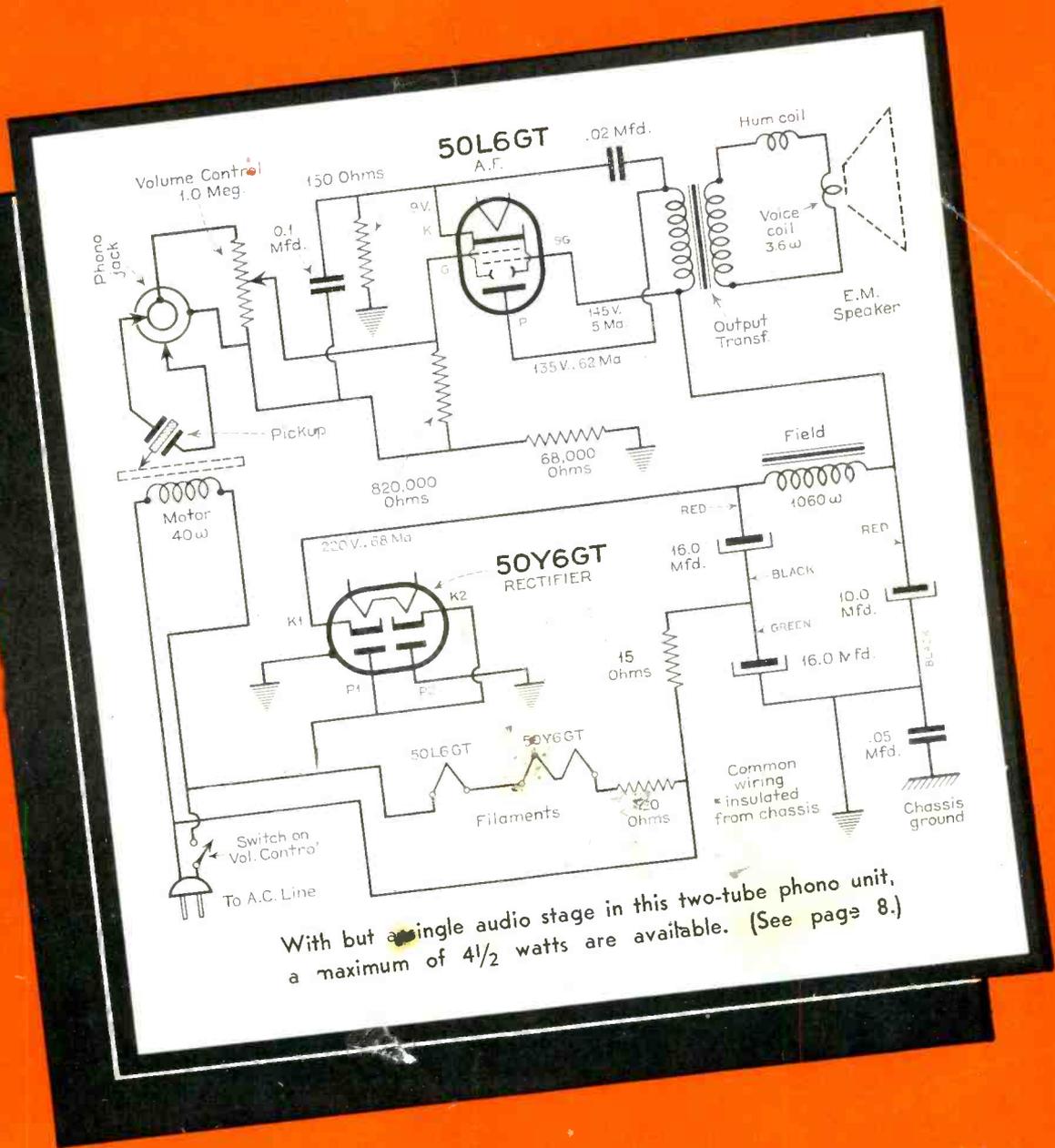
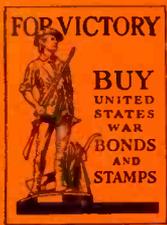


# SERVICE



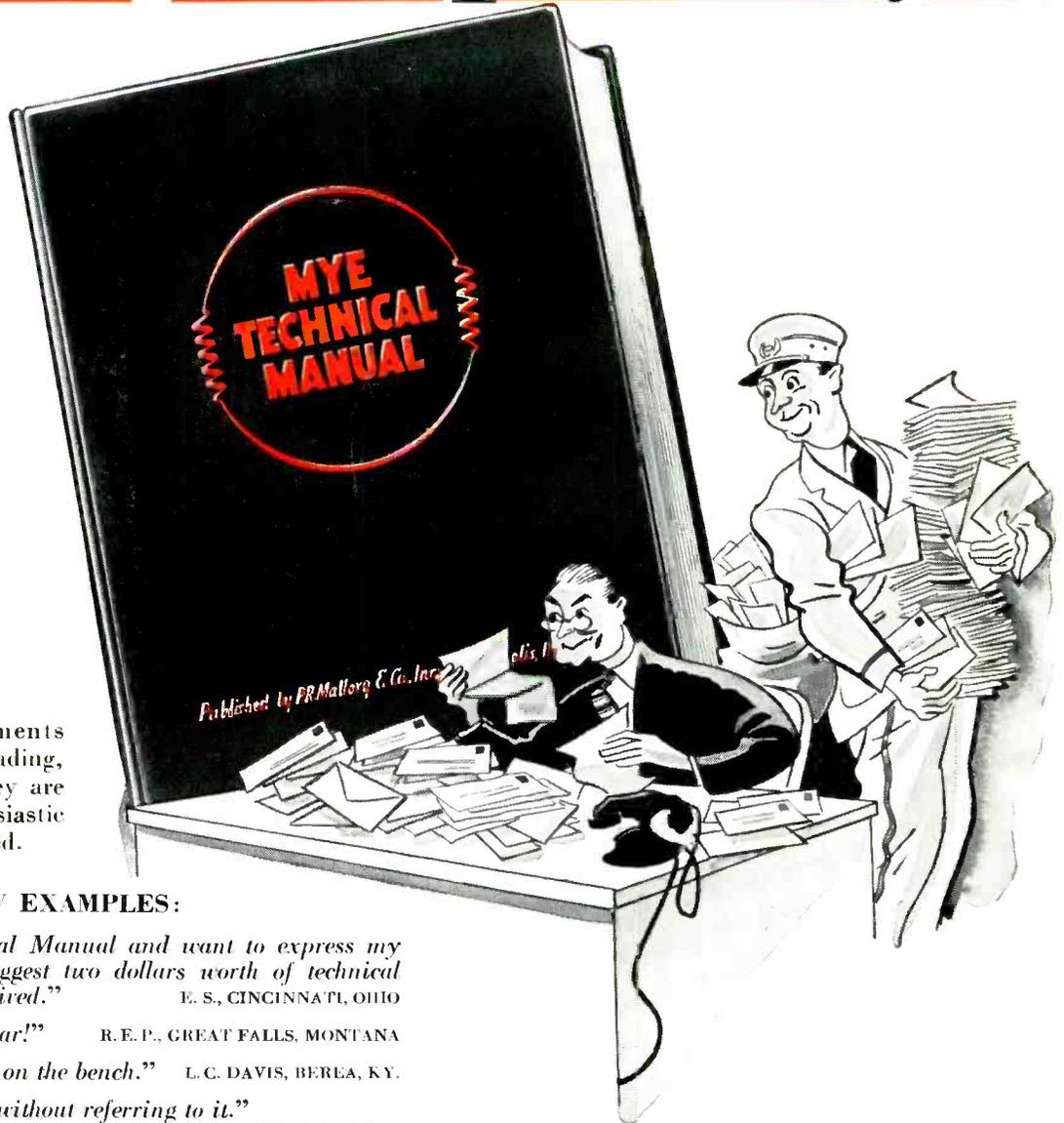
With but a single audio stage in this two-tube phono unit, a maximum of 4½ watts are available. (See page 8.)



December  
1942

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# What People Say..



Unsolicited compliments make interesting reading, particularly when they are as sincere and enthusiastic as these we've received.

## HERE ARE A FEW EXAMPLES:

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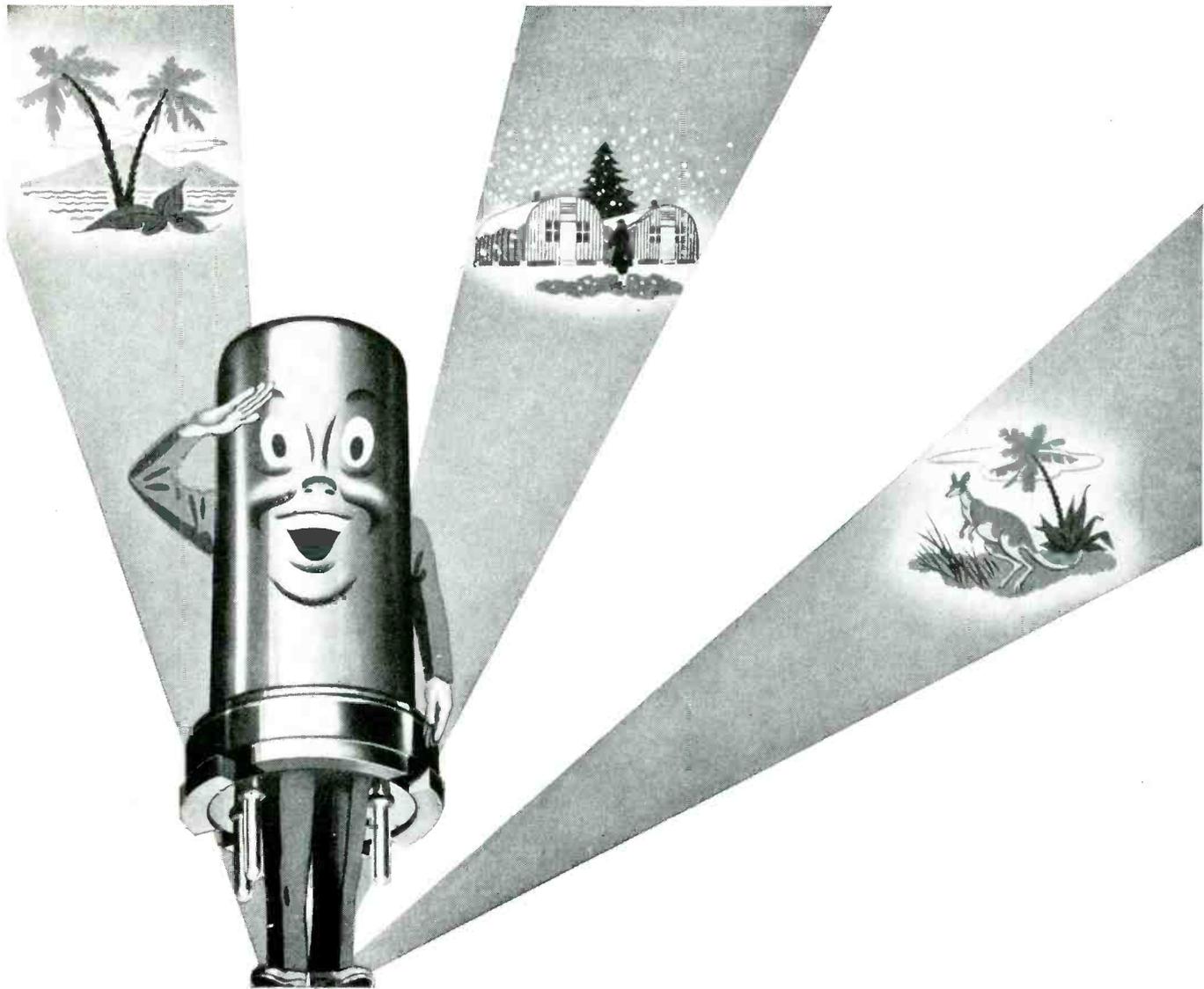
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# KEN-RAD RADIO TUBES

SERVICE, DECEMBER, 1942 • 1

# EDITORIAL

ALTHOUGH the importance of standardization and simplification had been acknowledged by everyone, including those in Washington, the necessary concrete plan of procedure always seemed to be a notch away from completion. However, the necessary decisions to go or stop had to eventually come and fortunately such a decision . . . and in the affirmative . . . has finally come. The OPA and the WPB have sanctioned the formation of a committee, to be guided by the American Standards Association, to establish all component standards. That the WPB program has reached interesting stages is evident from the list of tentative specifications already issued on parts and tubes.

The tentative "standardized" list of components include 11 types of dry electrolytics instead of the customary 375; 11 paper tubular types instead of 300; 61 volume controls instead of 2,700; 10 power transformers instead of 150 and 3 chokes instead of 50. In the tentative listing of tubes for 1943 production, only 118 types are shown!

That the job before the committee and the allied personnel and manufacturers is quite a healthy one is quite evident. Many a step must be passed before this new V line reaches the ultimate consumer. A month or two or perhaps more may have to go by before the complete program is in full progress. However, prudent Service Men, aware of this coming program, can organize their servicing methods now so that the line will ultimately be utilized effectively. All ways and means of using a restricted group of components should be studied and put into immediate practice. In SERVICE, many articles covering this phase have already appeared, and many more will appear.

And talking about planning, Service Men can contribute to another type of planning today, too . . . planning for the post war era. There will be ample need for servicing. Complete stocks of parts, tubes and many new test devices will be essential. You can't buy these now, but you can organize your budget so that a

(Continued on page 8)

# SERVICE

A Monthly Digest of Radio and Allied Maintenance

Reg. U. S. Patent Office

Vol. II. No. 12

December, 1942

**ROBERT G. HERZOG**

Editor (On Leave)

**ALFRED A. GHIRARDI**

Advisory Editor

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## REPLACING FIXED RESISTORS IN RECEIVERS

By M. E. HELLER

**F**IXED resistors occupy an extremely important position in circuits. And today, with their availability becoming more and more difficult, their importance increases, particularly to the Service Man. To effectively service receivers today, the Service Man must know not only what alternate unit to employ, in case of shortage, but how it can be used to the best advantage. To do this, a rather general knowledge of

the purpose and function of fixed resistors in typical circuits is required. In view of the variety of types and receiver positions in use, a standard text discussion might prove confusing. Accordingly special charts have been prepared, with applied functions shown.

### Normal Values Discussed

The values given are normal, or average. Many sets will be found with values

differing as much as 2 to 1, or even greater in rare cases. There is no accounting for the decisions of some radio engineers, so, obviously, we must select the usual values rather than attempt to include all possibilities.

Where a range of resistance values is given . . . say  $\frac{1}{4}$  to  $\frac{1}{2}$  megohm for an audio plate load resistor, the tolerance shown on the chart applies to the particular value in question. A  $\frac{1}{4}$  megohm

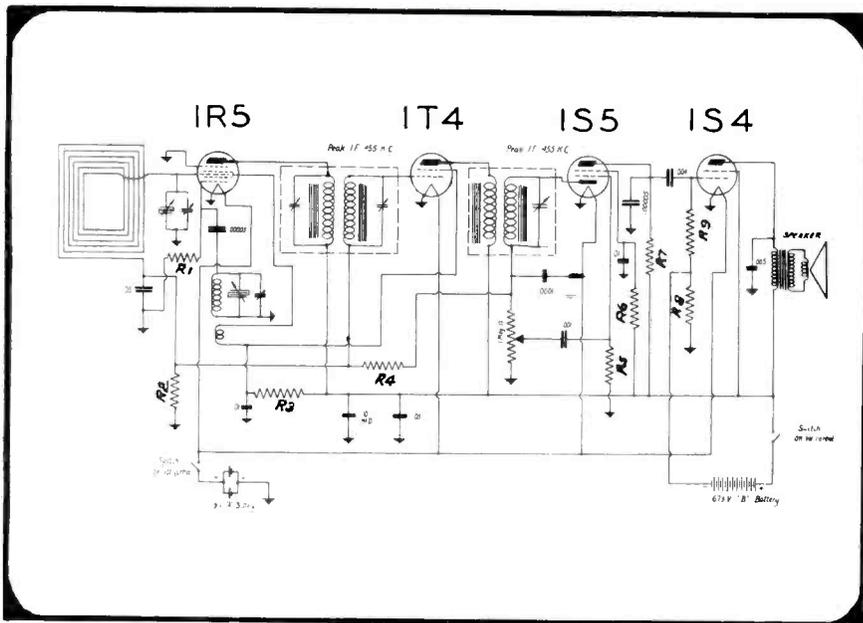
### RESISTORS USED IN TYPICAL 4-TUBE BATTERY RECEIVER

Fig.	Res.	Circuit Location	Function	Usual Value in Ohms	Applied Voltage	Type	Usual Wattage	Tolerance	Remarks
1	R1	osc	grid leak	22,000	r-f and d-c	carbon	$\frac{1}{4}$ W	$\pm 20\%$	
1	R2	avc	r-f and a-f filter	2 meg.	d-c, r-f and a-f	carbon	$\frac{1}{4}$ W	$\pm 30\%$	
1	R3	audio	first a-f grid leak	2-15 meg.	a-f	carbon	$\frac{1}{4}$ W	$\pm 30\%$	dependent on coupling cond. used*
1	R4	audio	plate load	$\frac{1}{4}$ - $\frac{1}{2}$ meg.	d-c and a-f	carbon	$\frac{1}{4}$ W	$\pm 20\%$	depends on constants
1	R5	audio	first a-f grid leak	$\frac{1}{4}$ -1 meg.	a-f	carbon	$\frac{1}{4}$ W	$\pm 30\%$	a-f
1	R6	audio	second a-f grid bias	150	d-c and audio	carbon or wire	$\frac{1}{2}$ W	$\pm 10\%$	voltage used to produce degeneration

\* Some d-c developed as automatic bias.

### RESISTORS IN A TYPICAL 5-TUBE A-C/D-C RECEIVER

Fig.	Res.	Circuit Location	Function	Usual Value in Ohms	Applied Voltage	Type	Usual Wattage	Tolerance	Remarks
2	R1	osc	grid leak	100,000	r-f and d-c	carbon	$\frac{1}{4}$ W or less	$\pm 20$	
2	R2	avc	r-f and a-f grid bias	2-10 meg.	d-c	carbon	$\frac{1}{4}$ W or less	$\pm 20$	Tolerance dependent on gain
2	R3	sg	screen supply	10,000	d-c	carbon	$\frac{1}{4}$ W or less	$\pm 20$	
2	R4	avc	filter avc	2-10 meg.	r-f, d-c and r-f	carbon	$\frac{1}{4}$ W or less	$\pm 30$	
2	R5	audio	first a-f grid leak	5-15 meg.	a-f	carbon	$\frac{1}{4}$ W or less	$\pm 30$	See R3 Fig. 1
2	R6	audio	first a-f screen vol	3-5 meg.	d-c	carbon	$\frac{1}{4}$ W or less	$\pm 30$	
2	R7	audio	first a-f plate load	1 meg.	d-c and a-f	carbon	$\frac{1}{4}$ W or less	$\pm 20$	
2	R8	audio	second a-f bias	800-900	d-c	carbon	$\frac{1}{4}$ W or less	$\pm 10$	
2	R9	audio	second a-f grid leak	2-3 meg.	a-f	carbon	$\frac{1}{4}$ W or less	$\pm 30$	



resistor should be replaced with a new  $\frac{1}{4}$  meg unit plus or minus the tolerance; similarly for the  $\frac{1}{2}$  megohm resistor. In general, the  $\frac{1}{4}$  megohm unit should not be replaced with a  $\frac{1}{2}$  megohm unit or vice versa. In a pinch, however, tolerances may be greatly exceeded, but not promiscuously. A good background of theory and experience will be of great assistance in the amount of liberty taken.

Where resistors are called upon to dissipate a sizeable amount of heat, a knowledge of wattage ratings and calculations is important. The general practice among Service Men seems to be the

Figs. 1 (below) and 2 (top). Resistors used in these receivers are analyzed in tables appearing on page 5.

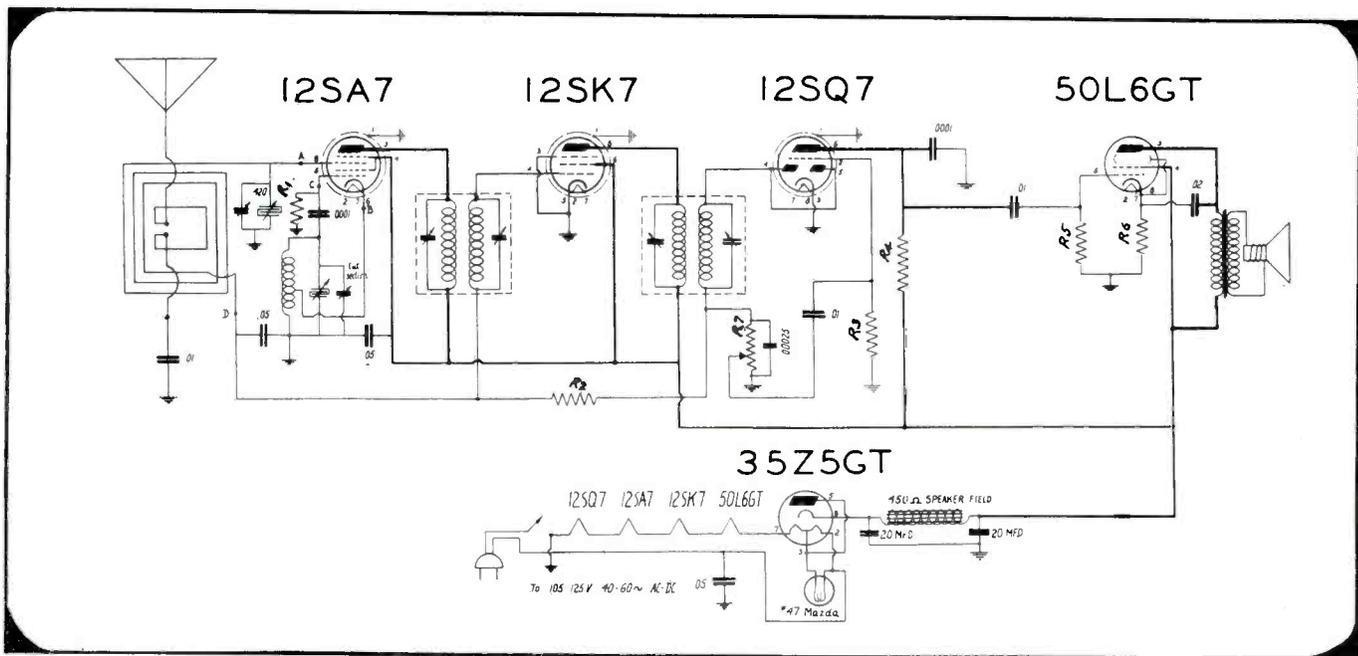
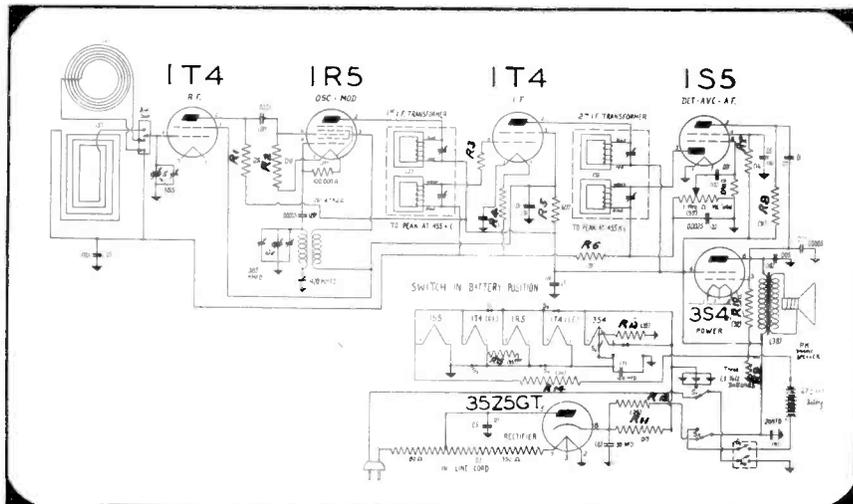


Fig. 3. A 6-tube with a variety of resistors, the characteristics of which are analyzed in the table at top of page 7.



employment of resistors having at least double the average wattage dissipation expected—such as the use of a 1 watt resistor for an element dissipating  $\frac{1}{2}$  watt. A little common sense should guide the user in the amount of deviation possible. The ambient temperature and the particular position of the resistor have a great deal to do with the choice of power rating; also the possibilities of line voltage variation. A resistor should never be run at its full rating, even if it is in the clear, away from any obstruction. A little safety factor should always be allowed. In a radio chassis, we never see a resistor so enjoying itself; hence, the 2 to 1 allowance. Where parts are really jammed together, better allow at least 3 to 1.

Wattage calculations are now as fa-

## RESISTORS EMPLOYED IN TYPICAL 6-TUBE THREE-WAY RECEIVER

Fig.	Res.	Circuit Location	Function	Usual Value In Ohms	Applied Voltage	Type	Usual Wattage	Tolerance	Remarks
3	R1	r-f	r-f plate load	5,000-10M	r-f and d-c	carbon	¼ W or less	± 20%	determines coupling
3	R2	r-f	grid leak	47M-470M	r-f	carbon	¼ W or less	± 20%	
3	R3	i-f	suppressor	500-1,000	i-f	carbon	¼ W or less	± 10%	suppress oscillations
3	R4	filament	initial bias supply	50-500	d-c	carbon	¼ W or less	± 20%	
3	R5	screen	screen supply	3M-10M	d-c	carbon	¼ W or less	± 20%	
3	R6	avc	avc	3-5 meg	d-c	carbon	¼ W or less	± 30%	
3	R7	audio	first a-f screen vol	3-5 meg.	d-c	carbon	¼ W or less	± 30%	
3	R8	audio	first a-f plate load	1 meg.	d-c and a-f	carbon	¼ W or less	± 20%	
3	R9	audio	second a-f bias	800-900	d-c	carbon	¼ W or less	± 10%	
3	R10	audio	second a-f grid leak	2-3 meg.	a-f	carbon	¼ W or less	± 30%	
3	R11	d-c	filter "a"	1700-2500	drops "b" to filament	wire	6-10 W or less	± 5%	
3	R12	d-c	filter "b"	1500-3000	d-c	carbon	1 W or less	± 10%	substitutes for choke
3	R13	filament	filament equalizer	500-1500	d-c	carbon	¼ W or less	± 10%	compensates for plate current
3	R14	filament	a-f bias	600-1000	d-c	carbon	¼ W or less	± 10%	line position only
3	R15	filament	filament equalizer	500-1500	d-c	carbon	¼ W or less	± 10%	compensates for plate current

miliar as tuning operations to the great majority of Service Men, so we wont go into that. Both  $I^2R$  and  $\frac{E^2}{R}$  may be used to figure the power wasted in a resistor. (Be careful not to use these

formulae in a-c circuits where any reactive element (coil or condenser) is present). Full rating of a wire-wound resistor will produce a temperature rise of 160 degrees Centigrade, for a cement coated type employing asphaltic binders and a rise of 250 degrees for vitreous

enamel resistors or cement coated types using inorganic binders, these ratings being for open air operation. Wire-wound elements are generally limited to 5000 or 10,000 ohms for a 1 watt size and progressively higher for larger units. Their main use lies in power sup-

## RESISTORS USED IN 8-TUBE BATTERY/A-C RECEIVER

Fig.	Res.	Circuit Location	Function	Usual Value In Ohms	Applied Voltage	Type	Usual Wattage	Tolerance	Remarks
4	R1	r-f	r-f plate load	1M-5M	r-f and d-c	carbon	½ W	± 15%	determines coupling
4	R2	r-f	grid load	47M-470M	r-f	carbon	¼ W	± 20%	
4	R3	r-f	r-f bias	250-500	d-c	carbon	¼ W	± 20%	
4	R4	screen	screen voltage	10M-25M	d-c	carbon or wire	2 W	± 15%	
4	R5	osc	grid leak	22,000	r-f and d-c	carbon	¼ W	± 20%	
4	R6	tuning eye	Target supply vol	1 meg.	d-c	carbon	¼ W or less	± 20%	usual in socket
4	R7	avc	avc	2-4 meg.	r-f, a-f and d-c	carbon	¼ W or less	± 20%	
4	R8	a-f	audio filter	50M-100M	a-f	carbon	¼ W or less	± 30%	substitutes for choke
4	R9	audio	first a-f grid leak	2-15 meg.	a-f	carbon	¼ W or less	± 30%	
4	R10	audio	plate load	¼-½ meg.	d-c and a-f	carbon	¼ W	± 20%	
4	R11	audio	first a-f second a-f grid leak	½-1 meg.	a-f	carbon	¼ W	± 30%	
4	R12	"b" supply	filter	1M-2M	d-c	wire or carbon	6-8 W	± 10%	substitutes for choke
4	R13	"b" supply	filter	100-300	d-c	carbon or wire	2 W	± 10%	substitutes for choke
4	R14	vibrator	hash-filter	100-500	a-c	carbon	1 W	± 15%	suppresses spark
4	R15	osc	bias equalizer	600-1M	r-f and d-c	carbon	¼ W	± 15%	improves sensitivity on short waves

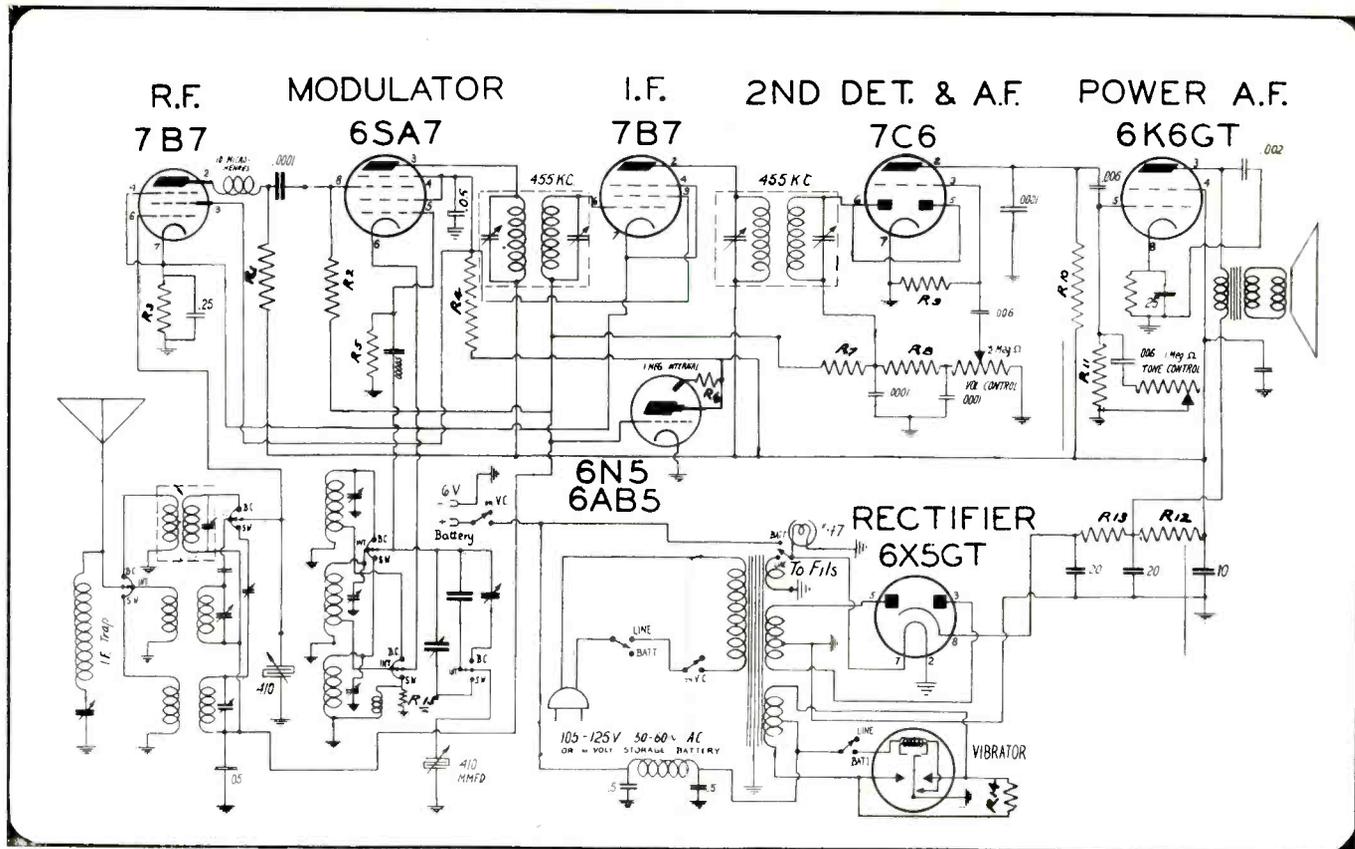


Fig. 4. A battery/a-c 8-tube super that uses fixed resistors in an unusually effective manner.

plies for voltage dividers, bias resistors and surge protectors.

When a Service Man thinks of a radio resistor nowadays, however, he is usually considering one of composition type, popularly known as carbons. These have a great flexibility in range, being made in values from below 100 ohms to 20 or more megohms. The metallized type resistors are considered in the same class although they are essentially different. Carbons employ a conducting powder and binder mixed together in definite proportions whereas the metallized type has a conducting coat baked on the surface of a continuous glass filament. Many of these resistors have a considerable frequency effect whereby high frequencies cause a lowering of resistance value which is very considerable for the ultra highs . . . 10 to 1 or more. Also, carbon type resistors have a negative temperature coefficient of resistance. This means that, as the unit heats up, its resistance decreases instead of increasing such as most conductors do. This causes a cumulative effect. As it gets hotter, its value goes down, it draws more current, it gets still hotter . . . , etc. And, in some cases, it will be ruined. All these composition types are color coded similarly, RMA style. One bad fault with these resistors is the noise generated in them in cases of high gain. When a circuit containing one or more of them is followed by a

large amount of gain, noise will result.

Resistances in filters are often a makeshift application. Chokes would do a lot better job. But price and space must be considered.

## Two-Tube Phono Unit Affords 4 Watts Output

(See Front Cover)

A SINGLE audio stage with an unusually high power output is a feature of the 2-tube a-c RCA Victor model R-56. A maximum of 4½ watts and 2.25 watts, undistorted, are obtained with the aid of a high level crystal pickup and a voltage doubler rectifier circuit. Magnets being scarce, a field coil speaker is used. The filter consists of the field coil with a pair of 16 mfd. input condensers and a 10 mfd. final section.

No cathode bypass condenser is used across the 150 ohm bias resistor. Considering that every bit of possible gain should be utilized in a single tube audio amplifier of this kind, it might seem a needless sacrifice to leave out this condenser. This is not the case, however, because the input circuit employed is not standard; a resistance capacitance decoupling circuit being used. The grid current from the pickup voltage has a choice of getting to cathode through the .1 mfd. bypass or through the bias resistor by way of a 68,000-ohm discouraging resistor. Cathode bias resistors are bypassed to prevent an a-c

voltage drop in the resistor due to combined plate and grid currents which would cause degeneration, the amount being proportional to the voltage drop. In this phonograph, grid voltage is discouraged from going through the bias resistor by the 68,000-ohm resistor from the low side of the pickup to ground. The effectiveness of this arrangement is easily calculated by obtaining the ratio of impedances of the two paths described. The .1 mfd. condenser has an impedance of 68,150 ohms at about 23 cycles. (For bypass data and impedance calculations, see pages 5, 6 and 7, SERVICE for November, 1942.)

The audio range of a device of this type would not ordinarily go below 100 cycles, perhaps 150 cycles. The lowest note giving the least favorable ratio, four-fifths of the grid current under question would still go through the condenser, not through the resistors. For 400 cycles, a common measuring frequency, the ratio would be 17 to 1.

## EDITORIAL

(Continued from page 2)

certain amount can be appropriated for these necessary expenses when the time comes. Buying War Bonds is one way of providing these funds. Remember that after the war, credit lines will be drawn tightly. These "sinking funds" will certainly be welcome. Well stocked shelves . . . the latest in test equipment will get you that business. So start saving and planning now!

# INSTANTANEOUS SOUND-RECORDER WARTIME SERVICE

By **ALFRED A. GHIRARDI**

Advisory Editor

## PART 3

**T**HE servicing of instantaneous recorders is quite easily accomplished if the Service Man learns to adopt a systematic trouble-shooting procedure adapted to the particular problems at hand and, also, if he learns the usual causes of the many common troubles that are encountered in instantaneous recording work.

### Good Recording Technique Essential

It must be fully realized and understood at the outset that faulty recordings are not always due to troubles in the equipment. When Aunt Minnie's voice plays back like that of Donald Duck on a rampage, it may be Aunt Minnie's fault, and not that of the recording equipment. Making good recordings is not all mechanics and electricity. The personal care and skill which the operator brings to this work is also of vital importance. Lack of it is responsible for more faulty recordings than are actual equipment troubles—simply because purchasers of recording equipment are not usually instructed sufficiently in its proper use. Poor microphone technique, careless manipulation of the volume level control, use of a dull or nicked recording stylus, im-

proper depth of cut, etc., will produce faulty recordings on the best recorder in the world.

Therefore, it must be assumed here that the customer is using good technique in making the recordings—otherwise the Service Man should instruct him in the proper methods to be employed by actually showing him how to record properly with his own equipment. Every manufacturer of recording equipment will gladly supply instructions for this phase of the work. This leaves for our consideration only those troubles due to actual faults in the equipment or materials used.

### Preliminary Troubleshooting Routine

The Service Man's job usually starts at the point where he is informed that the recorder does not work at all, or else, the recordings made with it have some particular defects. Many of the most frequent troubles cannot be checked with any of the test instruments he ordinarily employs in his routine radio service work. Instead, they must be tracked down by purely visual and aural observations, as we shall see. Consequently it is vitally important for him to learn just what the troubles usually encountered in this work are, what their aural symptoms are, and what remedies will eliminate them most directly and effectively.

The following outline provides a rapid, systematic trouble shooting procedure to follow. Of course, it may be modified to suit individual equipment and trouble conditions.

(1) Inspect the grooves of several of your customer's recordings with a suitable magnifying glass in order to discover any obvious troubles.

(2) In radio-phonorecorder combinations first check the audio amplifier and speaker system by playing the radio and noting the volume, tone quality, noise, hum, ability to handle loud volume without overloading and distortion, etc. If performance is okay, these units may visually be eliminated from suspicion.

(3) Check the phono pickup, and the

volume and tone control circuits, by playing a good commercial record. Note volume, tone, scratch, noise, hum, ability to handle loud volume, etc. Also look for any defects or peculiarities in the operation of the phono motor and turntable system. "Wow," waver, squeaks, etc., should be noted. Any mechanical vibration present will record as hum on a disk later.

(4) Any troubles observed during the two foregoing tests will call for further trouble shooting in these portions of the equipment, employing the various tests used in ordinary radio service work. Naturally the amplifier and playback equipment must be put in perfect working order before concentrating attention on the recording equipment. The second test will also reveal any defects or peculiarities in the phono motor and turntable system and these should be corrected.

(5) Inspect the cutting surfaces of the cutting stylus with a suitable magnifying glass of about 20 power. In order to obtain a perfect groove, it naturally follows that the cutting tool must be of the highest order; a chipped edge or broken stylus point will result in groove

(Continued on page 30)

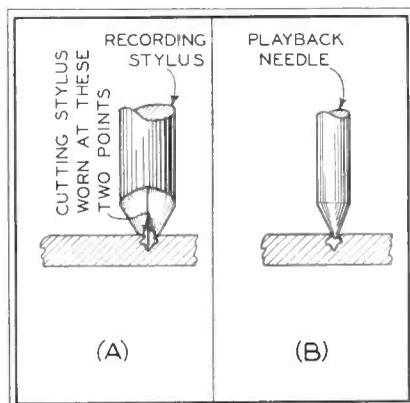


Fig. 1. Effect (A) of natural wear at the disc surface line of the recording stylus. The playback needle riding on these rough edges is shown at (B). These are end-on views.

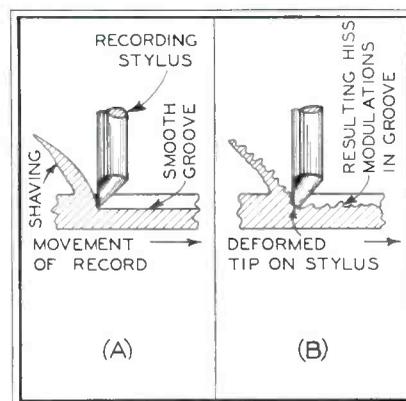


Fig. 2. The clean, smooth, "noiseless" groove bottom which results when the stylus point is sharp and correct (A), and (B) the ragged groove bottom which results when the stylus tip is deformed. These are cross-section side views.

# TO "EVEREADY"

Here's how the recent WPB restrictions on radio batteries for civilian use affect you:



## *NO MORE PORTABLE TYPE BATTERIES*

The fighting forces, particularly the U. S. Signal Corps, have found so many important uses for our radio batteries they are taking every one we can make. This includes, of course, the popular "Eveready" "Mini-Max" battery as well as the other portable types.



## *A LIMITED QUANTITY OF FARM TYPES*

Production of this entire line has been severely cut. From now on we will concentrate on the more popular types.



## *DRY CELLS FOR ESSENTIAL CIVILIAN NEEDS*

While the production of "Eveready" No. 6 Dry Cells is restricted, we hope to supply enough of these batteries to fill essential civilian needs.

# RADIO BATTERY DEALERS

**N**EEDLESS to say, we regret the necessity for this drastic curtailment of "Eveready" Radio Battery line. Particularly as we know it was your support that helped create the manufacturing skill and productive capacity which have become so vital to our War Program.

By the same token, you certainly can share our pride in the job we are able to do for the Army, the Navy and the Lend-Lease Account.

Meanwhile we will do our best to provide an equitable allocation of the "Eveready" Radio Batteries we are permitted to produce for civilian use.

NATIONAL CARBON COMPANY, INC.  
*Unit of Union Carbide and Carbon Corporation*



The words "Eveready," "Mini-Max," "Ignitor" and "Layer-Bilt" are registered trade-marks of National Carbon Company, Inc.



# SER-CUITS!

By HENRY HOWARD

UNUSUAL voltage doubling systems, increased phono-power outputs and high gain loop circuits are among the circuit highlights of this month's discussion.

In the RCA Victor V-135, for instance, a 50Y6GT with two 16 mfd. condensers is used in the double rectifier system. The 750-ohm speaker field is aided by a 330-ohm resistor for better filtering. The oscillator grid coil returns to the avc bus instead of "B-". This automatically applies the negative bias to the bus due to the rectified r-i from the oscillator grid, as we see in Fig. 1. The phono-radio switch in this receiver is also the On-Off line switch and tone control. There are two tone positions for phono and two for radio.

### Westinghouse WR-42X3 and 42X7

Westinghouse console models WR-

42X3 and 42X7 also have voltage doublers using 25Z6 rectifiers. These sets are designed around 300 mil tubes

which have become somewhat of a rarity in modern sets. However, these are large phono combination sets with built-

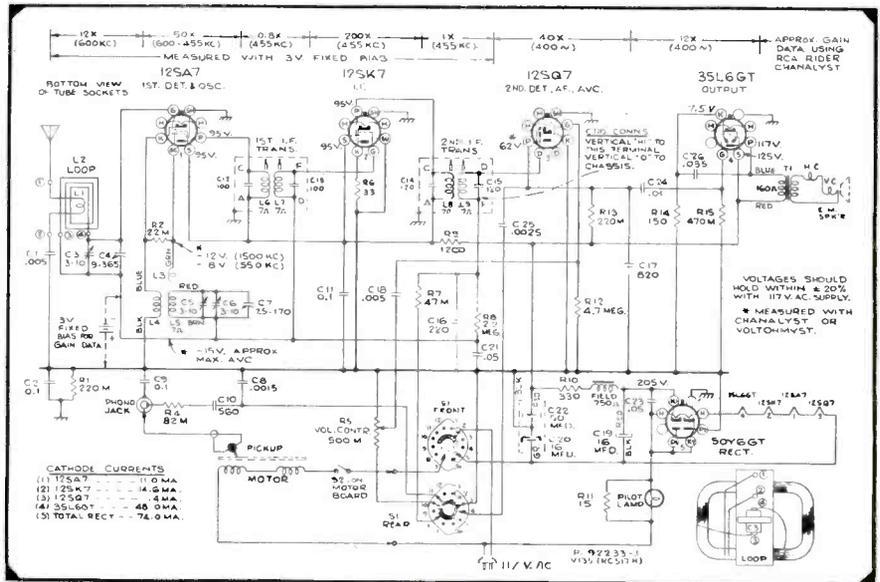
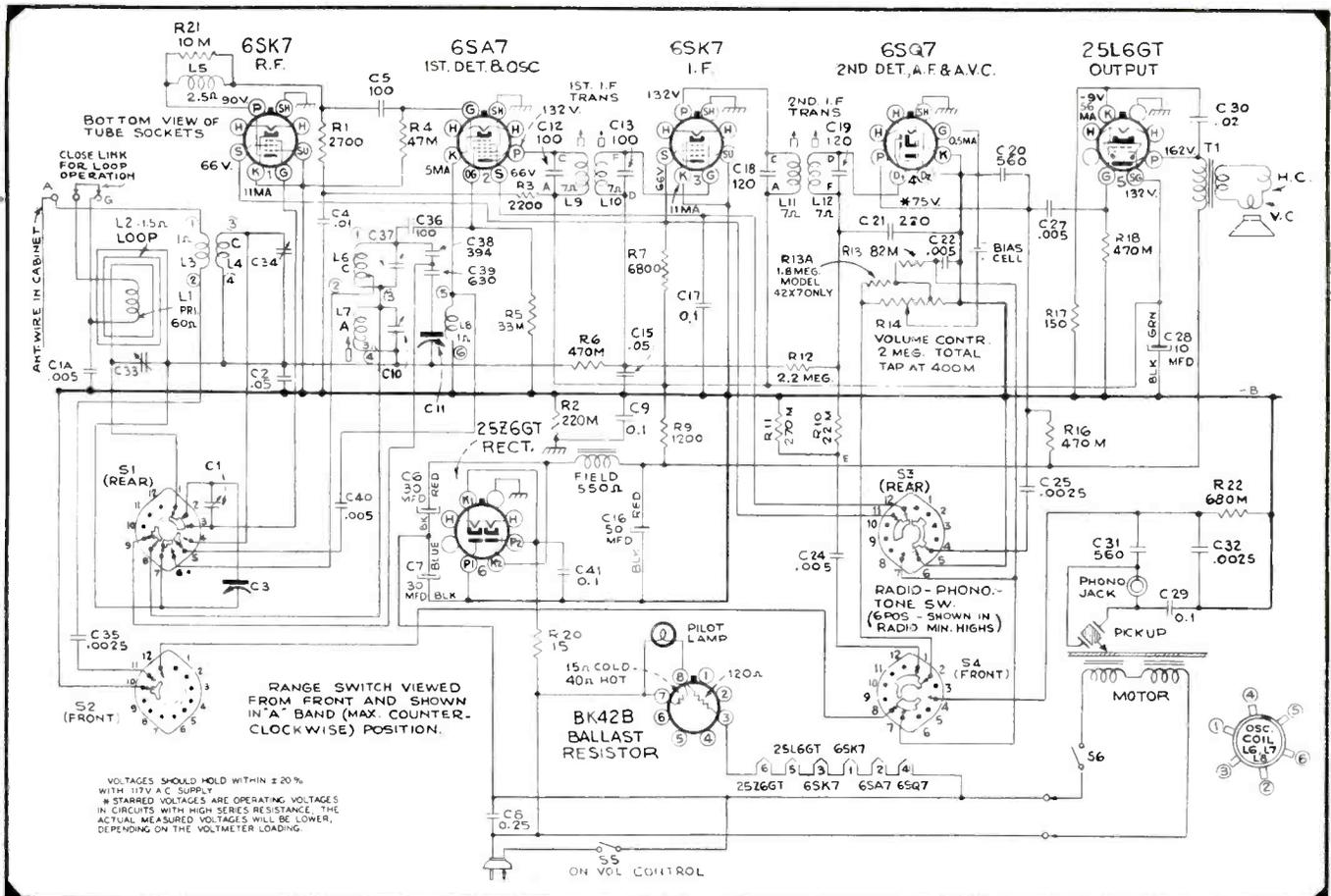


Fig. 1 (right) RCA V-135. Fig. 2 (below) Westinghouse WR-42X3 and 42X7.



in loops so there is plenty of room for heat dissipation. Note the oscillator circuit in Fig. 2 which shows a change from the standard cathode tickler circuit on broadcast to a Hartley with hot cathode on short waves. The 6SA7 screen is opened for phono operation. A 2-megohm volume control with a tap at 400,000 ohms from the low end is part of a compensation circuit.

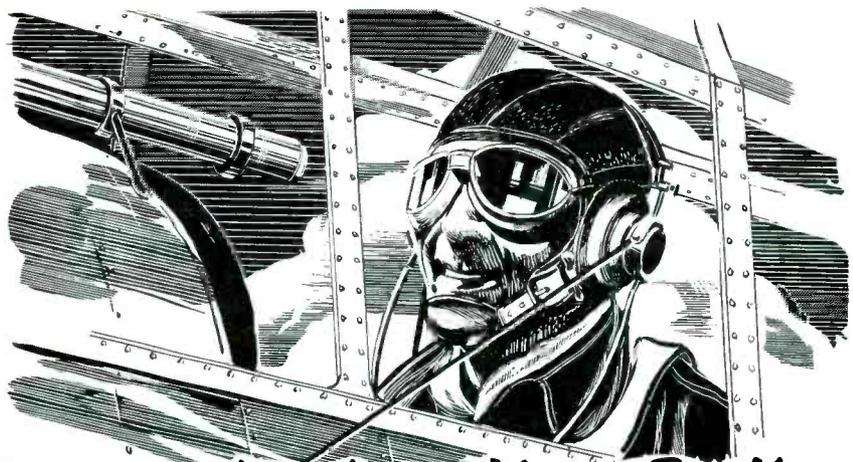
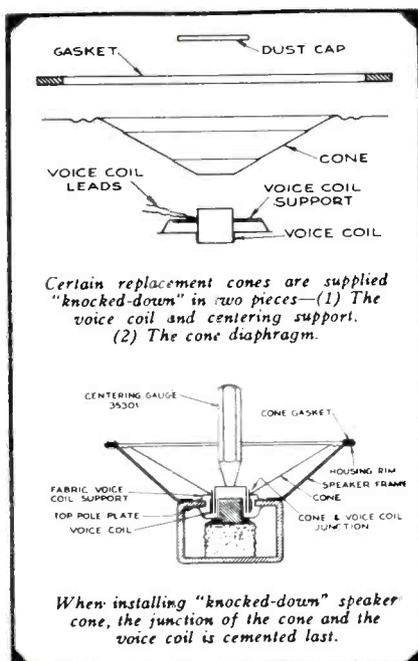
The service notes on this receiver call for critical lead dressing, something often neglected by Service Men. While it is true that, in most cases, lead dressing may not show any obvious changes in performance, it provides that extra bit of improvement in hum reduction and adds to the stability of r-f circuits, often preventing oscillation. Specifically, the bulletin requires the following operations: dress bias cell up from chassis and away from a-c switch; dress tone control leads and power tube grid leak away from a-c switch and leads; dress volume control compensation resistors close to front apron and the same treatment for the resistors in the pickup equalizer circuit; antenna lead to terminal board to be dressed in back of i-f transformers, etc.

Westinghouse stresses this dressing in many of their circulars. The way in which chassis are built nowadays allows unwanted coupling and induction to occur when leads are allowed to remain in a sloppy condition. We believe this advice to be good. And, of course, it applies to all sets, regardless of make.

#### Westinghouse WR-42X1

In model WR-42X1, Westinghouse

Fig. 7. Illustrating cone replacement tricks. (See pages 18 and 20.)

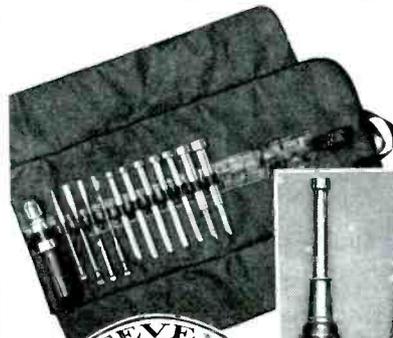


## Communications Must Be Kept

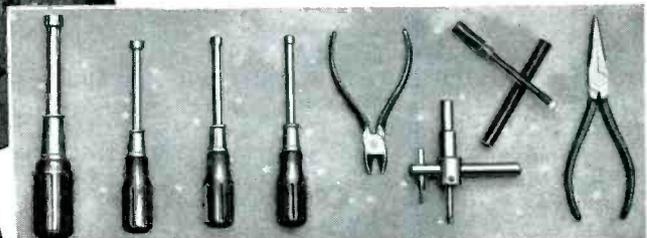
The intricate maze of modern radio equipment needs frequent servicing . . . and good tools to speed the work. Spintite, the wrench that works like a screw driver is on the job from assembly lines to air bases . . . on ship and ashore.

Originally developed by Stevens Walden, Spintite features drilled shank, non-slip handle, precision machining . . . a tool to do a better job.

To speed your production or to facilitate servicing, we offer these wrenches produced by a plant with over 36 years experience in building good tools. Send for catalog showing complete range.



T51 Set at left, is popular for quick repairs. Chuck type handle, 7 Spintites with sockets ranging from 3/16" to 1/2", Reamawl, three screw drivers in various sizes. All in compact leatherette roll.



**STEVENS WALDEN, INC.**

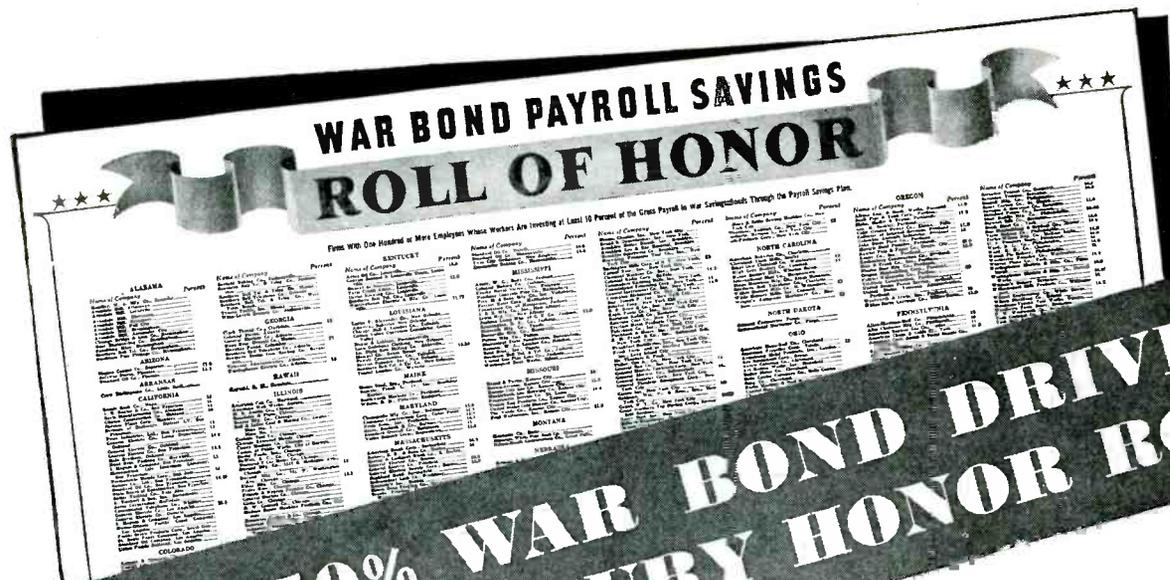
**467 SHREWSBURY STREET**

**WORCESTER, MASSACHUSETTS, U. S. A.**

table model phonograph, the power output is considerably increased on phono operation by raising the plate and screen voltage on the power tube. Fig. 3 shows the "B" circuit. The highest voltage point, right at the rectifier cathode, feeds the output plate only. Note the tap on the output transformer, similar to other circuits previously described in this column. This tap reduces the amount of saturation of the core due to the d-c plate current and improves the low frequency response. A 1500-ohm resistor drops the "B" voltage for the

output tube screen and first a-f plate, and runs through the phono-radio switch to provide plate and screen voltages for the r-f tubes. When this r-f plate current circuit is opened, the first a-f plate and power tube screen are considerably raised in potential. The plate voltage of the 50L6GT also rises somewhat due to the decreased load on the rectifier. This stunt increases the undistorted output from 0.9 watt to 1.5 watts; the maximum power from 1.2 to 2.2 watts.

(Continued on page 15)



The eyes of all America are upon the United States Treasury Roll of Honor appearing in the "Payroll Savings News." For a copy write War Savings Staff, Treasury Department, Washington, D. C.

### HOW TO "TOP THAT 10% BY NEW YEAR'S"

Out of the 13 labor-management conferences sponsored by the National Committee for Payroll Savings and conducted by the Treasury Department throughout the Nation has come this formula for reaching the 10% of gross payroll War Bond objective:

1. **Decide to get 10%.**  
It has been the Treasury experience wherever management and labor have gotten together and decided the job could be done, the job was done.
2. **Get a committee of labor and management to work out details for solicitation.**
  - a. They, in turn, will appoint captain-leaders or chairmen who will be responsible for actual solicitation of no more than 10 workers.
  - b. A card should be prepared for each and every worker with his name on it.
  - c. An estimate should be made of the possible amount each worker can set aside so that an "over-all" of 10% is achieved. Some may not be able to set aside 10%, others can save more.
3. **Set aside a date to start the drive.**
4. **There should be little or no time between the announcement of the drive and the drive itself.**  
The drive should last not over 1 week.
5. The opening of the drive may be through a talk, a rally, or just a plain announcement in each department.
6. Schedule competition between departments; show progress charts daily.
7. Set as a goal the Treasury flag with a "T."

AS of today, more than 20,000 firms of all sizes have reached the "Honor Roll" goal of at least 10% of the gross payroll in War Bonds. This is a glorious testimony to the voluntary American way of facing emergencies.

But there is still more to be done. By January 1st, 1943, the Treasury hopes to raise participation from the present total of around 20,000,000 employees investing an average of 8% of earnings to over 30,000,000 investing an average of at least 10% of earnings in War Bonds.

You are urged to set your own sights accordingly and to do all in your power to start the new year on the Roll of Honor, to give War Bonds for bonuses, and to purchase up to the limit, both personally and as a company, of Series F and G Bonds. (Remember that the new limitation of purchases of F and G Bonds in any one calendar year has been increased from \$50,000 to \$100,000.)

**TIME IS SHORT.** Our country is counting on you to—

## "TOP THAT 10% BY NEW YEAR'S"



# Save with War Savings Bonds

This space is a Contribution to America's All-Out War Effort by SERVICE

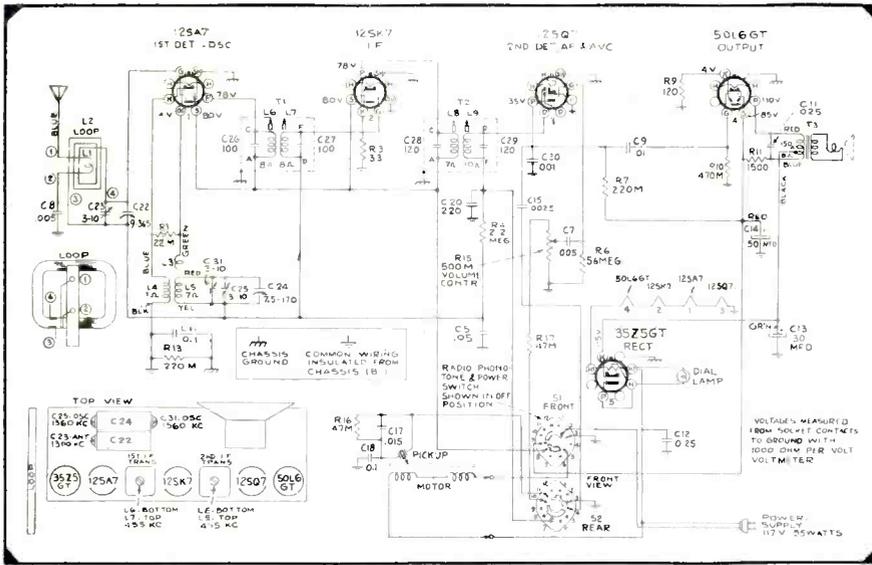
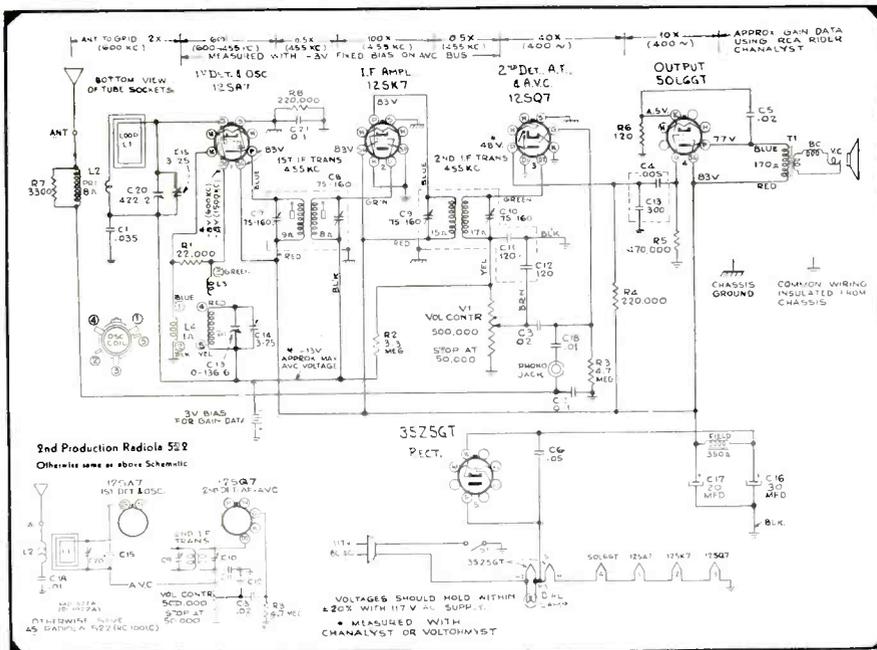


Fig. 3. Westinghouse WR-42X1 with tapped output transformer for better bass.

### Westinghouse WR-13X8

Another Westinghouse set, model WR-13X8, a 5 tube, 2 band compact with an unusual loop circuit, is shown in Fig. 4. The detector grid circuit, from grid to ground, consists of the secondary of the shortwave transformer, the loop antenna and the secondary of the antenna transformer (broadcast band). The primaries of the antenna coupling transformers are in parallel. On shortwaves, the loop circuit is cut out, leaving only the shortwave transformer from antenna to grid. Both the shortwave antenna transformer and oscillator coil are tuned by taps on these coils, permitting a high degree of band-spread.

Fig. 6. RCA 522 with new and old loop coupling transformer circuits.



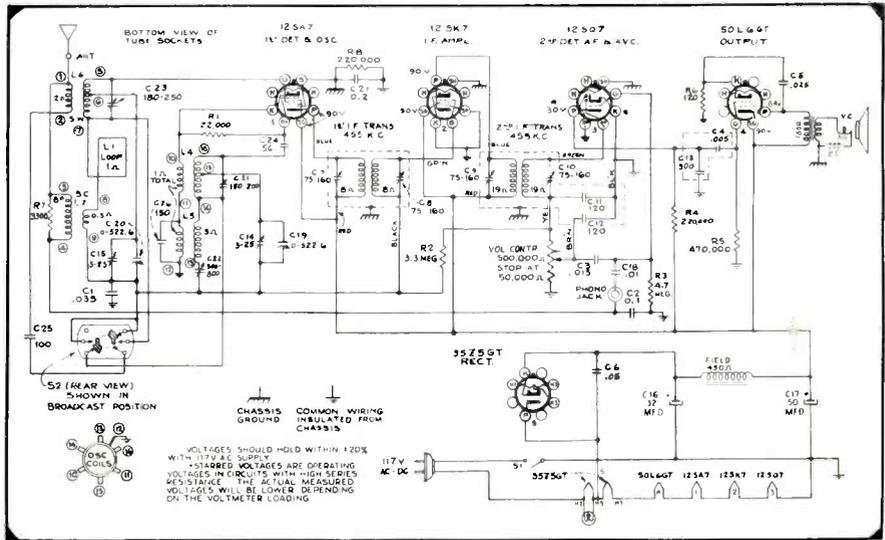
### Westinghouse WR-12X9 and 12X12

A similar bandspread system is employed in models WR-12X9 and 12X12 (see Fig. 5). Note the r-f coupling circuit used between the r-f stage and detector which contains a series inductance, 1200 ohm plate load and an i-f wave trap in addition to the blocking condenser and grid leak. Fig. 5 also shows the screen grid tickler oscillator circuit which uses a 10,000 ohm load resistor shunted across the short wave oscillator tuned grid coil.

### Radiola 522

In the first models of the Radiola 522, Fig. 6, a small series coupling transformer was used for feeding the external antenna into the loop circuit. In later production models, this trans-

Fig. 4. Westinghouse WR-13X8 and its controlled loop circuit.



former was eliminated; direct magnetic coupling to the loop superseding it.

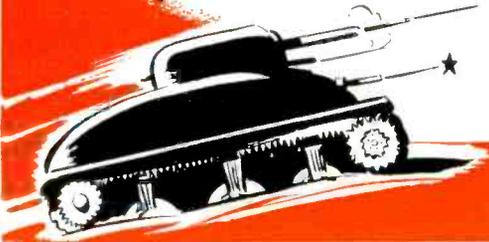
### Shielding Data

Supplementary information given out by RCA Victor gives data on the shielding effect of a metal window frame with reference to loop pickup. The frame acts as a coil, or loop aerial that is shorted, having a minimum field (maximum shielding effect) at the center. The worst place to place a loop from a portable receiver is, then, the center of the window. The maximum pickup will be obtained in the corner. It's funny, but there's a natural tendency to place the loop in the center, this point seemingly being farthest from metal shielding.

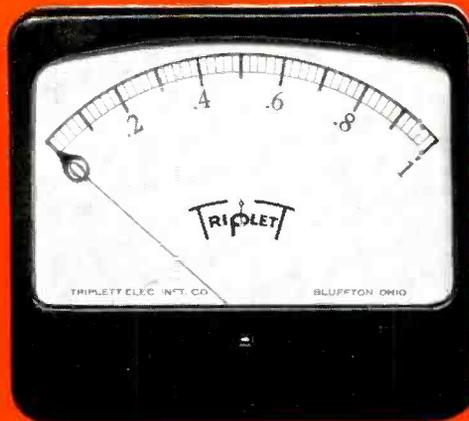
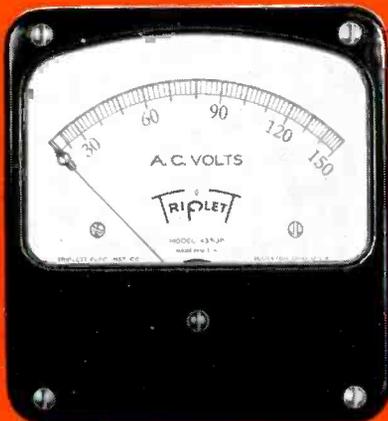
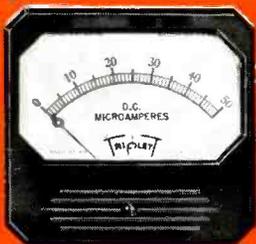
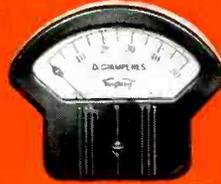
We previously mentioned lead dressing in connection with Westinghouse receivers. RCA Victor also stresses this procedure in their bulletin on model 26X4. We give you only the highlights: dress all leads or parts as far as possible

(Continued on page 18)

# The **TRIPL**ETT ELECTRICAL



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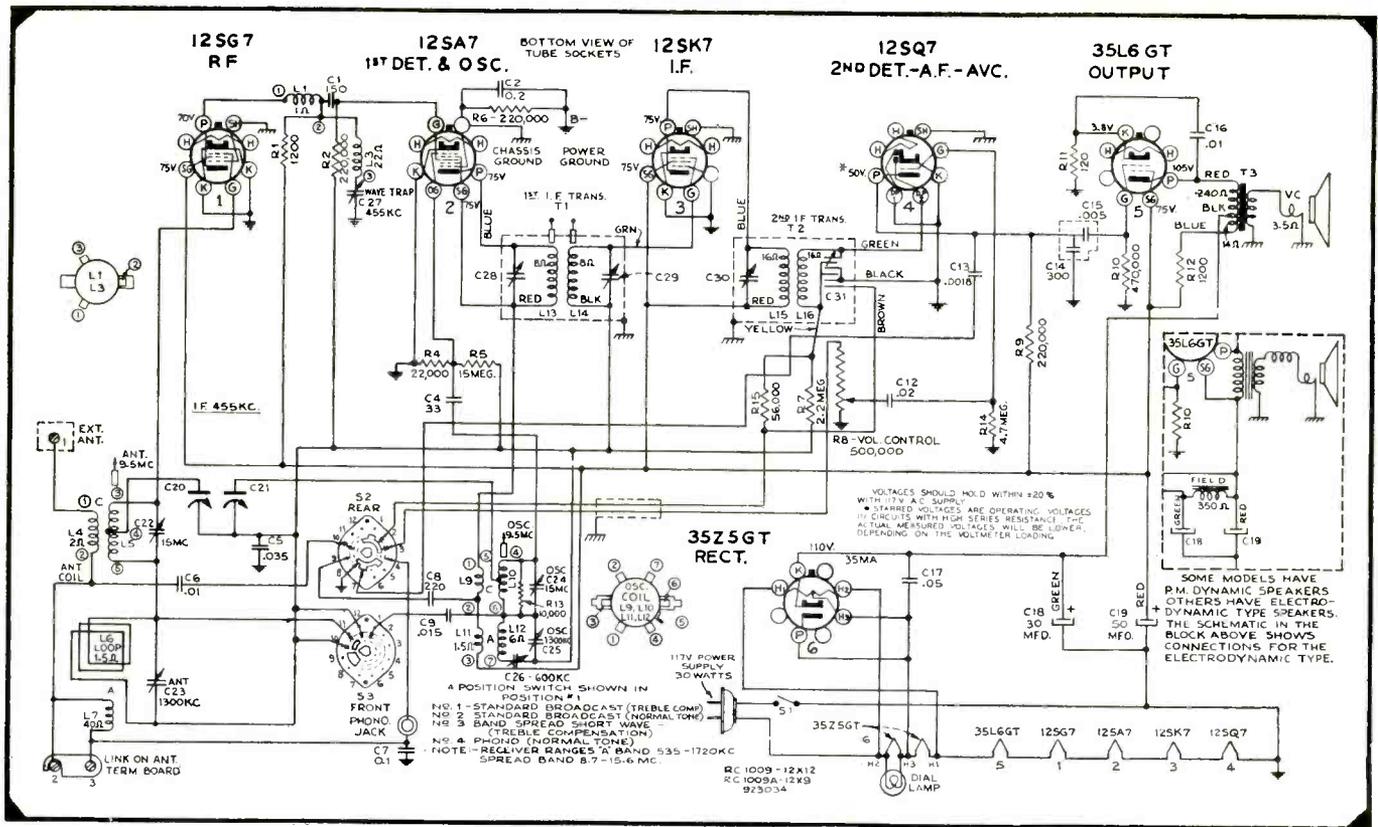


Fig. 5. Westinghouse WR-12X9 with series inductance in r-f coupling circuit.

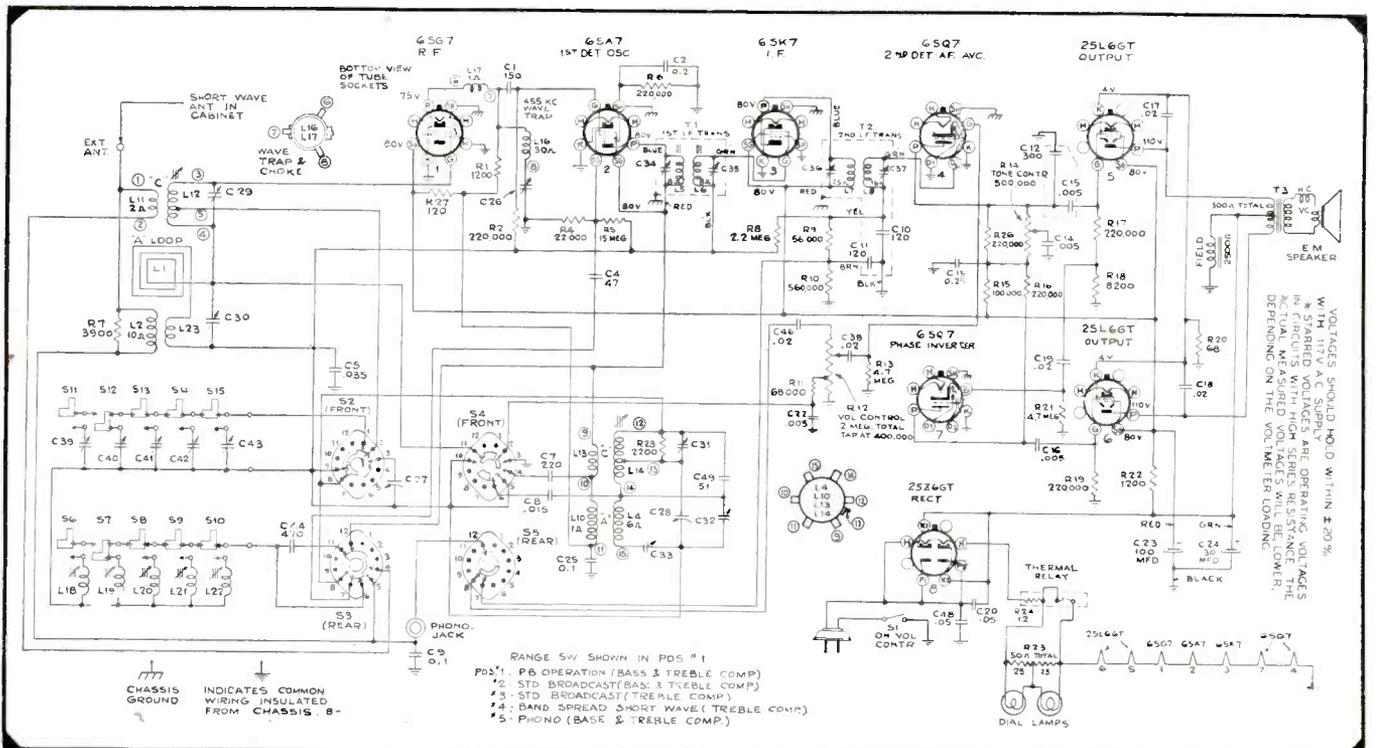
**Cone Replacement Data**

Westinghouse gives some useful data on cone replacement on the type of speaker where the cone and voice coil

are supplied as separate units. The general procedure is as follows: cement voice coil support to the speaker, using centering gauge or speaker shims; solder voice coil leads; put cone in place, cementing around rim of speaker frame; cement junction of cone and voice coil.

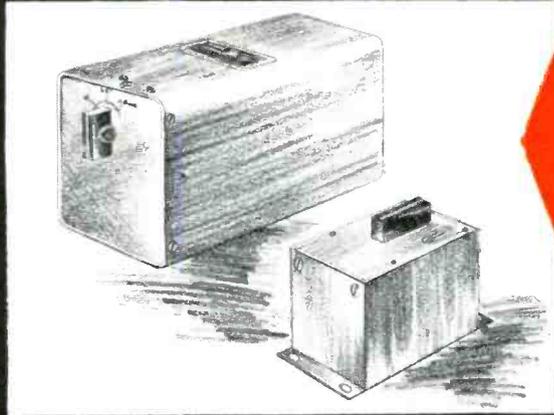
Fig. 8. Westinghouse WR-12X16 with 5-position switch for tone, frequency and phono control.

(Continued on page 20)



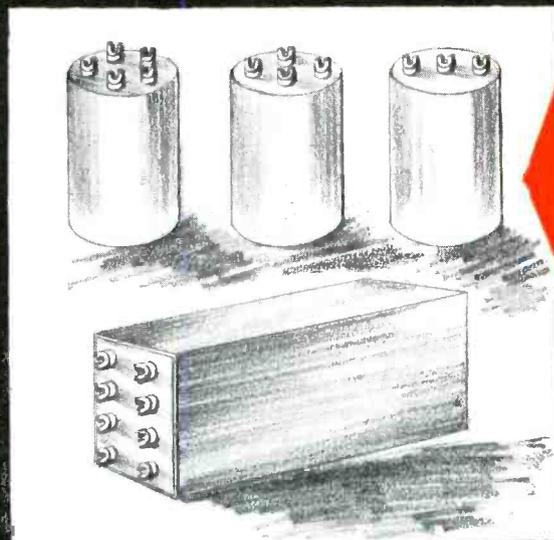
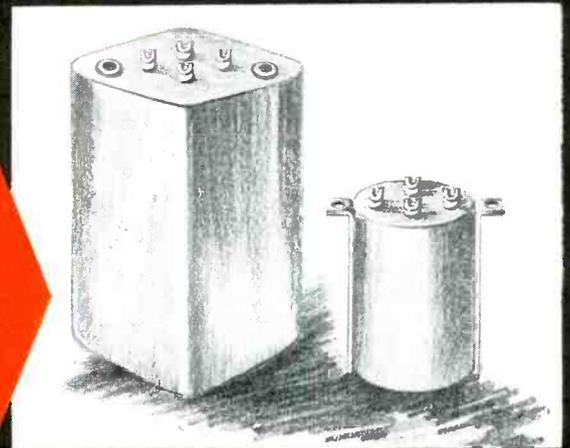
# Waste is as damnable as sabotage

Electrical and mechanical design are the foundation of our military production. Small individual savings, when multiplied in mass production, add up to large savings in critical materials and labor time. Here are some examples from our organization:



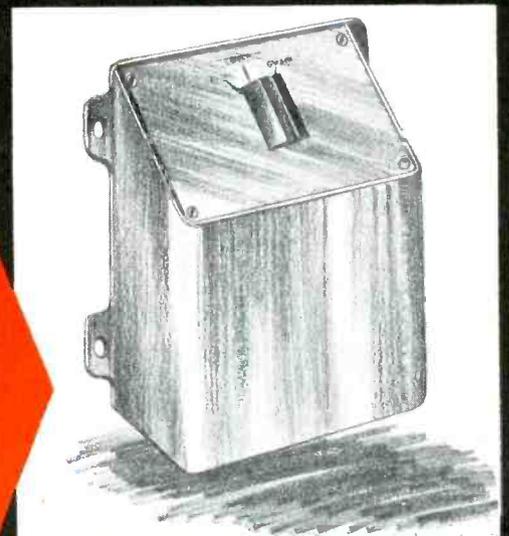
Cumulative electrical and mechanical redesign reduced the quantity of critical materials in this unit 60%, reduced total size and weight in direct proportion.

Through proper mechanical redesign, the weight and volume of this unit were halved, yet the same mounting centers were maintained for field replacements.



This application employed three of our Ouncer units. By combining the three in one case, we eliminated two aluminum housings, four terminals, two terminal strips, etc.

Electrical redesign reduced the amount of nickel iron alloy used in this filter by 50% . . . the mechanical redesign eliminated a dozen brass brackets and screws and cut installation time one-half hour.



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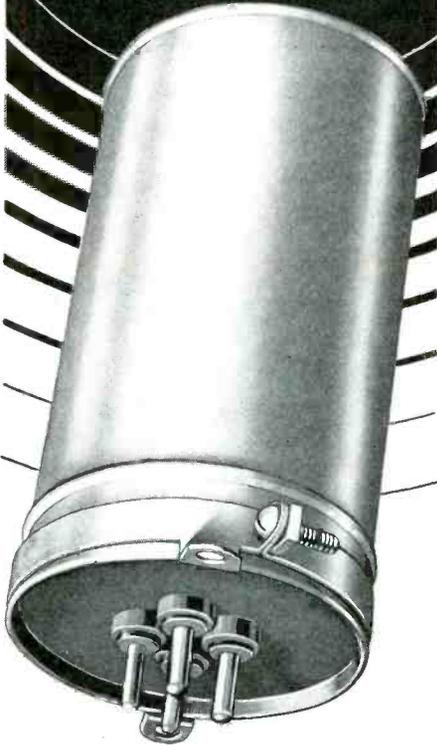


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"The shape of things to come"



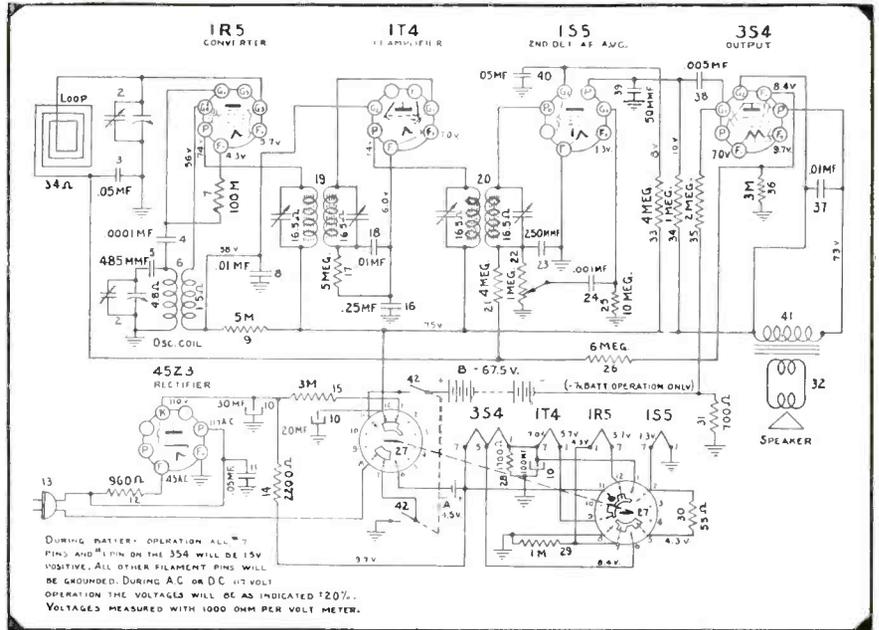
● It requires no gift of prophecy to sense that this capacitor stands for "The shape of things to come." The plug-in feature denotes ready replacement. That signifies a vital functional use. Also continuous, gruelling, telling service that wears out capacitors. Therefore, just as the demountable-rim wheel marked the transition of the automobile from Sunday diversion to everyday transportation, so this plug-in capacitor spells a still greater day for radio technique and radio men. Call it the Electronic Age, if you wish.

Our first job is winning the war. Tens of thousands of radio men are engaged in waging war. We at Aerovox are virtually 100% on war work. However, out of that experience, the war time capacitor types and production growth, must come the foundation for the much-heralded Electronic Age. Thus "The shape of things to come."

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**SER-CUITS**

(Continued from page 18)

Detailed instructions are as follows:  
(a) Remove old cone and voice coil. Protect air gap with scotch tape. Clean off all paper and cement. (b) Apply a ring of cement on top plate. (c) Insert centering gauge in new voice coil, handle first, from the winding end. (d) Remove scotch tape from gap. Insert voice coil and gauge in gap with leads in position for soldering. Press rim of voice coil support into the cement. (e) Solder the voice coil leads to terminals, allowing sufficient slack to permit free motion of the cone. Dress leads in plane of motion, clear of cone and housing. (f) Apply a ring of cement around the rim of the speaker frame. Place cone right over voice coil and press cone rim tight to speaker frame. (g) Allow cement to dry on cone rim and voice coil support. Then run a ring of cement around the junction of the cone and voice coil, being careful that the cement does not run inside voice coil. (h) After

Fig. 9. Westinghouse WR-62K3 a-c/d-c battery unit, featuring permeability tuning.

the cement at the junction has dried, remove gauge, using a rotary motion. (i) Cement large cardboard gasket in place. Set the speaker in inverted position on a flat surface until gasket is dry. Cement dust gap on cone center. In Fig. 7, these points are effectively illustrated.

**Westinghouse WR-12X16**

Westinghouse table model WR-12X16, an 8-tube, 2-band job, has a neat solution to the pilot lamp problem. Using 300 mil tubes, a thermal relay is incorporated in the heater series circuit that shorts out the pilot lamps until the set warms up about a half minute. It takes this long for the heat to act on the thermal element, causing the short circuit to be removed, which places the lamps and their 25-ohm shunts in the series lineup. The relay element has a resistance of only 12 ohms. See Fig. 8.

(Continued on page 21)

Safeguard your  
"GUARANTEE"  
USE **STANCOR**  
STANDARD TRANSFORMER  
CORPORATION  
1500 NORTH HALSTED STREET . . . CHICAGO

## SER-CUITS

(Continued from page 20)

### Westinghouse WR-62K3

Model WR-62K3 is a personal type battery set having 4 tubes and a rectifier, and employing two flashlight cells in parallel for "A" supply and a 67½ volt "B" battery. The battery life on intermittent duty is approximately 6 to 10 hours for the 250 mil "A" load and 25 to 40 hours for the 8.5 mil "B" drain. The series-parallel filament switching arrangement with its adequate bypassing is shown in the circuit diagram. Fig. 9. Note the decoupling filter between plate and screen of the 1T4 i-f amplifier and, also, the 1R5 converter. Note, too, the low value audio coupling condensers; .001 mfd. at the first a-f grid and .005 mfd. between first a-f and power tube grid. Of course, the grid resistors are high compared to those used in higher powered receivers so as to permit the use of less capacity. Accordingly, from the small 3½ inch speaker and very limited acoustic setup, we wouldn't expect a great deal of bass response. Optimum results (greater apparent power output) are, however, obtained by purposely cutting down bass note response in the power tube. The lower frequencies require the greatest power demand.

### RCA Output Transformer Color Code

RCA Victor has issued color code change data on output transformers that should solve many problems. These data, presented in Fig. 10, show the alternate colors as against the original colors.

### Fluorescent Lamp Interference

The interference from direct bulb radiation is usually effective only for short distances. If the radio antenna and its lead-in wire are located more than ten feet from the lamp bulb, the bulb radiation will be negligible.

Fig. 10. Output transformer color code changes effected by RCA for their receivers.



## "Of Course, I'd Rather Use My Car

... but if the boys in the service need the gas, I'm satisfied to do with less."

★ People have willingly given war needs a priority over civilian desires.

★ If you explain to your customers why radio parts are scarce—and how you licked an "impossible" situation to get their sets operating at all—they will accept those repair jobs that may be "a little less than perfect."

★ Naturally, you don't like to work on the antiquated sets you're getting today—especially with the shortage of men and materials. But, it's your patriotic duty to keep 'em playing—even if you have to improvise repairs. Of course, to do this efficiently you must know exactly what's inside the set.

★ That's where Rider Manuals save you time. They lead you right to the cause of failure and furnish you with the facts that speed repairs.

★ So, don't waste time "guessing out" defects and "experimenting" with possible methods of improvising repairs. Reach for one of your thirteen Rider Manuals when you begin every job. It's good sense and good citizenship to work efficiently today. It conserves parts and saves labor—both critically scarce right now.

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Pri. Start	Red	Red	Red	Red	Red	Red	Red
Pri. Tap	Black			Red-Black	Red-Black	Red-Black	
Pri. Finish	Blue	Blue	Blue	Red	Black-Red Tr.	Red	Red
Sec. Start	Bus	Green-Red Tr.	Black	Black	Yellow	Black	Bus
Sec. Finish	Bus	Brown	Black	Black	Black	Black	Bus

### Alternate Colors

Stock No.	35774	38994*	35056	33444	37899**	14534	36098
Dwg. No.	94106-2	97610-2	97610-1	97604-2	97604-1	83517-1	97611-1
Pri. Start	Blue	Blue	Blue	Brown	Brown	Red	Blue
Pri. Tap	Red			Red	Red	Red	
Pri. Finish	Red-Black	Red	Red	Blue	Blue	Blue	Red
Sec. Start	Bus	Black	Black	Bus	Black	Black	Black
Sec. Finish	Bus	Green-Red Tr.	Green-Red Tr.	Bus	Green-Red Tr.	Black	Black

\* Stock No. 38994 supersedes No. 37350.

\*\* Stock No. 37899 supersedes No. 15434.

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FOR VICTORY BUY UNITED STATES SAVINGS BONDS and STAMPS



Condenser replacements account for about 40% of all radio repair jobs. Dependable condensers are, therefore, essential for gaining and maintaining maximum customer satisfaction.

PROTECT **40%** that



NOW, more than ever, the jobber and service man must recognize the growing demand for POLYMET.

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For 21 years POLYMET ELECTROLYTIC and BY-PASS CONDENSERS have improved quality and service. Add to this a liberal and reasonable markup. No fly-by-night "bargain catalogs" can undersell you on POLYMET. You're protected, your customer is satisfied, your profits and volume increase. We're conserving vital defense materials by limiting sizes to those most universally used. These will serve practically every need.

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**POLYMET CONDENSER CO.**

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## PARTS PROBLEMS ANALYZED

TO ANALYZE the immediate problems that confront the radio parts distributors, a round table conference was held recently during a meeting of the Eastern division of the Sales Managers Club at the Hotel New Yorker, New York City.

The conference, presided over by Charles Golenpaul, president of the club, featured such outstanding jobber specialists as George Barkey, president of NEDA, Walter Braun of Chicago and Aaron Lippman of Newark, N. J. Each outlined proven methods of successful operation in wartime, pointing out that today it is essential to rearrange peace-time systems. Industrial and war work are a vital adjunct of jobber business, they declared. Cooperation with Government agencies, with effective coordination of executive, administrative and engineering branches to afford such assistance is a vital factor, too, these leaders emphasized.

The Service Man can play his major role by cooperating with his local distributor, in the ordering of parts and servicing of equipment in his or other areas, said those at this conference. It is necessary that replacement needs be anticipated to avoid stock depletion. This does not mean excess inventory, but rather an anticipated need for those components found to be most necessary.

According to authoritative sources, present at the conference, it appeared as if sufficient replacement parts and tubes would probably be allocated to maintain at least one radio in every home in operating condition.

Members of the trade press, sales executives of many manufacturing plants and representatives, represented by Sam MacDonald, who were present at this conference, offered topical suggestions that were included in many of the plans adopted for immediate jobber use.

## FADA SERVICE DEPT.

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And to you it means not only maximum support of the war effort, but a pledge of continuing Clarostat service, production and reputation in the peace to come.



CLAROSTAT MFG. CO., Inc. • 285-7 N. 6th St., Brooklyn, N. Y.

## NOTICE

Inductions into the armed forces and demands of war production industries have created shortages of labor necessary in the printing, handling and mailing of publications.

If your monthly copy of SERVICE should be late in reaching you — remember that the delay is due to war conditions and the war effort must come first.

Please bear with us.

**Thank You!**

## MYE TECHNICAL MANUAL

A new 392-page MYE manual, unlike any other previous Mallory publication, has just been published. In this new technical manual will be found thirteen chapters covering essential data that every Service Man, engineer, amateur or experimenter will welcome.

The topics covered are loudspeakers and their use, superheterodyne first detectors and oscillators, half-wave and voltage doubler power supplies, vibrators and vibrator power supplies, phono-radio service details, automatic tuning frequency modulation, television, capacitors, noise suppression, vacuum-tube voltmeters, receiving tube characteristics and general service data.

The volume is profuse with diagrams and illustrations. So that the discussions can be understood with the utmost effectiveness, commercial applications are used in many of the discussions.

The servicing information chapter contains such pertinent data as power transformer designs, milliammeter extension range chart, reactance charts, single layer inductance charts, etc. Another portion of this chapter is devoted to a complete analysis of various types of resistance-coupled amplifiers.

Service Man's net price of this book is \$2.00.

\* \* \*

## ARH TELEGRAPH KEYS

Telegraph keys, type J-38, are now being produced by the American Radio Hardware Co., 476 Broadway, New York City.

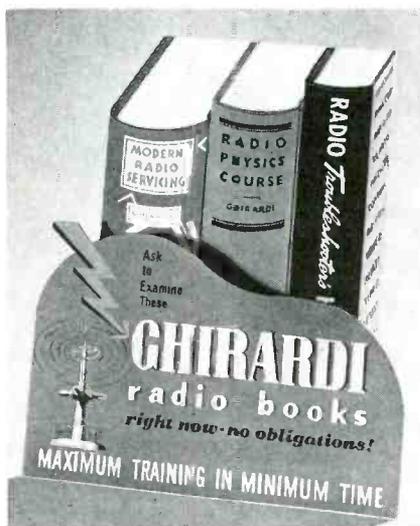
This new key is equipped with a shorting lever for receiving. The mounting base is cut from 1/4" grade XX black bakelite. An eyelet in the base prevents the phone cords from pulling loose. The frame of the key is a solid casting, and the bearing parts are of brass.

A newer feature of this key is the replacement of the customary hard rubber insulating washers on contacts and binding posts by a laminated electrical grade bakelite.

\* \* \*

## GHIRARDI BOOK DISPLAY

A new counter and window card display for Ghirardi books is now offered free to




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THE WAR**

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World's Oldest and Largest Manufacturers of Radio Aerial Systems  
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radio jobbers by the Radio & Technical Publishing Co., 45 Astor Place, New York, N. Y.

The display is made of heavy, die-cut cardboard in five colors.

A pair of these new displays, one for the window and one for the counter, are available to jobbers free of charge by addressing the publisher direct.

\* \* \*

*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."*

## EICOR EXPANDS AGAIN

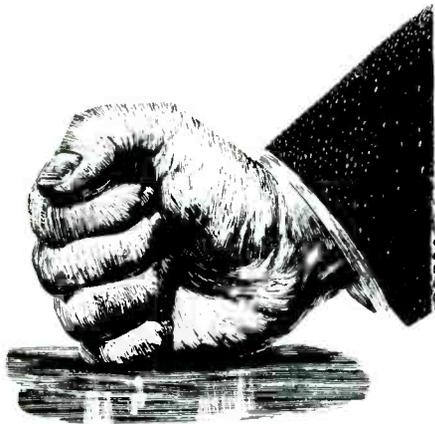
Eicor, Inc., manufacturers of dynamotors, d-c motors, converters, power plants, and other rotary electrical apparatus, are moving to a new DPC building at 1501 W. Congress Street, corner of Congress and Laflin, Chicago.

\* \* \*

## STANCOR FETES VETERANS

At a banquet and celebration, held November 24, at the Standard Club, Chicago, the Standard Transformer Corporation acted as host to 105 of its employees who have served the corporation for five years or more. The event inaugurated the presentation of Honor Awards to members of the Stancor family. The Honor Awards were silver emblems for those who had

(Continued on page 31)



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The CREI Placement Bureau is flooded with requests for CREI trained radiomen. Employes 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 at once.

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24 • SERVICE, DECEMBER, 1942

**ASSOCIATIONS**

**Radio Servicemen's Ass'n. of Luzerne County**

On Tuesday evening, November 17, the Radio Servicemen's Association of Luzerne County, Pa., had its regular meeting during which officers were elected to serve for the coming year. Those elected were: president, E. L. Maneval of R. B. Wall Co., wholesale distributor in Wilkes-Barre, Pa.; vice-president, Edmond Nowicki of Voss Sales Co., wholesale distributor, Nanticoke, Pa.; treasurer, John Kennedy, chief serviceman of City Radio Service Co., wholesale distributor, Wilkes-Barre, Pa., and secretary, C. F. Bogdan of C. F. Bogdan Radio Service, service dealer, Wilkes-Barre, Pa.

Three directors were elected as follows: Roy Stroh of Stroh's Repair Shop, West Pittston, Pa.; Edward Buckman, independent serviceman, Wilkes-Barre, Pa., and A. B. Dungan of Dungan Electric Co., Forty Port, Kingston, Pa.

There are three directors who are still in office and will remain there until the election of 1943. They are as follows: Max Frederick, independent serviceman, Wilkes-Barre, Pa.; Joseph Sincavage, independent serviceman, Wilkes-Barre, Pa., and Dave Thomas, independent serviceman, Shavertown, Pa.

This association has been functioning for some time and although 80% of the members have left this area to join the armed forces or to find defense jobs, we find that we still can have and are having very successful meetings. We have found that in this association technical, business and personal benefits are derived. The radio Service Man needs more than ever before to be organized. This is a field that has many times been abused both by the radio man and the general public. In the past several years in which this organization has existed we have accomplished many things for our betterment in this area. The most noteworthy is the minimum service fee of \$1.50. Through our many other activities, we have also improved the radio Service Man's standing as a reputable person in his community.

*C. F. Bogdan, Secretary*

**VARIABLE CONDENSER OSCILLATION**

Many compact receivers have a tendency to oscillate when the variable condenser is tuned to a maximum capacity. This is due to a feed-back effect that takes place between the loop and i-f cans. Feed-back may be eliminated by making certain i-f cans are definitely tightened at the mounting to chassis.



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



**FIXED RESISTORS**



**CERAMIC CAPACITORS**



**VOLUME CONTROLS**



**WAVE CHANGE SWITCHES**



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DIVISION OF GLOBE UNION INC. MILWAUKEE, WIS.

**BIG BOY**



**MODEL 860**

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 5000 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**

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**READRITE METER WORKS, Bluffton, Ohio**

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†This material is obtained from our readers and is representative of the actual experiences of the Service Man in the field.

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*Record Player (Emerson FY434, FY2-434) .....	Feb.	23
*Replacing Discontinued AB Packs and Unit Batteries in Portables. By Alfred A. Ghirardi .....	July	5
*Replacing Fixed Resistors in Re- ceivers. By M. E. Heller .....	Dec.	5
Replacement Parts and Tubes .....	June	25
Running Your Service Shop for the Duration. By Alfred A. Ghirardi .....	June	5
*Ser-Cuits. By Henry Howard .....	Jan.	12
*Ser-Cuits. By Henry Howard .....	Feb.	13
*Ser-Cuits. By Henry Howard .....	Mar.	10
*Ser-Cuits. By Henry Howard .....	Apr.	19
*Ser-Cuits. By Henry Howard .....	May	12
*Ser-Cuits. By Henry Howard .....	June	8
*Ser-Cuits. By Henry Howard .....	July	18
*Ser-Cuits. By Henry Howard .....	Aug.	13
*Ser-Cuits. By Henry Howard .....	Sept.	8
*Ser-Cuits. By Henry Howard .....	Oct.	8
*Ser-Cuits. By Henry Howard .....	Nov.	10
*Ser-Cuits. By Henry Howard .....	Dec.	12
Servicemen in England. By W. E. Miller .....	May	14
*Servicing Power Supplies. By Mark Glaser .....	Sept.	13
*Solving Problems of Replacement in Power Supplies. By Mark Glaser .....	Aug.	6
*Solving Shortage Problems in A-F Circuits. By Robert G. Herzog *Solving Shortage Problems in Oscillator Circuits. By Robert G. Herzog .....	Apr.	13
	Jan.	9
*Solving Shortage Problems in Speaker Replacements. By Rob- ert G. Herzog .....	July	11
*Solving Shortage Problems in I-F Circuits. By Robert G. Herzog *Solving Shortage Problems in Second Detector and AVC Cir- cuits. By Robert G. Herzog .....	Feb.	9
	Mar.	14
Sound Ideas. By Jay Allen .....	Feb.	19
*Sound Systems Today. By Sidney Harman .....	Oct.	5
Special Batteries (Chart) .....	May	5
*A Study of Wave Traps. By Mark Glaser and Edward M. Glaser .....	Oct.	14
*Tricks of Trade in Wartime Ser- vicing. By Alfred A. Ghirardi. *Unique Oscillator Circuit .....	Aug.	8
	Oct.	7
*Unique Voltage Regulator. By Francis C. Wolven .....	Aug.	15
*Vacuum Tube as Variable Im- pedance .....	Feb.	16
Vibrator Problems Today. By R. M. Ellins .....	Aug.	5
We Quote .....	June	11
We Quote .....	Oct.	19
*Wien Bridge Oscillator. By Rob- ert Stang .....	Apr.	16

**FREQUENCY MODULATION**

*G. E. LF115 Series .....	Mar.	24
*G. E. LF115, 116 .....	Oct.	9
RCA 46X3 (1940 Model). By Willard Moody .....	Aug.	22
*Stromberg-Carlson 935 .....	July	19

**HELPS**

*Cone Replacement Tricks .....	Dec.	13
Electrolytic Terminals .....	Aug.	29
Keep Things Handy. By Martin Francis .....	Jan.	27
Safe Operation of A-C/D-C Equip- ment .....	Feb.	27

**HUM**

Airline 62-301 (BRC1170). By D. C. Sprong .....	Sept.	18
Emerson 109. By Willard Moody. Mechanical Hum Cure .....	Nov.	25
Philco 611. By Willard Moody .....	Dec.	28
Philco 421019, 42-1011, Code 121. Philco 37-690. By D. C. Sprong .....	Sept.	18
	Aug.	17
Philco 42-1019, 42-1011, Code 121. Pilot 31, 81 (Rainbow). By Fran- cis C. Wolven .....	Aug.	31
	Aug.	17
RCA 46X3 (1940 Model). By Willard Moody .....	Aug.	22
*Servicing Power Supplies. By Mark Glaser .....	Aug.	22
*Silvertone 7025 Hum Bucking .....	Sept.	13
*Solving Problems of Replacement in Power Supplies. By Mark Glaser .....	Feb.	13
	Aug.	6

**MOTORS**

Belmont 11A25 .....	July	22
*Instantaneous Sound-Recorder Wartime Servicing, Part I. By Alfred A. Ghirardi .....	Oct.	10
*Instantaneous Sound-Recorder Wartime Servicing, Part II. By Alfred A. Ghirardi .....	Nov.	15
*Instantaneous Sound-Recorder Wartime Servicing, Part III. By Alfred A. Ghirardi .....	Dec.	9
Philco 42-1001, 1002, etc. ....	Apr.	18
Phonograph Motor Repairs. By John F. Rider .....	Jan.	15
*Pickup, Motor and Record Chang- er Wartime Servicing. By Al- fred A. Ghirardi .....	Sept.	5
Rim Drive Phono Motors .....	Apr.	22

**NOISE**

G. E. G105. By Willard Moody .....	Aug.	20
*RCA QU56C, QU56M .....	Apr.	22
Stromberg-Carlson 410H. By Wil- lard Moody .....	Aug.	17
*Study of Wave Traps. By Mark Glaser & Edward M. Glaser .....	Oct.	14
Tube Noises .....	Mar.	24

**ON THE JOB**

Broken Dial Cords. By R. G. Chrouch .....	Sept.	31
Handy Tool. By R. G. Chrouch .....	May	19
Keep Things Handy. By Martin Francis .....	Jan.	27
Modernization. By R. G. Chrouch Servicemen in England. By W. E. Miller .....	Aug.	21
	May	14
*Tricks of Trade. By Alfred A. Ghirardi .....	Aug.	8

**PARTS**

*Bypass Condenser Substitution. By M. E. Heller .....	Nov.	6
*Capacitor Replacement. By S. Gordon Taylor .....	Jan.	20
Parts Problems Analyzed .....	Dec.	22
Parts Tolerances. By Vic Mucher Prolonging Condenser Life .....	Feb.	27
Replacement Parts and Tubes .....	Dec.	8
10 Good Reasons Why a Service Man Should Patronize His Parts Jobber .....	June	25
	May	21
*Replacing Fixed Resistors in Re- ceivers. By M. E. Heller .....	Dec.	5

An asterisk preceding a listing indicates that a partial or complete circuit accompanies the text.

**PHONOGRAPHS, PICKUPS, RECORD PLAYERS, ETC.**

*Anslay 52 A-C/D-C Power Amplifier	Mar.	11
*Anslay 61 A-C Power Amplifier	Mar.	12
*Anslay 62 A-C/D-C Power Amplifier	Mar.	12
*Automatic 148, 175	Nov.	12
*Belmont 8AE1	Jan.	13
Belmont 11A25	July	22
*Belmont 12A52	Apr.	11
*Crosley, 52TQ (Chas. 83)	May	28
*Crosley 53TP (Chassis 100)	Oct.	8
*Crosley 72 CP (Chassis 85)	Oct.	8
*Emerson FY434, FY2-434 Record Player	Feb.	23
*Emerson GH437, GH447 and GH2-447	Feb.	14
*G. E. F-M/A-M Radio-Phonograph Combinations	Mar.	24
*G. E. 40 F-M/A-M	June	22
*G. E. G-105. By Willard Moody	Aug.	20
*G. E. LF115, -116, LFC1118, -1128, -1228 Phonograph Pre-amplifier	Mar.	24
G. E. LR170	Oct.	21
*G. E. 40 F-M/A-M Phono-Radio Combination	June	22
*Instantaneous Sound-Recorder Wartime Servicing. By Alfred A. Ghirardi	Oct.	10
*Instantaneous Sound-Recorder Wartime Servicing, Part II. By Alfred A. Ghirardi	Nov.	15
*Instantaneous Sound-Recorder Wartime Servicing, Part III. By Alfred A. Ghirardi	Dec.	9
*Motorola 81F21	Nov.	14
*Motorola 51R11	Mar.	13
Philco 39-55RX, 39-116RX. By D. C. Sprong	Aug.	17
Philco 42-1001, 1002, 1003, 1004, 1005	Apr.	18
Philco 42-1003, Code 121-122	Apr.	18
Philco 42-1004, Code 121	Aug.	19
Philco 42-1005, Code 121-122	July	17
Philco 42-1008, Code 121-122; 42-1009, Code 121-122	July	26
Philco 42-1012, 42-1013, Code 121	Apr.	18
*Philco 42-1016, Code 121	July	26
Philco 1942 Record Changer Replacement & Speaker Kit	Aug.	26
Phonograph Motor Repairs. By John F. Rider	Jan.	15
*Phono Switching (Silvertone 7055)	Jan.	27
*Pickup, Motor and Record Changer Wartime Servicing. By Alfred A. Ghirardi	Sept.	5
RCA 99K, 99T. By D. C. Sprong	Sept.	18
RCA QU7, QU51, QU52, QU53, QU56	Mar.	33
*RCA R56, RS119. Record Player	Apr.	19
RCA RP160	July	27
RCA U-9. By Willard Moody	Aug.	20
RCA V105	July	26
*RCA VHR-212	Sept.	11
*RCA Schematics	Sept.	29
*RCA-Victor R56 Phono Amplifier Rim Drive Phono Motors	Dec.	8
*Silvertone 57RL391 (Model 7188)	Apr.	22
*Silvertone 7039	Aug.	13
*Silvertone 7039	Feb.	15
*Silvertone 7048	Mar.	12
*Silvertone 7056	Mar.	11
*Silvertone 7066	Apr.	11
*Silvertone 7066	Sept.	8
*Silvertone 7068	Sept.	10
*Silvertone 7069	Apr.	22
*Silvertone 7165	Oct.	20
*Silvertone 7168	Sept.	8
Soldiers Use Discs	Feb.	33
Sonora Record Player. By Francis C. Wolven	Aug.	19
*Stromberg-Carlson 935	July	19
32-V Battery Charger	May	19
Westinghouse 473. By Willard Moody	Sept.	29
Westinghouse 473-Y. By Willard Moody	Aug.	22
*Westinghouse WR-42X3, 42X7	Dec.	12
*Wilcox-Gay A-72 Recorder	Nov.	21
*Wilcox-Gay A-103	May	28
*Wilcox-Gay A105 Recorder Combination	Apr.	30

**PUBLIC ADDRESS**

(See Sound)

**RECEIVERS**

*A-C/D-C Battery Portables. By Jas. J. Adams	Mar.	22
*Air Chief S-7405-9 Resistance Coupled I-F	Feb.	12
*Air King 4245, 4265 Output	Feb.	13
*Airline 14BR440A	Nov.	24
*Airline 14BR683 Antenna Input	Apr.	18
*Airline 14BR573A Oscillator	Jan.	11
*Airline 14BR574A	June	10
*Airline 14BR734B, 735B	July	18
*Airline 14BR736B	Apr.	12
*Anslay Dynaphone 52	Mar.	11
*Anslay 52 A-C/D-C Power Amplifier Circuits	Mar.	11
*Anslay 61 A-C Power Amplifier Circuits	Mar.	12
*Anslay 62 A-C/D-C Power Amplifier Circuits	Mar.	12
Atwater Kent 72 Preselector	Feb.	9
*Automatic 148, 175	Nov.	11
Batteries for Portables. By Robert G. Herzog	May	5
*Belmont 579	June	10
*Belmont 6D14	July	14
*Belmont 6P11 Battery Portable	July	22
*Belmont 7D22	July	19
*Belmont 8AE1	Jan.	13
Belmont 11A25	July	22
*Belmont 12A52	Apr.	11
Bias Cells	June	9
*Coronado C6D18	May	19
*Crosley 43FB (Chassis 91)	Oct.	20
*Crosley 52FC	May	13
*Crosley 52TQ (Chassis 83)	May	13
*Crosley 53TP (Chassis 100)	Oct.	20
*Crosley 63TA-63CA (Chassis 110, 111)	Oct.	9
*Crosley 72CP (Chassis 85)	Oct.	8
*Crosley 96	Sept.	12
*DeWald 563 Oscillator	Jan.	11
Emerson FU Series	Jan.	14
*Emerson EL360, EP367 Series	June	8
*Emerson FH413, FH440 Degenerative Tone Control	Jan.	14
*Emerson FV426, FV433	Apr.	8
*Emerson FY434, FY2-434 Record Player	Feb.	23
*Emerson GH427, GH447, GH2-447	Feb.	14
*G. E. 40 F-M/A-M Phono-Radio Combination	June	22
*G. E. L915W, L916 Output	Feb.	13
G. E. L740	Feb.	16
*G. E. LB424 Output Tube Bias	Mar.	10
*G. E. LB-673 Versatile Loop Receiver	Aug.	29
*G. E. LF115, -116, LFC1118, -1128, -1228 Phonograph Pre-amplifier	Mar.	24
*G. E. LF115, 116 A-M/F-M	Oct.	9
G. E. LRP 170	Oct.	21
Garod BP310	Jan.	33
*Garod 1B50 Power Supply	Jan.	14
*Garod 1B55L Degenerative Feedback	Jan.	14
*Garod Series 60	Nov.	11
*Garod Series 100	Nov.	10
Halicrafters S27, S27B	Feb.	15
Halicrafters SX28 Super Sky-rider	Feb.	14
*Motorola 51R11	Mar.	13
*Motorola 81F21	Nov.	14
Philco C1908	Jan.	13
*Philco P1935 Auto-Radio	Jan.	12
*Philco PT-91-95 series	Nov.	10
*Philco S1926	Feb.	15
*Philco 42-380 Code 121	Nov.	11
*Philco 42788, Code 121 Padding Circuit	June	26
*Philco 42-842, 42-843, 42-844	May	13
*Philco 42PT87, 42PT88	May	12
*RCA 26BP	Apr.	7
*RCA 41903 Electronic Control	June	18
RCA AVR100 AVR101 Aircraft	Apr.	11
RCA V133	Sept.	29
*RCA R56, RS119 Record Player	Apr.	19
*RCA VHR-212	Sept.	11
*SeaPal Marine Radio Set	May	12
*Radiola 522	Dec.	15

RCA 26X4	Dec.	15
*RCA 522	Dec.	15
*RCA V-135	Dec.	12
*Westinghouse WR-12X9, 12X12	Dec.	15
*Westinghouse WR-42X3, 42X7	Dec.	12
*Westinghouse WR-12X16	Dec.	18
*Westinghouse WR-42X1	Dec.	13
*Westinghouse WR-13X8	Dec.	15
*Westinghouse WR-62K3 a-c/d-c Battery Unit	Dec.	20
*Silvertone 57RL385 (7905)	Aug.	14
*Silvertone 57RL390 (7189)	Aug.	14
*Silvertone 57RL391 (Model 7188)	Aug.	13
*Silvertone 4714 Power Shifter	Sept.	12
*Silvertone 7010, 7034	June	10
*Silvertone 7025	Feb.	14
*Silvertone 7039	Feb.	15
*Silvertone 7048	Mar.	10
*Silvertone 7055 Phono Switching	Jan.	27
*Silvertone 7051	Sept.	11
*Silvertone 7056	Apr.	11
*Silvertone 7066	Sept.	8
*Silvertone 7068, 7168	Sept.	10
*Silvertone 7069	Mar.	11
*Silvertone 7071 First Detector-Oscillator	Apr.	12
*Silvertone 7083, 7087, 7089	Apr.	7
*Silvertone 7085, 7090	Feb.	16
*Silvertone 7091	Jan.	12
*Silvertone 7091	Feb.	12
*Silvertone 7093 Input and Oscillator	Jan.	12
*Silvertone 7108, 7158	Nov.	14
*Silvertone 7112	Apr.	8
*Silvertone 7134	Sept.	10
*Silvertone 7165	Oct.	20
*Silvertone 7168	Sept.	8
*Silvertone 7900	June	10
*Silvertone 7915	Sept.	10
*Stromberg-Carlson 935	July	19
*Studebaker-Philco S1924 Input and Mixer	Jan.	13
*Truetone D4220	July	18
Truetone D4240	June	10
*Ward 14BR-734B and 735B	July	18
*Wells-Gardner 1A63	June	9
*Wells Gardner 7D11	Nov.	12
*Westinghouse DT3 Electronic Speed Regulator	June	20
*Westinghouse M101 Output and Power Supply	Jan.	13
*Westinghouse M108	June	8
*Westinghouse WR-62K1, WR62K2	Nov.	26
*Wilcox-Gay A103	May	28
*Wilcox-Gay A105 Recorder Combination	Apr.	30
*Zenith 7G605 DeLuxe Portable	May	23
	July	8

**RECORDING**

Emerson U48. By Willard Moody	Sept.	18
*Instantaneous Sound-Recorder Wartime Servicing. By Alfred Ghirardi	Oct.	10
*Instantaneous Sound-Recorder Wartime Servicing. By Alfred Ghirardi	Nov.	15
*Instantaneous Sound-Recorder Wartime Servicing. By Alfred Ghirardi	Dec.	9
Majestic 210, 211, 214, 215. By D. C. Sprong	Sept.	18
*Motorola 51R11	Mar.	13
Philco 12-123, Code 121	July	27
Philco 42-124	June	26
Philco 42-125	June	26
Philco 96. By Willard Moody	Aug.	19
*Railroad Sound. By A. B. Armistead	Apr.	5, 6
*Silvertone 7168	Sept.	8
*Solving Shortage Problems in A-F Circuits. By Robert G. Herzog	Apr.	19
*Sound Systems. By Sidney Harman	Oct.	5
*Wilcox-Gay A-103	May	28
*Wilcox-Gay A-105 Recorder Combination	Apr.	30

**RELAYS**

*Industrial Electronics. By Alfred A. Ghirardi	Mar.	5
*RCA 41903 Electronic Control	June	8

An asterisk preceding a listing indicates that a partial or complete circuit accompanies the text.

**SOUND**

Acoustic Feedback	Dec.	28
*Air King 4245, 4265 Output	Feb.	13
*Airline 62-207	Sept.	18
Airline 62-301 (BRC 1170). By D. C. Sprong	Sept.	18
*Amplifier Power Supply	Mar.	9
*Ansley 52 A-C/D-C Power Amplifier Circuits	Mar.	11
*Ansley 61 A-C Power Amplifier Circuits	Mar.	12
*Ansley 62 A-C/D-C Power Amplifier Circuits	Mar.	12
*Crystal Ear Hearing Aid	May	8
Extend Amplifier Life. By Jay Allen	Mar.	9
*G. E. L915W, L916 Output	Feb.	13
Grunow 871 (Chassis AE). By D. C. Sprong	Aug.	22
*Hearing Aids. By Alfred A. Ghirardi	May	7
*Hearing Aid Circuits	May	8, 9
*Hytron Hearing Aid Circuit	May	9
*Microtube Hearing Aid Circuit	May	8
*Instantaneous Sound-Recorder Wartime Servicing. By Alfred A. Ghirardi	Sept.	19
*Instantaneous Sound-Recorder Wartime Servicing. By Alfred A. Ghirardi	Oct.	10
*Instantaneous Sound-Recorder Wartime Servicing, Part III. By Alfred A. Ghirardi	Dec.	9
Output Stage Oscillation	Dec.	28
Philco 37-690. By D. C. Sprong	Aug.	31
*Philco 42-718, Code 121	Aug.	17
Philco 42-762, Code 121	Aug.	16
Phonograph Motor Repairs. By John F. Rider	Jan.	15
Phono Switching (Silvertone 7055)	Jan.	27
*Pickup, Motor & Record Changer Wartime Servicing. By Alfred A. Ghirardi	Sept.	5
*RCA Hearing Aid Circuit	May	9
RCA Q16E (RC561C)	Aug.	17
RCA V105	July	26
RCA 222. By D. C. Sprong	Aug.	20
RCA-Victor R56 Phono Amplifier	Dec.	8
*Railroad Sound Switching and Interconnections	Apr.	5, 6
*Record Player (Emerson FY434, FY2-434	Feb.	23
*Record Player (RCA R56, RS119)	Apr.	19
Soldiers Use Discs	Feb.	33
*Solving Shortage Problems in Second Detector and AVC Circuits. By Robert G. Herzog	Mar.	14
*Solving Shortage Problems in Speaker Replacements. By Robert G. Herzog	July	11
*Solving Shortage Problems in Speaker Replacements. By Robert G. Herzog	July	11

*Solving Shortage Problems in A-F Circuits. By Robert G. Herzog	Apr.	13
Sound Ideas. By Jay Allen	Feb.	19
Sound News	Jan.	33
*Sound Systems Today. By Sidney Harman	Oct.	5

**TEST EQUIPMENT**

*Capacitor Replacement. By S. Gordon Taylor	Jan.	20
*Cornell-Dubilier BF50 Capacitor Analyzer	Jan.	20
High Speed Limit Bridge	June	20
*Precision EV10 Electronic Multitester	Mar.	20
RCA 158, 160B Cathode-Ray Oscilloscope	Apr.	22
RCA 160 Cathode-Ray Oscilloscope	Apr.	22
*RCA 167-1670 Test Oscillator	July	26
Radio City Products 662 Electronic Multitester	Jan.	26
*Wien Bridge Audio Oscillator. By Robert Stang	Apr.	16

**TELEVISION**

Color Television	Mar.	26
*Silvertone 7048	Mar.	12

**TUBES**

*Hearing Aids. By Alfred A. Ghirardi	May	7
*Industrial Electronics. By Alfred A. Ghirardi	Jan.	5
*Industrial Electronics. By Alfred A. Ghirardi	Feb.	5
*Industrial Electronics. By Alfred A. Ghirardi	Mar.	5
Iron to Glass Seal	Apr.	21
*Output Tube Circuits	Apr.	13, 14
Replacement Parts and Tubes	June	25
Tube Noises	Mar.	24
*Vacuum Tube as Variable Impedance	Feb.	16

**TUNING INDICATORS  
TUNING MECHANISMS**

*Belmont 8AE1	Jan.	13
*Colpitts Oscillator	Jan.	11
*Dial Drive Repairs. By Walter L. Schott	May	10
Emerson EL360, EP367	June	8
G. E. G95. By Willard Moody	Sept.	18
Philco 39-55RX, 39-116RX. By D. C. Sprong	Aug.	17
*Philco 42-380	Nov.	11
*Philco 42-380, Code 121	Nov.	11

*Philco 42-842, 42-943, 42-944	May	11
RCA 28X5	Apr.	22
RCA T80. By A. Knickner	Apr.	22
*RCA VHR-212	Sept.	11
RCA 97R2. By Willard Moody	Jan.	28
*Silvertone 7048	Mar.	10
*Silvertone 7195	Sept.	10
*Stewart-Warner Hudson SA40	Jan.	29, 30
*Zenith 7G605	May	23

**WARTIME SERVICING**

*Bypass Condenser Substitution. By M. E. Heller	Nov.	5
*Capacitor Replacement. By S. Gordon Taylor	Jan.	21
*Instantaneous Sound-Recorder Wartime Servicing, Part I. By Alfred A. Ghirardi	Oct.	10
*Instantaneous Sound-Recorder Wartime Servicing, Part II. By Alfred A. Ghirardi	Nov.	15
*Instantaneous Sound-Recorder Wartime Servicing, Part III. By Alfred A. Ghirardi	Dec.	9
*Pickup, Motor and Record Changer Wartime Servicing. By Alfred A. Ghirardi	Sept.	5
*Replacing Discontinued "A-B" Packs and Unit Batteries in Portables. By Alfred A. Ghirardi	July	5
Replacement Parts and Tubes... Running Your Service Shop for the Duration. By Alfred A. Ghirardi	June	25
Replacement Parts and Tubes... Running Your Service Shop for the Duration. By Alfred A. Ghirardi	June	5
*Servicing Power Supplies. By Mark Glaser	Sept.	13
*Solving Problems of Replacement in Power Supplies. By Mark Glaser	Aug.	6
*Solving Shortage Problems in Speaker Replacements. By Robert G. Herzog	July	11
*Solving Shortage Problems in Oscillator Circuits. By Robert G. Herzog	Jan.	9
*Solving Shortage Problems in I-F Circuits. By Robert G. Herzog	Feb.	9
*Solving Shortage Problems in Second Detector and AVC Circuits. By Robert G. Herzog	Mar.	14
Solving Shortage Problems in A-F Circuits. By Robert G. Herzog	Apr.	13
*Sound Systems Today. By Sidney Harman	Oct.	5
*Study of Wave Traps. By Mark Glaser & Edward M. Heller	Oct.	14
*Tricks of the Trade For Wartime Servicing. By Alfred A. Ghirardi	Aug.	8
Vibrator Problems Today. By R. M. Ellis	Aug.	5

**ACOUSTIC FEEDBACK**

Acoustic feedback may be eliminated by placing the speaker on rubber grommets when mounting same. This acts as a shock mount and prevents direct sound feedback to other elements of the receiver.

\* \* \*

**MECHANICAL HUM CURE**

A mechanical hum through chassis and cabinet is usually due to the fact that the power transformer is mounted directly on the chassis. The chassis acts as one large lamination. This may easily be overcome by placing 2 small spacers between the power transformer mounting and chassis.

**OUTPUT STAGE OSCILLATION**

In small receivers, usually, the cathode bypass condenser is omitted in order to save expense and also permit the output circuit to have a certain percentage of degeneration. When these output tubes get older, due to service, and all other components change slightly, there is a tendency for this output stage to oscillate. Usually a .1 mfd condenser will eliminate these oscillations.

\* \* \*

**NATIONAL UNION OPENS NEW PLANT**

The new plant of the National Union Radio Corporation at Lansdale, Pa., was recently opened with impressive ceremonies in which Army and Navy officers participated.

**CROSLEY'S POST WAR PLANS**

The Crosley Corporation is actively planning its post-war program in radio and major appliance distribution. In order to keep its distribution informed and, at the same time, consult with its peacetime distribution, a series of meetings are being held around the country.

The first of these meetings was held in Washington, D. C. Harold A. Newell, Crosley's service manager, outlined to the distributors the part his department is playing in maintaining a steady flow of replacement parts on all Crosley products to distributors and dealers.

Frank H. McIntosh, chief of the civilian radio section, and Glenn C. Harvey, administrator, both of the War Production Board, discussed the board's radio program and told what is being done to assist in keeping replacement parts reaching dealers and consumers constantly.

# Farrell Says:

By C. H. FARRELL

Anno  
Domini  
of  
1942

The curtain rings down on a memorable year; a year which witnessed the resurgence of American night; a year characterized by epochal changes in the long-time habits of peace-loving America; a year in which a high, wide and handsome Democracy discarded its swaddling clothes overnight and emerged as the fightin'est war machine the world has ever seen.

Yea, verily, it was a year for the books; a year which historians may well describe as "The Year of American Unity."

Belt puller-inners cheerfully accepting short rations; housewives in slacks and snoods joyfully going about the business of producing the sinews of wars; fond parents saying farewells to the youth of the Nation as it embarks upon its great crusade against the forces of evil; ingenious manufacturers and service technicians devising substitutes for vital components which have joined up for the duration.

That was America, circa 1942.

When the story of the Great War is written in its proper perspective it will narrate the importance of America's "Secret Weapon" . . . TRUTH . . . in the war effort. It will tell all and sundry of the part played in the winning of the war by that most important agent for the dissemination of information and truth . . . RADIO!

And any narrative on the subject of wartime radio communications must inevitably credit John C. Servicer with an important "assist."

Against  
Great  
Odds

Sitting here in my "Ivory Tower," I'd have hardly believed that the Servicing fraternity could have met the unusual demands placed upon it. There seemed to be insurmountable difficulties. Shortages of replacement parts. Shortages of tubes. Shortage of skilled help.

The insatiable Maw of Mars was reaching out and scooping up everything in the way of manpower and materials which the servicing fraternity depended upon for its continued operation. Things being what they are, the aforesaid Maw of Mars had priorities on men and materials.

Let it be recorded here and now that

## STANISLAUS WIDGIT MAKES IT CONVINCING

"See here, guy," said Orbitz Hammer, as he led Serviceman Stanislaus Widgit into the living room. "I sent for you to fix my radio and you'll do it right here, see—not back in your shop. I want to watch you work and know what I'm payin' for. Just try to gyp me and I'll bust you right smack on the beezee, see?"

Good as his word, giant Orbitz Hammer then proceeded to tower menacingly over little Stanislaus as the latter went to work on the ailing radio. Luckily, however, the trouble was easy to locate—a dead section in a big, old-fashioned 8-8 mfd. dual cardboard dry electrolytic condenser.

After removing the old condenser, Stanislaus produced a dual 8-mfd. Sprague Atom from his kit and started to make the replacement.

"Hey," bellowed Orbitz Hammer, looking at the old condenser. "You ain't taking a big thing like this out of my radio and puttin' a little peanut in its place. Put in a big one or I'll smack ya, see?"

"But," protested Stanislaus softly, "this little one is a Sprague Atom. It's even better than the old one."

Bulking head and shoulders over little Stanislaus, Orbitz Hammer shook a huge fist under the serviceman's nose.

"Put in a big one, I tell ya, before I forget myself and put another gyp outta commission for a couple of months, see?"

"But . . ." protested Stanislaus again.

Orbitz Hammer roared wildly. His big fist described a wide arc terminating in the general direction of Stanislaus' "beezee." But neither the



beezee nor any other portion of Stanislaus' anatomy was there to receive it.

Almost at the same instant, something extremely hard and compact crashed into Orbitz Hammer's midriff causing him to get out mightily. Then a small but surprisingly strong arm encircled his head, and he was flipped jauntily through the air to land with a crash on an end table, which collapsed beneath his huge bulk. When he finally came to, he realized that Stanislaus had carried him bodily to the davenport, propped a pillow under his

aching head and then flipped the entire contents of a vase—flowers, water and all—over his face to revive him.

"Now just take it easy, big boy," Stanislaus was saying softly. "Just lie there quietly while I pick up my stuff and get out of this firetrap before I really get mad and hurt you."

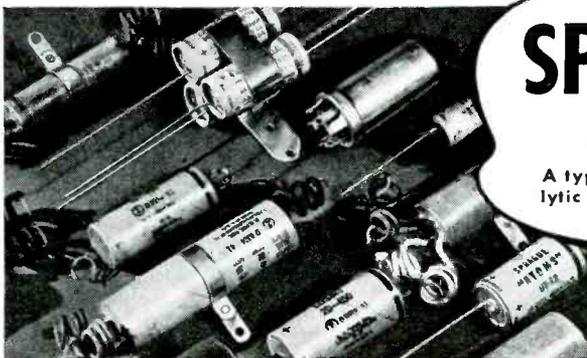
"But," protested Orbitz Hammer weakly, "you came here to fix my radio, see?"

"Uh huh," said little Stanislaus, "and I hope I ended by proving that good goods often come in small packages. Or shall I shove a few of these little condensers down your throat just to make it doubly convincing?"

"Aw," replied Orbitz Hammer, "I was only kiddin'. All I want is my radio fixed as good as it was before, see?"

"It won't be fixed as good," said Stanislaus. "It'll be fixed better. Sprague Atoms do a man-size job, see?"

And back he went to the radio set.



### SPRAGUE ATOMS

A type for every dry electrolytic need. Use them universally.

SPRAGUE PRODUCTS CO.  
North Adams, Mass.

the wartime adaptability of manufacturers, parts distributors and Service Men will forever become one of the brightest pages in the history of the radio industry.

Surely . . . the servicing fraternity has contributed in a great measure toward bringing the United Nations one year closer to victory.

Servicers  
Are  
Modest

To the average Servicer, such words of praise may come as a shock. The fraternity has ever been modest. I hazard the guess that most Service Men in the radio business got into it because radio was an avoca-

tion rather than a vocation. Money has always been secondary to pride of accomplishment. And while I cannot find too much fault with that attitude (being somewhat on the same side myself), honesty compels me to express the belief that men should dally no longer in Elysian Fields. For even as they exert every effort to keep the nation's radios in good operating condition, post-war problems begin to rear their heads.

And to say that these problems will have a large migraine factor for today's Service Man is to perpetrate a masterpiece of understatement.

(Continued on page 31)

## SOUND RECORDER SERVICING

(Continued from page 9)

deformities that take the pattern of the defective stylus; while dull cutting edges will result in torn and ragged side walls with resulting high surface noise. More will be said about styli inspection later.

(6) Check the recording stylus adjustments (horizontal and vertical angles and cutting depth). The best setting for each one depends upon the other, if one is changed the others may also have to be changed with it. For example, changing the vertical angle necessitates a change in the depth-of-cut adjustment and may also require a new vertical angle to prevent chatter or reduce surface noise. It is often well, however, to first try a new cutting stylus before making any adjustments, to preclude the necessity for a complete re-adjustment. Adjustments made with a dulled cutting stylus being used will have very little effect upon the depth of cut produced.

(7) Cut a test record, keeping the first portion unmodulated and modulating the remaining part. Listen carefully to the recorder mechanism while the record is being cut, in order to detect any possible noises (such as hisses, squeaks, bounces, etc.) that indicate a source of trouble. Note also such important things as a wobbly or unevenly running turntable, etc. Inspect the thread being cut under a magnifying glass, and make any cutting adjustments that seem advisable.

(8) Remove the record from the recorder and inspect the grooves with the magnifying glass under good light. Check for proper depth of cut (observed by noting ratio of groove width to "land") and for any "patterns" that indicate definite troubles (these will be discussed later).

(9) Play back the record for further aural analysis of troubles that it may reveal.

## Examining Recording Stylus for Wear or Damage

Since the recording stylus is one of the most important components of the recording equipment it is important to know the exact condition of the point and the cutting edges. This may be learned either by visual examination of the stylus, or as we shall see later, by actually testing the stylus.

Since the stylus is entirely too small to be even superficially examined by the naked eye, (the thread cut out by the stylus being of the approximate size of a human hair) we must resort to the use of a good magnifying glass of 15 or 20 power to enable us to examine the side walls of the groove and most important, the cutting edges that produce them. (An inexpensive 15-power commercial unit made for this work also illuminates the surface to be examined by a self-contained No. 1 battery and small bulb.)

The two cutting edges forming the "V" are themselves formed by the intersection of the two back "heel" surfaces with the "front" face of the stylus. Therefore, since any flaw in any one of the three stylus surfaces will produce a ragged, noisy groove it is important to examine *all three* of these surfaces under the microscope, and not just the front one. They must all have an unblemished mirror-like finish.

Natural wear of a cutting point usually becomes first apparent at the surface line, resulting in two dulled spots, one on either side of the point, averaging .0025 in. from the top. This is caused by the fact that the surface tension of the disc is much harder than it is down in the body of the material, which naturally causes more wear at the sides of the cutter than at the nose and tip. This is illustrated at (A) of Fig. 1. The effect is obviously to cut a groove that has rough and torn upper side walls and edges, which result in excessive surface noise in the playback. The groove is also narrower at the top than the standard size. This makes the

playback needle unable to properly couple to the groove; see (B) of Fig. 1.

The extreme tip of the recording stylus should be examined next. While it is not subject to extreme wear at this point, its sharpness and uniformity are important. If the tip is sharp and true it will cut a clean and smooth groove as shown at (A) of Fig. 2. Any deformity in the tip will cause a high-frequency "chattering" effect that will produce minute high-frequency modulations in the groove—mostly in a hill-and-dale direction. When the tendency is only slight, these modulations will appear only at the groove bottom (as shown at (B) of Fig. 2), and will be of extremely high frequency (generally above audibility at normal groove speeds). However, if the condition is in aggravated form, the modulations will appear throughout the entire groove, and their frequency may drop down to the upper limits of audibility, resulting in a high-pitched "hissing" sound. When above audibility, such conditions on a record can be determined by slowly rotating the turntable by hand, thus bringing the frequency down to an audible range, so that the condition can be heard through the playback system.

When the tendency to whistle is only slight, it can generally be eliminated by readjusting the angularity of the stylus until it disappears. However, if such adjustment fails to eliminate the trouble, obviously the stylus must be discarded or, in the case of sapphire, returned to the factory for resharpening and polishing.

The point and cutting edges of the stylus are *razor sharp*, and it is obvious that if the cutting stylus should bump or scrape against the turntable or other metal object, it would be dulled or nicked and rendered useless. Also, the head and stylus should not be allowed to drop on the record when starting to record, for the point will thereby be crushed or flattened. Even the normal recording head pressure of a few ounces

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

## 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.

is equivalent to several hundred pounds per square inch on the razor sharp point. During periods of inoperation, the recording arm should always be returned to its normal out-of-use position off the record to prevent damage.

#### Testing Recording Styli

The cutting ability, and life of recording styli may be quickly tested by cutting an unmodulated groove with the stylus in a standard disc known to be fresh and of good quality. The recording head leads should be connected to the input terminals of the amplifier instead of to its output. This operates the recording head electrically as a pickup. The amplifier should be turned up full. Its output will be read on the volume level indicator. Good styli will cut very smoothly and quietly and give a low output as indicated by the volume level indicator. The noisier the stylus is (the more ragged the groove it cuts), the greater will be the indication of the level indicator. The cutting quality of a stylus and also whether its useful life is ended or not can be determined accurately and quickly in this way.

#### Testing Recording Blanks

Recording blanks may be tested for quality, imperfections, etc., similarly.

(To be continued)

## FARRELL SAYS

(Continued from page 29)

For instance . . . can you envision the future scramble for "industrioelectronic" business? And what of the present day chatter re: the "Super-Service Station"?

**Super  
Duper  
Service**

Folks are discussing it. Some of the best minds in the industry talk of the "Super-Service Station" of the post-war future as a

*fait accompli*. The Signal Corps Training Program of the armed forces will surely produce thousands of radio technicians who will be an economic factor in the future radio service. Widespread use of electronic devices will present an attractive market for the post-war radio technicians as will the countless augmented communications, sound and television applications.

I am not prepared to make any long-range predictions as to the future of the present-day radio technician. But I'll go AWOL (all the way out on the limb) and state this axiom:

*Knowledge is Power. Your future is up to yourself. If you are a better technician; a better business man, than your competitors . . . you have absolutely nothing to worry about!*

**Cinaudagraph Speakers..**  
*Where the Goings Tough!*

**Cinaudagraph Speakers, Inc.**  
3911 S. Michigan Ave., Chicago  
*"No Finer Speaker Made in all the World"*

## NEWS

(Continued from page 29)

served five to nine years, and gold emblems for those who had served the company continuously for ten years or more.

Stancor's president, Jerome J. Kahn, welcomed the veterans and the honored guests which included Lt. Col. Boruszak, Lt. Com. George C. Norwood, Major H. E. Billington, Major Eldon A. Koerner, Major Leo E. Steiner, and Levi Anderson, Kenneth C. Prince served as toastmaster.

\* \* \*

#### HANDY RADIO TROUBLEFINDER

An ingenious trouble finder device, that should prove extremely helpful in wartime training programs and service work, has been devised by Alfred A. Ghirardi of the Radio and Technical Publishing Company, 45 Astor Place, New York City.

**BUY UNITED STATES  
WAR SAVINGS BONDS AND STAMPS  
EVERY PAY DAY**

In handy pocket-sized form the trouble-shooter consists of eight 4 3/4" x 7" printed cards arranged to swing on an eyelet. For any of the 8 common radio receiver trouble symptoms such as "dead receiver," "intermittent reception," "fading," etc., it clearly lists all of the probable causes of



the trouble in the 7 main portions of the receiver and also suggests the remedy for it.

There is one designed specifically for Home Radio troubles and another for Auto Radio troubles.

"MAKE DO"  
WITH A WINNER\*

# SYLVANIA SERVICEMAN SERVICE

by  
**FRANK FAX**



"MAKE do with what you can get" is the order of the day on the home front. Substitution is serious business with radio tubes, so to help you Sylvania engineers have prepared a "correlation for substitution" chart to be consulted whenever exact replacements are unavailable.

No less than 450 types of tubes are listed. For each type are given style, duty and —most important— tubes available with "equivalent" and "similar" characteristics, with instructions as to interchangeability —direct or with circuit modifications.

This chart is a great help when used in connection with its companion pieces, the Characteristics Sheet and Technical Manual.

Use this know-how on tube replacement problems. Put those sets, awaiting unavailable exact replacements, back into wartime service. Wind up a lot of unfinished business. To the satisfaction of yourself and your clients.

This chart is free, as are many of the other technical and sales helps listed below. If your jobber is short on any of them, write to Frank Fax, Dept. S-12, Sylvania Electric Products Inc., Emporium, Pa.

#### WARTIME PROMOTION ITEMS



\*WINNER — 1942 American Direct Mail Contest for the best wartime jobs.

1. Blackout button
2. First aid index
3. War bond poster
4. Radio caretaking

5. hints for the housewife
5. Air raid precautions folder and window poster
6. Direct mail letter

#### REGULAR ITEMS

1. Window displays, timely window streamers, etc. (From your Sylvania jobber only)
2. Electric clock signs
3. Electric window signs
4. Outdoor metal signs
5. Window cards
6. Imprinted match books
7. Imprinted tube stickers
8. Business cards
9. Doorknob hangers
10. Newspaper mats
11. Store stationery
12. Billheads

13. Service hints booklets
14. Technical manual (35c)
15. Tube base charts
16. Price cards
17. Sylvania News
18. Characteristics sheets
19. Interchangeable tube charts
20. Tube complement books (35c)
21. Large and small service carrying kits
22. Service garments
23. 3-in-1 business forms
24. Job record cards (with customer receipt)

**SYLVANIA**  
ELECTRIC PRODUCTS INC.  
RADIO TUBE DIVISION  
Formerly Hygrade Sylvania Corporation

## JOTS & FLASHES

It's Major John F. Rider now . . . congratulations on the promotion, John . . . Bliley Electric awarded the Army-Navy "E" in Erie, Pa., on December 9th . . . radio certainly doing its share and more in war production efforts . . . new advertising manager at Hallicrafters . . . congrats to Miss M. M. Hirsman . . . Charley Golenpaul, s. m. of Aerovox, again elected chairman of Sales Managers Club, eastern division . . . will be third term of office for Charley since club was organized in 1935 . . . Ralph Glover, well known sound specialist, now with Webster-Chicago . . . National Union opened brand new factory at Lansdale, Pa., on November 20th . . . James T. Buckley, president of Philco, just celebrated his 30th anniversary with the company . . . Irving Berkman appointed manager of priorities and expediting for Radio City Products Co., instrument manufacturers of New York City . . . industry estimates 6,000,000 worthless radio throughout country by June, 1943 . . . hope that WPB will allocate sufficient replacement parts to forestall such a situation . . . radios must be kept playing . . . we like the Stancor house organ . . . a swell morale booster for all employees . . . KenRad advertising certainly establishing brand consciousness . . . fine insurance against post war developments . . . read all advertising in SERVICE carefully . . . remember those concerns who haven't forgotten the Service Man in these days of essential war production . . . they'll deserve your support once hostilities are successfully concluded . . . and keep buying War Bonds to the limit of your capacity . . . there's no better way to help win the war . . . H. Ritzma now in charge of advertising and sales promotion at Ohmite . . . a big pat on the back to Hallicrafters for promotion of Signal Corps enlistments in their institutional advertising . . . Westinghouse appoints G. V. Bates, superintendent, and L. E. G. Suiter, supervisor of production at Sumbury, Pa., Works . . . December 4th, a red letter day at Meissner in Mt. Carmel, Ill. . . yes, the Army-Navy "E" awarded to them . . . congratulations, Vince . . . Harry Bridge, Philadelphia advertising agent specializing in radio, now located in Real Estate Trust Bldg. . . new Triplett COMBAT line of meters favorably received by the industry . . . George K. Throckmorton elected a Director of the Radio Corp. of America . . . D. W. May made Eastern Manager of General Electric Radio Receivers and tubes, with headquarters in the G-E Building in New York—P. S. W.



**A Merry Christmas  
and  
A Victorious New Year**  
from  
**RADIART**

We are plenty busy building Signal Corps and Ordnance Materials for Uncle Sam

but

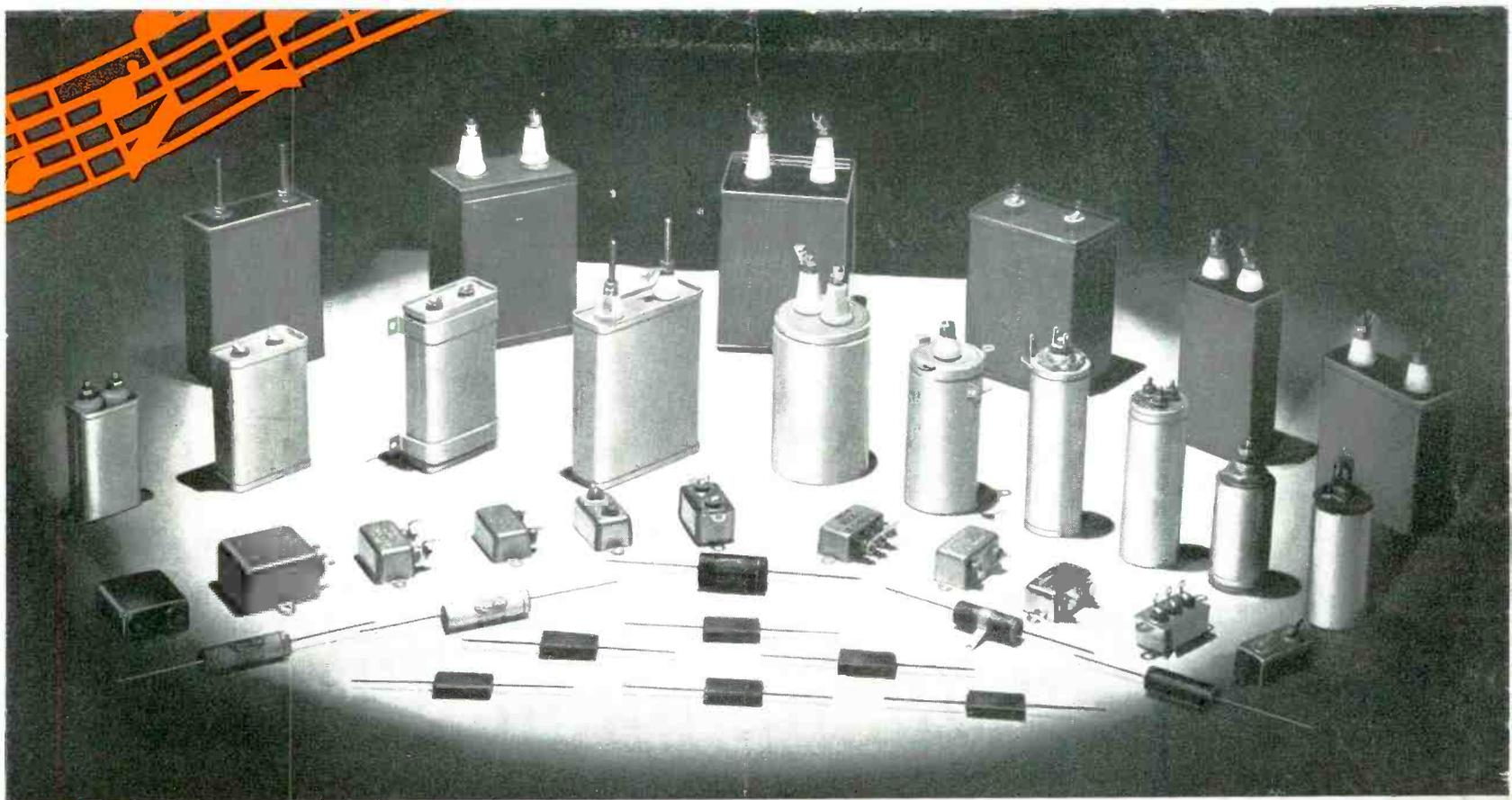
we are never too busy to extend Season's Greetings to our many friends in the radio service field.

**USE  
RADIART  
VIBRATORS  
VIPOWERS  
AERIALS**

Still available at Radiart Jobbers

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# *We're in the Army Now!*

And the Navy too! We Solar Capacitors are doing our bit behind the men behind the guns. Doing our best in tanks, in the hot spots – in the air, at frigid minus 40° C. – on the water, with spray in our face. You can be proud of our "Quality Above All" which helps the Armed Services for Victory!      ★      ★      ★

Some of us are still at your jobbers, with this same "Quality Above All" – for Service. Will be seeing you there!      ★      ★

*Solar Capacitors*

**SOLAR MANUFACTURING CORP.**

**BAYONNE, NEW JERSEY**

# NATIONAL UNION SHAKES A *Powerful Electronic Fist* RIGHT IN DER FUEHRER'S FACE!!!

WE'VE FLEXED OUR PRODUCTION  
MUSCLES

WE'VE CLENCHED OUR ENGINEER-  
ING FIST AND RIGHT  
AT THIS MINUTE

WE'RE AIMING OUR UPPER-  
CUT RIGHT TO THE  
UGLY AXIS FACES.

RADIO TUBES, TRANSMITTING TUBES, CATHODE RAY TUBES—THEY'RE ALL POURING OUT FROM OUR DOORS TO POUR DEVASTATION ON OUR ENEMIES. YOU WOULD BE PROUD TO KNOW THAT YOU ARE A NATIONAL UNION ASSOCIATE IF WE COULD TELL YOU HOW VITALLY OUR PRODUCTS ARE COUNTING IN THE WAR EFFORT.

**ON THE HOME FRONT...**



NATIONAL UNION Distributors, service men, dealers—all are fighting along with us to keep the domestic market open to keep home receivers in operation. N. U. tubes, condensers, volume controls—yes, even panel lamps, and other N. U. products, are counting now more than ever before. Every single unit which goes into a set today keeps the ears of the nation opened. We're proud of the distributors and service dealers who are helping in the war effort, and assure them to the last man that National Union appreciates your problem. National Union is doing everything humanly possible to help you solve it.

**NATIONAL UNION RADIO** Corp.

57 STATE STREET, NEWARK, NEW JERSEY . . .