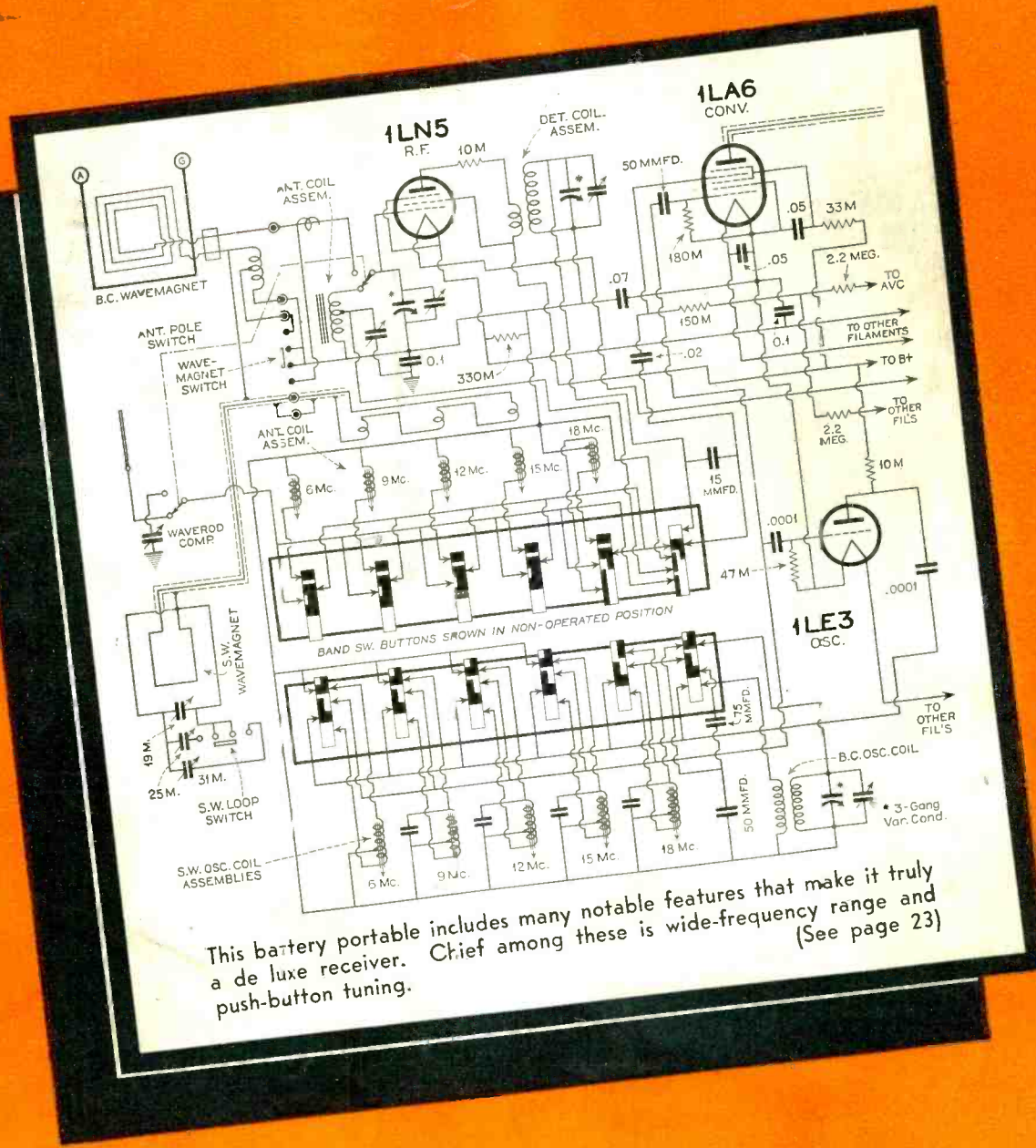


SERVICE



This battery portable includes many notable features that make it truly a de luxe receiver. Chief among these is wide-frequency range and push-button tuning. (See page 23)

MAY
1942



The Home Front ~~Needs~~ Must Have Good Reception

“Keep ’em listening!”

Despite restricted production and material shortages, as a radio service engineer, we urge you to “keep ’em listening!”

We know how essential a home front job you perform. And, you know you can depend on Mallory for practical help in meeting the brain-racking radio service problems imposed by current shortages and restricted production.

Although we are up to our ears in wartime production, we haven't forgotten your needs for one instant.

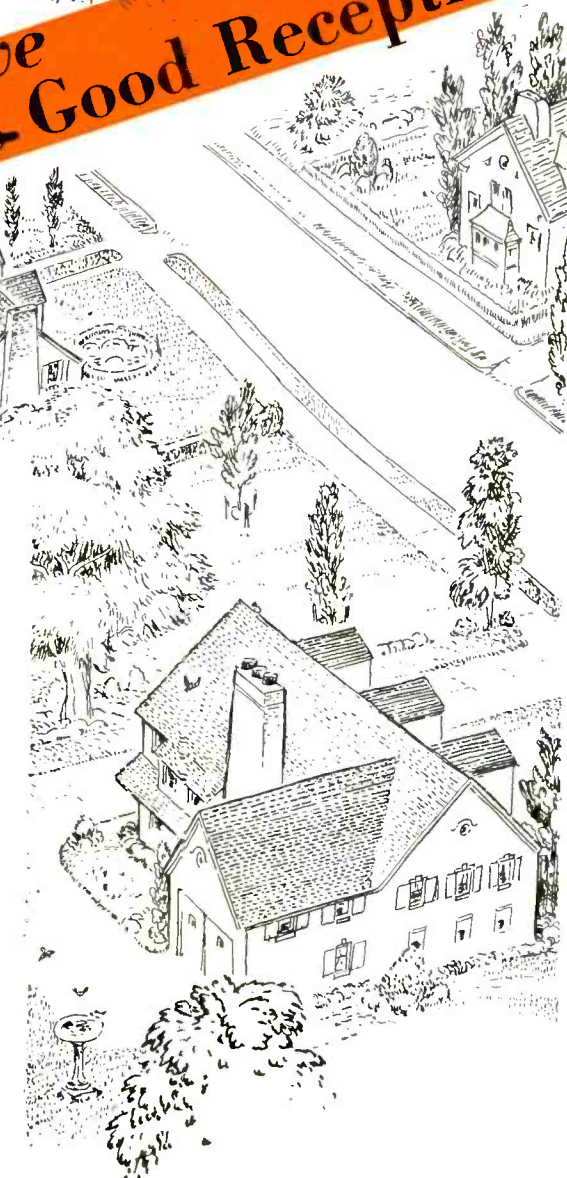
We are making every effort to provide adequate supplies of Mallory Approved Precision Parts. Our research laboratories are working night and day, coping with the present, anticipating the future. Problems induced by material shortages have, in many cases, resulted in engineering adaptations that mean real progress in good servicing.

And we are getting a fine demonstration of how beautifully the Mallory policies of standardizing parts and simplifying lines have operated to aid servicemen.

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Mallory radio parts including a battery, a box of parts, and various electronic components.

HIGH FREQUENCIES

Ultra HIGH FREQUENCIES

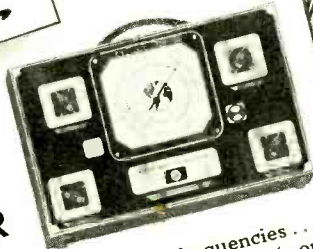
30,000 KC.

HERE ARE THE INSTRUMENTS FOR YOUR MEASUREMENT NEEDS!

*50 kc to 33 mc
fundamental
frequencies*

WESTON Model 776 OSCILLATOR

For testing broadcast and intermediate frequencies... in vacuum tube circuits. Accurate within 1/2 of 1% on broadcast bands—1% on short wave bands. Has large 330° hand calibrated dial. WESTON AAC (Automatic Amplitude Control) circuit assures uniform output level regardless of frequency (no trimmers or padders used.) Triple shielding eliminates leakage.



*22 mc to 150 mc
fundamental
frequencies*

WESTON Model 787 UHF OSCILLATOR

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*For potential
measurements over
broad frequency
ranges*

WESTON Model 669 Vacuum Tube Voltmeter

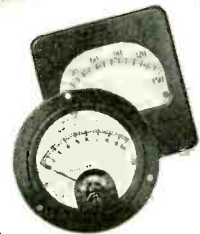
For measuring voltages in vacuum tube circuits where frequency is a factor. Has low input capacity of 5 micro-microfarads with 6" leads. All ranges operate direct to measuring tube grid, providing a maximum input resistance and impedance device. Loading effect on circuit under test is only that of the tube itself, as no grid resistors are used on 0-1.2-3-6-8-12-16 volts ranges. Phone jacks provided for making audible tests. Ranges 0-12-30-60-80-120-160 volts full scale with multipliers.



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A Monthly Digest of Radio and Allied Maintenance
Reg. U. S. Patent Office

JUST A FEW short months ago the assistant manager of the parts division of a very large set manufacturer discussed our series of articles on "Solving Shortage Problems" with us. He seemed to be of the opinion at the time that we were quite a good bit ahead of the times. He felt sure that there was no shortage of replacement parts of any kind and couldn't foresee any in the very near future. We mention this here because at the time he was not alone in his opinion. We had heard the same thoughts from others, before and since, but not from anyone in such a high position. It goes without saying that he is completely wrong. By now he will probably admit it himself.

All this brings us to the point where we are moved to warn the Service Man that there will be a serious curtailment of the manufacture of replacement parts of all types. Some sources even predict that the manufacture of such parts, for other than war use, will be prohibited entirely.

To cope with this situation we suggest if you haven't done so already that you sit down right now and read our series of articles on "Solving Shortage Problems", which began with the November, 1941, issue of SERVICE. Then bring on the shortages!

A MANUFACTURER of metal stampings has released a statement, which a contemporary trade publication has published, to the effect that the War Production Board has stopped the production of metal tubes for other than war orders. We have checked with WPB and with the tube manufacturers and find that the statement is without factual basis. Metal tubes are still manufactured for replacement and priority orders.

THE TRADE has been informed that the National Radio Trade Parts Show, normally scheduled for June, has been suspended for the duration. Because of this we have taken it upon ourselves to discuss the "State of the Industry" in our June issue. We will attempt, in so far as possible, to tell our readers what items, new or otherwise, the manufacturers are offering, together with such news, etc., that would usually be collected at the show.

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*All out
Performance*

with

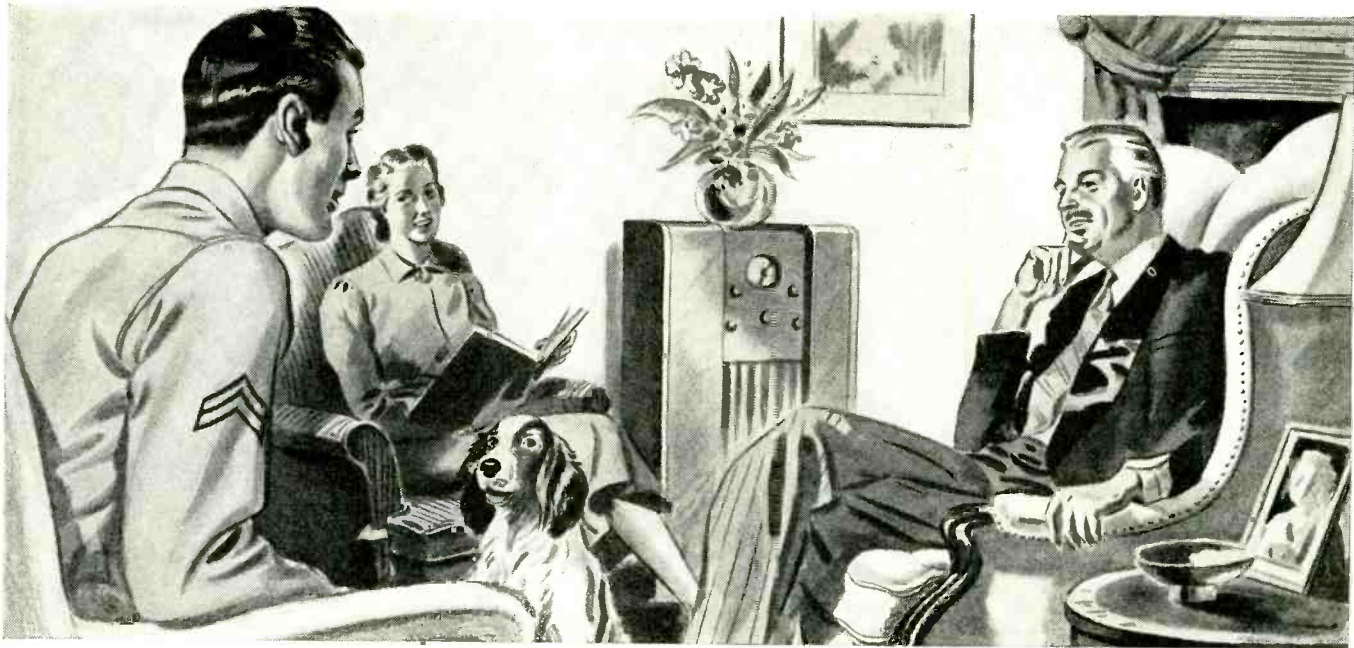
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WHAT ABOUT RESISTORS AND CONTROLS FOR THE HOME FRONT?

A Statement Regarding the IRC War Effort and Its Effect on Normal Production

As a natural consequence of unquestioned leadership in its field, IRC has been called upon to provide fixed and variable resistors for war requirements to an extent which has absorbed a large part of its production capacity. This war demand has steadily increased and has exceeded all expectations. Naturally, this is a tremendous responsibility that we cannot neglect.

Nevertheless, we have by no means forgotten the important requirements of service men and jobbers. We have wanted for some time to make a definite statement concerning our ability to supply replacement parts. This has been impossible since there was no means of knowing the extent of the war demands, and no definite provision has been made to insure a supply of critical materials for radio servicing requirements.

The national authorities in charge of this most difficult task of allotting critical materials for the greatest good of our Nation fully recognize the importance of radio repair and maintenance but, up to now, urgent war production has rightfully had priority over all else. As soon as these authorities decide upon definite plans for the allotment of materials for replacement parts, we shall relay these plans to you.



Meanwhile, we state definitely:

That IRC realizes fully the importance of keeping the Nation's old radios in perfect working order during the emergency.

That IRC thoroughly recognizes its obligation to keep jobbers and service men supplied with dependable replacement parts.

That IRC pledges itself to fulfill its obligation to the utmost, within the limits permitted by authorization of critical materials.

If deliveries have at times been slow, or if you have found an occasional unit missing from jobbers' stocks, we know that you will understand. You will realize that any failure to deliver goods on the home front is only because we have recognized that there *must* be no failure to deliver them on the war front.

Obviously, all replacement parts production will be faced with many difficulties arising from the war. Through participation in the "Production Requirements Plan" now being expanded to cover replacement parts, plus full utilization of our greatly enlarged manufacturing facilities, IRC hopes to be in a position to handle all legitimate requirements.

The home front has not been forgotten.

We'll do our level best to meet its needs!

INTERNATIONAL RESISTANCE COMPANY 401 NORTH BROAD ST. PHILADELPHIA, PA.

SERVICE

A Monthly Digest of Radio and Allied Maintenance

BATTERIES FOR PORTABLES

By **ROBERT G. HERZOG**

EDITOR

SPECIAL BATTERIES

Voltage	Burgess	General	Eveready	Rayovac
30	W20PI	V20AAAG	—	—
51	W34	V34AAAG	—	—
60	W40	—	—	—
88½	Z59	—	—	—
90	A60	—	—	BB60P
90	—	—	—	7S60P

ADVICES from battery manufacturers indicate that they have been forced to consolidate their lines. The sudden advent of the United States into war has necessitated this in order that manufacturing facilities could be given over to those types in demand by our armed forces and war industries. The Service Man will therefore find that many of the types recommended for replacement, and listed on the comparative number charts which accompany this article, have been discontinued and no new items have been added to take their place. For example, the National Carbon Company, Inc., informs us that Eveready type numbers 741, 718, 727 and 733 are no longer manufactured or will be discontinued in the very near future. Likewise, the Ray-O-Vac Company lists their discontinued types as follows: P24SA, P24A, P98A, P624A, AB94, MB49, AB419, AB684, and AB794. Other battery manufacturers have similarly discontinued slower moving and extra special types from their lines.

Once again the Service Man's ingenuity is taxed to the utmost. It is up to him to keep the nation's battery portables operating in spite of the lack of proper battery replacements. At first glance this might seem to be an almost impossible assignment. Further study, however, will reveal several methods of approach.

A good many of the units discontin-

ued are among the combination or AB types. Where such is the case replacement is a comparatively simple matter. Special cables are available from Eby, Bud, Alden, JFD and others, which connect the four-prong pack plug to suitable leads and plugs for use with standard separate A and B units.

The situation becomes a bit more difficult where specific A or B units are unobtainable. Of course, the substitu-

tion of the next smaller size unit of the same voltage will restore operation. Occasionally a flat or otherwise specially shaped A battery (say of 1½ volts) is required and no other unit will fit the space. In such cases the (6-volt) counterpart battery may be used by opening it and reconnecting the individual cells (in series instead of parallel) to obtain the proper voltage.

(Chart on next page)

COMPARATIVE BATTERY PACKS FOR PORTABLES

Voltage	Acme	Advance	Burgess	General	Philco	Rayovac	Usalite	Zenith
1½-61	—	—	4GA41	—	P41A4G	—	AB672	—
1½-63	442-4	41AD7	4GA42, 8TA42	41A4FL	P41A4FL	AB419	AB669	—
6-61½	—	—	F4A41	—	—	—	—	—
6.75	—	—	G4B50	Z50 B4H4	—	—	AB670	Z675
7½-63	—	—	G5A42	—	P87	AB794	—	—
1½-90	460-15MS	—	2GA60	—	—	—	—	—
1½-90	—	—	3FA60	—	—	MB49	AB675	—
1½-90	860-41	—	4FA60	—	—	—	—	Z9B
1½-90	—	—	4TA60	—	—	—	—	—
1½-90	460-15	411	5DA60	60A2L	—	—	AB665	—
1½-90	—	837	—	60A4H	—	—	—	—
1½-90	—	—	6FA60	60A4L	P60A4L	AB84	AB667	—
1½-90	—	—	6TA60	—	—	—	—	—
1½-90	—	—	—	—	—	AB94	—	—
6-90	—	—	2F4B60	—	—	—	—	—
6-90	—	—	F4B60	—	—	—	—	Z659
6-90	—	—	G4B60	60B4H4	—	—	—	—
6-90	460-14S	659	D4A60	—	—	—	AB664	—
6-90	—	—	—	60A110	P60A110	AB684	AB671	—
6-90	—	—	2F4A60	—	P60A8F4	—	AB673	—
6-90	—	—	—	60A4FL4	P60A4FL4	AB694	AB668, AB674	—
7½-90	—	—	F5A60	—	—	—	—	—
7½-90	—	—	FSA60	—	—	—	—	—
9-90	—	—	G6B60	—	—	—	—	—

COMPARATIVE NUMBERS OF BATTERIES FOR PORTABLES

Acme	Advance	Bond	Bright Star	Burgess	Eveready	General	National Union	Philco	Rayovac	Usalite	Willard	Winchester
1½ VOLT A UNITS												
111	2	102	10M	D	950	D	D	D	2	1094	D	1511
—	—	—	461	—	—	—	—	—	—	—	—	—
—	—	—	—	2F	—	2FI	—	—	—	—	—	—
114	247	4826	462	4F	742	4FI	A830	P94	P94A	634	4FI	4816
—	—	—	—	—	—	4HI	—	—	—	—	4HI	—
—	—	—	—	—	—	4LI	—	—	—	—	4LI	—
115	—	—	—	—	—	—	—	—	—	—	—	—
116	—	4824	660	6F	743	6FI	A831	P96	P96A	637	6FI	4814
118	147	4829	860	8F	741	8FI	A833	P98A	—	635	8FI	4819
—	447	—	—	—	—	3LI	—	—	—	—	3LI	—
—	—	—	—	—	—	—	—	—	—	644	—	—
118FM	547	4823	865	8FL	745	8CFI	A836	—	P98L	645	—	4813
123M	—	—	465	4FL	—	—	A830L	—	P94L	642	—	—
—	—	—	—	FX	—	—	—	—	—	—	—	—
4½ VOLT A UNITS												
123	647	4928	361	G3	746	3H3	—	—	P83A	683	3H3	4919
6 VOLT A UNITS												
114S	—	—	—	—	—	—	—	—	—	—	—	—
—	2476	—	646	F4PI	—	4F4	A837	—	P624A, P694A	639	4F4	—
—	—	—	—	F4PIX	—	—	—	—	—	636	—	—
—	—	—	661	—	—	—	—	—	—	—	—	—
118S	817	4827	866	2F4	718	8F4	A834	—	P698A	638	8F4	4817
—	—	—	—	4FL	—	F4	—	—	—	643	—	—
118S6	747	4825	868	2F4L	747	8CF4	A838	—	P698L	646	—	4815
7½ VOLT A UNITS												
115S	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	561	G5	—	5H5	A839	—	P85A	687	—	—
45 VOLT B UNITS												
—	—	—	—	—	727*	F30A	—	P200	BB30P	—	—	—
330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
—	—	—	—	—	—	—	—	620	—	620	—	—
430	—	—	30-55	A30	—	V30A	B863	—	P430	621	V30A	—
—	—	—	—	—	—	—	—	—	—	622	—	—
530	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	30-50	A30M	—	—	—	—	—	—	—	—
—	—	—	—	A30X	—	—	—	—	—	—	—	—
830	284	6220	30-33	M30	482	W30B	B862	—	P7830	640	—	6210
—	—	—	—	Z30	738	V30AA	B864	—	P7R30	—	V30AA	—
—	—	—	—	—	733	V30AAA	—	—	P3A30	—	—	—
—	—	—	—	W30PI	—	—	—	—	—	—	—	—
—	—	—	—	XX30	455	—	—	—	—	—	—	—
67½ VOLT B FOR PERSONAL RECEIVERS												
—	—	1720	—	XX45	467	W45A	B865	—	4367	—	W45A	1710

* Type 482 should be used.

Although all the comparative types formerly available are listed here, many units have been discontinued for the duration because the lack of strategic material has forced the manufacturers to consolidate their lines of dry batteries.

H E A R I N G A I D S

By **ALFRED A. GHIRARDI**

A RECENT study of the hearing-aid field has produced some information which it is believed will interest many Radio Service Men, especially as vacuum-tube equipment has now come into its own in this field. In general, there are two types of hearing-aid manufacturers. On the one hand we have a few large outfits that have been in the hearing-aid business for many years and who have developed policies in which the Radio Service Man has no part. Even though these manufacturers are now making vacuum-tube instruments, they imagine the radio man does not fit into their picture. Their sales are handled by local representatives, who usually have considerable investment in merchandise on hand, audiometer test equipment, office, demonstration rooms, etc. Thus this type of organization is pretty much a closed corporation.

It is this type of dealer primarily who has promoted the hearing aid, has spent millions of dollars on advertising and whose sales costs are prodigiously high. Accordingly the prices of instruments made by these manufacturers are proportionately high. These high prices have discouraged hard-of-hearing people who really need hearing aids and have created an impression that the companies

For several years past wearable vacuum-tube hearing aids have been offered by a number of manufacturers.



Midget type tubes have been designed especially for hearing aid devices.

are hold-up artists or something of the kind. Actually, it is a fact that few if any of these manufacturers have made profits commensurate with their investments and efforts.

The other type of organization is the manufacturing company that distributes its product through mail order or regular retail channels and looks with special favor on the Radio Service Man as a logical distributor and servicer. These companies are often smaller than the first type and many are relatively new,

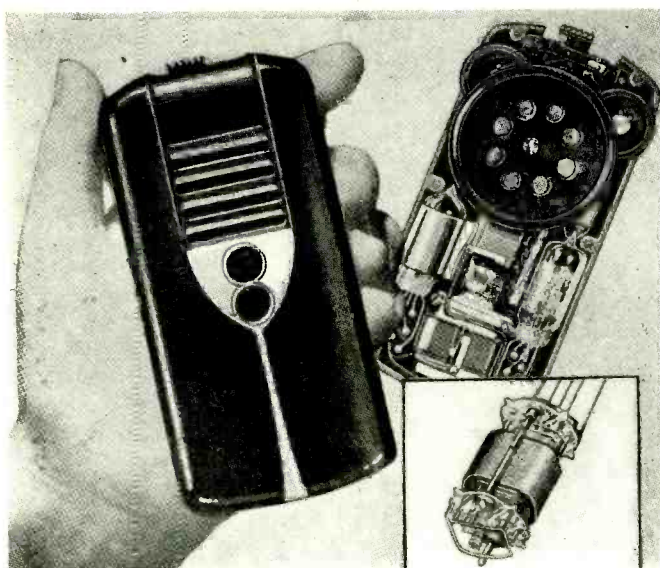
having come into the field only since the development of tiny tubes, small enough for practical use in hearing aids of the pocket type.

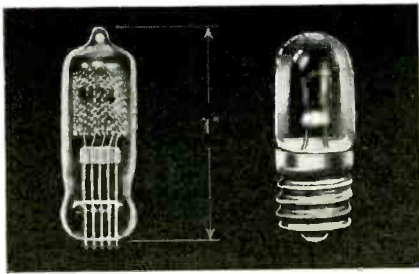
Usually, the latter type of manufacturer holds his promotion and other overhead costs down to a minimum. He can therefore afford to sell his product for a fraction of the price obtained by the old-line manufacturers. He encourages owners of his equipment to go to their local Radio Service Man for repairs. He uses standard miniature tubes, and other parts are likewise standard in so far as possible. If some parts are special he makes these available to Service Men for replacement purposes.

There we have the two basic types of suppliers of hearing-aid equipment. It is not compulsory that the Service Man interested in this field work with either. He can assemble his own hearing-aid equipment from standard parts if he so desires. The stumbling block here is, however, that of obtaining suitable cases in which to house his equipment.

At the present time it is likely that the majority of vacuum-tube hearing aids now in actual service are those made by the first type of manufacturer, but it appears more than probable that this will not continue to be the case.

A special plug connects the aid to a battery power supply. The latter unit is usually carried in the pocket.





Microtube makes tubes that are no larger than the familiar pilot lamp.

After all, it is only a small part of the hard-of-hearing public than can afford to pay in the vicinity of \$175 for a pocket hearing-aid. As this public becomes aware that really effective equipment is available at a fraction of this price it will not take long for the less expensive equipment to predominate the field. At that time the servicing of hearing-aid equipment by competent Radio Service Men will become more practical and widespread.

In the meantime it does not offer very impressive service possibilities. In the first place there are probably not more than a few thousand vacuum-tube hearing aids in existence at this time. Second, a goodly percentage of these are products of the old-line manufacturers and utilize special tubes which are not available to Service Men for replacement purposes. Finally, many of them are sealed and bear a warning that breaking the seals voids the manufacturer's guarantee. For this latter reason the owner feels compelled to return his instrument to the manufacturer for service.

Sales Possibilities

But why wait for this service field to develop? Why not get in on the selling end?

The Service Man has certain definite advantages when it comes to selling hearing-aids. First, he has occasion to visit many homes and it is in the home that hearing-aids can best be sold. There

a hard-of-hearing person can test the device on the voices of his or her family and under familiar surroundings. If it proves helpful the family will be the first to realize it and will lend their cooperation in the closing of the sale. The Service Man's advice is often sought on behalf of those who are hard of hearing. He may be asked to add headphones to a standard radio set so that some member of the family will be enabled to enjoy the programs, for instance. What better opportunity to demonstrate and perhaps sell a hearing-aid instead—enabling this member of the family to hear the radio comfortably, and the family conversation as well.

With a little intelligent effort the local Service Man should have scant difficulty in digging up sales prospects. The pastors of local churches can often provide the names of members of their congregations who need aid in hearing—and are usually only too glad to do so in the hope that they may thus bring greater happiness into the lives of the afflicted. Doctors will sometimes cooperate, as may also storekeepers and others who come in contact with large portions of the public.

It is even possible in some cases to arrive at a working agreement with the local representative of a competitive hearing-aid manufacturer. If he fails to sell a prospect because of the high price of his instrument, he might try selling

over to you. In either case you could split with him if the sale is closed, or can reciprocate by sending to him prospects that cannot be satisfied with your equipment.

Response

An audiometer or some other device for testing the frequency response of the residual hearing of the prospect has its advantages when properly used, but is not essential. The ingenious Service Man can fix himself up an arrangement of audio oscillator and output meter which will serve as a fair substitute for an audiometer—or can use standard frequency records played through a suitable amplifier. Probably neither of these combinations will approach exactness in measurements, but they will provide an approximate idea as to the general trend of the hearing characteristic under test.

If the indication is that the hearing is down more at high frequencies than at low the tone control on the hearing-aid can be adjusted accordingly to give plenty of high-frequency response, and so on. It is well to remember, however, that what sounds best to the subject at first may not be actually the best. A hard-of-hearing person may judge a hearing-aid by its general loudness rather than by the intelligibility of speech. In trying the aid, therefore, an effort should be made to arrive at a tone adjustment which will provide the

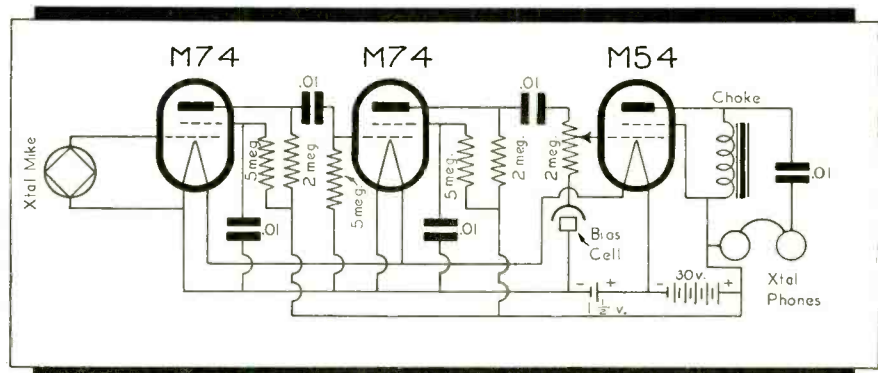


Fig. 2. This wearable hearing aid employs Microtubes of the type shown above.

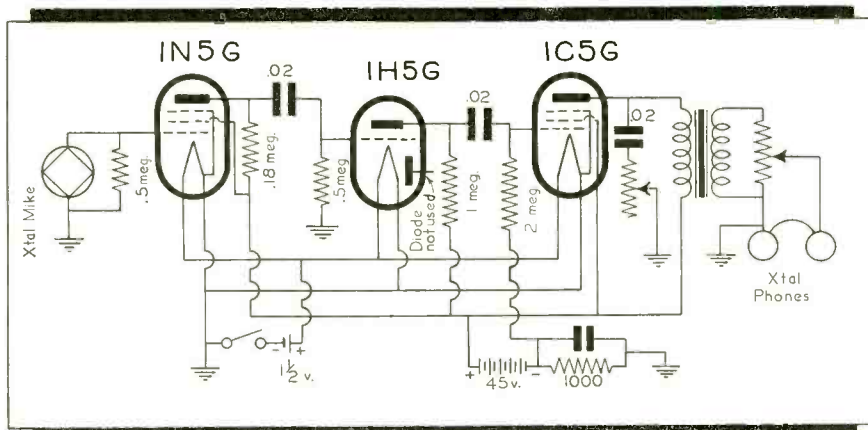


Fig. 1. The "Crystal Ear" is a larger but more economical type of hearing aid.

one of yours rather than lose the prospective business—or turn the prospect

maximum understandability of speech at the lowest practical setting of the volume control.

The fact that most modern vacuum-tube hearing aids do include a tone control eliminates one of the important reasons why the use of an audiometer was heretofore considered essential in testing defective hearing. With the old carbon-type hearing-aids variations in the response of the instrument could be obtained only by combining earpieces, carbon microphones and mechanical amplifiers of different "pitch" until an acceptable overall response was obtained. Some manufacturers might have micro-

phones of as many as six different "pitches," mechanical amplifiers in two or three "pitches" and perhaps ear-pieces or bone conductors of several "pitches." To find just the right combination for any individual case would have been most difficult without some advance indication of the subject's response. By first making a run on the audiometer, therefore, the testing time was reduced and a reasonably satisfactory combination found to start with. Thereafter the exact ultimate combination was found by trial.

Size

All available vacuum-tube hearing-aids are not of the pocket variety, although this small type is unquestionably in greatest demand. More than anything else the hard-of-hearing demand inconspicuousness, then convenience, in

Illustration courtesy KC-1

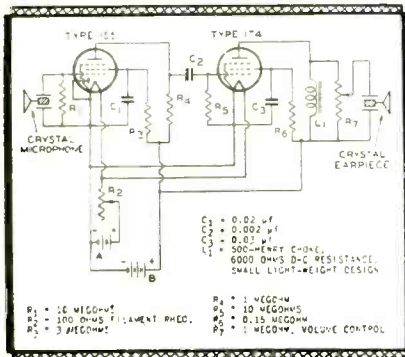


Fig. 4. A two-tube device can be constructed employing the midget 1S5 and 1T4.

the order named. Strangely enough, many are even willing to sacrifice some of the effectiveness of an instrument in order to decrease its conspicousness. Years ago, for instance, the demand was for tiny earpieces to fit into the ear in preference to the conventional flat-type headphone; this despite fact that larger flat unit provided very much higher efficiency. Today this is still true, although small ear pieces have been improved.

Where the hearing-aid is to be used on an office desk the prospect will sometimes prefer a portable box-type instrument capable of operation from the light lines and thus eliminating battery replacements. This type reduces the up-keep cost to the vanishing point, but has the drawback that it cannot be conveniently moved around from place to place, and cannot be used at all unless light lines are available. There are similar box types which provide space for large, long-lived batteries within the case. These require little battery attention and offer the advantage that they can be used anywhere at any time.

Components

Midget earpieces which fit within the ear are in greatest demand, although

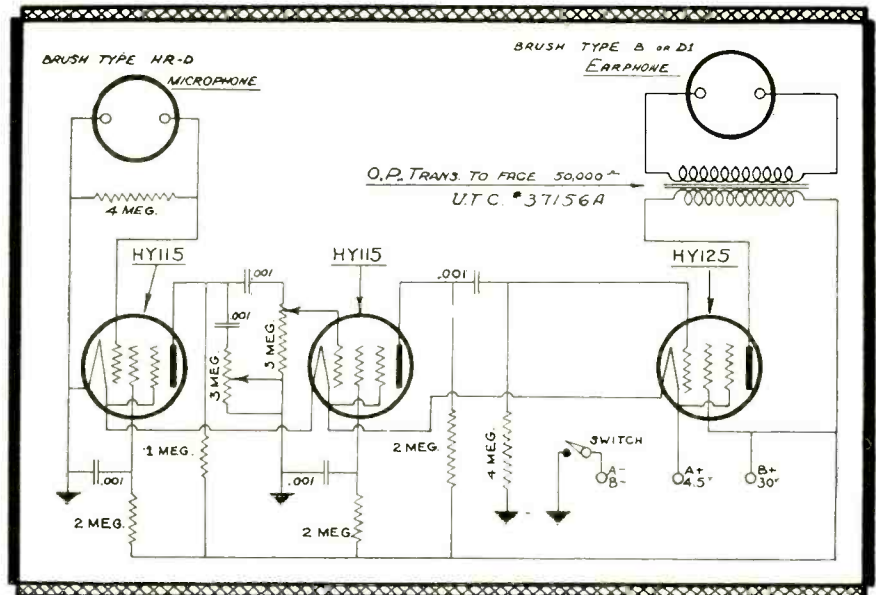


Illustration courtesy Hytron

Fig. 3. A simple amplifier of this type gives ample volume for all cases.

bone conductors used behind the ear are most effective for some kinds of hearing defect, and are equally inconspicuous. In any event, the choice is usually between the two types, rather than the large flat earphone. In the vacuum-tube hearing-aid the lesser efficiency of the small earpiece as compared with the large is usually compensated by the over-abundance of volume which the vacuum-tube amplifier makes possible. A very definite advantage offered by the midget earpiece is that it is supported within the ear and by the ear itself and therefore does not require a headband. There is also less likelihood of mechanical feedback.

Bone conductors are not available from all hearing-aid manufacturers and are usually quite expensive. In fact, the bone conduction units offered with the equipment of some of the large companies cost nearly as much as the entire hearing aids of others.

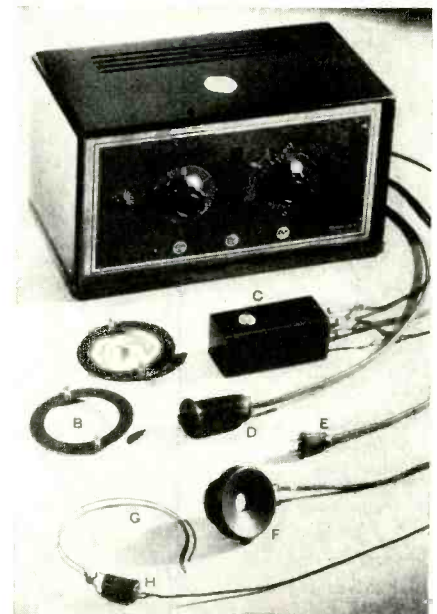
The vacuum-tube hearing-aid employs either two or three tubes. These are usually the midget tubes, some of which are especially designed for this purpose and supplied with tinned leads to be soldered directly into the circuit, thus dispensing with space-wasting bases, sockets, etc. In the case of portable types of hearing-aid (as distinguished from the "wearable" type) the larger standard tubes, such as the 1C5G, 1N5G, etc., are sometimes used because in this box-type hearing-aid space is not at such a premium and the larger tube is somewhat less expensive than the midget type.

The midget tubes are now standard products with several tube companies. Going them one better, from the standpoint of size, is the "microtube" recently introduced by an independent company (Microtube Laboratories, Chicago). This tube is no larger than an ordinary dial light.

All midget tubes are designed to operate at low plate voltage and with plate and filament current held to the absolute minimum. As a result an ordinary 1½-volt flashlight cell is usually practical for the A battery and a tiny 30-volt "Minimax" battery for the plate. In pocket-type equipment these batteries are usually incorporated in a case separate from that which houses the microphone and amplifier. Each of the two units is of such size as to comfortably fit in a man's vest pockets. In one instance the microphone case, in which is included the complete vacuum-tube am-

(Continued on page 20)

Not all hearing aids are of the wearable type. Larger units are also available.



DIAL DRIVE REPAIRS

By **WALTER L. SCHOTT**

WALTER L. SCHOTT COMPANY

DIAL DRIVE replacement and repairs number among the troublesome jobs with which we have to contend. However, when properly and efficiently made each one can be made to pay dividends and create satisfied customers.

Instructions for repair of dial drives are seldom found among the radio Service Man's literature. It is generally taken for granted that replacement is simple, and is all that is necessary. This may not always be the case.

Among the many types of dial-drive mechanisms employed in commercial receiving sets, there are four types that are in common use, and date back to the early days of broadcasting. These can be called the *direct drive*; the *friction and planetary drive*; the *cable or cord drive*; and the *belt drive*.

Direct Drive

The direct drive, where the knob or drive wheel is fastened directly to the condenser tuning shaft, presents the simplest service problem. Where difficulty is experienced in turning such a drive, it is generally because the knob or wheel rubs against something, or because the condenser needs lubricating.

Lubrication is an item which should be done to any condenser in every receiver on which repairs are being made.

Another item in a direct driven unit which may call for attention is slippage between the dial and the shaft. The cause of this is most often a loose set screw. On some more recent models, such as the RCA Personal receiver, no set screw is employed. In such receivers the tuning wheel is secured to the condenser shaft by means of thermo-plastic cement. In these sets if the dial should slip or if removal is required, for one reason or another, a hot soldering iron held against the shaft will loosen the cement. The dial may then be removed or adjusted. Upon cooling the cement will again set and provide a strong bond between the metal shaft and the tuning wheel or dial.

Friction Drive

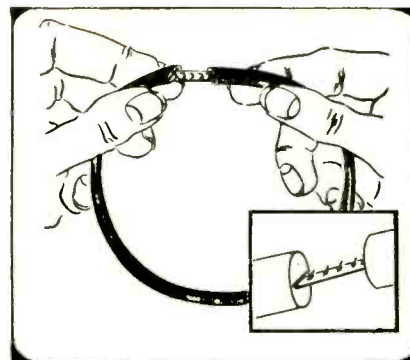
The friction and planetary drives cause occasional troubles which generally require replacements of worn out parts. The application of friction increasing compounds to overcome slippage in friction drive units is not recommended, since the result obtained

mit an increase in the amount of friction between the drive and wheel to make up for wear. Adjustment of the screw or replacement of the spring will in many cases permit further use of the other parts for considerable length of time.

Where the friction drive and/or the wheel are symmetrical reversal of either one, or both, will often effect a cure for slippage problems.

Cable and Cord Drives

From the earliest days of singly-tuned multiple-circuit receivers, cable, cord and belt drives have enjoyed popularity. In spite of this they required the most attention. A large majority of recently manufactured receivers em-



An open belt can usually be installed without taking the dial mechanism apart.

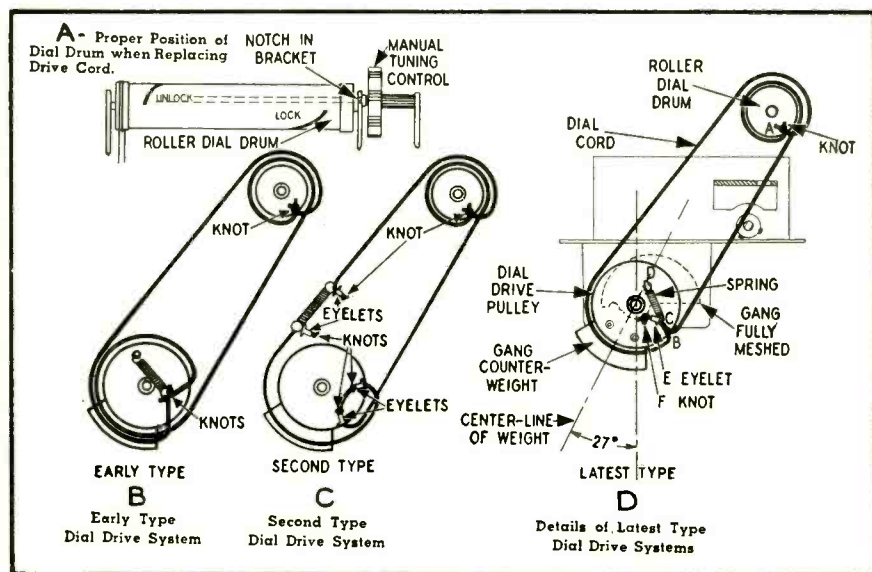


Illustration courtesy Stewart Warner

Instructions for repair and replacement of dial drives are usually missing in service literature.

will be of a temporary nature.

Some friction dials are provided with spring or screw adjustments which per-

mitted a cord drive to connect the tuning condenser to the tuning shaft and to provide a suitable stepup tuning ratio. Cables in different models, and over different periods, were variously made of phosphor bronze, specially woven linen, and other common and specially selected materials. Most of these were selected and woven so as to give more wear with little or no stretch. Some provided greater advantages insofar as wear and stretching were concerned, but provided less friction to accomplish the drive purpose.

Where drive cables require replacement it is usually advantageous to use the same material as the manufacturer employed. In the event that such material is no longer available, a similar material of the same diameter should be used. Lately, however, bronze and phosphor bronze cables are

used only in rare cases and drive cords of silk, linen and Fibreglass are being used extensively.

A dial drive using a cord may be completely out of service because the cord is worn through, or it may have excessive slip. The latter is the more common trouble. The most common cause of excessive slip is stretching of the cord or cable. Most dial drives provide a small coiled spring so attached to take up the stretch in the cord and keep it in tension. Often, however, the cord stretches excessively, either because of climatic conditions, or because of poor quality, and the spring is unable to take up all of the excess. Another cause of slipping is excess friction (torque) in the tuning condenser or elsewhere in the dial mechanism. Occasionally oil or grease may collect

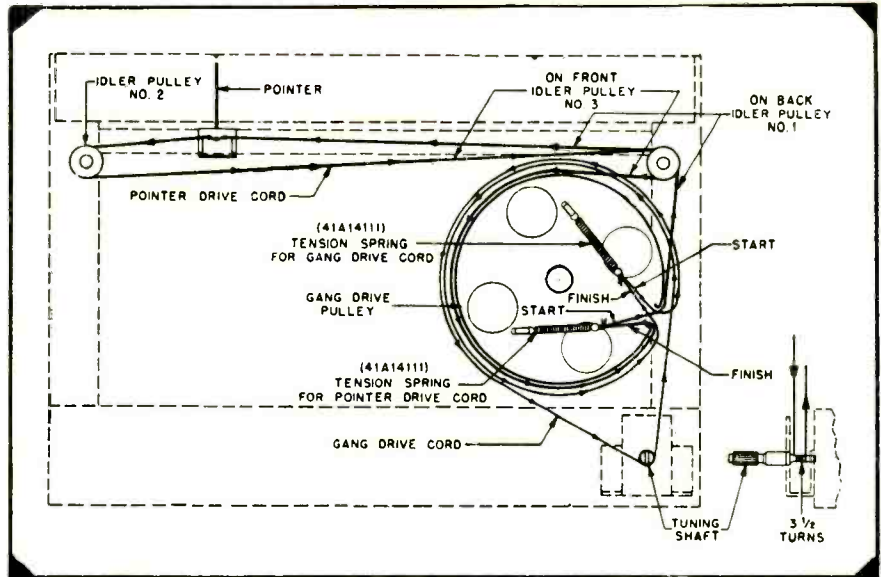
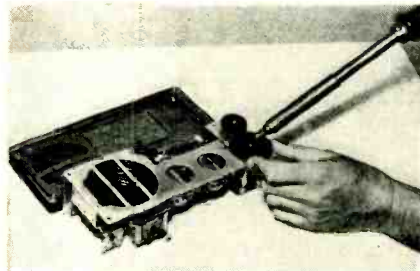


Illustration courtesy Motorola



In some receivers the dial drive is glued to the tuning condenser shaft.

on the cord or shaft and this, too, will cause slippage.

In order to properly repair a dial with a slipping cord, the following steps should be taken, no matter what the cause for the slippage: First, inspect the cord for damage to the threads or strands. If signs of wear are found, replace the cord under all circumstances. A cord which already started to fray or wear has lost its strength. If the cord is found to be undamaged, check all the pulleys on which the cord runs for signs of excessive friction. Check the tuning condenser also to see if it turns freely. Clean and lubricate the tuning condenser bearings in all cases. Pully shafts and other moving parts of the dial-drive mechanism should also be lubricated, using the proper dial oil. Apply the oil sparingly with a small screw driver or with a toothpick.

The next step is an inspection of the tension spring. In most cases a visual inspection will be sufficient to determine whether the spring is still in tension. If the cord has stretched excessively the coils of the spring will be fully closed. This condition could be remedied by shortening the spring, but a better solution can be accomplished by shortening the drive cord, either by cutting off a piece on one end or by tying a knot in any place where it will

not interfere with the movement of the pulley. Where replacement of the tension spring is necessary the new spring should provide sufficient tension, but should not be too stiff. Only the tension should be considered when replacing this spring. The diameter and length are unimportant, provided there is no mechanical interference.

As a final step in the repair of a slipping drive, the cord should be dressed or treated with a compound designed to increase the friction. Such compounds are available in powder, stick and liquid forms. Powders and sticks are somewhat difficult to apply. Liquid dressing seems to be the most satisfactory, since they penetrate the cord. Where the cord has collected oil or grease, liquid dressings will neutralize these. Liquid dressings also have a tendency to slightly shrink the cord to which they are applied. These dressings are comparatively easy to apply, since all that is required is to paint the liquid on the cord with a brush.

Should it be necessary to replace the dial drive cord, cord specifically made for this purpose should be used. Other cords, such as fish line for example, stretch or wear excessively in a short time and give very unsatisfactory service in dial drives. Silk drive cords have proved to be most satisfactory, but are not available at the present time. Very satisfactory cords are now being made, however, using a spun Fibreglass core and an outer braid of a synthetic fiber. These cords are available in small diameters (thin cords). Medium cords with a diameter of approximately 0.040 inch are made of nylon, cotton, linen, etc. Because of the heavier diameter these latter materials prove satisfactory. Thin and medium cords will take care of about 90 percent of all replacements. Heav-

Cable drives have been popular since the earliest days of single-tuned multiple-circuit sets.

ier cords, including phosphor bronze cables, find only rare application.

Belt Drives

Replacement of the belt is indicated in almost every case where troubles are experienced in belt driven dial drives. In most cases the whole dial drive must be taken apart in order to replace the belt. Over one hundred different sizes and types of dial belts are used. Such repairs are quite often made without profit, because the Service Man cannot always charge the customer for the trouble he experiences in obtaining the proper belt.

At least two kinds of belts are used. The "endless" belt and an adjustable open belt (Walsco Unibelt). The endless belt is made of fabric and rubber and has the advantage that its installation does not require any special care. In almost every case, however, the dial must be taken apart for the installation of the endless belt. It is also necessary that the exact size be used for replacement. If the belt is only slightly oversized slippage will occur. A belt slightly undersized, if it can be used at all, will cause difficulty while turning and will wear out in a very short time.

The open belt, on the other hand, is a more delicate item and requires greater care in handling, but once installed it has proved that it will stand up in service. The greatest advantage in the open belt is the fact that only three sizes are required to replace almost any endless belt, since these units are adjustable within a specified limit. These belts are purchased open (as opposed to

(Continued on page 23)

SER-CUITS:

By HENRY HOWARD

JUST as the April 22 deadline for the end of civilian set production approached, word was received from the War Production Board that an extension had been granted to permit production to continue till June 7. In spite of the extension, however, several manufacturers are already working 100% on war orders.

This month's offering of new circuits and circuit kinks is meager, as can be expected. It is likely that we may run out of them entirely in the not too distant future.

Philco 42PT87, 42PT88

Philco's portable Model 42PT87, 42PT88 is unusual in that no very large values of electrolytics are used for filtering. Fig. 1 shows the components of

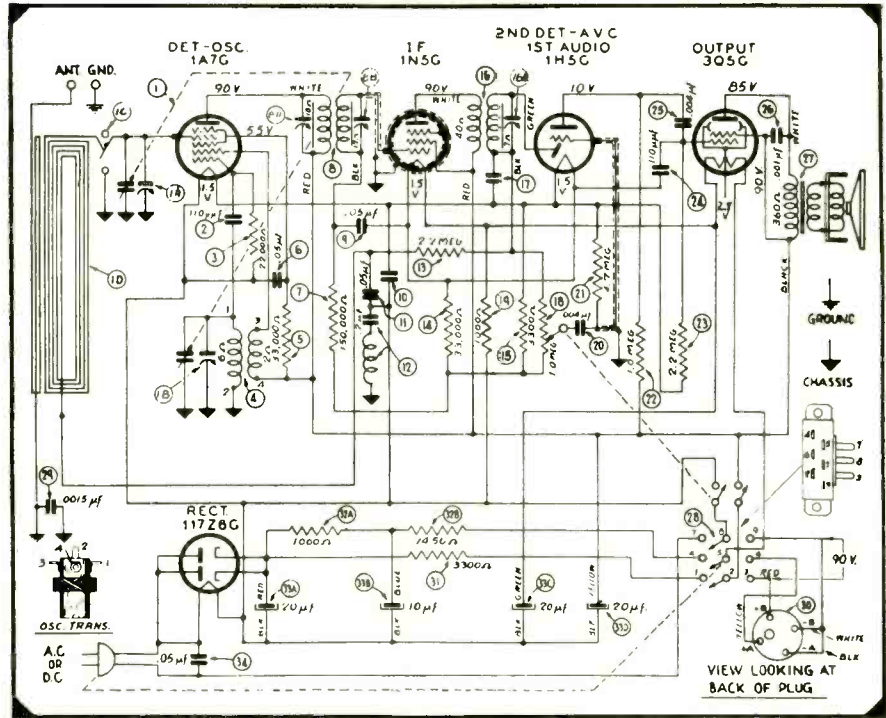
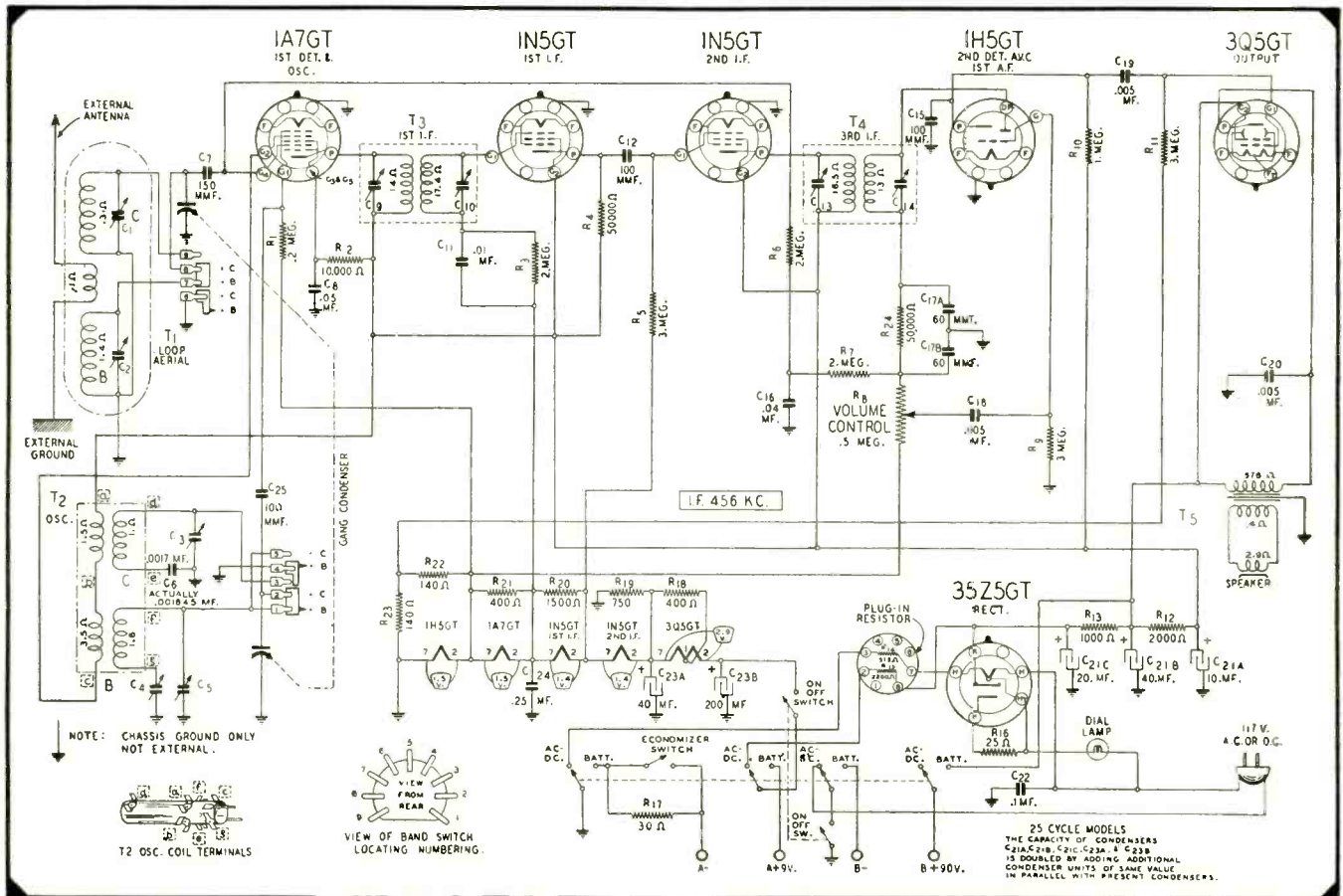


Fig. 1. (Right) Philco 42PT87, 42PT88.
Fig. 2. (Below) Sea Pal marine radio set.



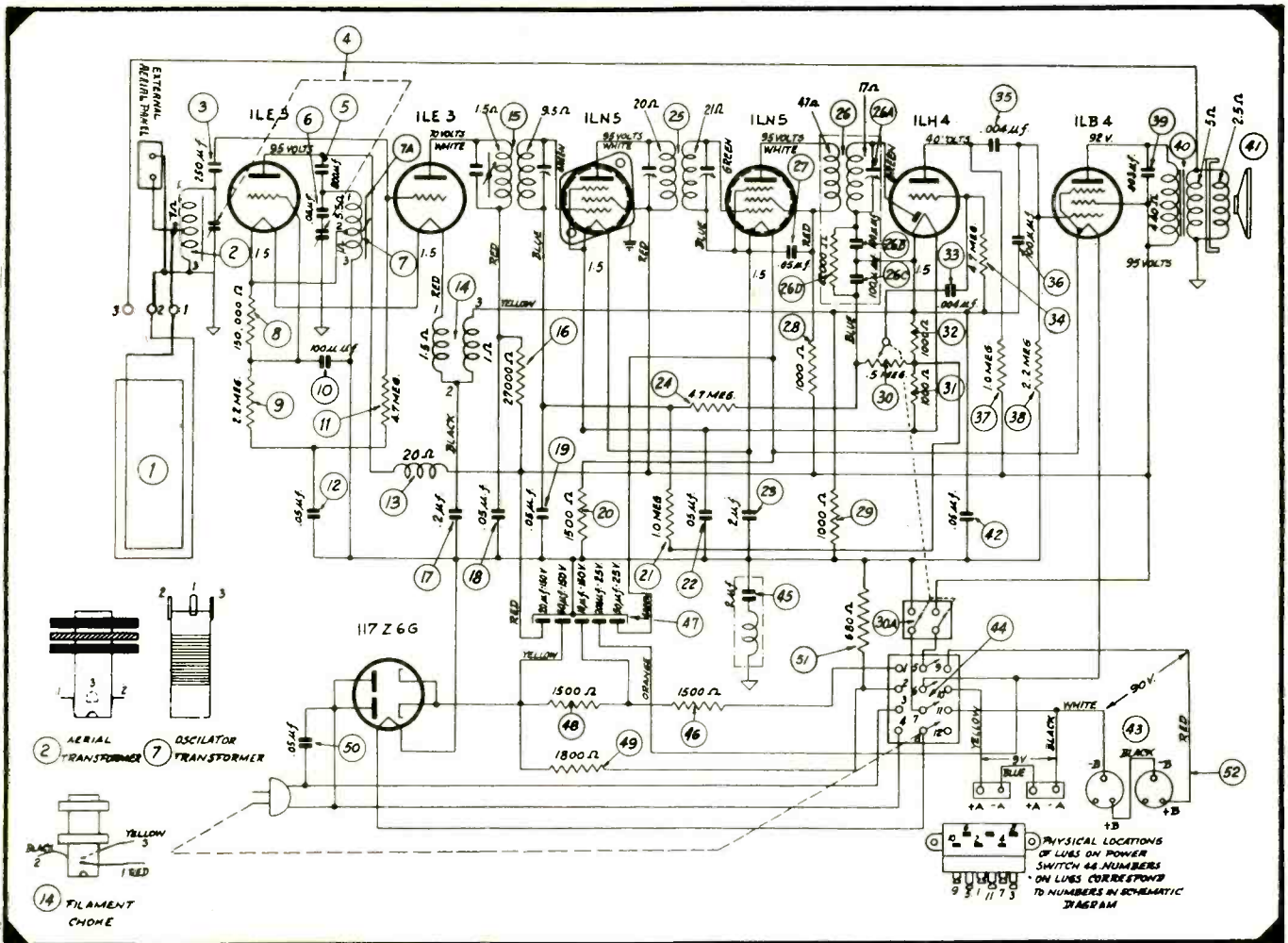
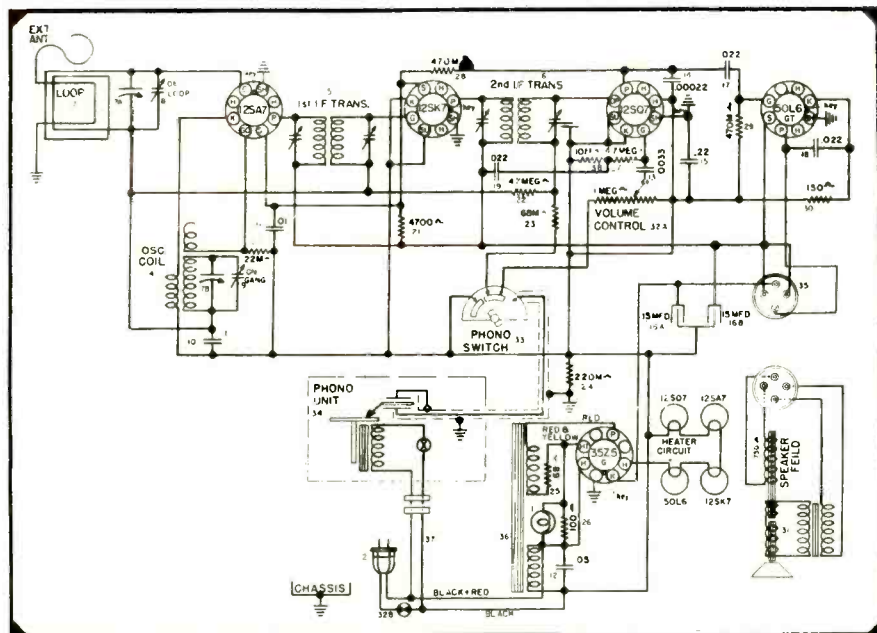


Fig. 3. (Above) Philco 42-842, 42-843, 42-844. Fig. 4. (Left) Crosley 52TQ (Chassis 83).



Crosley 52FC

the filament and plate supplies which are as follows: a 20-mfd condenser common to both supplies; 1,000 ohms, 10 mfd and 1,450 ohms for the filaments, with another 20 mfd after the 3Q5 filament for further filtering of the supply to the r-f tubes. The B filter uses a further 3,300 ohms and 20 mfd.

Crosley has initiated a new merchandising policy in connection with Model 52FC whereby the 117Z6GT rectifier is not supplied as original equipment with the portable. Should 110-volt supply be available, the tube may be purchased

separately although, for battery operation, the tube is not required.

Sea-Pal Marine Radio Set

The Sea-Pal Radio Co. puts out a Marine Portable universal receiver which is particularly designed for boat owners but which differs from conventional portables mainly in the frequency range covered. In addition to the broadcast band, the band from 2,100 to 6,700 kc is covered. Marine telephone, weather service and other communications are ordinarily heard in this range but we wouldn't be surprised if many of these services have been discontinued for the duration. Fig. 2 shows the dual loops and switching circuits for the two wave bands. The familiar economizer is included. A plug-in ballast resistor is used for both the power line resistance in series with the 35Z5GT rectifier filament and the battery filament drop resistor of 2,200 ohms. Two i-f stages are used—resistance coupled.

Philco 42-842, 42-843, 42-844

Philco Models 42-842, 42-843, 42-844 are 7-tube, 3-way portables with triodes

(Continued on page 28)

Keep Swinging
with

SYLVANIA SERVICEMAN SERVICE

by
FRANK FAX



RADIO servicemen need *technical* help these days, and Sylvania will keep right on as the leader in supplying expert aids to expert repairs.

But along with technical facts, you now need plenty of hard-hitting *sales* helps to tell the public the truth about your expert trained talents — and to bring the repair trade to *your* shop.

We at Sylvania are making a special effort to keep our promotional pieces right up to the minute — to take advantage of any new situation that develops.

Just last month we added two new items: a series of "radio alert" post-cards, and a booklet on radio caretaking hints for housewives — mighty useful as a door-opener.

Below is a complete list of Sylvania helps available today. Many are free; the rest are bargain-priced. Before this column appears in print there may be still others, so keep in touch with your local jobber. If he's short on any item, write direct to Frank Fax, Dept. S-5, Hygrade Sylvania Corporation, Emporium, Pa.

1. Window displays, dummy tube cartons, timely window streamers, etc. (From your Sylvania jobber only)
2. Counter displays
3. Electric clock signs
4. Electric window signs
5. Outdoor metal signs
6. Window cards
7. Personalized postal cards
8. Imprinted match books
9. Imprinted tube stickers
10. Business cards
11. Doorknob hangers
12. Newspaper mats
13. Store stationery
14. Billheads
15. Service hints booklets
16. Technical manual
17. Tube base charts
18. Price cards
19. Sylvania News
20. Characteristics sheets
21. Interchangeable tube charts
22. Tube complement books
23. Floor model cabinet
24. Large and small service carrying kits
25. Customer card index files
26. Service garments
27. 3-in-1 business forms
28. Job record cards (with customer receipt)
29. "Radio Alert" Post-cards
30. Radio Caretaking Hints to the Housewife

SYLVANIA

RADIO TUBE DIVISION
HYGRADE SYLVANIA CORPORATION

SERVICEMEN IN ENGLAND

The Editor of the English magazine, "The Wireless and Electrical Trader," a contemporary publication for the Radio Service Man and dealer, writes us concerning the situation in his country. With perseverance and fortitude the English Service Man is making the best of it after three years of war and in spite of all odds.

April 10, 1942.

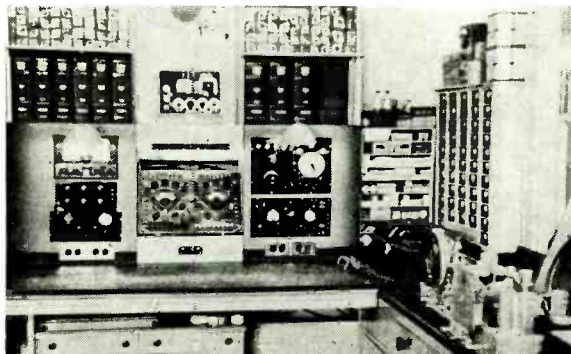
Robert G. Herzog, Esq.,
"Service,"

Bryan Davis Publishing Co., Inc.,
19 E. 47th St.,
New York City,
United States America.

Dear Sir,

In reply to your letter of February 24, received here on April 8, problems

If the American Service Man thinks he is having a tough time of it let him consider his English cousin. Overburdened with work; called upon to make repairs without parts, tubes or even service notes; he is blitized on top of all that. Throughout it all he keeps "thumbs up", for in the end Victory will be ours and it certainly is worth our very best efforts.



in connection with the shortage of service engineers and spares have been, and are still, confronting us over here.

Shortly after the outbreak of war in September, 1939, our Schedule of Reserved Occupations caused radio service engineers under the age of 30 to be liable for military service. Owing to the fact that the majority of service engineers are fairly young men, we anticipated that this would withdraw a large proportion of engineers from the industry. At that time this journal conducted a census, which showed that 66.5% of service engineers in the country were under 30 and therefore liable for military service.

This left 33.5% of existing engineers free to carry on service work, but from this number must be subtracted a further percentage of those who volunteered for National Service in the Forces, or elsewhere. The percentage of engineers left would thus be about 25%.

Later the reservation age for service engineers was raised to 35, and a further census revealed that this would

leave only 13 per cent. of the prewar engineers available

Subsequently, the age of reservation was again raised in steps of one year per month, starting in January, 1942, and the various trade associations realized that this would soon withdraw all but a negligible number of engineers of advanced age. Representations were therefore made to the appropriate Government departments, with the result that a temporary "stop" was put on the

calling up of engineers over 35 to enable the Radio Manufacturers' Association to secure evidence of the needs of the radio service industry and the available personnel. At the present time this investigation is still going on.

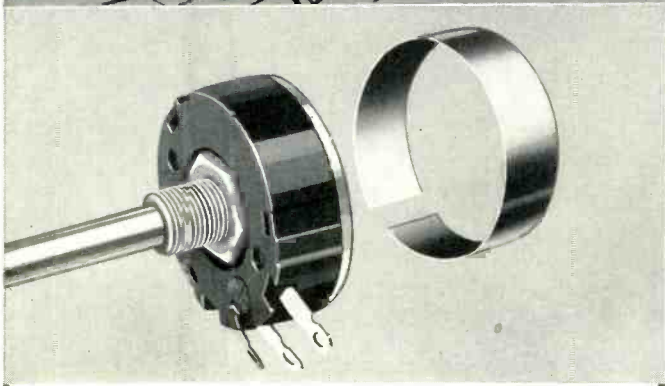
Meanwhile, strenuous attempts have been made in the radio industry to supplement the small percentage of trained engineers available by lads under military age, and older men, such as shop managers, over military age. Where a radio dealer has been able to retain one trained engineer, this man has been charged with the task of training the novices to do the simpler work, leaving the intricate fault finding to himself. Having located the fault, he passes the receiver to a novice for the actual component replacement, or whatever it may be.

Numerous articles have been published in this journal to assist beginners, while the supply of service information (never as prolific in this country as in yours) has been increased as far as possible. In a few cases girls

(Continued on page 17)

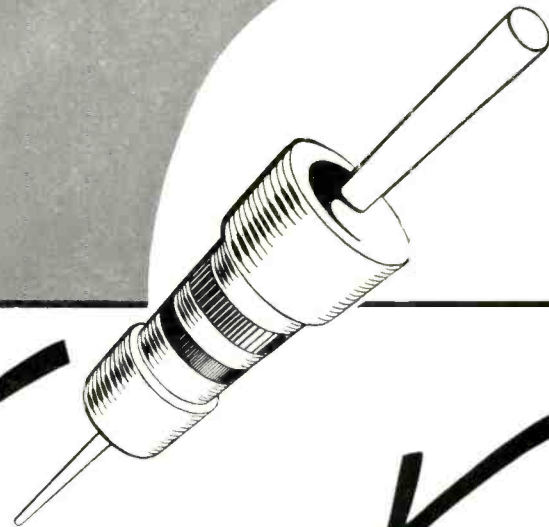
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Specify Centralab



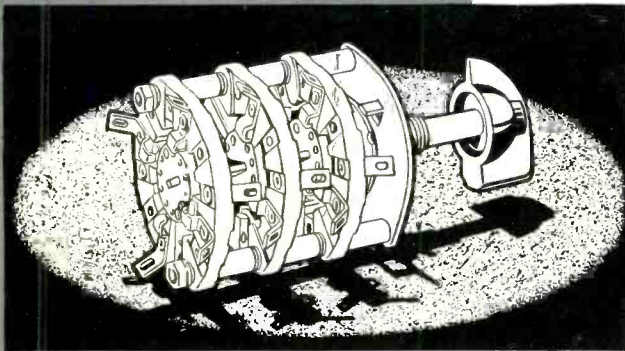
CONTROLS

Featuring the famous WALL TYPE resistor element which hugs the inner circumference of the black moulded bakelite case. Exclusive non-rubbing contact assures quiet smooth rotation and long life. Available in STANDARD, MID-GET AND EL^F with or without switch cover.



RESISTORS

Available in two types: RADIAL LEAD and AXIAL LEAD. Both feature a center core of resistance material, surrounded by a dense shock-proof ceramic providing strength and protection against humidity. Core and jacket are fired together at 2500 degrees F: into a single solid unit, hard and durable as stone.



SWITCHES

Both selector and transmitter switches are available in an infinite number of combinations . . . ideal for high frequency circuits with minimum losses.

Most switches are supplied with an "adjustable stop" index . . . permitting the selection of from two to twenty-three positions.

CENTRALAB through every emergency continues to adhere to its policy of "performance plus" at all times.

The slogan "ALWAYS SPECIFY CENTRALAB" which has appeared in our advertising from the very inception of this name is as timely today as it was fifteen years ago.

Today as then . . . there is no substitute for **QUALITY**.

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SERVICE—19 E. 47th St., N. Y. C.

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

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—When Exact Duplicates are Unavailable

Data prepared by a group of leading receiver design engineers discussing various circuits and procedure necessary for making component substitutions.

—When even Substitutes are Unavailable

Articles by Editor Herzog and engineers from parts companies and laboratories dealing with repairs of components and accessories.

—When Industrial Electronic Service is Required

Technical discussions by Alfred A. Ghirardi and other engineers who specialize in electronic development—for industry, for control, for protective use.

—When the Latest Data on Circuits is Needed

Henry Howard's circuit analyses each month with diagrams and parts values.

—Sound—Case Histories—Shop Notes



Remember that until further notice the Group Rate (**\$1.00 Yearly instead of the regular \$2.00 Yearly**) is still in effect.

SERVICEMEN IN ENGLAND

(Continued from page 14)

have been trained in service work with some success, but this is not general.

You ask whether, owing to depletion in service engineers, many home receivers have become inoperative. This is a little difficult to answer, as no figures are available; on the whole I should say that the number thus rendered inoperative is not considerable, but against this is the fact that certain types of sets cannot be maintained owing to lack of parts, while even when the parts are available some dealers cannot repair radiograms and similar heavy models which need workshop attention owing to lack of petrol for transport. In any case, long delays often occur before a customer can get his set repaired.

On the subject of spare parts, valves form the major problem over here. As you probably know, British valves are not standardized as to type, or base, with the result that although two valves of different make may have almost identical characteristics, they cannot be interchanged owing to difference in their bases or base connections. This has led to the use of adaptors, which are usually constructed by the service engineer, or to the changing of the valve socket and wiring in the receiver to take the particular valve which happens to be available.

Certain types of valves are being issued in small batches from time to time for replacement purposes in home sets, but often the owner of the set has to wait a long time, while certain types are definitely not scheduled for production.

Dealers have therefore been obliged to make various changes in receivers to take the nearest type of valve available at the time. Often this impairs the performance of the receiver, but this has to be borne.

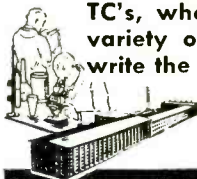
There is a tendency here for dealers to refuse to repair a set unless it is definitely out of commission. Where the fault is only a minor one, such as slight distortion or a noisy volume control, the customer is asked to put up with the trouble so that the available labor and parts can be used to repair completely "dead" sets.

Apart from valves, other components are getting scarce, particularly those of specialized design, which perhaps are more common in British than in American sets. This will eventually cause more and more sets to go out of commission. In addition, such "standard"



WINNERS OF THE WORLD'S MOST CONVINCING AWARD OF MERIT

Long ago, Sprague TC Tubular (by-pass) Condensers first won the World's Most Convincing Award of Merit—and they've continued to win it year after year. It isn't a grand prize or blue ribbon. It's far more convincing than that. It's the continued first choice preference for Sprague TC's by leading servicemen, engineers, manufacturers and amateurs—men who prefer TC's, who specify TC's, and who insist on TC's for a wide variety of jobs—men whose actual field experience helped write the now-famous TC slogan "Not a Failure in a Million!"



WRITE FOR CATALOG . . . or ask your Sprague jobber for a copy describing all Sprague Condenser types including Atom midget dry electrolytics and famous Sprague Koolohms—the greatest wire wound resistor development in the history of Radio.

SPRAGUE TC TUBULARS

"NOT A FAILURE IN A MILLION"

SPRAGUE PRODUCTS COMPANY, North Adams, Mass.

components as electrolytic condensers are also becoming difficult to obtain.

On the whole, this is perhaps not a very rosy picture, but it must be remembered that the radio component, valve and set manufacturers have for the past 2½ years been working day and night on Government orders for essential radio equipment. The dealers and service engineers fully realize that the needs of the fighting services must come first, and one can say that, short-staffed, lacking components, overburdened with sets to repair and often "blitzed," they have performed miracles in keeping radio going on the home front

by improvisation and sheer tenacity.

I trust that this information will be of help to you, who may shortly be facing similar problems, and I am sure that service engineers in America will "go to it" with the same spirit as their colleagues in Britain.

I shall be interested to hear of your experiences with these problems in due course, and if I can be of any further help in sending you notes or an article on the subject, I shall be happy to cooperate.

Yours faithfully,
(Signed) W. E. Miller, Editor.

A WAR MESSAGE FROM THE UNITED STATES TREASURY DEPARTMENT



Next to the Stars and Stripes . . .

AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 Percent or More Employee Participation in the Pay-Roll Savings Plan

IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly*, every pay day, through the systematic purchase of U. S. War Bonds.

You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify and make a vital contribution to Victory by making the Pay-Roll Savings Plan available to its employees, and by securing 90 percent or more employee participation. Then notify your State Defense Savings Staff Administrator that

you have reached the goal. He will tell you how you may obtain your flag.

If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, **TIME IS SHORT.**

Write or wire for full facts and literature on installing your Pay-Roll Savings Plan now. Address Treasury Department, Section D, 709 12th St., NW., Washington, D. C.

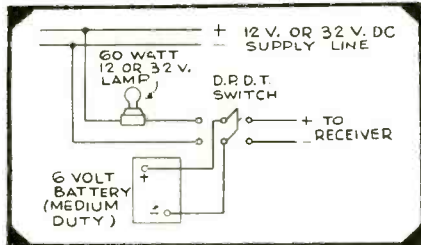
Make Every Pay Day "Bond Day"



U. S. **WAR Bonds** ★ **Stamps**

32-VOLT BATTERY CHARGER

A 12-volt or 32-volt d-c farm-lighting supply can be used to recharge a 6-volt radio storage battery. The recommended circuit is shown herewith. The charging rate may be



increased or decreased by using a higher or lower wattage lamp.

RCA Service Note

HANDY TOOL

By R. G. CHROUCH

CUT A SLOT about $\frac{1}{16}$ -inch wide and about $\frac{1}{8}$ -inch deep in the end of the blade of an old screwdriver and you have a tool about as handy as your inside coat pocket. It's amazing the way you can lead a pesky dial cord around into place with this slotted tool. It's an equal blessing when you use this tool to catch in the eye of the tension spring and force the spring and cord to wed.

Then, too, this tool is just the cat's pajamas to break off a wire deep down in the works where your diagonals can't go. When there isn't room for any other tool, and your soldering iron, hold the lead in place with this slot while resoldering wires, and you'll wonder how you ever got along without it.

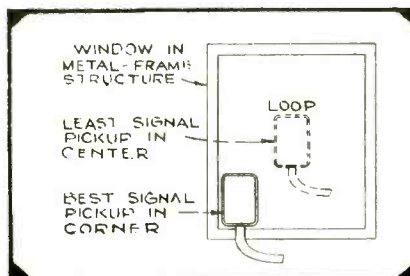
BIAS CELLS

A further check on these bias cells is to connect a 4.5-volt C battery between the control grid cap of one of the tubes on the bias cell circuit and the chassis frame. The negative of the C battery should be connected to the control grid of the tube and the positive of the battery to the chassis frame. This connection should be made only momentarily. If the bias cell had been weakened before, it will now be found to be recharged and will not ordinarily need to be replaced.

From "The Philco Serviceman" for June, 1937.

LOOP PICKUP

IN A METAL-FRAMED structure, such as a car, train, plane, or steel building, best signal pickup is usually obtained by placing the loop in one corner



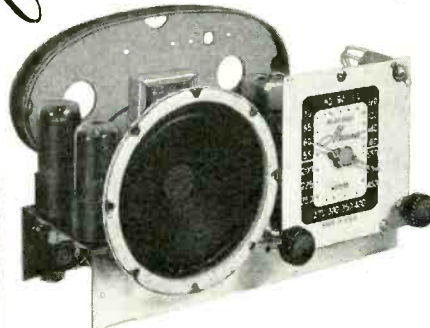
of the window instead of in the center. The center of the glass space is usually a null for signal. This fact should be kept in mind when using the extension loop on a portable radio, as there is a natural tendency to fasten the loop in the center of the window.

RCA Service Note

PHILCO 42-125, CODE 121

Improving power output: To improve the audio power output the 800-ohm resistor (50) was changed to 680 ohms.

Keep 'Em Playing!



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Now, more than ever before, it is vitally necessary to keep radio receivers in good condition.

... Meissner replacement parts have proven their ability to satisfy even the most discriminating serviceman.

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- Despite shortages of this, that and the other material, Aerovox continues to meet the *essential* requirements of servicing. Through engineering ingenuity closely geared to field conditions, *plus* exceptional production foresight and facilities, Aerovox still has a suitable replacement condenser for almost every need. In dry electrolytics, to replace discontinued "wets", for instance:

- Type GL metal-can dry electrolytic, in 250, 450, 475 and 600 v. D.C.W. All popular capacities. Single, dual and triple section.
- Type PRU handy AC-DC universal replacement with spade lugs. Choice of capacity and voltage combinations to serve most makes of AC-DC sets.
- Type F prong-base metal-can electrolytic in wide range of capacities and voltages.
- These types are meeting about 90% of all electrolytic needs.

• Ask Our Jobber . . .

Put your replacement needs up to him. He'll help you out with suitable Aerovox types. Ask for latest catalog—or write direct.



HEARING AIDS

(Continued from page 9)

plifier, is only 3" high, 2 $\frac{3}{8}$ " wide and 1 $\frac{1}{16}$ " thick.

The microphones employed in vacuum-tube hearing-aids are of the crystal type and are incorporated right in the amplifier, thus keeping input leads at minimum length, improving stability and eliminating the tendency toward induced noise.

Such is the overall gain provided by some of these pocket-type instruments that persons whose hearing losses are so great that only really loud sounds are audible without a hearing aid, are enabled to participate freely in normal conversation.

Circuits

The circuits of Figs. 1, 2 and 3 are typical of those employed in hearing-aids. That of Fig. 1 is the circuit of the "Crystal Ear" (Crystal Ear, Inc., Chicago) Model 39BM. This is a portable model designed for long battery life and low cost under conditions where wearability is not essential. It is inclosed in a leather-covered case approximately 6" x 6" x 5" with a hinged rear door to provide access to the battery compartment. The batteries used are standard sizes, the 1 $\frac{1}{2}$ -volt A battery being the equivalent of the Burgess "Little Six" and the 45-volt B battery the Z30 type used extensively in portable radios.

The tubes used are the regular dry-cell type, not midgets. The circuit is for the most part conventional. A rather notable feature is the relative scarcity of by-pass condensers and filter resistors. Yet in operation this circuit is highly stable and free from bugs. Bias for the output tube is obtained by means of the drop across the 1000-ohm resistor in the B return lead. This equipment uses a crystal headphone, of either the flat or in-the-ear types.

Fig. 2 is the circuit for a hearing-aid as suggested by the Microtube Laboratories, makers of the pilot-lamp sized tubes mentioned above, and is intended especially for use with these tiny tubes.

The type M74 voltage amplifier tube filament is rated at 20 ma and $\frac{5}{8}$ volt. The type M54 power amplifier filament also operates at $\frac{5}{8}$ volt, but draws 40 ma. With the filament arrangement shown in Fig. 2 a 3-tube combination may be operated from a single 1 $\frac{1}{2}$ -volt flashlight cell. The B battery employed is a 30-volt "Minimax." Battery life for this combination in normal intermittent use is said to be from 300 to 500 hours for the "Minimax" and 30 to 50 hours for the flashlight cell. Because the total plate voltage is only 30, bias for the

power stage is obtained by means of a bias cell rather than by dissipating any of the scant available plate voltage in the form of self-bias.

No provision is made for either a cut-off switch or tone control, possibly because the microphone and amplifier are both contained in a metal case only about 2 $\frac{1}{2}$ " square by perhaps $\frac{3}{4}$ " in thickness. This and a vest-pocket battery case are supplied with the kit. A plug on the battery case provides the means for disconnecting the batteries when not in service. The frequency response is regulated during construction and adjustment by means suggested in the instruction sheet which accompanies the kit.

The circuit of Fig. 3 is one recommended by the manufacturers of the Hytron "Bantam" and "Super-Bantam" hearing aid tubes (Hytron Corp., Salem, Mass.). These tubes are all of the baseless type. The Super-Bantams are only 1 $\frac{1}{4}$ " long by $\frac{1}{2}$ " diameter, overall. Terminals take the form of 1 $\frac{1}{2}$ " tinned leads which may be cut to the desired length on installation. The Bantams specified in Fig. 3 are 1 $\frac{5}{8}$ " long by $\frac{3}{8}$ " diameter. These, too, have wire connection leads.

This circuit includes tone and volume controls and utilizes crystal microphone and headphone. The latter may be of either the flat or miniature types, of course. The Bantam tubes have 1.4-volt filaments and draw slightly less than 50 milliamperes each. Operation in series from a 4.5-volt battery provides increasing operating bias for the succeeding stages.

Prices

The Service Man is naturally interested in the matter of the cost of such of these vacuum-tube hearing-aids as are available to him for sale, and of parts or kits from which they can be constructed. At the last reports the Crystal Ear instrument whose circuit is shown in Fig. 1 was available, complete with headphones, batteries and ready for operation, at a nominal list price of \$75 and an actual cost to Radio Service Men of under \$40. In addition to this model, this same company offered a smaller portable model and two different a-c/d-c models, all at the same price. A 3-tube vest-pocket type sells for one-third more.

This group of equipment constitutes a complete line because the two a-c/d-c units are suitable for group as well as individual use and are therefore adaptable to use in churches and other places of assembly.

The Microtube kit represented in the circuit of Fig. 2 was, at last reports, available to Service Men for \$27.50,

complete with cases, tubes and all essential components.

Considering the discrepancy between these prices and the prices (usually from \$150 upward) at which the old-line manufacturers sell their vacuum tube hearing-aids, it would certainly seem that the Radio Service Man has an opportunity for profit that is too good to overlook. It isn't necessarily the sort



Some of the aids employed by the hard of hearing do not employ tubes.

of a business that will produce riches overnight, but it does offer definite possibilities as a profit-producing sideline. In some instances it may well develop into a very important part of a business. There are many cases where local representatives of old-line manufacturers are making good incomes selling their more expensive equipment. It should therefore be possible for others to do the same thing with instruments selling at half the price or less and therefore within the pocketbook range of a vastly greater number of prospects.

Now is a logical time to get started. Hearing aids are rapidly increasing in popularity, because the small vacuum tubes have made them so much more effective than ever before.

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1. Because a serviceman's Jobber—YOUR OWN PARTS JOBBER—offers immediate delivery from a local stock.
2. Because your parts Jobber carries a complete stock of parts for all makes of sets. This enables you to reduce your investment to a minimum as well as the space required to carry your maintenance needs.
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THEY DON'T GET RID OF THEM NOW They Bring Them To You To Fix!



—And some of them are "honeys"—five, eight, even ten years old! But it's your patriotic duty to keep those old babies working when there are no new sets being made. There's only one way to handle this extra volume, and that's by repairing more sets, per hour, per man, by means of increased efficiency. And the thirteen volumes of Rider Manuals will give you just that.

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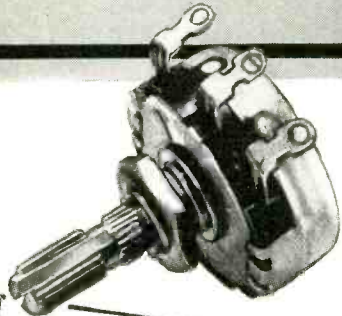
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—The Canadian Radio Data Book

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Just try a
**CLAROSTAT
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Now featuring . . .

- ★ Perfected bakelite support with thoroughly-bonded long-life carbon element. Glass-like resistive surface virtually immune to humidity, wear and tear.
- ★ Split-finger contact rides smoothly over glass-like surface of resistive element, with positive contact at all settings.
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★ Such features are interesting if you want to know what makes a good radio component really GOOD. But the main thing is the actual test. Pick up a Clarostat volume control. See how smoothly it rotates. Check resistance value. Put it in service and see how closely it maintains its original resistance value over months and years of steady use. Judge it for yourself. That's all we ask.

Try a CLAROSTAT . . .

- ★ Order some Clarostat volume controls from your Clarostat jobber. He'll gladly help you pick the best types for given replacement needs. Just try Clarostat!



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**CATALOGS,
BULLETINS ETC.**



Copies of the catalogs and bulletins discussed below may be obtained directly from the respective manufacturers mentioned. Write for them today!

• • • • • Duotone, Inc., 799 Broadway, New York City, have prepared a 20-page booklet for distribution to the consumer by Service Men. The booklet covers record needles, the care of records, and home recording.

• • • • • The Radio and Technical Publishing Co. is offering a wall chart which shows the replacement batteries for more than 1,250 models of portable radio receivers. Included in the chart are batteries of 23 leading makes, and receiver models of 100 different manufacturers. The tabulation was prepared by Alfred A. Ghirardi.

In the main tabulation all portable receiver models are listed in an alphabetical arrangement by makes. Opposite each model number are shown key designations for the A and B, or the AB batteries employed, and the quantity of each. Referring this key designation to keyed battery tabulations that are included on the chart shows the equivalent battery type number for the various battery manufacturers that make an electrically comparable battery.

The chart is of heavy colored paper and is printed on one side only to make it suitable for wall mounting. Its size is approximately 20 inches wide by 17 inches high. Copies can be obtained from Radio and Technical Publishing Co., 45 Astor Pl., New York City, for 10¢.

• • • • • For industrial, central station, laboratory, and general use, portable switchboard and miniature panel instruments are described in a new 34-page booklet, B-3013, announced by Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

Design features and physical characteristics of meter pivots, springs, pointers, and cases are described, with additional notes on manufacturing methods and testing facilities. Re-

produced in the booklet are 120 photographs, 44 representative meter dials and 13 types of strip and circular charts.

• • • • • Lafayette Radio, 100 Sixth Ave., New York City, have issued their 1942 catalog, No. 87. The 128-page rotogravure booklet lists radio receivers; receiver components; transmitting and receiving type tubes; batteries; photoelectric equipment; phonograph equipment; sound systems and accessories; test equipment; hardware and the like among its many items for the Radio Service Man, experimenter and enthusiast. Most of the items listed are adequately described and illustrated and prices are quoted.

EXPANSION

• • • • • The Precision Apparatus Co. announce their removal to 92-97 Horace Harding Blvd., Elmhurst, L. I., New York. The new quarters are approximately three times the size of those previously occupied by this company. Executive and general offices, laboratory, manufacturing and assembly facilities are now incorporated under a single roof. Annual output of Precision Test Equipment will be correspondingly increased.

• • • • • University Laboratories are in the process of moving to larger quarters at 225 Varick St., New York City. New equipment and modernized manufacturing facilities will permit greatly increased production of University Horns and speaker units.

DISPLAYS

• • • • • A complete line of 15 different types of needles has been featured for Duotone, Inc., manufacturers of record accessories, by Lyon and Healey, Chicago record distributor, in their Wabash Ave. window. The attractive window done in red, white and blue ties up with a striking counter display inside the store. Lyon and Healey report a noticeable increase in traffic as a result of this unusual merchandising display.

Safeguard your
"GUARANTEE"
USE **STANCOR**

STANDARD TRANSFORMER
• CORPORATION •
1500 NORTH HALSTED STREET . . . CHICAGO

DELUXE PORTABLE

(See front cover)

ZENITH's universal portable 7-tube, 6-band receiver, Model 7G605, is a deluxe layout. Note the broadcast and short-wave loops and the wave-rod—a short vertical rod aerial. The latter is particularly effective on the shorter wave-length bands. Six pushbuttons are provided—for five stations and manual tuning. A headphone jack is also available.

A 1LE3 triode is used as a separate oscillator, aiding short-wave performance particularly. A 1LN5 tuned r-f stage has a 10,000-ohm resistor in series with the primary of the detector transformer to prevent peaking, or, at least, to reduce it. The oscillator is coupled to the converter by a grid to grid connection.

The principal feature of this portable is, perhaps, the very wide frequency range covered; 540-1620 kc and the following mc ranges: 6.0 to 6.5, 9.4 to 9.8, 11.7 to 11.9, 15.1 to 15.3 and 17.6 to 18.0.

Besides a battery pack, two paralleled flashlight cells are used in series with the filament supply. A complete tone control with four positions, treble to base, is also provided. Looking at all these features we see there isn't much of a gap between a good portable and a home receiver.

DIAL DRIVE REPAIRS

(Continued from page 11)

endless), and can generally be installed without taking the dial-drive mechanism apart.

The average Service Man should be able to install an endless belt without previous instruction. The installation of the open belt, however, as indicated above, carries with it the requirement that the instructions be carefully read in advance and applied in every detail.

Several common mistakes are made during the installation of these units. Service Men, eager to get at the job, often cut the belt too short. Where this is done the belt will usually break as soon as it is pulled over the rim of the pulley, or at least a short time later. This happens because the steel cord inside the belt cannot possibly stretch

DEVELOPMENTS IN SOUND ENGINEERING BY

Utah



A. C.
FIELD EXCITED
SPEAKER



A typical result of Utah's ingenuity and ability to meet changing requirements is the new Utah A.C. Field Excited Speaker. In anticipation of the critical shortages of raw materials needed for the fabrication of permanent speakers, it was necessary to develop a new line of substitute speakers. Utah's solution to the problem has all the dependability and high satisfaction of the line of which it becomes a part.

These new Utah speakers have standard Utah weather resistance. They are humless in operation and equivalent in performance to the famous Utah Permo-Dynamic line.



New Utah A.C. Field Excitation Supply. At 117 volts, 60 cycle input, the maximum output is 12 watts at 105 mills.

A speaker has been designed for every public address and sound requirement. They require only the addition of the A.C. Field Supply shown at the left—to substitute for any Permo-Dynamic application. The Field Supply is properly designed for humless operation of any of the new Field Excited speakers. The supply may be mounted directly in the speaker baffle.

Look for the Utah trademark. Utah Radio Products Company, 816 Orleans St., Chicago, Illinois. Canadian Offices: 560 King Street, W., Toronto. In Argentina: Ucoa Radio Products Company, SRL, Buenos Aires. Cable Address: Utaradio, Chicago.



SPEAKERS

VIBRATORS • TRANSFORMERS • UTAH-CARTER PARTS

and must break if excessive force is put on the belt. Occasionally Service Men will attempt to employ the wrong belt. This, too, will cause difficulty, since there is a limit to which the open belt can be shortened. If a shorter belt is required than the smallest length specified for a given open belt, then the next smaller size belt must be used.

Dial belts should be replaced whenever signs of wear are obvious. If the belt slips, but it still seems to be intact, the application of a friction-increasing compound will generally correct this condition temporarily.

CORRECTION NOTICE

In the circuit shown on the front cover of the March 1942 issue of SERVICE the grid load resistor has been erroneously omitted. A 220,000-ohm resistor should be shown between the junction of the 1,000-ohm resistor and the 0.05-mfd condenser in the lower 6V6GT grid circuit. This addition makes the upper and lower grid circuits identical.

Buy United States War Savings Bonds
and Stamps every payday.

SERVICE, MAY, 1942 • 23

**DON'T BE
A Lone
Wolf**



● In the replacing of parts and repair of radio and phonograph equipment, experienced service men find it more convenient, economical and satisfactory to use nationally known, trademarked and guaranteed products. The use of unidentified or so-called "bootleg" parts, of which limited quantities are now on the market, leaves service men and jobbers "holding the bag". Don't be a "lone wolf". Parts manufacturers will neither replace nor repair such equipment. There is no substitute for quality. The dependability of Astatic Crystal Microphones, Pickups, Cartridges and Recording Heads is a positive assurance of customer acceptance and satisfaction.

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Forms for May close on May 10th

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Now more than ever the jobber and service man must protect the standing which he has built. Condenser replacements account for about 40% of all radio repair jobs. Dependable condensers are therefore essential to the building of the utmost in customer satisfaction and in holding your clientele.

CONTINUOUS DEPENDABLE SERVICE

For 21 years the manufacturers of POLYMET ELECTROLYTIC and BY-PASS CONDENSERS have striven to improve quality and service. Add to this a liberal and reasonable mark-up and the fact that 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, replacing larger electrolytics when proper capacity and voltage are used.

Complete listing of available types and prices will be forwarded upon request.

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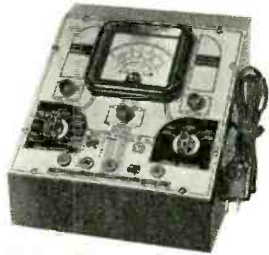
TRADE JOTTINGS

It's Captain John F. Rider, Signal Corps., U.S.A., now . . . stationed at Fort Monmouth N. J. . . . congratulation and good luck, John. . . . Bill Osler of Cornish Wire informs us that his plants are 100 per cent on war production . . . congratulate Cornell-Dubilier engineers, Bill Bailey and Paul Deeley, on election to vice-presidencies. . . . Hygrade Sylvania transfers Philip Pritchard from equipment sales in Chicago to purchasing and expediting operations in New York office . . . in past 18 months General Electric has trained more than 50,000 new employees and placed them on war production work. . . . orchids to Burt Browne, Chicago adman, for preparation of Radar recruiting ads for Navy Signal Corps. . . . Al Ghirardi announces second printing of his Handbook is now off the press . . . you didn't forget to buy your quota of war bonds and stamps this month, did you? . . . are you getting the Ohmite News each month? . . . chock full of good data for you . . . better write to Ohmite for it. . . . Demand for Radio City Products line of test equipment forced removal to much larger quarters at 127-133 W. 26 St., New York. . . . plenty of new equipment will greatly increase production. . . . Louis Westphal now in charge of test department at Universal Microphone. . . . Sun Radio, 212 Fulton St., New York, celebrating 20 anniversary in radio . . . here's wishing you another double-decade of prosperity, Sam. . . . Chas. Wilson, president of General Electric, stated on April 16 that they had already produced more war goods for the present conflict than the company had turned out for the entire first World War. . . . Solar appoints Sylvan Wolin sales manager for jobber sales . . . congratulations, Syl. . . . Hygrade Sylvania has recently purchased a new plant for tube production at Mill Hall, Pa. C. A. Haines will be in charge of operations. . . . last civilian Stromberg-Carlson radio chassis until victory came off the line on April 21. . . . get yourself a copy of Emerson's replacement parts catalog. . . . Dick Bachhuber and Joseph Anderson of Hygrade Sylvania have joined the armed forces. . . . ask your distributor to demonstrate the new National Union air raid alarm. . . . it's a moneymaker. . . . bonds, bonds, bonds and still more bonds. . . . better buy plenty of 'em. . . . best victory insurance there is. . . . no parts show in Chicago this year. . . . June SERVICE will post you on all new developments and news of industry interest. . . . watch for important announcements by parts manufacturers. . . . PSW.

YOUR JOB AND OURS—

Your job is twofold: (1) Servicing "essential" war production plants, laboratories, institutions, etc., in your community, and (2) servicing home receivers to keep America listening. Both assignments are heavy and important. They call for your best, fastest effort. To operate at peak efficiency, you need super-quality, accurate, dependable test instruments. It's our job to give them to you!

Whatever you need in testers, analyzers or signal generators—there's a dependable RCP instrument to fit your purpose and your pocketbook. You don't buy a set of dishes when you need only a cup and saucer. Likewise, as few or as many of the various units you require for various tests are available in the different models of RCP equipment. No waste, no unnecessary expense—always top quality in each—the finest values in the industry! Write today for Catalog 125, describing the full RCP line.



MODEL 662

NEW RCP Electronic Multitester

AVAILABLE ON A-1-J OR HIGHER PRIORITY ORDERS ONLY!

Here's one of RCP's most amazing values—the perfect general purpose multitester for quick checks on intercommunication systems, public address equipment and the many electronic devices in industrial plants and hospitals. Puts you head and shoulders above competitors for "essential" business. Maximum sensitivity, flexibility and utility—combining the latest developments in direct-reading vacuum tube DC and AC voltmeters, capacity meter and ohmmeter. 27 vacuum tube-operated ranges. D'Arsonval microammeter. 2% accurate. Ideal tester for AM, FM, Television, AVC and laboratory measurements. Send for special circular on Model 662. Compare point-for-point with any meter made. You'll be amazed. Write today!

Complete only \$47.50

RCP dependable TEST instruments

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NEW YORK, N. Y.

Don't FALL for this one!

Numerous complaints have recently reached us that subscription salesmen, who have no connection with SERVICE MAGAZINE, are offering subscriptions to SERVICE and then delivering another radio publication.

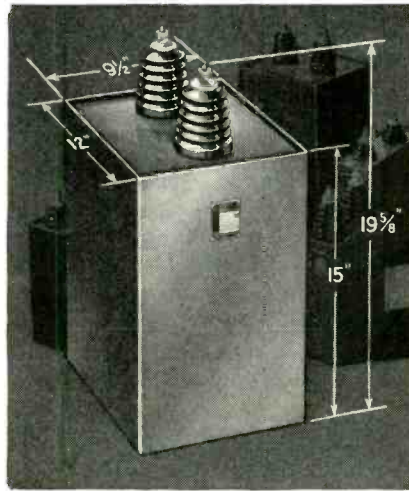
Beware of this subterfuge!

NEW PRODUCTS

Additional information and prices of the products described below may be obtained, without obligation, from the respective manufacturers.

OIL CAPACITORS

To meet the requirements of radio transmitters and other applications calling for high-voltage heavy-duty oil capacitors, Aerovox Corp., New Bedford, Mass., announce their Type '20 units. These oil capacitors cover voltage rat-



ings from 6,000 to 50,000 d-c-w, and include dual-section units for voltage-doubling circuits with 12,500 or 25,000 volts output, in 0.25/0.25 and 0.5/0.5 mfd.

Multi-laminated kraft tissue and high-purity aluminum foil sections for these capacitors are uniformly and accurately wound under critically controlled tension to avoid mechanical strains, it is said. The sections are thoroughly dried, vacuum-treated, oil-impregnated and oil-filled under continuous vacuum in specially designed and built tanks.

COMMUNICATION SYSTEM DYNAMOTORS

A new line of dynamotors for communication and other service in aircraft, tanks, and mobile field equipment has been announced by the General Electric Co., Schenectady, N. Y. The new line comprises five types, ranging from 25 to 600 volts in output, and from 3 to 31 pounds in weight. Formex wire insulation, light weight, and reliability under rigorous conditions are claimed. Each unit is designed for high output from a small frame size.

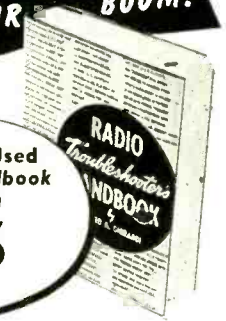
SPRAGUE DRY ELECTROLYTICS

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for use in place of wet electrolytics which are unobtainable because of war restrictions. They also replace various aluminum can type dry electrolytics, now no longer available.

Although standard dry electrolytic condensers can sometimes be used as wet replacements, the safety margin is

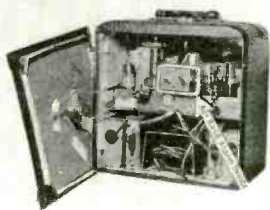


likely to be insufficient in many applications. Sprague Type WRs are said to have a much higher voltage formation than standard dries to insure their standing up under the high peak voltages which are impressed on wet electrolytics. The diameter of WRs is the same as that of standard wets so they will fit the screwtype can mounting holes. Their metal feet can then be soldered to the chassis for firm mounting.

Type WRs are available in three sizes; WR8 which replaces wet or dry electrolytics in capacities from 4 to 8 mfd; WR16 which replaces capacities from 12 to 18 mfd; and WR25 which replaces capacities from 20 to 40 mfd.

AIR-RAID ALARM

National Union Radio Corp., Newark, N. J., announce their Model AR101 air-raid alarm, designed to work on any receiver which incorporates au-



tomatic volume control circuits. The alarm is set off by local "alert" broadcasting stations which are on the air 24 hours a day. When the radio station goes off the air at the first indication of an air-raid, the National Union alarm automatically goes on, creating a loud, penetrating signal in the receiver, which will automatically give warning that an air-raid "alert" alarm has been ordered.

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SER-CUITS

(Continued from page 13)

(type 1LE3) for first detector and oscillator, two tuned i-f stages and a novel low impedance loop and coupling system with provision for connecting an external loop. The low impedance loop idea has been used for many years in high grade aircraft and marine direction finders or radio compasses but this

very serious in a high-impedance loop, may be considerably reduced with a low-impedance loop. Note the circuit in Fig. 3.

Crosley 52TQ (Chas. 83)

Fig. 4 shows the Crosley Model 52TQ 5-tube phono combination which uses a transformer for boosting the plate supply voltage but uses a string of series filaments operating directly from the line just as in a-c d-c sets.

Wilcox-Gay A103

Wilcox-Gay Model A103 recorder and record player is equipped for both 78 and 33 $\frac{1}{3}$ -rpm turntable speeds. An equalizer is provided to maintain uniform response at the two different speeds—shown in Fig. 5. The equal-

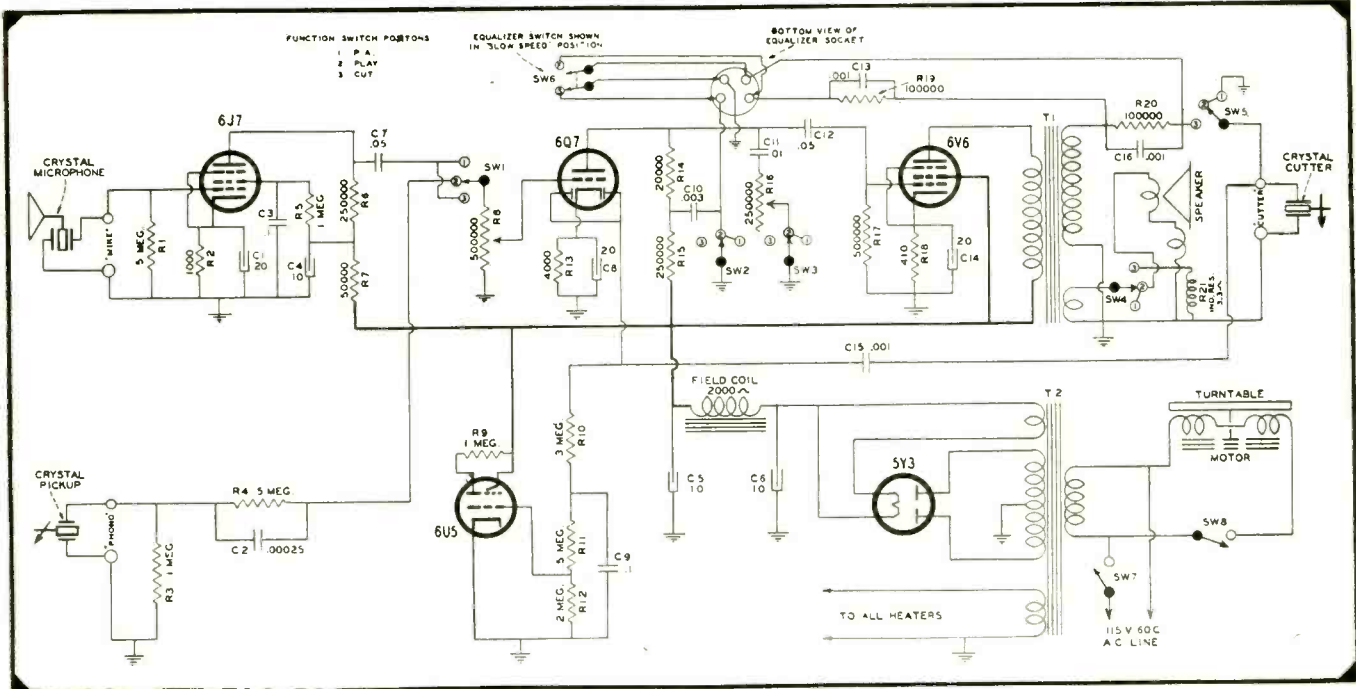


Fig. 5. Wilcox Gay A103.

is the first instance we have seen in a portable. One of the main advantages in aircraft or marine installations is the reduction of losses and distributed capacity in the long leads necessary for such installations. In a broadcast receiver there are losses too, but for a different reason. Here, the loop is located right against the chassis, batteries, or both, which lowers the Q considerably and reduces its effectiveness as an antenna. Stray coupling to various parts of the circuit, which is sometimes

The transformer for this purpose is, of course, very small, but the power output is increased considerably by the addition of a few plate volts so the transformer seems to be a good investment. This is also a boon to the often ill-treated pilot lamp which is connected in series with the half-wave rectifier. A surge reducing resistor of 68 ohms is in series with the lamp and a 100-ohm re-

izer switch is shown in the slow speed position. An additional filter is created by grounding a 0.003-mfd by-pass condenser which connects two load resistors in the 6Q7 plate. At high frequencies, the load is thereby considerably reduced—from 270,000 ohms to 20,000 ohms. Hence, there should be a boost in lows. The second circuit allows a paralleled 0.001 mfd and 0.1 meg in series with the cutter. At high speed, the values become 0.002 mfd and 50,000 ohms, passing more lows.

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ASSOCIATIONS



NRPDA MEETING

Although the annual National Parts Trade Show was cancelled because of the industry's total war production program, tentative plans are being made for a meeting of the National Radio Parts Distributor's Association by its president, George D. Barbey, of Reading, Pennsylvania, coincident with the RMA convention at the Stevens Hotel in Chicago. This assembly of parts distributors, to discuss immediate replacement parts problems, is being planned for June 7 or 8.

RMA CONVENTION

An outstanding feature and attraction of the Eighteenth Annual and War-Time Convention of RMA, Tuesday, June 9, at Chicago, will be a prominent personality in the Government's war program, Honorable William L. Batt of the War Production Board. Mr. Batt, a key official of WPB, will make a special trip from Washington to address the industry at the RMA membership luncheon at the Stevens Hotel on June 9. A special message on the industry's war production program will be brought by Mr. Batt, insuring a large attendance at the RMA "all out" war convention.

President Galvin of RMA will preside at the convention luncheon session. His annual report on the industry's present and future war problems will be of special interest. Treasurer Leslie F. Muter will submit a financial report.

RMA members will vote on a proposal, recommended by the Executive Committee and Board of Directors, to expand RMA war services and activities by organizing a new Transmitter Division, and also another proposed

amendment to change the name of the Amplifier and Sound Equipment Division to the "Speaker" Division.

JOINT MEETING

The radio industry has already been advised that the annual radio parts trade show has been suspended for the duration. Various elements in the industry, however, have considered the advisability of holding a joint meeting of manufacturers, jobbers and representatives in Chicago early in June. The RMA has planned a meeting, and now the Sales Managers Club, the National Radio Parts Distributors Association and The Representatives are also planning a meeting, to discuss replacement parts.

The Sales Managers Club, Western Group, has appointed a Victory Program Committee, consisting of Jerome J. Kahn of Standard Transformer Corp. as chairman, W. A. Kuehl of Drake Electric Works, Inc., Ed Singer of Alliance Manufacturing Co. and Jerome Prince of Carron Manufacturing Co., to plan a joint meeting with the National Radio Parts Distributors Association and The Representatives. The meeting has been scheduled for Monday, June 8, 1942, at the Stevens Hotel, and dinner will be served at 6:30 P.M. Manufacturers, jobbers and representatives are invited to attend. All interested are urged to send reservations to Jerome J. Kahn, 1500 North Halsted St., Chicago, accompanied by checks at the rate of \$2.50 per plate.

Persons in authority in the War Production Board and in the Office of Price Administration have been invited to speak on subjects relating to the parts industry. *Kenneth Prince.*

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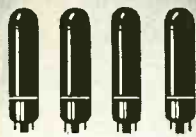
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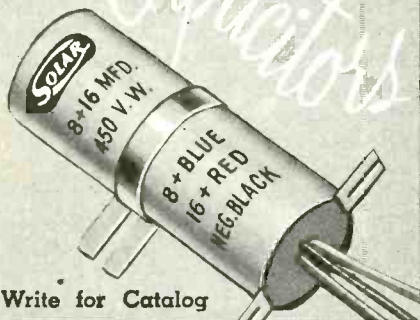
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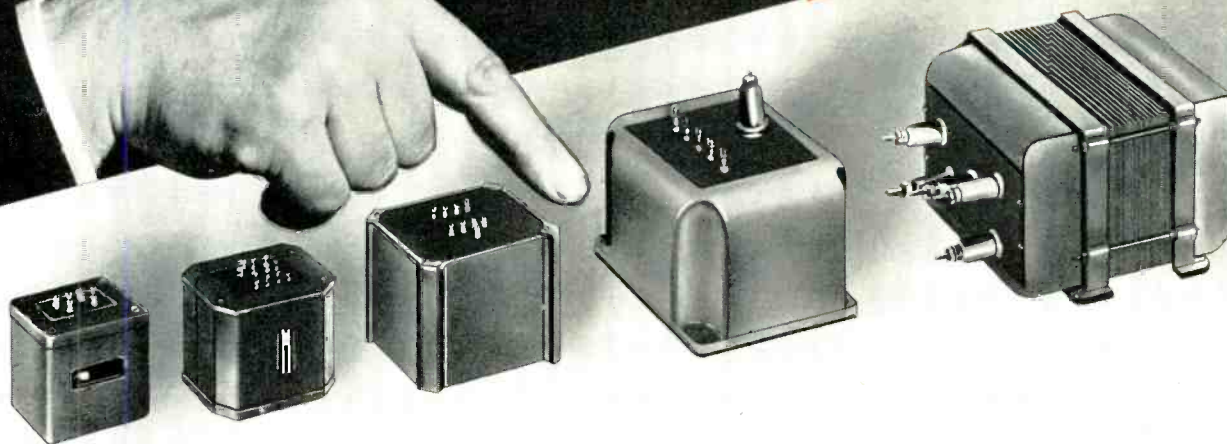
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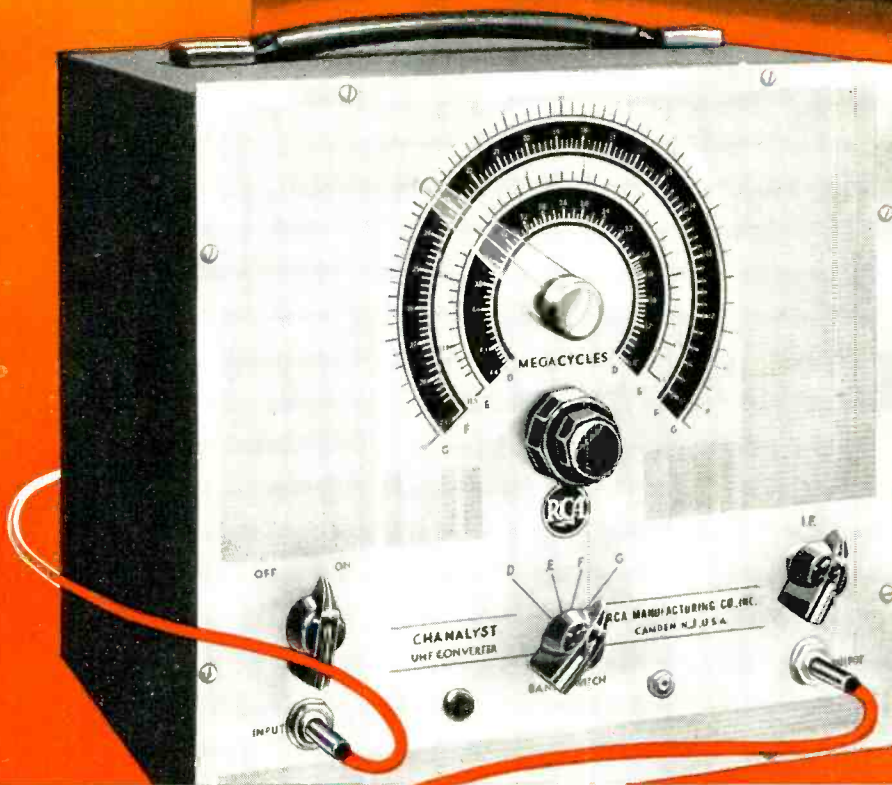
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