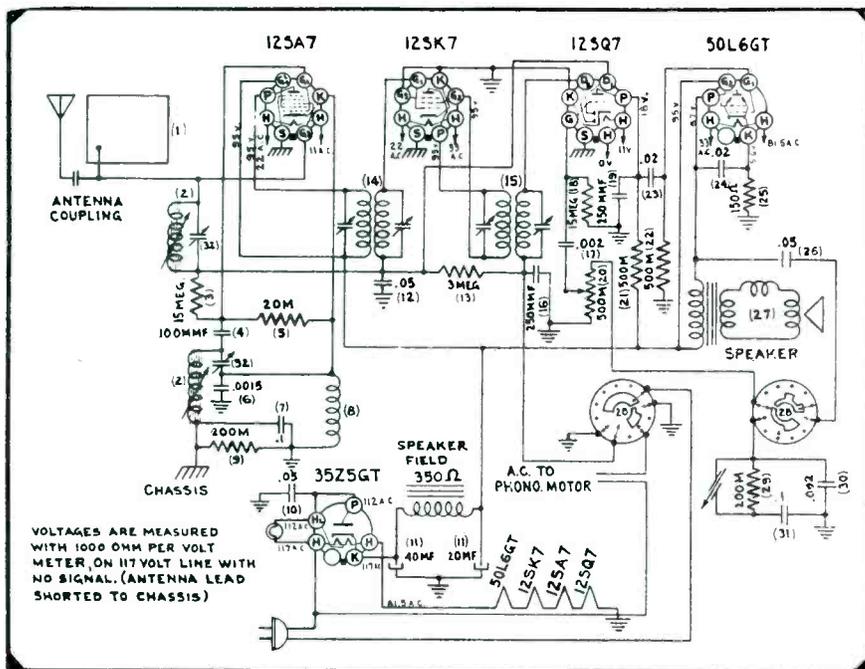
By HENRY HOWARD

TO achieve the maximum efficiency in short-wave broadcast receivers, many design features are incorporated. In the Silvertone 7072 eight-tube two-band phono and recorder combination (Fig. 1), for instance, a loop plug is connected in the antenna circuit. The antenna coupling coil is connected in series with the primary of the short-wave transformer. The reactance of the latter is low at broadcast frequencies, so there

is negligible signal voltage drop. However, the loop primary is a high impedance coil; hence, the need for a bypass condenser across it for the high frequencies. This condenser,  $C_1$  has a capacity of 110 mmfd. The loop antenna returns to the avc bus and has a loading coil,  $L_1$ , in the "hot" leg.

For tone control, in this receiver, an

Fig. 3. An antenna plate and permeability tuning are featured in this Westinghouse WR-42K11.

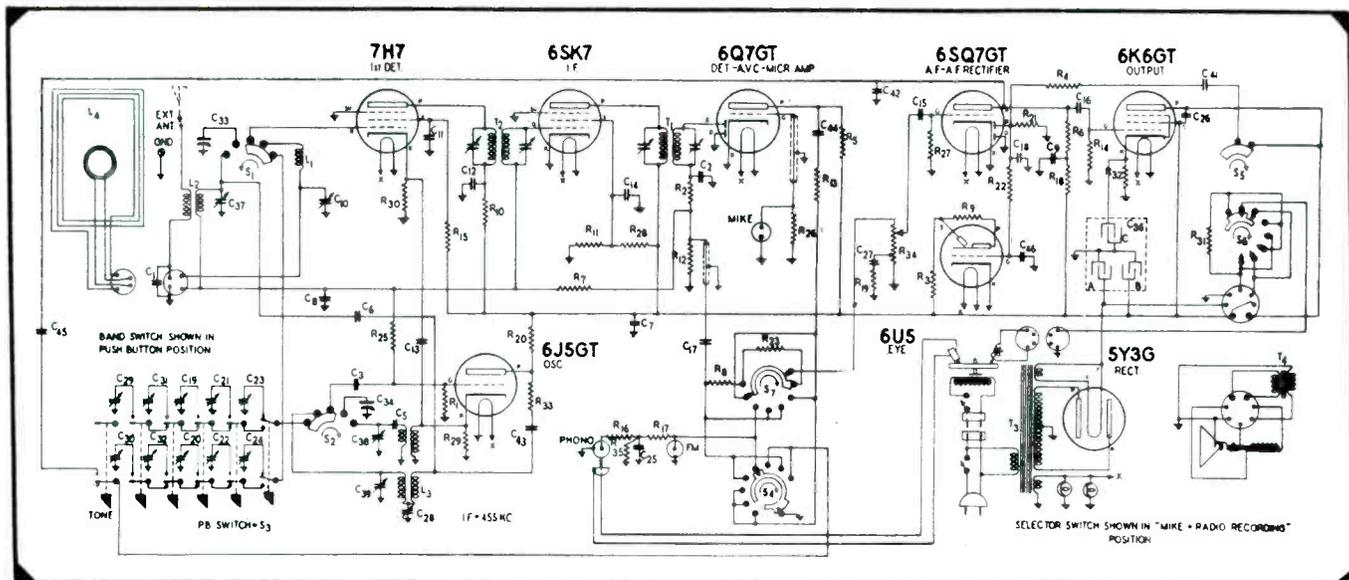


unusual one button push-button arrangement has been included. A 6J5GT separate oscillator with different feedback circuits is used for the two-wavebands. On the broadcast bands the upper oscillation transformer with the cathode feedback is used. Oscillator voltage is fed to the first detector by way of its cathode and across the cathode bias resistor of 680 ohms. This resistor is not bypassed for either band. Thus there is some signal loss. On the shortwave band, a plate tickler with shunt feed is used. The coupling to the detector occurs through a short piece of wire direct to the signal grid. This condenser has a capacity of about 3 mmfd. A 180 ohm resistor,  $R_{32}$  is in series with the tickler coil. In addition a resistor,  $R_{25}$ , which is a ten-megohm carbon unit, connects the oscillator grid to the avc bus, supplying it with a bit of initial bias which is independent of any signals. The plate and screen supply circuits are well filtered by decoupling networks.

The phono pickup is fed through a low pass filter to the high side of the volume control. At this point a jack for f-m audio is included. The 6Q7GT serves as the second detector with avc from one of the diodes, while the triode section acts as a microphone amplifier. The microphone is permanently connected to the grid. The plate supply also remains connected, the switching being done in the audio coupling circuit.

While the cap-type tube is used as above, the single ended 6SQ7GT is used for the first audio while one of its diodes is used as an audio rectifier. This unusual idea permits the use of 6U5 tuning eye for both tuning and recording level without the need for switching. You will note that the rectifier eye control operates from the output circuit through an .05

Fig. 1. Silvertone 7072 two-band receiver with unique antenna coupling system.



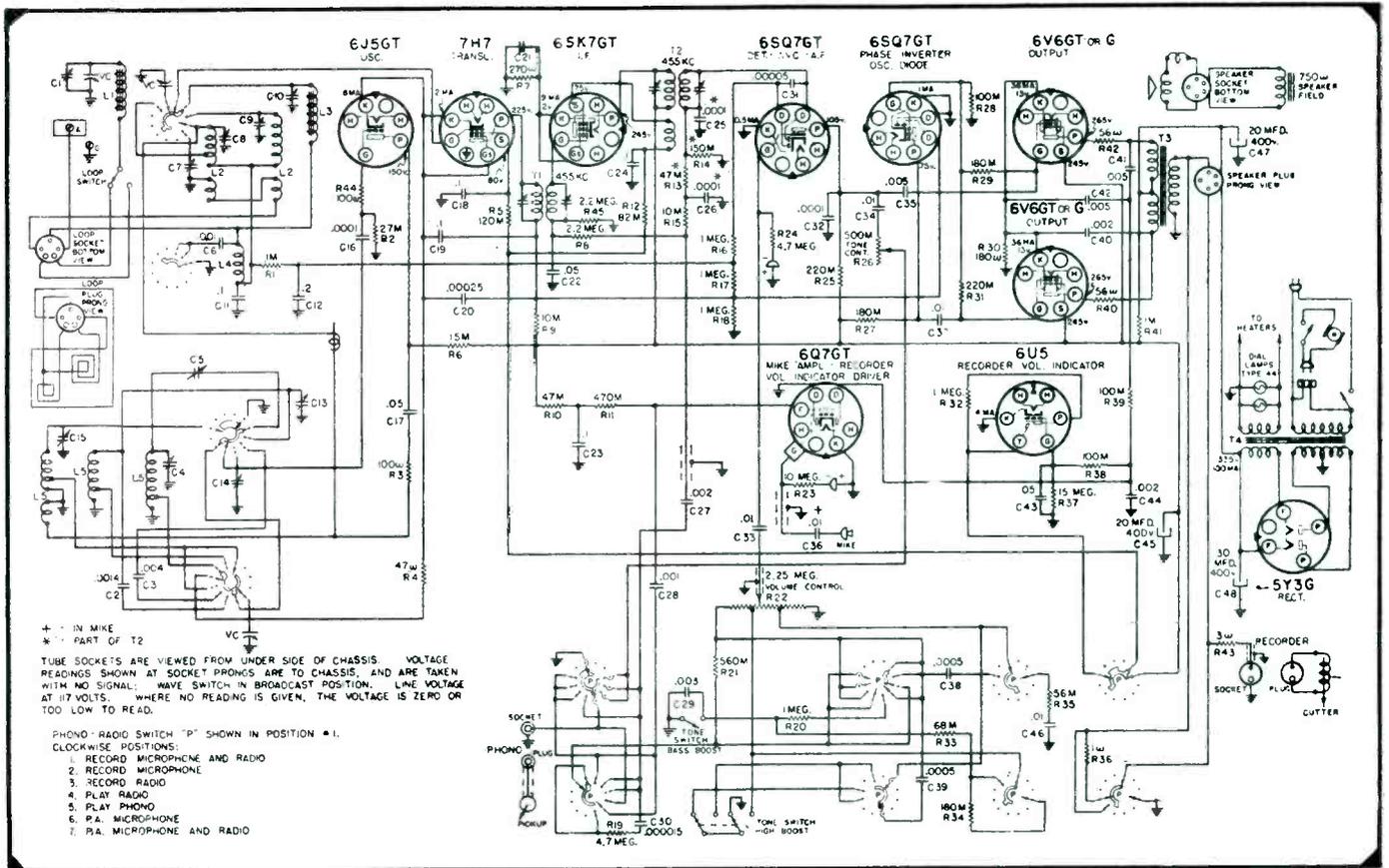
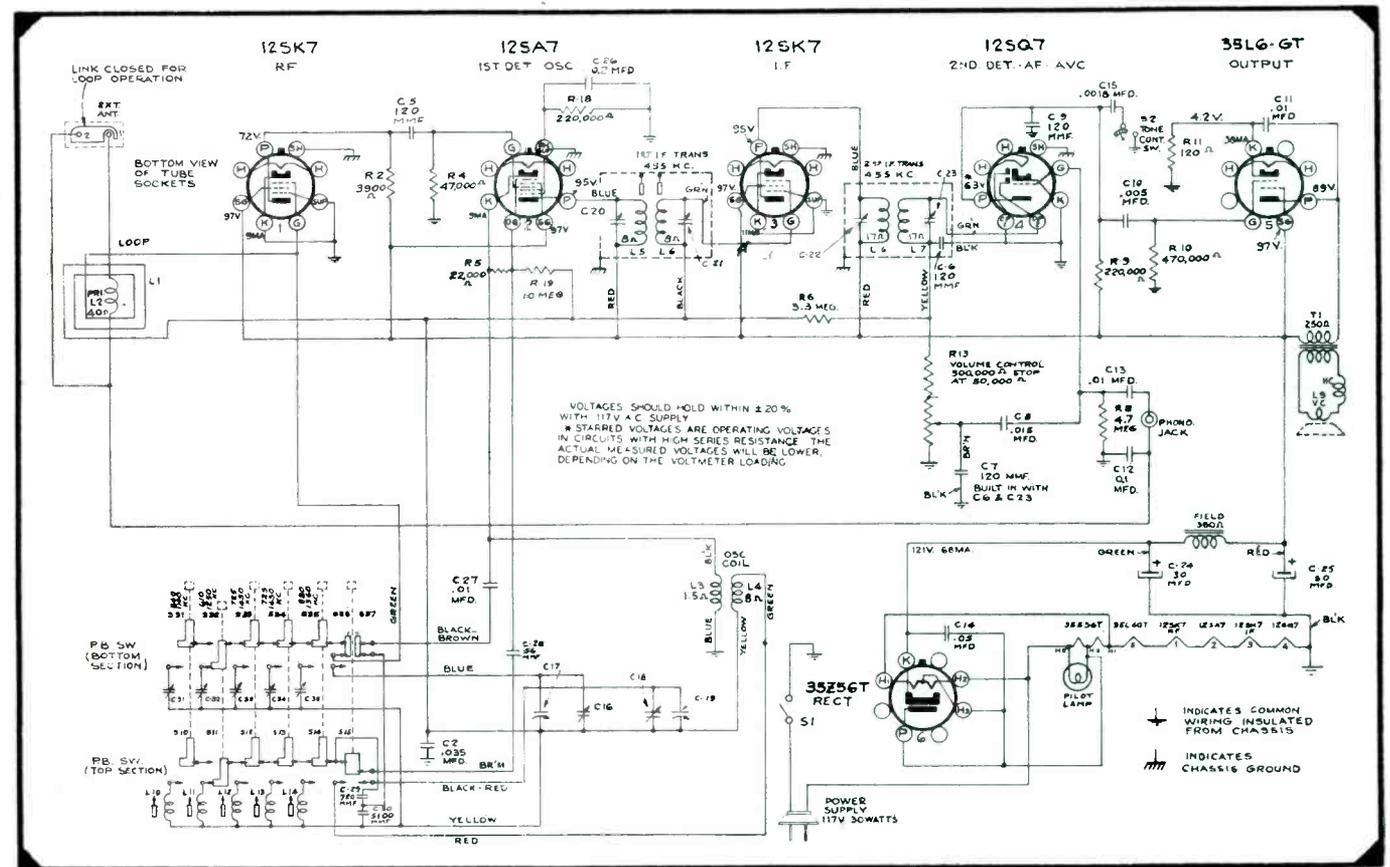


Fig. 2 (top). Silvertone 7070 features low-impedance loops.

Fig. 4 (bottom). Westinghouse WR-12X14, with cathode feedback oscillator.

value is used as a load resistor. Since the tuning indicator does not work on the station carrier no visual tuning can be done unless modulation is present.



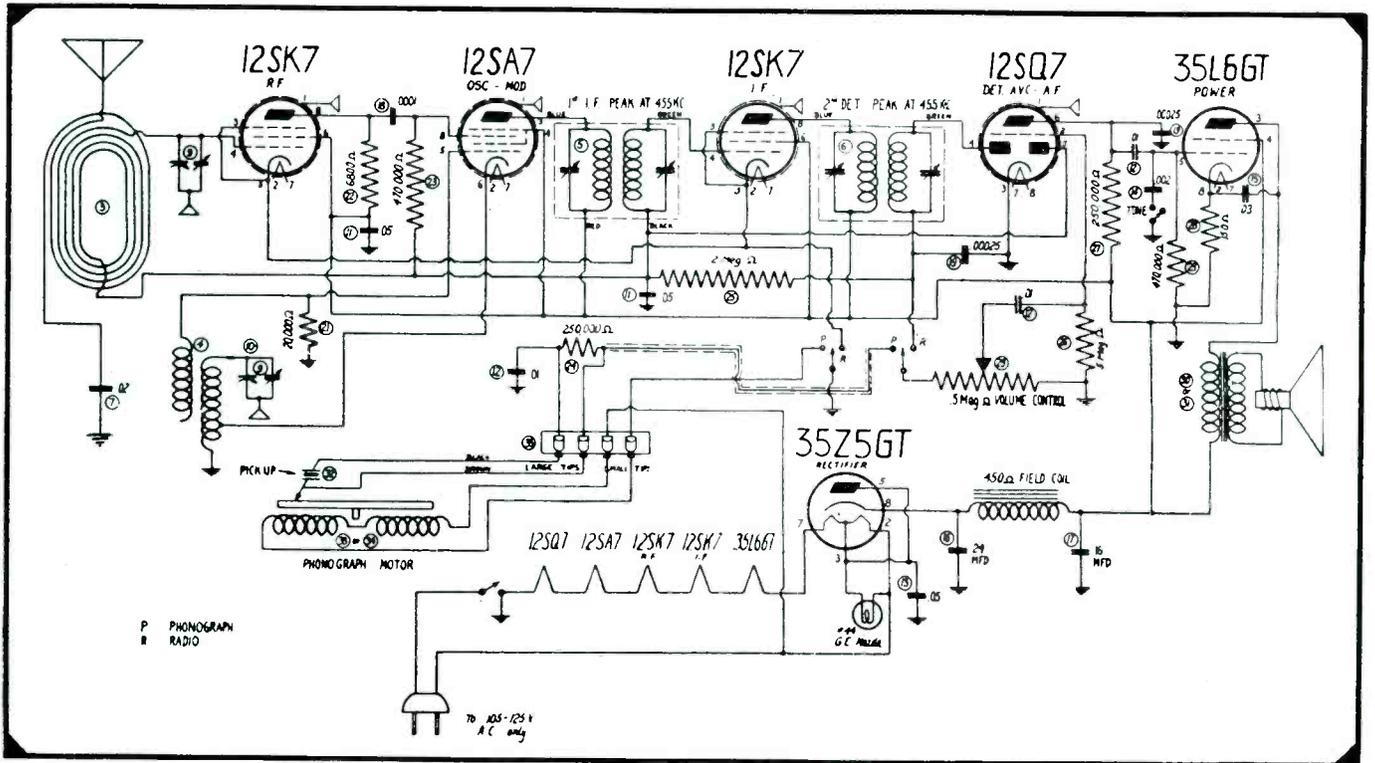


Fig. 5. DeWald 675 and its unusual radio-phonograph switching system.

The time constant of the rectifier-filter is important for proper operation.

#### Silvertone 7070

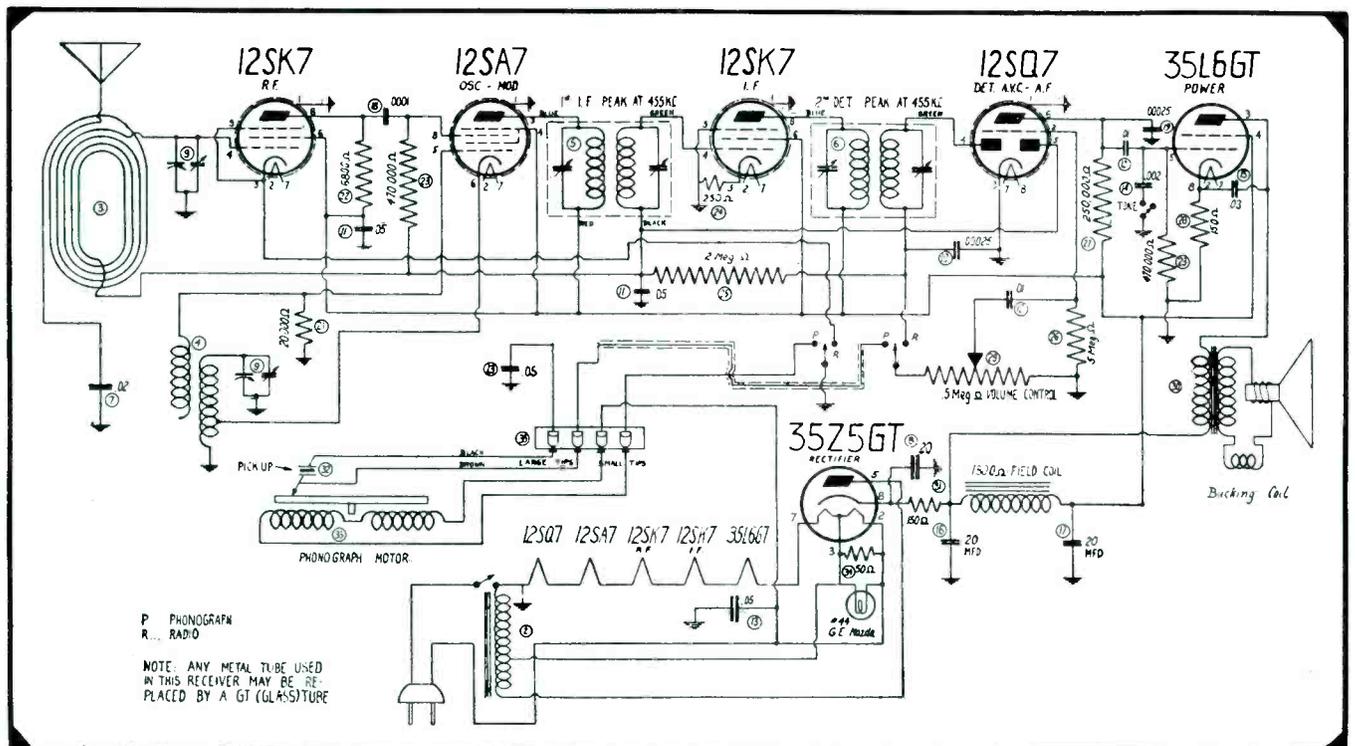
A ten-tube, four-band model, the Silvertone 7070, with some contrasting features to the previous model, is shown in Fig. 2. Two low impedance loops are used, and set at right angles to each other. A push-button selects either one. The loop primary is used as a shortwave

antenna. The loop circuit is loosely coupled to the first detector, and tuned independently with one section of the three gang variable. A separate oscillator with its cathode is tied to the translator cathode. In contrast to the previous receiver, a 6SQ7GT is used for

Fig. 6. DeWald 764 features a small autotransformer to boost output power.

detector, avc and first audio, while a 6Q7GT serves as a mike amplifier. Bias cells are used for the first audio and microphone amplifier.

The avc system in this receiver is of the dual type. Only the i-f stage is controlled in the usual manner. The first detector obtains its control bias from two sources; one depending on the carrier strength, while the other is more or less constant. The variable



voltage comes from the second diode of the detector tube, while the independent bias is obtained from the oscillator and rectified by one of the diodes in the phase inverter tube, the 6SQ7GT.

Another contrasting feature is the 6U5 circuit. Here the 6U5 indicator tube is used only as a recorder voltmeter not as a tuning indicator. The high voltage supply is opened in receiving position. The same switch opens the translator and i-f screens during phono operation. A 2.25 megohm volume control with two taps is used. This model, like many other Silvertones, uses screen-grid regeneration in the i-f transformer.

#### Westinghouse WR-42K11

A five-tube a-c phono model, Westinghouse WR-42K11, featuring an antenna plate and permeability tuning, is illustrated in Fig. 3. The oscillator circuit uses an independent cathode coil shunted by a .0015 mfd. condenser. Instead of the usual cathode tap on the oscillator inductor, a capacitance voltage divider is used; an arrangement similar to that of the Colpitts oscillator. The oscillator coil returns directly to the chassis which is isolated from the line by a .1 mfd. condenser and a 200,000-ohm resistor.

#### Westinghouse WR-12X14

In Fig. 4, appears another Westinghouse model, WR-12X14. This model features permeability tuned push-buttons in the oscillator circuit, while the buttons tuning the loop cut in various condensers. The oscillator uses a cathode feedback circuit with a .01 mfd. condenser shunt on the tickler. A phono-jack is included without switching means. This requires the removal of the plug for radio operation.

#### De Wald 675

A simple, but effective radio-phono switching system is used in the De Wald 675 receiver, (Fig. 5). The common arm of the switch is grounded. In the phono position, the motor is connected while the r-f and i-f cathodes are opened from ground. There is some increase in plate voltage with a consequent increase in power output. The other part of the switch connects the high side of the volume control to detector or pickup in the usual manner.

#### De Wald 674

A simple method of boosting the output power considerably, and without much expense, is used in the DeWald 674, shown in Fig. 6. This receiver uses a small autotransformer with its primary connected to the mid-tap of a 35Z5GT rectifier tube. The stepped-up output is connected to the rectifier plate. The transformer need handle only the

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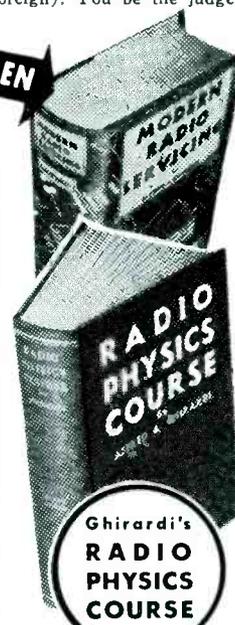
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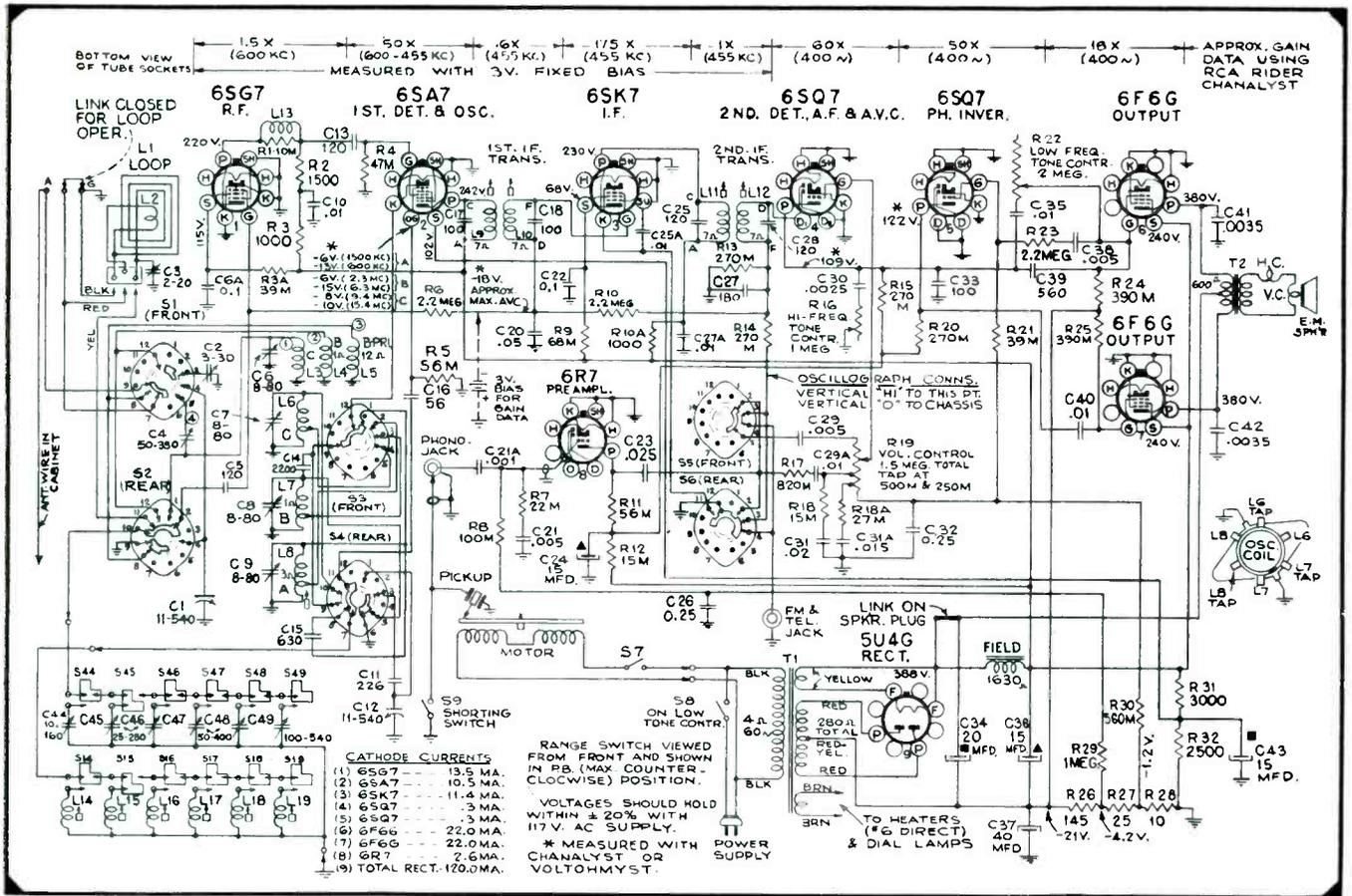
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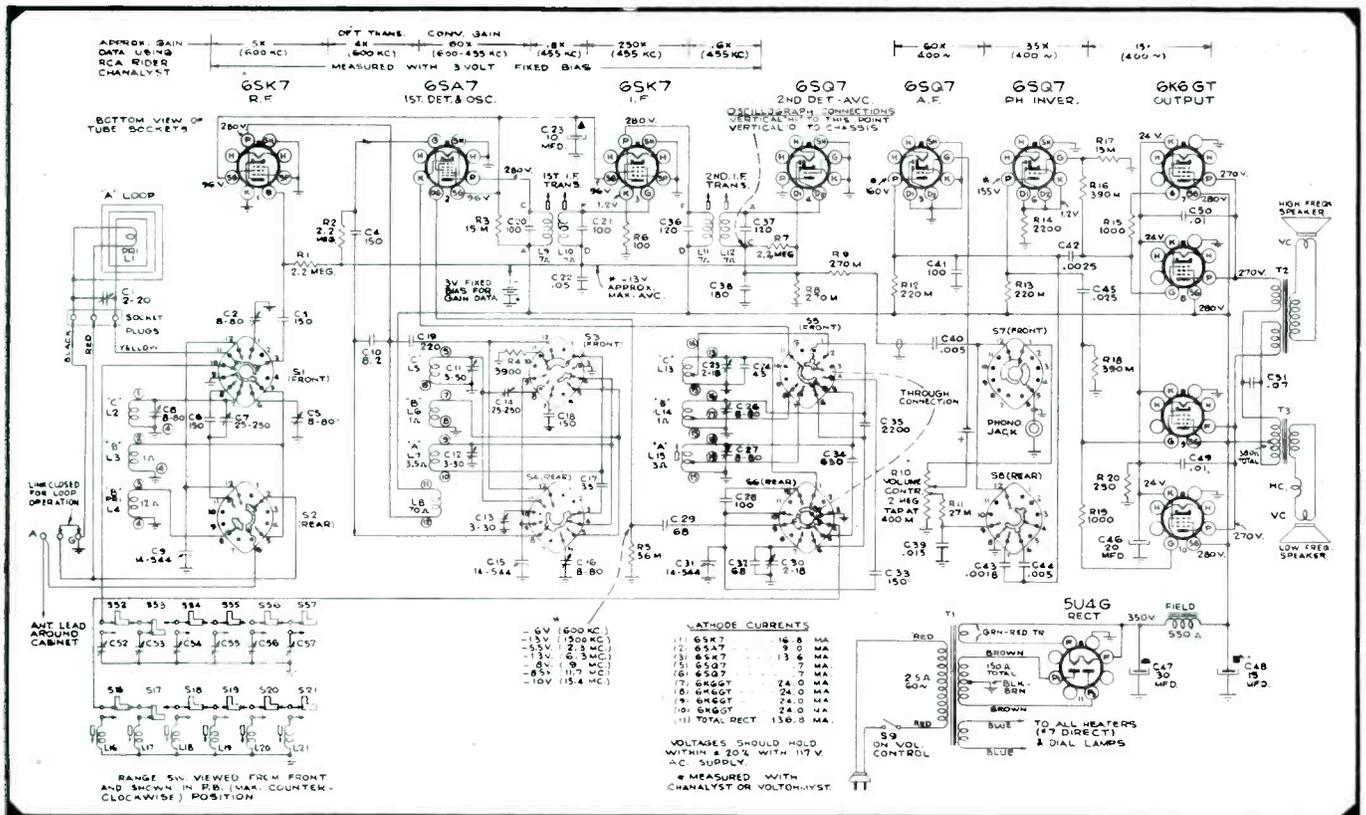


"B" power since the heaters are supplied direct from the line. A 50-ohm shunt is placed across the pilot lamp to equalize the drop across the rectifier filament due to the transformer load. The maxi-

Fig. 7. RCA-Victor V-225 and its impedance-coupled r-f stage.

Fig. 8. RCA-Victor 211K four-band set with t-r-f stage.

imum power output is boosted from about .9 watt to about 3.0 watts by raising the plate voltage in this simple manner. The 35L6GT screen voltage is, however, not boosted.



**RCA Victor V-225**

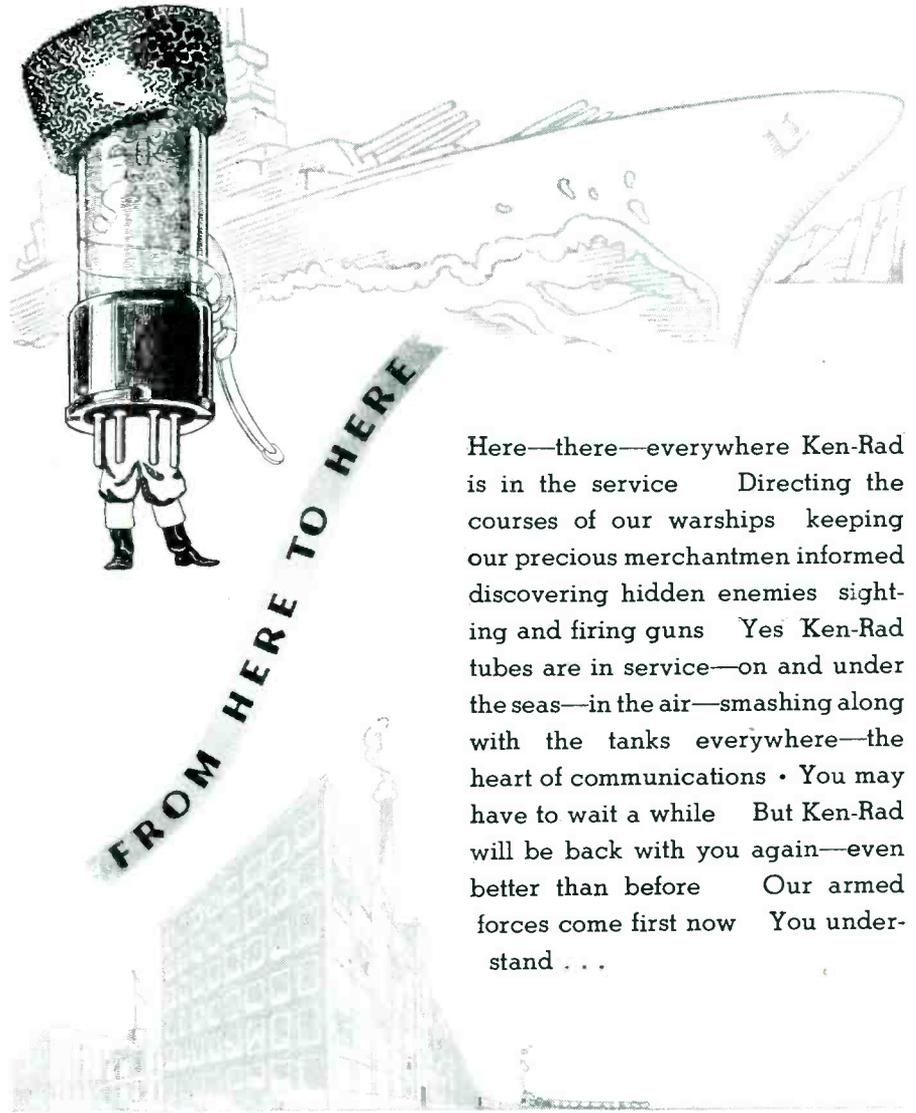
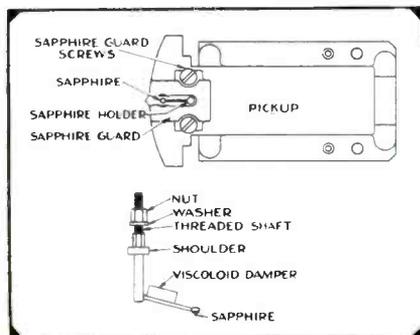
Several RCA models use an impedance coupled r-f stage rather than plain resistance coupling. Model V-225, shown in Fig. 7, favors the lower frequencies in the shunt resistor and inductor in series with the r-f plate. This receiver uses a 6R7 phono preamplifier. The unused diodes are left open instead of being grounded as is usually done. The pickup output is filtered with a .005 mfd. capacitor and a 22,000 ohm resistor in series. A shorting switch is connected to ground on the high side of the pickup when the phono is not in use.

A 1.5 meg volume control is supplied with two taps; one at a quarter-megohm and one at a half-megohm for dual bass compensation. The 6SQ7 1st audio is connected directly to the volume control arm and is supplied bias through an R/C filter from the "C" voltage divider. The blocking condenser from the first audio plate to the output 6F6 grid has a capacity of only 560 mmfd., while an .01 mfd. condenser connects the inverter plate to the other output tube. This doesn't cause any unbalance, however, because the inverter derives its audio input from the grid side of the 560 mmfd. condenser. The .01 mfd. condenser is sufficiently large so that no material voltage is lost through it.

**RCA Victor 211K**

RCA Victor model 211K (Fig. 8) is a four-band set with a rare t-r-f stage and a 3-gang variable. It features parallel, push-pull audio and two speakers. A combination of capacitive and magnetic coupling is employed between the t-r-f stage and first detector. The 8.2 mmfd. coupling capacitor favors the higher frequencies. Only three sets of coils are used for the four bands, band-spread on the fourth band being obtained by means of series condensers. Automatic volume control is applied to the entire three stages. The low and high frequency speakers are supplied by separate output transformers, the spectrum being divided by a .07 mfd.

Fig. 9. Replacing sapphire needle is a delicate step. Study diagram below and data at right for proper method.



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condenser across the primary of the low frequency "o-t" which bypasses the highs.

**Replacing Sapphire in Pickup**

In replacing complete unit, simply slide the unit out of the tone arm and insert a new one. In the replacement of the sapphire, never bend the sapphire support wire. Slide the pickup forward out of the arm (See Fig. 9).

The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that

the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and take the guard off. Remove the small nut and washer on the threaded shaft of the sapphire holder and push the shaft through the hole in the viscoloid until the sapphire holder assembly comes free.

Insert threaded shaft of replacement sapphire holder through viscoloid and replace the washer and nut. Make sure that the flat sides of the shaft are firmly in place in the clamp and then tighten the nut very carefully so as not



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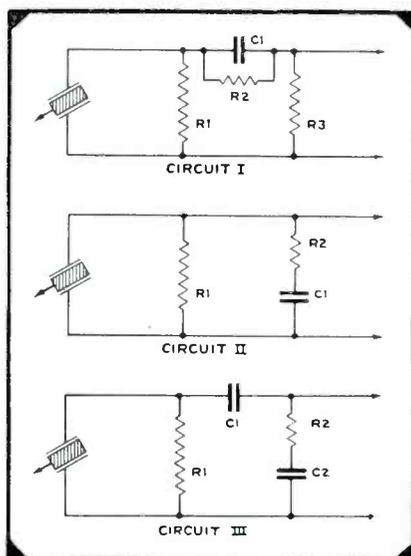
to strip the threads nor break the crystal. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder.

Bend the spring contacts to make good contact with the slides in the tone arm.

#### Tone Compensation For Pickup Circuits

Because of the widely varying frequency characteristics of various types

Fig. 10. Adjusting resistance and capacitance in pickup circuits to secure best tonal range.



of audio amplifiers with which crystal pickups may be used, it may be desirable in some cases to make refinements in the pickup circuit to compensate for the characteristics of the amplifier. In Fig. 10 appears examples of compensation adjustments.

Circuit 1: Increasing  $R_1$  increases low frequency response. Increasing  $C_1$  increases high frequency response. Increasing value of  $R_3$  with respect to total value of  $R_2$  plus  $R_3$  increases the output.

Circuit 2: Increasing  $R_1$  increases low frequency response. Increasing  $R_2$  increases high frequency response. Decreasing  $C_1$  increases output.

Circuit 3: Increasing  $R_1$  increases low frequency response. Increasing  $R_2$  increases high frequency response. Increasing value of  $C_1$  with respect to total value of  $C_1$  plus  $C_2$  increases the output.

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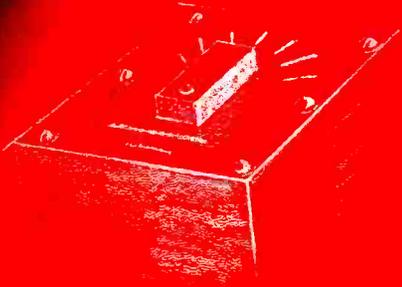
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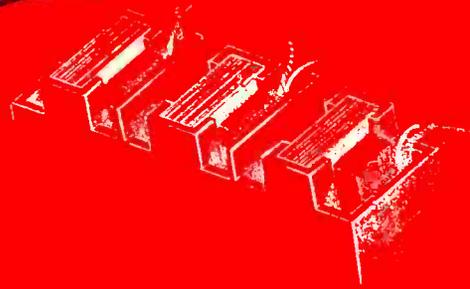
Name .....  
 Address .....  
 City-State .....  
 Occupation .....  
 Employed by .....  
 State whether Employer is a Service Organization, Dealer, Jobber or Manufacturer .....

# Combinations for Victory

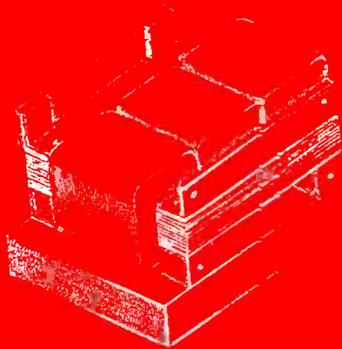
Savings in materials and machine time are vital to victory. Substantial savings can frequently be effected by combining elements. Typical UTC design refinements of this type are illustrated.



The design of this unit combines switch plate, name plate, and cover.



This unit employs a special die cast housing which combines the mounting of six units, eliminating twelve sets of brackets, twenty-four screws, and a special outer case.



UTC three phase to single phase transformers combine the mounting facilities of the transformer and condenser. This and electrical design reduced the volume and weight of the UTC design forty per cent compared to contemporary design.



Two reactors, four condensers, and two shielded transformers are combined in this hermetically sealed container. Separately cased, the volume and weight would be doubled.

May we design a Victory Unit to your application?

## UNITED TRANSFORMER CO.

150 VARICK STREET



NEW YORK, N. Y.

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

# CHECK HERE!



... if you  
want a  
**BETTER**  
radio job!

The lack of technical ability  
is the only thing that stands  
between you and a better job

• Face the facts! Present-day conditions which surround employment and promotion in all branches of both civilian and military radio are actually unbelievable. The tremendously expanded demand for *technically trained* radiomen has created a condition wherein there are many more jobs than qualified men to fill them.

• Hundreds of men have had new jobs at comparatively high pay literally thrust upon them. Manufacturers are offering increased base pay to attract new additions to their staffs.

• If you have a commonplace job—a temporary job. If you are a serviceman with the ambition to hold a position of greater responsibility with higher pay . . . then enrolling for, and completing a CREI home study course in Practical Radio Engineering is the most important thing you can do toward accomplishing your ambition at this most opportune time.

WRITE FOR FREE BOOK  
TODAY about CREI Home  
Study Courses

If you are a professional radioman and want to make more money, let us prove to you that we have something you need to qualify for a better engineering job.

To help us intelligently answer your inquiry, please state briefly your background of experience, education and present position.



## CREI STUDENTS AND GRADUATES, ATTENTION!

The CREI Placement Bureau is flooded with requests for CREI trained radiomen. Employers in all branches of radio want trained men. Your government wants every man to perform his job, or be placed in a job that will allow him to work at maximum productivity. If you are or will be in need of re-employment, write your CREI Placement Bureau.

## CAPITOL RADIO ENGINEERING INSTITUTE

E. H. RIETZKE, *President*

*Home Study Courses in Practical Radio  
Engineering for Professional Self-Improvement*

Dept. S-2, 3224 — 16th Street, N. W.  
WASHINGTON, D. C.

Contractors to U. S. Signal Corps and U. S. Coast Guard  
Providers of Well-Trained Technical Radiomen to Industry

## Antenna-Oscillator Circuit Design

(See Front Cover)

THE antenna and oscillator switch circuit design in this RCA-Victor V-209 (same as model V-210 but without push-buttons), is most interesting.

The upper left switch wafer changes the input grid of the 6SG7 r-f stage from loop to short wave antenna transformer and grounds the loop in the shortwave position. The wafer below switches the antenna to the loop primary or to the primary of the shortwave transformer and also cuts in a series condenser (100-350 mmfd.) in the variable condenser (14-544 mmfd.) circuit for greater bandspread in the short-wave position.

The usual link shorting bar is used to short the high impedance antenna coupling coil (primary) when receiving on the loop. It must be removed for external antenna broadcast operation but does not affect shortwave reception.

The upper right wafer controls the position of the oscillator grid and also applies a condenser (220 mmfd.) in series with the oscillator section of the tuning condenser (14-544 mmfd.) to correspond with the r-f stage tuning in the short-wave position. The lower right wafer section switches the 6SA7 cathode from one oscillator coil to the other. The broadcast oscillator coil is grounded for short-wave reception to prevent absorption but no such precaution is necessary for broadcast frequencies.

## INDUSTRIAL SOUND

(Continued from page 9)

in the installation are divided into five different circuits so that certain sections or areas of the building can

be paged without using the entire bank of speakers. The areas or circuits of speakers are as follows . . . (1) office; (2) manufacturing; (3) assembly; (4) foundry, and (5) test cells. A small control panel with five keys, placed at the microphone enables the person paging to select any combination of the five areas for a specific message. There is also a master key that automatically cuts in all five circuits.

Dual equipment is installed throughout. The equipment is so wired that failure of any vital unit automatically switches a reserve unit into the circuit, thus obviating any interruption of service for repairs.

In keeping with modern industrial trends many concerns have introduced music schedules over their plant paging system to be played for the workers. It has been found that music has a definite effect on production, by effectively lessening fatigue throughout the day. Some interesting experiments to determine the effects of Industrial Music have been made at our plants.

We are devoted almost 100% to war work, producing great numbers of control boxes and small mechanisms. One production line, in particular, composed of carefully selected, skilled workers, had been running for many months, and had reached a very high level of production.

This line had maintained an identical daily average for weeks, and, feeling sure that it had reached its ultimate peak of production, company officials were extremely skeptical that music could noticeably affect it. With the gradual introduction of a carefully planned music schedule, however, production immediately began a gradual climb. The output actually increased, even on this already efficient production line, to a point more than six per cent

*Safeguard your*

**"GUARANTEE"**

USE **STANCOR**

**STANDARD TRANSFORMER**

• CORPORATION •

1500 NORTH HALSTED STREET . . . CHICAGO



higher than ever before. Think of it! With a serious shortage of skilled labor, the increased output was equivalent to six extra workers for every 100 now employed! Music has joined the fight by sending a few extra finished pieces each day to the shipping floor.

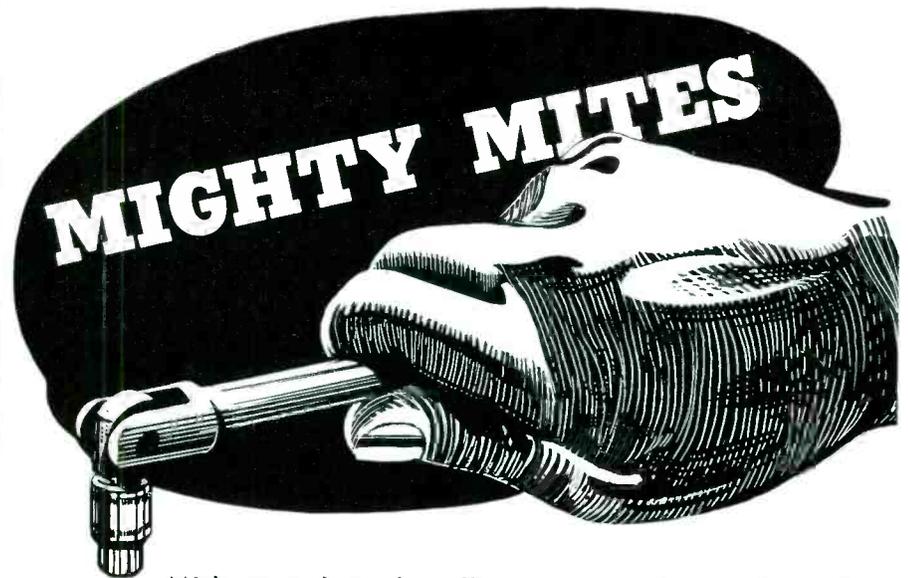
We also broadcast radio news reports twice daily to the workers at rest periods, and employ participation programs are now being produced. A broadcast studio is being built large enough to accommodate a male chorus, women's glee club, or other groups.

Sound systems have many other important uses in the factory. They may be used for air raid warnings, fire signals, or time signals, plant maintenance and plant protection. A microphone in the police captain's office provides the mobilization of a force instantly. Sabotage is thus made highly precarious when it is known that a warning can be spread with the speed of light. In case of accident, a breakdown, or a fire, which would ordinarily halt production, quick action is taken and the loss becomes insignificant.

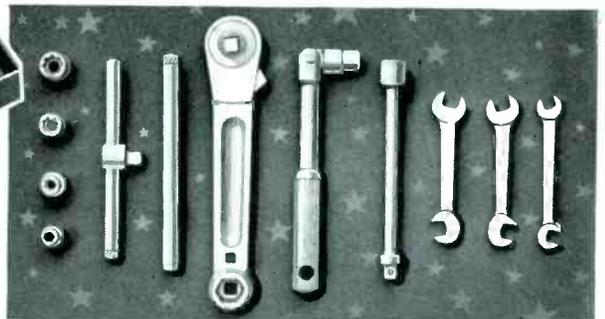
We are told that sound systems are mandatory in English factories where they are used for air raid warnings, paging, and for music to boost the morale of the workers. In the event of a raid, warning can be withheld until the last minute, keeping production going, and the workers are then sent quickly to cover. It has been said that Hitler did more damage by holding up production than he did by bombing.

With all its many advantages, a *voice paging*, or *industrial sound system* is a natural for today's hard-pressed industry, and it is just as natural that the job should be handled by the Service Man in many localities. Many of the jobs are large and some men may hesitate because of the very size of the deal, but on most industrial jobs, the equipment is custom-made and adapted to the case at hand. Usually the factory assists in surveying the plant, noting the area and the noise level in each department. This, of course, determines the number and type of loud speakers needed, and the output required to actuate them.

The factory also will furnish wiring layouts, and an engineer is available to supervise the installation and final hook-up of the equipment. In many cases the maintenance department of the customer concern makes the actual installation. Then a periodical inspection schedule to test tubes, and



Midget sockets, handles, open end wrenches, etc., specially designed for hard-to-get-at radio, carburetor and ignition work . . . made under Walden Worcester's rigid standard . . . extremely strong and rugged. You can depend on Walden Worcester tools . . . backed by a plant with over 36 years experience in "knowing how" to build the best. Send for complete catalog.



**STEVENS WALDEN, INC.**  
**467 SHREWSBURY STREET**  
**WORCESTER, MASSACHUSETTS, U. S. A.**

insure perfect operating conditions, should be established.

Most plant managers are quick to see the many advantages of a *voice paging system*, and their companies, as a rule are busy, and prospering. It only remains then to properly present all these facts and justify the investment. There is no single piece of equipment in a busy war plant that will give a greater saving in man-hours, greater security, or quicker control in an emergency. It has been found that a system will pay for itself in a relatively few months.

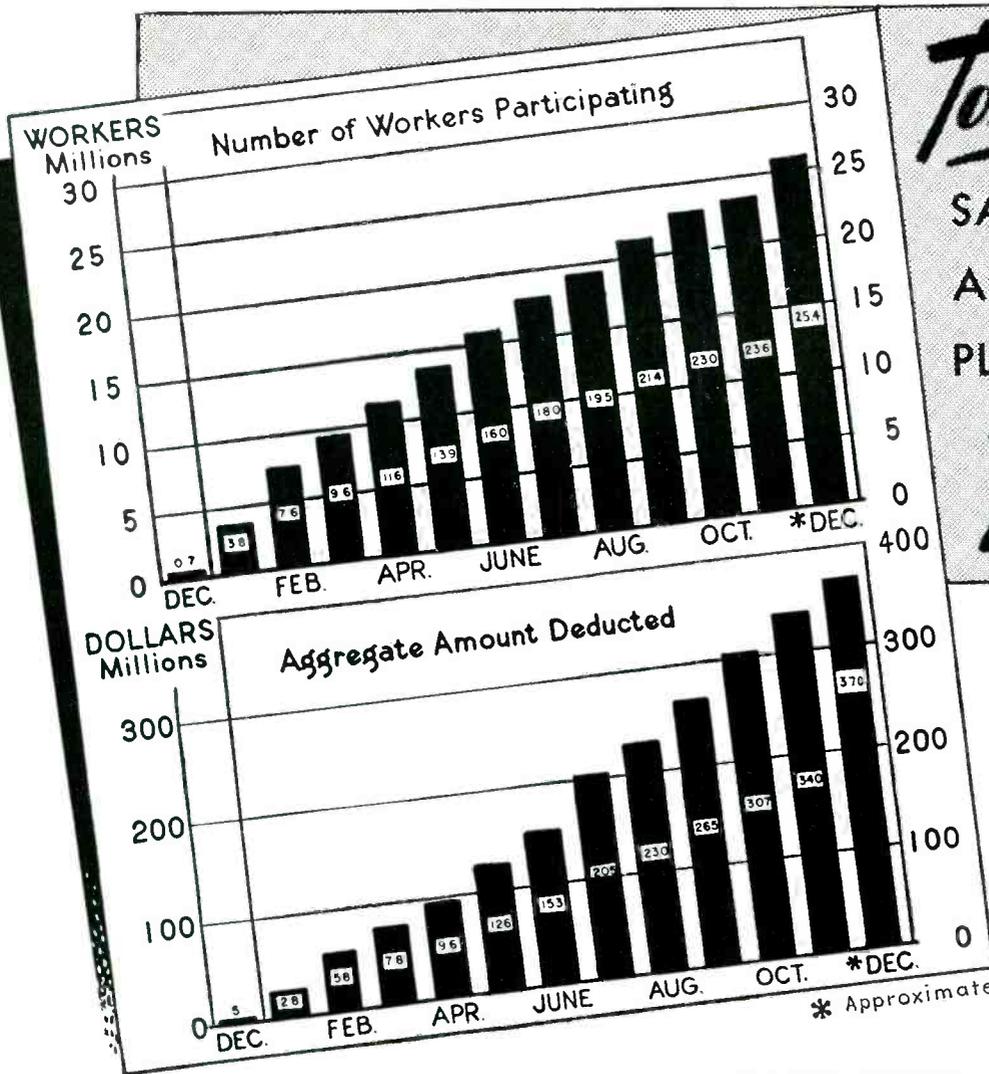
Get in touch with a reliable manu-

facturer. Study their literature thoroughly, and familiarize yourself with the layout and operation of the *sound system*. Many changes have been made in many industries, and many changes in the distribution set-up have taken place. It is quite likely that the distribution of a highly satisfactory line may be available to you. Look around your locality . . . see what your factories use for paging. If they have no system, or still use bells, or gongs, persuade them to speed up their entire plant with *voice paging*. Every essential office and war plant should be contacted.

*Tomorrow's*

SALES CURVES  
ARE BEING  
PLOTTED . . .

*Today*



THESE CHARTS SHOW  
ESTIMATED PARTICI-  
PATION IN PAYROLL  
SAVINGS PLANS FOR  
WAR SAVINGS  
BONDS (Members of  
Armed Forces Included  
Starting August 1942)

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to **FOUR AND A HALF BILLION DOLLARS** per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—and mountains of brand new consumer goods tomorrow. Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns \$4 for every \$3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory—and tomorrow's sales curves—are being plotted today by 50,000,000 Americans who now hold **WAR BONDS**.



Save with  
**War Savings Bonds**

This space is a contribution to America's all-out war effort by

**SERVICE**

## BANDSWITCHES

(Continued from page 7)

bedded in the silver and cause more trouble. Clips may also be squeezed to increase contact pressure. When a switch is only slightly noisy it may only be necessary to rotate it half a dozen times, depending upon the wiping action to do some self-cleaning. This doesn't always work of course, the grit sometimes becoming imbedded. It is then a case of getting "down under."

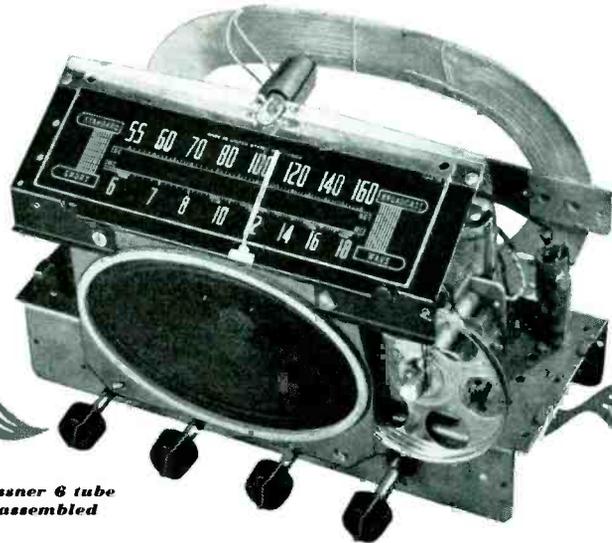
Where the switch is definitely defective, it should be repaired by replacing the bad section, or panel; not the entire switch. But make sure the new section has the same characteristics, shorting or non-shorting, or grounding where required; otherwise anything may happen, oscillation, dead spots, etc., due to absorption or lack of it. When possible, keep the same spacing between sections as before. The slide type bandswitch can easily be taken apart, cleaned, readjusted and pressure increased for better contact.

In u-h-f receivers designed for f-m or television reception ceramic insulated switches are often used for low-loss construction. If these insulators become cracked they may be cemented together as replacement will probably be extremely difficult at the present time.

When replacing an entire switch with a unit having too many band positions, a self-tapping screw may be put into the front mounting panel to limit the throw and provide the exact number of positions required. The unused clips are left open. If the indexing ball falls out of the positioning arm of a switch, it may be replaced with the aid of a long nose plier. If too elusive, add a little vaseline.

In most cases, there is little reason for the complete replacement of a band-switch. A little common sense combined with an adequate supply of patience and the necessary tools should provide the fruits of victory. We didn't say "every case," however, because we've come across a few tricky problems ourselves. In such a case as the latter, if the customer sees it your way (when you can't get a new switch), it may be advisable to perform a major operation, setting the receiver on the broadcast band forever. This drastic surgery would be required only when broadcast band reception was actually impaired by the defective switch.

**Our country is at war. On the home-front, it is your obligation, small enough surely, to keep your industry functioning smoothly "for the duration."**



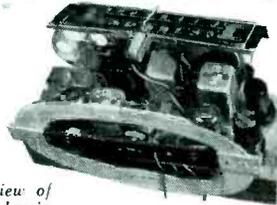
Meissner 6 tube kit, assembled

## TRAIN WITH MEISSNER KITS

SIX TUBE student training kit engineered for more complete basic radio training. Two bands cover a tuning range of from 540 kc. to 1620 kc. (53 to 16 meters). Operates on 110-120 volts 50-60 cycle AC, or 110-120 volts DC.

Chassis is equipped with automatic volume control, slide-rule dial, beam power output, six inch oval electro dy-

namic speaker . . . four panel controls: volume and on-off switch, station selector, tone control, band selector switch. Meissner six tube student training kits are shipped complete, including all parts and tubes . . . each kit is supplied with a schematic diagram. Meissner 6 tube kit (Model No. 10-1197) special school net price . . . \$19.10



Rear view of 6 tube chassis, assembled . . .

**The name Meissner** on radio training kits is your guarantee that each part represents the finest radio craftsmanship. All Meissner radio kits are precision engineered to give a definite objective value in teaching . . . see your Meissner distributor, or write for complete catalog.



**Meissner**  
MOUNT CARMEL, ILLINOIS

"PRECISION-BUILT PRODUCTS"

### RCA VICTOR 121

**Noisy reception:** Caused by poor connection between shielding of wire which goes to grid of 6B7. Resoldering will correct the trouble.

*Willard Moody.*

### WESTINGHOUSE WR 336

**Intermittent noise:** Check red rubber leads of 6F6 screen filter circuit for contact with chassis. Replace with push-back wire.

*Willard Moody*

### SPARTON 516

**Set drops out at low end of band near 600 kc:** High resistance value of R17 lowers available plate voltage for anode grid. New resistor allows correct operation. Also check padder for short circuit (series padder in oscillator circuit of the broadcast band).

*Willard Moody.*

### ZENITH 5R303

**Distortion:** High resistance R7 in C bias circuit reduces plate current to lower value than normal and causes chopping of signals. Regeneration or squealing may be caused by open C9 in plate circuit of output tube.

*Willard Moody.*



• Yes, by all means keep a supply of these "Victory" type Aerovox Dandees within ready reach in your servicing activities. These midget electrolytics in war dress have extra-generous wax coating and sealing. Bare tinned-copper leads. Truly excellent general-utility replacement electrolytics, in an adequate choice of voltages, capacities, combinations.

**DANDEES:**

PRS Single Section:  
25 to 450 v. D.C.W.

PRS-A Duals:  
Concentrically-wound, Three leads. Center mounting strap.  
25 to 450 v. D.C.W.

PRS-B Duals  
Separate sections. Four leads.  
150, 250 and 450 v. D.C.W.

• See Our Jobber . . .

Order your supply of these general-utility electrolytics from him. Ask for latest "Victory" catalog. Consult him regarding parts to service those civilian radio sets and win the war on the home front.

AEROVOX

CORPORATION

NEW BEDFORD, MASS., U. S. A.

In Canada: AEROVOX CANADA LTD., Hamilton, Ont.

EXPORT: 100 Varick St., N. Y., Cable 'ARLAB'

# NEWS

## SPRAGUE OFFERS FREE ADVERTISING SERVICE

A free classified advertising service, known as the Sprague Trading Post, to help radio Service Men and dealers find the tubes, parts, or equipment they need during the shortages of these wartime days, has been announced by Harry Kalker, sales manager of Sprague Products Company, North Adams, Mass.

Classified "Swap or Sell" advertisements from Service Men and dealers themselves will appear in full page advertisements. There will be no charge to Service Men for this service.

"Our sole aim," says Mr. Kalker, "is to devote our regular advertising budget to doing what we are convinced is a highly important and essential wartime job. We want to use it to cooperate with our friends throughout the radio profession in helping them get the things they need, and to dispose of the things they do not need and which would come in mighty handy to some other Service Man who is having a tough time keeping radios working on his sector of the home front."

Service Men or dealers who wish to have free classified advertisements in the Sprague Trading Post are requested to send them in promptly, keeping them down to 50 words or less. Ads may be sent in, either on the Service Man's business letter-



Harry Kalker

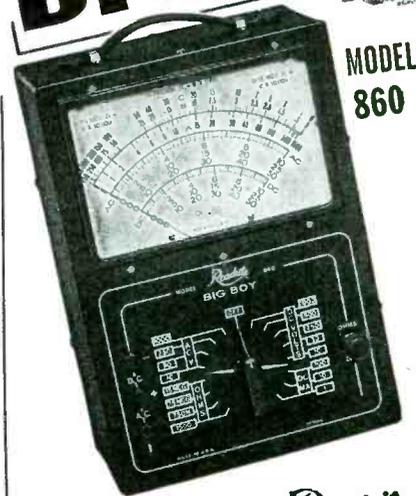
head, or on regular forms that may be obtained from local Sprague distributors.

Emergency ads for urgently needed equipment will, of course, receive preference, although all classified advertising that seems to Sprague officials to fit in with the spirit of the plan will be scheduled for appearance in one or more leading radio trade publications at the earliest possible moment.

### POST-WAR PLANNING DISCUSSED

The Western Group of the Sales Managers Club discussed post-war planning at their recent regular monthly meeting at the Electric Club of Chicago. Dr. Louis Wirth, Professor and Assistant Dean of the Sociology Division, Department of Sciences, University of Chicago, and chairman of Region No. 4 of the National Resources Planning Board, talked to this group on post-war problems as they affect industry generally and the radio industry in particular.

# BIG BOY



MODEL 860

Readrite  
METER WORKS

Performance . . . Eye Appeal . . .  
Value . . . Sensationally Priced  
at \$19.65. Dealer Net Price.

Here is an AC-DC Volt-Ohm-Milliammeter with all the ranges you want . . . easily readable on the large 7" instrument with extra-long 6" scale, in a new up-to-the-minute three-tone case. DC Volts 0-10-50-250-500-1000 at 3000 Ohms per volt DC; 1000 ohms per volt AC. AC Volts 0-10-50-250-1000 at 400 ohms per volt; DC Ma. 0-1-10-100; Resistance ranges: 0-1500 Low Ohms; 0-150,000 Ohms and 0-7.5 and 0-15 Megohms. Maroon case with red and silver panel, attached handle.

Dealer Net Price, \$19.65

For Catalog Write — Section 217, College Drive

READRITE METER WORKS, Bluffton, Ohio

Dr. Wirth has spent many years in research and study on the social and economic aspects of post-war adjustment.

In the judgment of Dr. Wirth, the first steps in post-war planning is to determine and agree upon objectives that would give society the benefits of modern mass production, employers the benefit of the retention of the maximum number of employees, and to the employees themselves, high standards of living by virtue of higher rates in pay so that they can purchase the products manufactured.

Dr. Wirth's inspiring and thought provoking talk convinced the members of the Sales Managers Club that planning now for the post-war will prevent an economic chaos.

### \* \* \*

### SYLVANIA'S TECHNICAL MANUAL REVISED

A revised edition of Sylvania's Technical Manual has just been released.

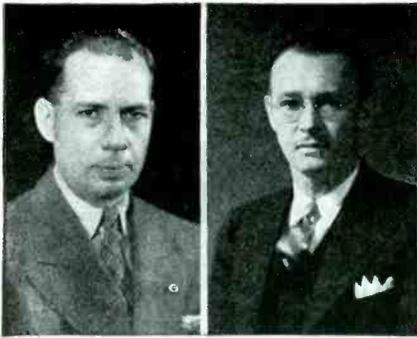
The contents of the 275-page manual are divided into four sections:

- (1)—Fundamental properties of vacuum tubes, including amplifier classification and definitions;
- (2)—General tube and circuit information;
- (3) Characteristics of Sylvania receiving tubes by types with listing of approximately 400 types, and
- (4)—Typical radio receiver and amplifier circuits.

Through the use of handy index tabs the main sections of the manual are clearly indicated and readily accessible for quick reference.

A listing of the new types of tubes released since the last issue of the manual is also included.

There are also data pertaining to panel lamps.



W. L. Jones (left), vice-president and general manager of newly formed RCA Service Company, and E. C. Cahill, president of new company.

**RCA FORMS COMPANY TO HANDLE ALL SERVICE**

A new subsidiary, RCA Service Company, Inc., has been formed to handle the technical servicing and installation activities of the RCA Victor Division of the Radio Corporation of America.

Edward C. Cahill, manager of RCA Victor's sound equipment activities is president of the new company. He will also retain his other responsibilities with the RCA Victor Division. W. L. Jones, former manager of RCA Victor's Service and Installation Division, is vice-president and general manager of the new company. There are no changes in either the managerial or the technical staff of the RCA Victor service organization, which is now incorporated in its entirety within the new company.

The new company will also continue to conduct its training school for technicians in Philadelphia for the U. S. Signal Corps.

\* \* \*

**GOLENPAUL SAYS PARTS JOBBERS HAVE A WARTIME JOB**

Even though business-as-usual died, on that morning after Pearl Harbor, there's a wartime job for every parts jobber provided *he goes after that job*, said Charles Golenpaul, jobber sales head at Aerovox, recently. Mr. Golenpaul, who was recently re-elected chairman of the Sales Managers Club, Eastern Group, based this comment on the many reports he received from jobbers throughout the country.

The reports, revealing activities awaiting the jobber in wartime, showed that . . . existing stocks should be made available to Government agencies. Complete inventories should be submitted with selling prices. Wonderful cooperation has been forthcoming from jobbers in this connection. Weeks and months have been saved in the most crucial days of our war efforts, before factories could swing into production. Most jobbers freeze merchandise deemed essential to the war effort, even at the sacrifice of immediate turnover and taking care of civilian needs.

Wartime activities — training camps, posts, fortifications, bases; university, college and training schools; research and engineering groups; local radio and electronic equipment manufacturers and sub-contractors, and other war workers should be contacted, the reports indicated. The jobber's stock is of tremendous importance in providing perhaps small quantities but certainly large varieties of needed components, particularly for experimental assemblies and models that must precede actual production, and for urgent maintenance.

The keen jobber today is invaluable as a procurement agent for firms and agencies

**★ DEDICATED TO**

**BRACH**

**ANTENNAS & RADIO PARTS**

**100% WAR PRODUCTION**

**BRACH** Antennas and other radio and electrical products are now enlisted for the duration—serving, as in the First World War, to hasten the day of Victory. Their high peacetime standards, today applied to the needs of war, reflect our 36 years' experience in "QUANTITY-plus-QUALITY" manufacture.

**L. S. BRACH MFG. CORP.**

*World's Oldest and Largest Manufacturers of Radio Aerial Systems*

**55-65 DICKERSON STREET • NEWARK, N. J.**

not so manned, the reports said. He knows where to get certain parts and supplies. Often he knows what other jobbers have in stock, and there is a growing collaboration among jobbers in this connection as a patriotic measure. The keen jobber is able to get together a highly diversified order comprising relatively small lots, which order could not be handled by the manufacturers under existing high-pressure production.

The reports also stated that due to the falling off in numbers of local Service Men, some jobbers have stepped in with a service department. Not only are they servicing home radios, and these are usually brought in by set owners, but also communications equipment, test instruments, electronic assemblies of the industrial kind, and so on. Many jobbers are now functioning as radio and electronic manpower recruiting agencies, unofficially, but nevertheless very helpful. Jobbers know the

local Service Men, experimenters, amateurs and other radio workers. The jobber can supply information to radio workers as to wartime opportunities. Names can be sent to the proper authorities seeking specialized manpower. Even after men have been drafted, before they had a chance to select a radio post, the jobber is referring such cases to the Chief Signal Officer in Washington, and doing a real service to Signal Corps and men alike.

The jobber can provide much needed engineering service to local manufacturers, sub-contractors, engineers, research workers and others, stated Mr. Golenpaul, in his review of the report data. In most instances the circuits and problems are highly confidential. Data cannot be taken out of given premises. Having access to such data, the jobber can suggest parts and substitutions, helping convert ideas into working models and even production efforts.



## What did *you* do today ... for Freedom?

Today, at the front, he died . . . Today, what did *you* do?  
Next time you see a list of dead and wounded, ask yourself:

“What have *I* done today for freedom?

What can I do tomorrow that will *save* the lives of  
men like this and help them win the war?”

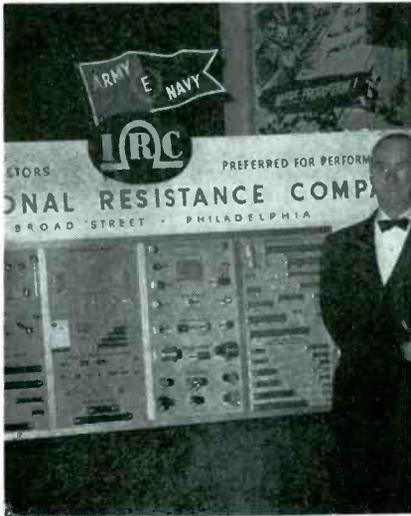
To help you to do your share, the Government has organized the Citizens Service Corps as a part of local Defense Councils, with some war task or responsibility for every man, woman and child. Probably such a Corps is already at work in your community. If not, help to start one. A free booklet available through this magazine will tell you what to do and how to do it. Go into action today, and get the satisfaction of doing a needed war job well!  
**EVERY CIVILIAN A FIGHTER**

CONTRIBUTED BY THE MAGAZINE PUBLISHERS OF AMERICA.

**NEWS**

(Continued from page 24)

**NELSON AWARDED MEDAL**



Donald Nelson, WPB chairman, at the exhibit of International Resistance Company prior to receiving Poor Richard Gold Medal of Achievement.

**BURLINGAME ASSOCIATES MOVES**

Burlingame Associates has moved its offices from 69 Murray Street, New York City, to 10 Murray Street, New York City, effective as of January 25, 1943. The phone numbers remain the same: WOrth 2-5563-4. The companies represented are Audio Development Company, Hewlett-Packard Company and the Supreme Instruments Corporation.

**RADIO INTERCEPT OFFICERS NEEDED**

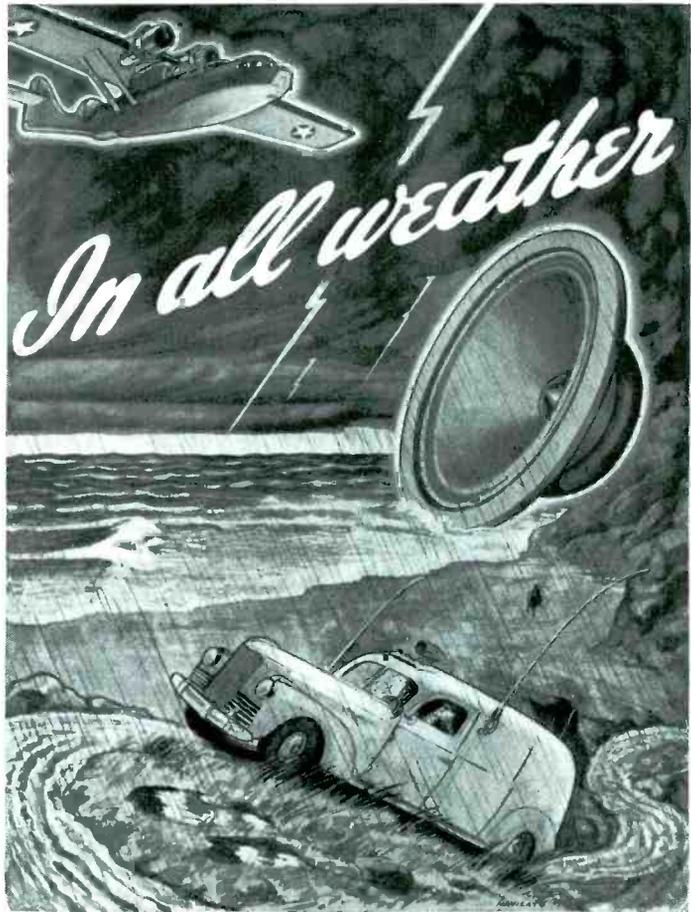
Persons qualified to intercept radio messages are needed by the Federal Communications Commission. The positions pay \$2,000 and \$2,600 a year, plus overtime, which increases the salaries about 21 per cent for 8 hours of overtime a week.

Radio intercept officers will participate with Army Air Forces in effecting radio

**COM. HUTCHINS GREETES LT. MACK**



Lt. Commander Henry A. Hutchins, N. U. sales manager on leave, greeting former N. U. distributor Dahl Mack, now a Lt. in Naval School, where Commander Hutchins is executive officer.



THE "MALLARD" — one of Cinaudagraph Speakers' achievements—designed to meet War standards. The finished Mallard is an unenclosed, moisture-impervious speaker — some have been tested under water and recommended wherever outdoor installations are required.

**Cinaudagraph Speakers, Inc.**

3911 S. Michigan Ave., Chicago

*"No Finer Speaker Made in all the World"*



silence and insuring compliance with silence orders. They will test the efficiency of methods of control, maintain a continuous watch on distress channels, and otherwise participate in monitoring assignments relating directly to the war effort.

For assistant radio intercept officer (\$2,600 a year) persons must have had either a full 4-year course in electrical engineering or physics at a college or university of recognized standing, 4 years of technical experience in the field of radio, or a time-equivalent combination of such education and experience. For the \$2,000 grade, less education and experience is required. Applicants for both grades must be able to transmit and receive in International Morse Code, and in some cases may substitute experience as a radiotelegraph operator, or as an amateur holding

a Class A license, or radio and engineering study at a recognized college or radio institute for part of the prescribed education or experience.

No written test is required, and the only age limitation is that applicants must have reached their eighteenth birthday. Positions are to be filled throughout the United States.

Persons using their highest skills in war work are not encouraged to apply. War Manpower restrictions on Federal appointments are given in Form 3989, posted in first- and second-class post offices. Complete information and applications forms may also be obtained at these post offices, as well as from civil service regional offices and from the commission at Washington, D. C.

(Continued on page 26)

**NEWS**

(Continued from page 25)

**ELECTRONIC CORP. MOVES**

The Electronic Corporation of America, formerly the Transformer Corporation of America, has moved its offices and plant to 45 West 18th Street, New York City.

\* \* \*

**LANGEVIN BUILDS NEW PLANT**

The Langevin Company has just completed their new transformer plant at 37 West 65th Street, New York City. This plant will specialize in the manufacture of electrical transformers of all types for use in radio and Radar communication work.

\* \* \*

**TUBE REPLACEMENT STICKERS**

To facilitate ordering and shipping of tubes for replacement purposes, Century Radio Co., Inc., 401 N. Broad Street, Philadelphia, Pa., have produced special tube stickers. The sticker, about 1" x 2", says, "The types and quantities of Sylvania tubes on this order are required for service jobs on hand only. None will be placed in stock."

This sticker is to be signed by and placed on those orders which call for tubes needed for specific service jobs. Orders containing these stickers will be rationed less critically because the supplier will know that these types and quantities are urgently needed for specific service work. If orders are sent without stickers only those types which are not on the critical list at that time, will be shipped, say Century.

\* \* \*

**FRANK LANGSTROTH WITH ARMY**

Frank Langstroth, former technical editor of *Sylvania News*, has received a leave of absence from the company to enter the United States Army Signal Corps.

\* \* \*

**ED DE NIKE NOW N. U. PUBLIC RELATIONS DIRECTOR**

Ed DeNike, former advertising manager of National Union Radio Corp., Newark, from 1931 to 1940, has been named National Union public relations director.

From 1940 to November, 1942, Mr. De-Nike was District Sales Manager for National Union at Geneva, New York.

**SIMPLIFIED RADIO SERVICING MANUAL**

A new pocket-sized manual, covering short cuts in servicing, written by Major J. G. Tustison, U. S. Army Signal Corps, formerly electronics engineer with ERPI and Altec Service Corporation, has been published by Allied Radio Corporation, 833 West Jackson Boulevard, Chicago, Ill.

The booklet describes practical field-tested methods for servicing electronic and radio devices with only the simplest equipment and tools.

This booklet also includes color code information on resistors, condensers, power and audio transformers, I-f transformers and speaker lead and plug connections. An additional feature is a conversion table of fractional inches to decimal and millimeter equivalents.

Engineers, maintenance and Service Men can obtain this booklet free by sending in requests on their letterheads.

\* \* \*

**"GHIRARDI" BOOK DISPLAY**

An improved *Silent Salesman* combination book display and reading desk for *Ghirardi* radio books has been produced for dealers.

Details will gladly be sent upon request to Radio & Technical Publishing Co., 45 Astor Place, New York, N. Y.



For VICTORY Buy United States War Bonds and Stamps

**POLYMET CONDENSER CO.**  
699 EAST 135th ST., NEW YORK, N. Y.

**JOBBER & DISTRIBUTORS**

If you can furnish us with your suitable ratings,\* we can supply your condenser needs.

**CONTINUOUS DEPENDABLE SERVICE**

\* Ratings A3 and higher on P.D.1x Forms supplied.

**FADA SERVICE DEPT.**

has replacement parts for all FADA models manufactured during the last 10 years. Call, write, phone or send 10c for our latest Replacement Parts Catalog.

**FADA OF NEW YORK**

928 Broadway, New York, N. Y.  
Tel.: IRonsides 6-5400

**PROTECTING THE VOICE AND EARS OF OUR FIGHTING FORCES**

Lives—Victories—depend on the proper performance of the radio equipment which is the voice and ears of our fighting forces. Army and Navy technicians depend on the same accuracy, dependability and ease of operation which have made the name Supreme famous for over 14 years.

Supreme Radio Testing Instruments keep communications open.

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

**WHEN YOU CHANGE YOUR ADDRESS**

Be sure to notify the Subscription Department of **SERVICE** at 19 E. Forty-seventh St., New York City, giving the old as well as the new address, and do this at least four weeks in advance. The Post Office Department does not forward magazines unless you pay additional postage, and we cannot duplicate copies mailed to the old address. We ask your cooperation.

# NEW PRODUCTS

## RCP MULTITESTER

A multitester, type 419, featuring an a-c/d-c voltmeter, milliammeter, ammeter, capacitometer, ohmmeter and inductance meter is now available from Radio City Products Co., Inc., 127 W. 26th St., New York City.

This model has a-c scales that are linear with d-c scales. The sensitivity of the meter is 2,000 ohms per volt, accurate to within 2%. Ohmmeter has self-contained power supply.

Ranges are . . . d-c voltmeter: 0-5-50-250-2,500-5,000 volts. Ac voltmeter: 0-10-100-500-1,000-5,000 volts. Dc milliammeter: 0-1-10-50-250-1,000 ma. Dc ammeter: 0-1-5-25 amps. Capacitometer: 0-.03-.30-3.0-30-300 mfd. Low ohmmeter: 0-100-15,000-150,000 ohms. Megohmmeter: 0-1-5-15 megohms. Inductance measurements (chart reference): .25-1,000 millihenries, .25-100-1,000-10,000 henries.

Model 419 is available in three types.

\* \* \*



## NEW HIT RECORDS

Four new "hit" records have been released by the Classic Record Corp., 2 W. 46th St., New York. They are . . . "Rose Ann of Charing Cross" and "Please Think of Me," recorded by the Peter Piper orchestra, and "Rosie the Riveter" and "I Kissed Your Picture Good Night," recorded by Allen Miller and his orchestra.

\* \* \*

## SHURE REACTANCE SLIDE RULE

A reactance slide rule to speed up the solution of reactance and resonant frequency problems has been devised by Shure Brothers, 225 West Huron Street, Chicago, Ill.

Coil "Q" problems, and dissipation factor problems can also be solved with this new slide rule.

On one side of this slide rule, resonant frequency problems are solved with one setting of the slide, using

$$\omega^2 LC = 1$$

with ranges of 5 cycles to 500 megacycles, .001 mmfd. to 1,000 mfd., and .00001 mh to 10,000 henries.

On the other side of the rule, reactance,

# Some Things are REALLY Scarce Right Now\*



## \*Including Servicemen's Time!

★ THE scarcity of receivers, replacement parts and labor have resulted in a dangerous scarcity of servicing time.

★ The only way you can handle the ever-growing burden is to ration your effort—get the utmost from every precious moment you spend at the bench. Study your consumption of time the same as you check the consumption of any other rationed item.

★ Are you employing the latest methods of servicing procedure—availing yourself of the advantages of testing instruments—using your Rider Manuals on every job?

★ The authorized and comprehensive servicing information in Rider Manuals leads you quickly to the cause of failure—supplies you with the facts that speed repair.

★ Stop wasting time "guessing out" defects; it's your dead-serious duty to work with maximum speed and efficiency.

★ Reach for one of the thirteen Rider Manuals before you begin every job. This way you'll conserve manpower, parts, time, and civilian receivers—all critically scarce right now.

## RIDER MANUALS

Volumes XIII to VII . . . . . \$11.00 each  
 Volumes VI to III . . . . . 8.25 each  
 Volumes I to V, Abridged . . . . . \$12.50  
 Automatic Record Changers and Recorders. 6.00

## OTHER RIDER BOOKS YOU NEED

The Cathode Ray Tube at Work . . . . . \$3.00  
 Frequency Modulation . . . . . 1.50  
 Servicing by Signal Tracing . . . . . 3.00  
 Meter at Work . . . . . 1.50  
 Oscillator at Work . . . . . 2.00  
 Vacuum Tube Voltmeters . . . . . 2.00  
 AFC Systems . . . . . 1.25

HOUR-A-DAY-WITH-RIDER SERIES—on "Alternating Currents in Radio Receiver"—on "Resonance & Alignment"—on "Automatic Volume Control"—on "D-C Voltage Distribution" 90c ea.

## JUST OUT!

A-C CALCULATION CHARTS—Two to five times as fast as a slide rule—and more fool-proof. All direct reading—operative over a frequency range of from 10 cycles to 1000 megacycles. 160 Pages—2 colors—9½x12 inches—\$7.50.

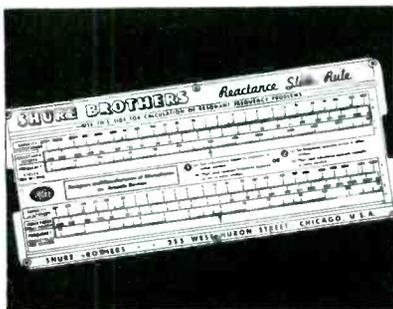
## FOR EARLY PUBLICATION

Inside the Vacuum Tube—complete elementary explanation of fundamentals of vacuum tubes.

## JOHN F. RIDER PUBLISHER, INC.

404 Fourth Avenue - New York City  
 Export Division: Rocke-International Electric Corp.  
 100 Varick St., New York City Cable: ARLAB

# YOU NEED ALL THIRTEEN RIDER MANUALS TO "CARRY ON"



dissipation factor and coil "Q" problems are solved with one setting of the slide, using the following formulae:

$$X_c = \frac{1}{2 \pi f C}$$

$$X_L = 2 \pi f L$$

$$Q = \frac{R}{2 \pi f L}$$

$$D = 2 \pi f C R$$

The ranges on this slide are 0.1 cycle to 10,000 megacycles, 1 mmfd. to 100 mfd., and .001 mh to 100 henries.

This slide rule is available for ten cents.

# TRIPLITT

## Combat Line

### TESTING EQUIPMENT



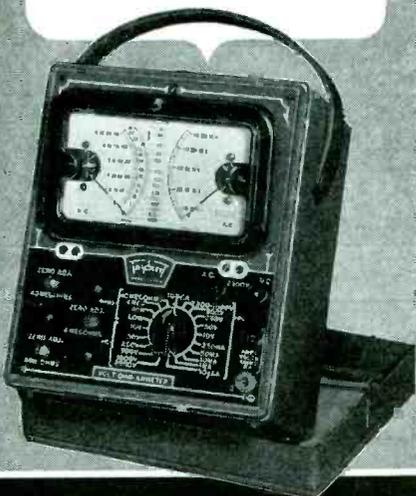
# TRIPLITT

### The Toughest Test in History

Miracles must be done in minutes in mechanized warfare. And Triplitt Testers, built to the needs of war, are valued tools with America's armed forces.

Here are a very few of Triplitt Combat Line Testers. There are many! Each different in adaptation to each specific purpose; unfaillingly alike in precision performance under the toughest test ever devised.

After Victory the values of Triplitt wartime experience will be evidenced by advanced technical superiority and by precision performance that might well seem miraculous today.



### A WORD ABOUT DELIVERIES

Naturally deliveries are subject to necessary priority regulations. We urge prompt filing of orders for delivery as expeditiously as may be consistent with America's War effort.

TRIPLITT ELECTRICAL INSTRUMENT CO.  
BLUFFTON, OHIO

## JOTS & FLASHES

**A** SWELL service for all Service Men is announced by Sprague in their advertising this month . . . read page 4 . . . sorry to hear of death of A. J. "Nick" Carter who was head of the Chicago motor manufacturing company bearing his name . . . a real radio pioneer . . . fifth edition of Sylvania's *Technical Manual* now ready for distribution to Service Men . . . Dahl Mack, former National Union distributor in Scranton, Pa., now a Lieutenant in the Navy studying at Naval Training School at the same place where Lieut.-Commander Henry Hutchins, ex-N. U. Sales Manager is Executive Officer . . . Art Akeroyd, Raytheon Replacement Sales Manager now assigned to special work in the Electrical Equipment Division . . . succeeded by Russ Lund . . . transferred from Chicago to Newton, Mass. . . this month's radio Army-Navy "E" awards to General Radio Company, Electronic Laboratories, DeJur-Amsco Corp., Thermador Electric Mfg. Co., Radio Receptor Co., Cinaudagraph Corp., Formica Insulation Co. . . Harold P. Westman, former secretary of IRE, now spending full time working on War Standards for Radio for American Standards Association . . . Emerson's new house organ, *The Emersonian* is well prepared and a fine morale booster . . . Walter G. Willie, for many years with National Union, now on active duty as a First-Lieut. in Signal Corps . . . Major John F. Rider spent a recent leave renewing trade friendships in New York . . . a big pat on the back to George Barbey, president of NEDA, for the outstanding job he's doing for member distributors . . . Ed DeNike appointed public relations head at National Union . . . Henry Johnson, ex-advertising manager of Sylvania, now full fledged Ensign, U.S.N. . . Allied Radio's new *Radio Data Handbook* will be announced shortly . . . how's the War Bond buying schedule holding up . . . don't slacken on your purchases . . . Uncle Sam needs every dollar you can scrape together to win this tough global war . . . Zenith Radio forms new subsidiary — Zenith Radionics Corp. — to conduct new product research . . . Philco awarded Army-Navy "E" with a white star for continued "meritorious services on the production front" . . . be certain to read all advertising in SERVICE carefully . . . play ball with those manufacturers who are still aware of the Service Man's importance to radio . . . it's essential to keep one set in every home in good operating condition . . . so "keep 'em playing."—P. S. W.

BUY UNITED STATES WAR SAVINGS STAMPS AND BONDS FOR VICTORY



**Old Man Centralab** reminds you to always "specify Centralab" when ordering parts.



**FIXED RESISTORS**



**CERAMIC CAPACITORS**



**VOLUME CONTROLS**



**WAVE CHANGE SWITCHES**



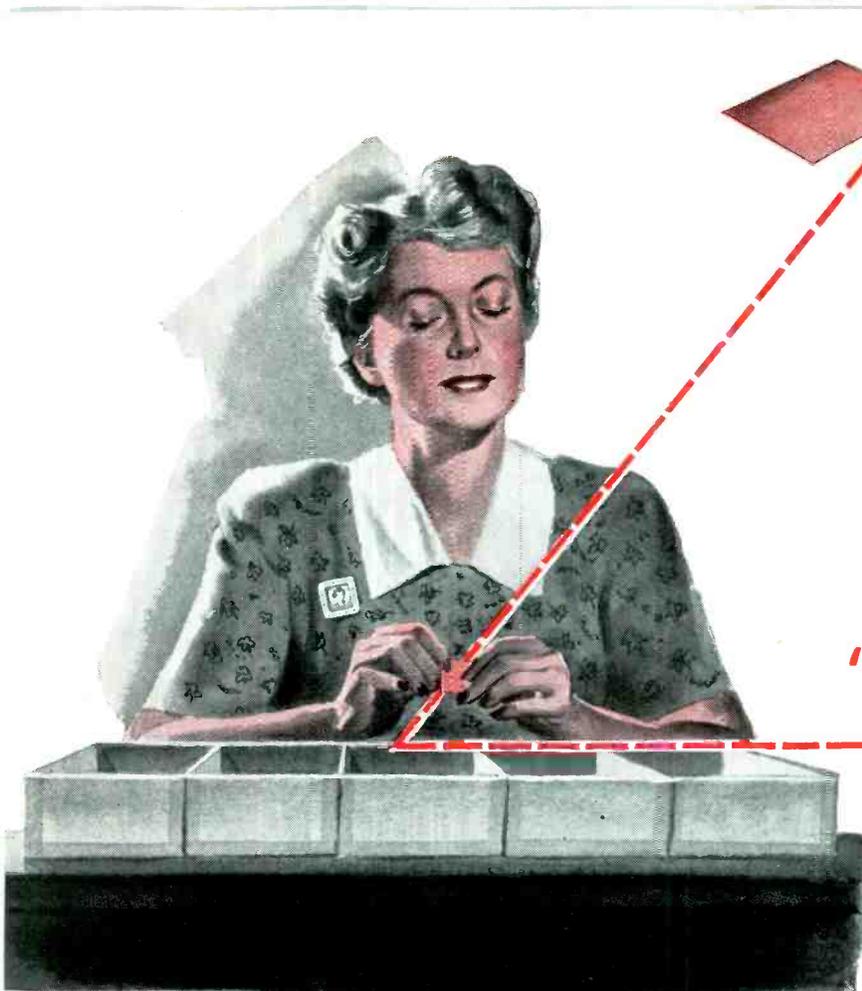
**TOGGLE SWITCHES**

# Centralab

DIVISION OF GLOBE UNION INC.  
MILWAUKEE, WIS.

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**EVEN** war can bring out much that is good.

The gauging of thin mica sheets threatened to be a production bottleneck. Fingers, highly trained by the Braille system, were called upon to replace mechanical gauges and slower vision. The fingers responded.

Today a group of blind employees at SOLAR are gauging mica quicker and more accurately than ever achieved before. They and their "seeing-eye" dogs bring unusual talents to the production front.

## "HANDS THAT SEE"

SOLAR is proud to be a pioneer in drawing upon the untapped reservoir of such able employees. SOLAR "Quality Above All" is well protected by these "hands that see."



*Solar* **SOLAR**

**SOLAR MANUFACTURING CORP., BAYONNE, N. J.**  
Makers of Capacitors (Mica, Paper and Electrolytic)

**— CAPACITORS —**

# GOING THROUGH HELL!



Yes, going through hell . . . and willing to take it! That's the spirit of all America, at the front and at home. You service men of the radio industry, in the armed forces and in your jobs at home, can look to the future with hope and confidence. Victory will bring you who are trained in the electronic arts a new era of opportunity. Electronic devices are the eyes and ears of modern, mechanized warfare. And

National Union, in its tube research and development, is doing its part for the electronic program of our armed forces . . . and for your future as a service man in the field of electronics. With Victory, the quality and precision of National Union manufacture, the ingenuity of National Union research will be devoted to the peacetime marvels of the new era of Electronics.

**NATIONAL UNION RADIO CORPORATION**  
NEWARK, NEW JERSEY • LANSDALE, PENNSYLVANIA



- TRANSMITTING TUBES
- 
- CATHODE RAY TUBES
- 
- RECEIVING TUBES
- 
- SPECIAL PURPOSE TUBES
- 
- CONDENSERS
- 
- VOLUME CONTROLS
- 
- PHOTO ELECTRIC CELLS
- 
- EXCITER LAMPS
- 
- PANEL LAMPS
- 
- FLASHLIGHT BULBS

## NATIONAL UNION ELECTRONIC TUBES