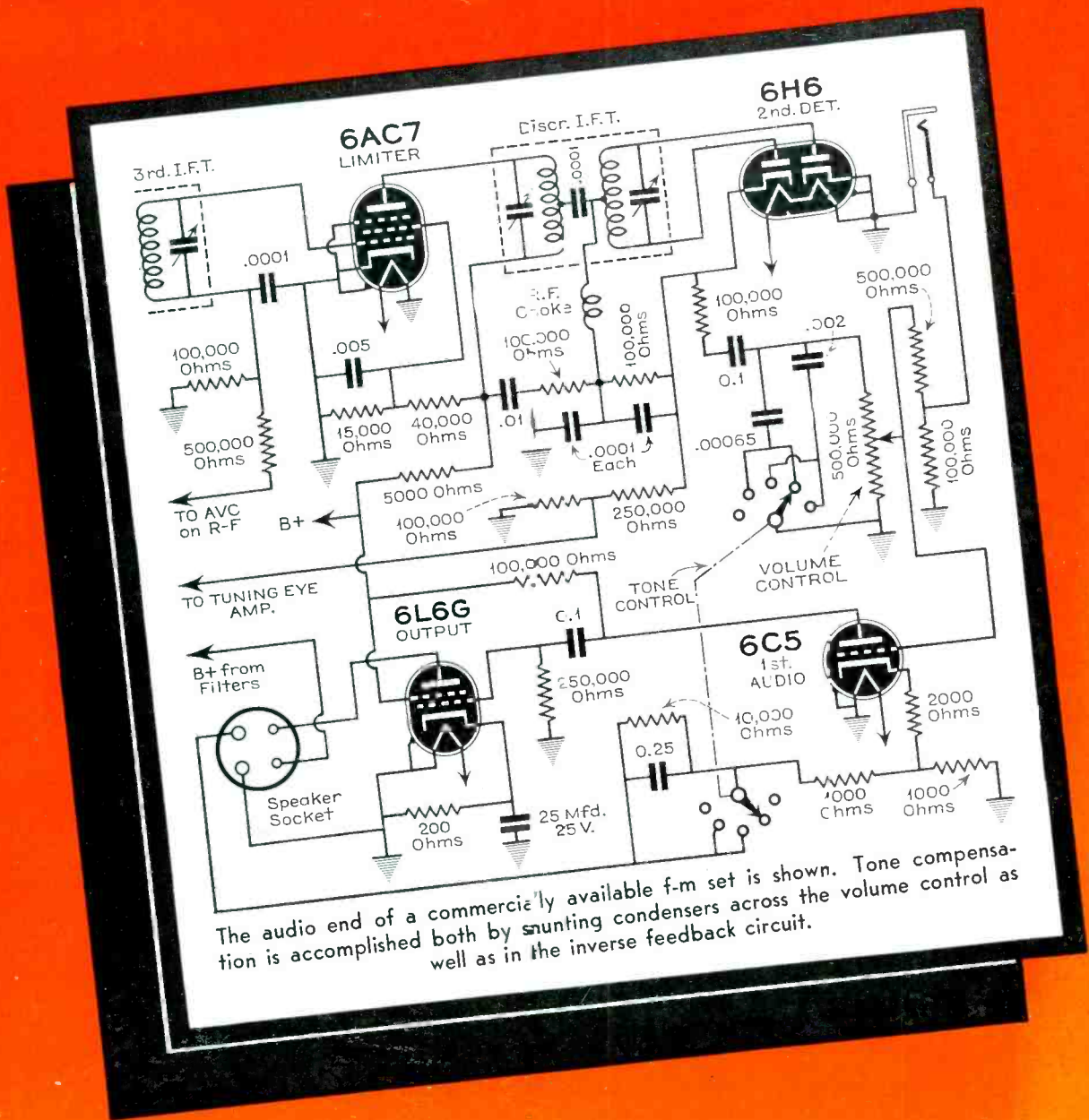


SERVICE



The audio end of a commercially available f-m set is shown. Tone compensation is accomplished both by shunting condensers across the volume control as well as in the inverse feedback circuit.

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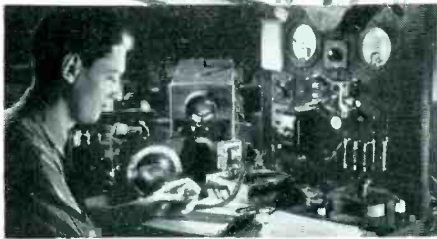


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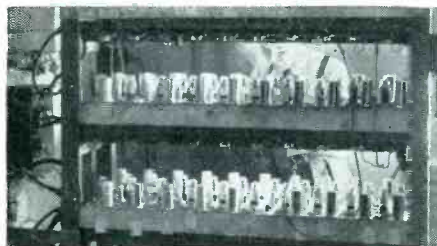
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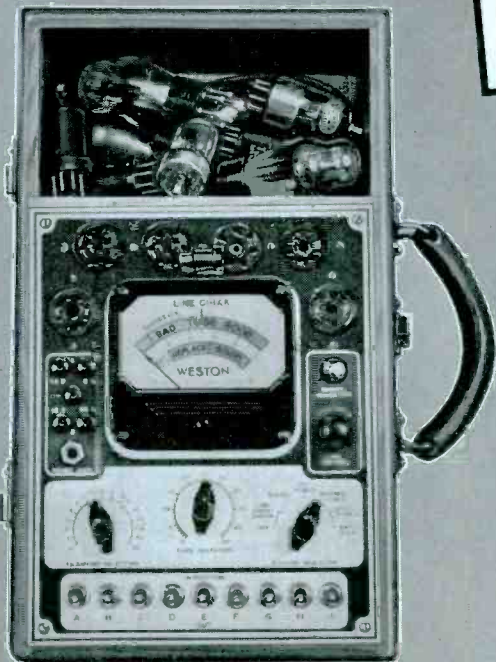
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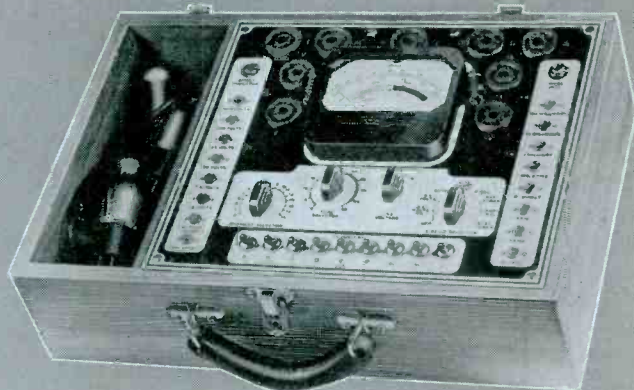
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A Monthly Digest of Radio and Allied Maintenance
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IT CAN readily be conceded that better times are ahead for the Service Man. Aside from the fact that pay-rolls in general are up, some radio men will be drafted into the armed services and others will take advantage of the increasing demand from the factories for workers with some technical skills. In other words, there will not only be more jobs but there will be less competition for those jobs.

Of course, the increase will not be all of a sudden. In fact, it is well on its way already and has received a strong impetus from the reallocation program.

Those of you who expect to stick to your service bench should not sit back and hope to take this extra work in stride. If you haven't made adequate preparations to improve your efficiency, how do you expect to handle more work? Will you work all hours of the night? Or maybe you like to turn away customers?

We suggest that you take stock now. Modernize your service bench, your tools and test equipment. Make sure that you are properly equipped to do every job efficiently.

The manufacturers have done wonders in the last few years in introducing just the type of instruments most suited to your job. Drop in at your jobbers and check over some of the latest apparatus. If you think your meters are "good enough" you're in for a pleasant surprise.

THE public has shown considerable interest in frequency modulation. Receivers have been selling quite well in such sections where f-m programs are being broadcast. With the commercialization of programs this interest should grow. We suggest that you take advantage of it. Push f-m! Where your customer is interested but has a good a-m receiver and does not care to make an additional investment in an f-m console, try recommending an f-m tuner or converter. These will enable the listener to get some of the benefits of such f-m programs that are now on the air at little extra cost.

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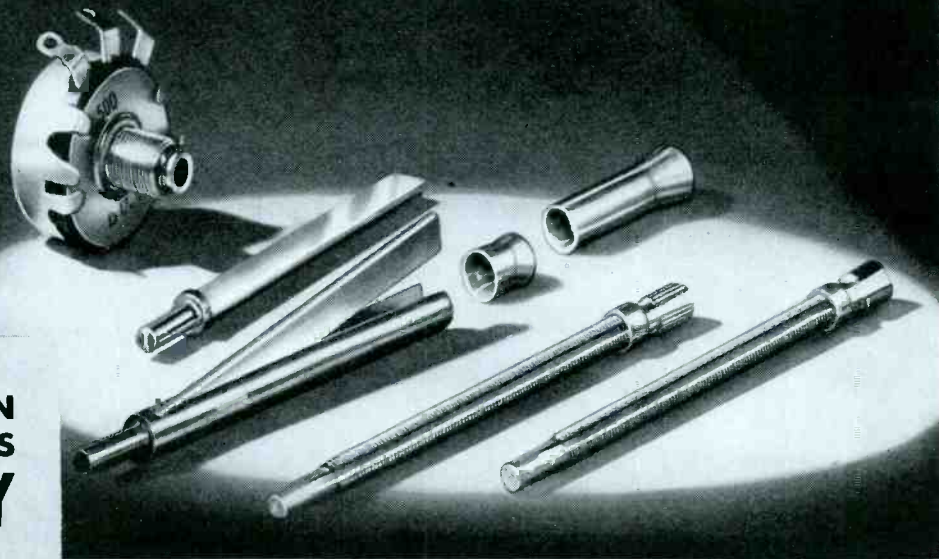
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Shaft position in knob requiring 1/32" flat.



How shaft is positioned for set-screw knob.



Only edges of shaft are filed for odd types.



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By this means, the high input resistance of 11,000,000 ohms can be maintained on all d-c voltage scales, giving a maximum sensitivity of 3,666,666 ohms per volt. This extreme sensitivity also allows resistance measurements from 0.1 ohm to 1000 megohms. As maximum meter driving power is limited by the capabilities of

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SPECIFICATIONS

D-C VOLTMETER... 6 ranges of 0-3, 10, 30, 100, 300 and 1000 volts with a constant input resistance of 11,000,000 ohms. This permits true dynamic testing under actual operating conditions. Full meter protection.

OHMMETER... 6 ranges of 0-1000, 10,000, 100,000, 1,000,000, 10,000,000, 1,000,000,000 ohms. No zero reset required when changing scales. No leads to short. Full meter protection. All ohms read on one scale having low end expanded for greater accuracy.

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METER ACCURACY... 2% at full scale. Matched pair multiplier resistors accurate to 1%. Rugged meter movement; withstands mechanical shocks.

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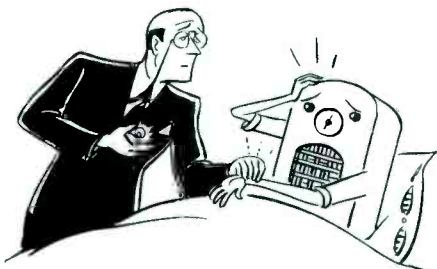


DEFENSE AND THE SERVICE MAN

By FARLEY CHARREL

I WONDER what the Service Men of America thought when the President of these United States signed the Lease Lend Bill and when the Congress further implemented our All Out Aid to Britain program by appropriating seven billions of dollars to see it through. Did any, or many, of them attempt to visualize the vast implications which these legislative measures carried as far as the servicing fraternity was concerned?

In all likelihood, those who did give the subject any thought merely concluded that perhaps business would be better. For those who stayed in the business of servicing radios and public address systems would, due to the tremendous demand for skilled labor, find that competition was lessened because of the fact that thousands of fringe Service Men had either joined the armed forces or had taken advantage of the attractive wages being offered by the factories affected by the defense boom. Perhaps they idly speculated that now that Joe Doaques and Otto Strubnik were no longer in the competitive picture they might be able to get a few profitable service jobs. But that's about



"... pull up a chair, I'll try, in my best set-side manner, to give you my prognosis."

as far as their look see into the future went.

There's more to it than that. Much—very much, more. If you'll pull up a chair, I'll try, in my best set side manner to give you my prognosis.

Flashback

Let us flash back—a la the galloping films—for a moment.

Many reasons have been advanced for the final collapse of the German Army in 1918. I subscribe to the theory that while the British blockade and the added man power of the AEF may have been important factors, the "blow that killed father" was Woodrow Wilson's Fourteen Points. With the publication of this proffer of the olive branch, a war-weary people were more than eager to lay down their arms and get themselves shed of the whole filthy mess. That, gentle reader, was PROPAGANDA. It was disseminated via the printed word and by word of mouth. For that was in the days when wireless was in its infancy, when the broadcasting and reception of radio programs was merely an idea in the minds of such men as Marconi and Sarnoff. Today, when the press of the totalitarian countries is merely an instrument to further the bloody aims of the leaders in the present fracas, the only method of disseminating propaganda in those countries which are under the iron heel of the dictators is via the medium of radio.

Esprit De Corps

But getting our side of the story into foreign countries is not the concern of the American Service Man. His role is concerned with getting our side of the story into the homes of millions of workers in America and out of the loudspeakers which are placed in barracks throughout the country for the entertainment and edification of our armed forces. Perhaps I'm slightly biased—but I proclaim from the house tops in stenorian tones, that you and you and you, Mr. Servicier, are going to play a role no less important than that played by the men behind the guns and the men who are producing tanks, planes and all the other instruments of war. That's

your job, Sir. You may take it in your stride. You may minimize its importance. But I think it's a big job. And I think, too, that the men who are faced



"... I state my belief that the production of radio receivers will take a sharp drop—perhaps by Government edict... In other words, dealers will have to turn-down their set customers."

with the task of putting the final kayo on those whom we have dedicated ourselves to exterminate, also realize that the men who maintain the 54,000,000 radios in this country are as important as any group which has signed up for the duration.

Material Shortages

Of late the headlines have proclaimed the news that already there is a shortage of those raw materials required to produce the sinews of war. It so happens that many of those vital war materials are also necessary to the production of radio receivers. Already there is a struggle between "war time industry" and the producers of "peace time" goods to obtain the materials required to keep their plants working to supply the tremendous demands placed upon them. As employment increases due to

the production of planes, tanks and guns, payrolls hit new highs. Bigger payrolls naturally mean greater demand for such items as radio sets. Inevitably, there must ensue a head-on collision between the peace time industries and the war industries. I cannot see any other result than the peace time industries losing out in the race to obtain raw materials. And, at the risk of having some of my friends in the receiver manufacturing business commit may-



"... one way of sabotaging the national program would be to use ... 'Graf Spee' replacement parts ... the sort of tubes, volume controls, resistors and condensers which scuttle themselves as soon as things get hot ..."

hem, I state my belief that *the production of radio receivers will take a sharp drop—perhaps by Government edict, during the balance of 1941 and the entire year of 1942.* And thereby hangs a tale of profits for the Service Man.

Regardless of the demands which the war industries make upon the stocks of such raw materials as aluminum, steel, copper, wax, etc.. I believe that the Administration will not clamp down on the production of those component parts and tubes which are necessary to the repair of the present 54,000,000 radio receivers. It may be difficult to obtain new sets, to be sure. But I cannot envision the Government of the United States permitting any citizen to be less than fully informed. I cannot picture any cessation of radio broadcasting. And I most certainly cannot visualize the agencies of propaganda being content with less than a 100% listening audience. I'd go so far as to say that we may, before the conclusion of this business in Europe, have legislation which makes it obligatory for every owner of a radio receiver to have it in good working order. And keep it so. Perhaps that seems a bit Utopian (*imagine laws-making people call in a Service Man!*), but in these days of world upset and turmoil, I wouldn't be surprised at anything.

In view of the foregoing, I cannot help but conclude that the Service Man will have little difficulty in obtaining those components necessary to the proper maintenance of the receivers in his trading area.

Quality Components

A condenser manufacturer told me, over the luncheon table, that one of the best things which could happen in favor of the Axis arms would be the sudden cessation of all radio reception in America. That was a new twist propaganda with reverse English. Of course, such a mass failure of receivers would be impossible, he thought. But even if an appreciable percentage of American receivers could remain permanently inoperative, it would be a victory for Herr Hitler comparable to the bloodless acquisition of the Ukraine Breadbasket and the Baku oil fields. It occurred to me that one way of sabotaging the national program would be to use what are laughingly referred to as "Graf Spee" replacement parts. You know—the sort of tubes, volume controls, resistors and condensers which scuttle themselves as soon as things get hot. Seriously, though, the use of sub-quality or unreliable replacement parts and tubes might be a reflection on the patriotism of the Service Man who installs such junk, in addition to the fact that, by that method, he builds up a had reputation for himself in the profession.

I have no hesitation in saying that the use of good, reliable, replacement parts is not only a patriotic duty, it is the best kind of *good business*.

Test Equipment

The expected increase in service calls which will come as a result of the elimination of competition via the training camp and defense production routes will find many a Service Man unprepared to take care of the added volume. In most cases, this will not be due to lack of technical knowledge on his part, but rather can be attributed to a lack of modern test equipment. I have always lent a sympathetic ear to the financial problems of the Service Man. When a Service Man, due to the lack of finances, has been unable to modernize his test bench, I have not criticized. I know that you cannot squeeze blood out of a turnip any more than you can buy the new, efficient test units with potato chips. But, I look for a removal of the financial barriers which have heretofore mitigated against the purchase of proper test apparatus.

With that objection to up-to-date methods dispensed with, it behooves the Service Man to invest in equipment which will allow him to make tests in six minutes which formerly consumed two hours or more. It is axiomatic that there is no profit in jobs which you don't do. If your capacity—with your present antiquated test bench—is only four sets a day, it is a cinch that when twelve sets a day come in for repairs,

you'll have to either turn eight of them over to a competitor or figure out a way of squeezing 32 hours into one day. Either that, or get insomnia.

Electronic Applications

Reference to electronic applications in industry is certainly not premature at this time. But I want to leave this thought with you. In thousands of factories throughout the land, such electronic devices as the photo-electric cell, various radio testing devices, capacity relays, electric counters, etc., are being used in thousands of ways. Public-address and intercommunication systems have become important instruments of production. There is hardly a plant which does not utilize—or, at least, *should utilize*—the things which you, by virtue of your radio training, are qualified to service and maintain. The list of Service Men who have made, and are making, a fine living servicing non-radio applications of electronic devices is as long as your arm.

So I suggest—if you have any time which can be devoted to reading and research—that you acquire as much knowledge of these industrial electronic applications as you possibly can. Perhaps—who knows?—that is the field of the future for the radio Service Man.

But in the meantime, you're a soldier of the American Nation. That soldering iron with which you are armed is an important weapon in the defense of the country—and don't kid yourself for a fleeting moment. Your defense job is to see to it that 54,000,000 radios are kept in tip-top shape so that the morale of



"... but in the meantime, you are a soldier of the American Nation. That soldering iron with which you are armed is an important weapon in the defense of the country ..."

the defense forces—both in the army and in the factories—can also be kept in tip-top shape.

For if national morale goes down—production of materials we'll need to finish the greatest task we as a nation have ever undertaken will suffer. That mustn't happen here, Mr. Servicier.

And *you* are one of the most important guardians of our national morale!

CIRCUITS

See Front Cover

By HENRY HOWARD

IN VIEW of the rapidly growing popularity of f-m it is fitting that we give the cover to an f-m receiver circuit. The particular circuit shown is the limiter, detector and audio end of Meissner Models 9-1023 and 9-1037 (Chassis 9-1041A), which are 11-tube, a-c sets covering the 42- to 50-mc band. While these receivers are complete and are capable of giving excellent quality

compatible with their size, provision is made for using them as converters when a high quality large console set is available, allowing greater bass tonal range. For use as a converter, a cord with a plug at each end is provided to connect the detector output of the converter to the phonograph jack of the large console. Note the jack between the 6H6 cathode and the volume-control

output, which is for this purpose.

The tone control circuit is particularly interesting. The first section operates in a conventional manner, inserting shunt condensers across the volume control. The second section operates in the inverse feedback circuit between the voice-coil winding and the first-audio cathode. A $\frac{1}{4}$ mfd and 10,000-ohm parallel circuit is cut in or out in combinations with the first section giving five steps of control. Position 1 decreases highs and accentuates the bass; position 2 increases lows without affecting highs; position 3 again cuts highs, but with no bass accentuation—giving a sort of mid-range response; position 4 is normal response; position 5 gives an

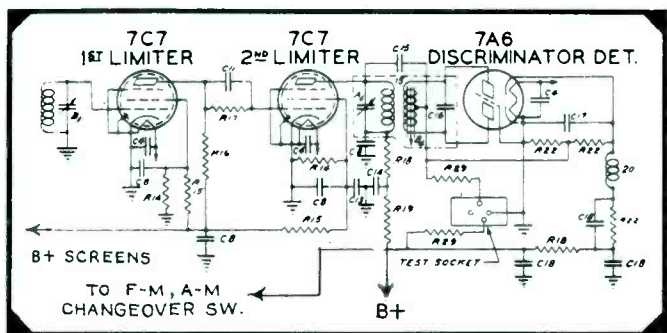


Fig. 1. Zenith Models 10H551, 10H571, 10H573 (Chassis 10A3) use a cascade limiter feeding the discriminator. (Above.)

Fig. 2 (right). Silvertone Models, 771, 1771 use two 6J5GT's cathode-to-cathode coupled as oscillator and translator.

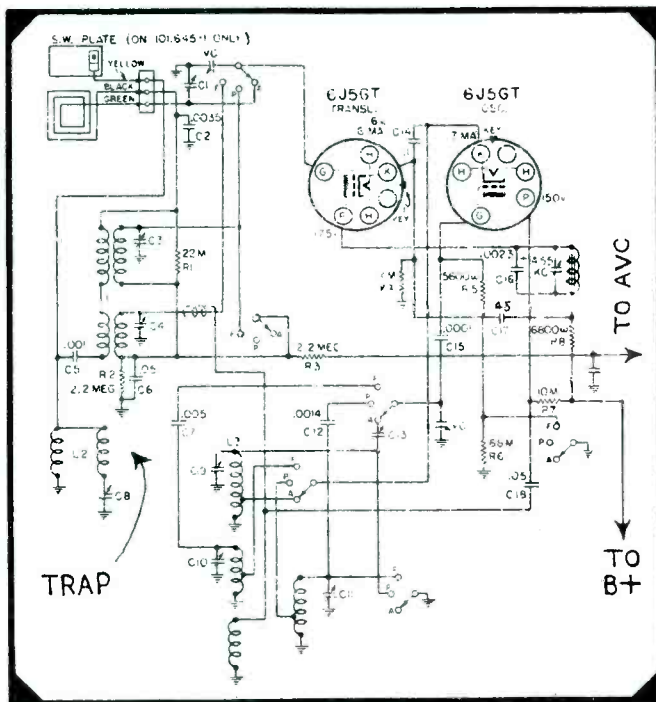


Fig. 5 (below). Some manufacturers of personal receivers are using a line cord resistor tapped at 80 ohms to feed the rectifier.

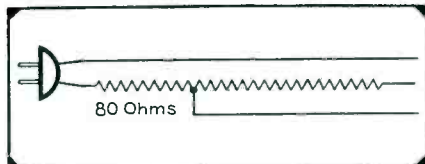
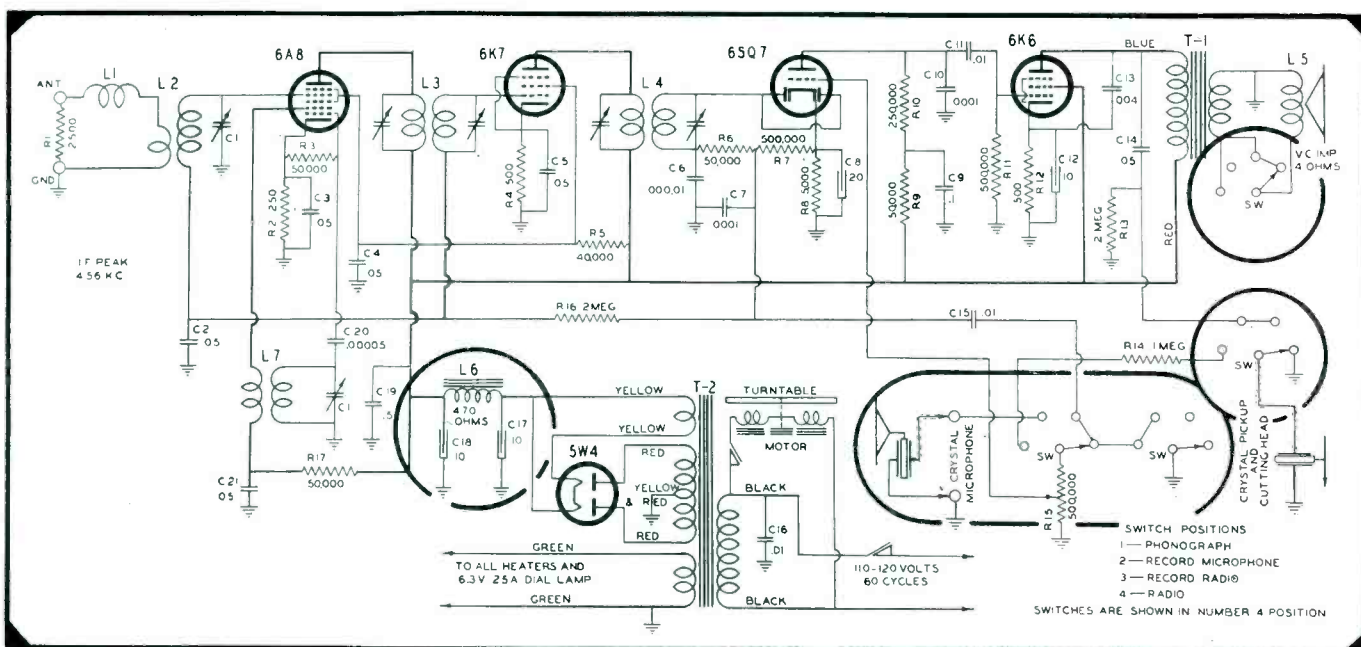


Fig. 3 (below). Wilcox-Gay A100 Recordio, Jr. is a simple radio-recorder using a five-tube superheterodyne with very few additions.



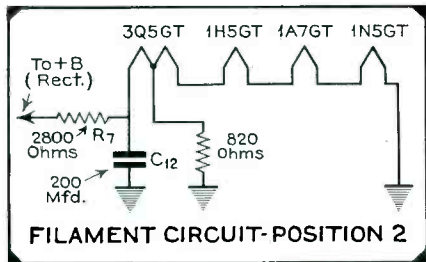


Fig. 8. RCA 15BP Series of battery portables.

excess of highs which is useful when the attached receiver lacks sufficient high-frequency output.

The tube lineup includes a 6AC7 r-f amplifier, 6SA7 mixer-oscillator, 6SK7 first i-f amplifier and 6SK7 second i-f amplifier, 6AC7 limiter, 6H6 second detector, 6C5 a-f amplifier, 6L6G output, 6SC7 indicator amplifier and 6AF6G dual-eye indicator. The dual shadow tube is provided to facilitate proper tuning because care in tuning an f-m receiver is even more important than tuning a very selective superheterodyne. Detuning during the warm-up period is quite a problem at the f-m frequencies. Meissner has minimized this drift so that it isn't bothersome. A VR150 regulator tube is provided to help in this respect and is also used to stabilize the indicator tube and amplifier.

The power output of these receivers is 6 watts, undistorted. They are 170-ke broad at twice the signal to permit wideband reception. The sensitivity is 10 microvolts average, with an i-f peak of 4.3 mc. The i-f peak is chosen to eliminate the possibility of images in the 48-mc f-m band. Also, at that high frequency the response curve is sufficiently broad to eliminate the need for overcoupling the i-f transformers to obtain sufficient band width.

Zenith, too, uses an i-f peak of 4.3 mc in their f-m receivers, although

many other manufacturers are using 2 mc in order to obtain sufficient amplification. The Zenith Models 10H551, 10H571 and 10H573, in particular, present some other contributions to f-m technique worthy of note. Two i-f stages are used on f-m, but only one on a-m. In f-m sets a high degree of selectivity in the r-f end is undesirable because of the wide f-m channels. These considerations allow the use of an aperiodic wide-band amplifier giving high gain without tuning. Electric automatic tuning is accomplished by varying the position of an electrolytic copper slug with respect to the coil. Only one adjustment (the oscillator) is required for each button.

While a loop (wavemagnet) is provided for broadcast a-m reception and a-m short-wave bands, f-m reception is greatly improved by using a dipole antenna, which is of the folded type suitable for vertical polarized waves only. If the f-m station to be received uses horizontal antennae, an external antenna must be used for proper reception. This matter of polarization will be

annoying until one type or the other is standardized. Fig. 1 shows the 2-stage 7C7 cascade limiter feeding the 7A6 discriminator detector. A 6-button, 6-position tone control (the "Radiorgan") is incorporated in the volume control—audio input circuit. Further tone compensation is provided in an equalizer located in the 6V6G power-amplifier output circuit.

Silvertone 771, 1771

Silvertone Models 771 and 1771 are 7-tube, 3-band push-button sets with loop for broadcast and plate antenna for short waves. 6J5GTs are used for both oscillator and translator with cathode to cathode coupling as shown in Fig. 2. Two i-f stages are used with 6U7Gs, resistance coupled. Another unusual feature is the switching of grid leaks in changing wave bands. On broadcast and police bands the grid-leak value is the sum of two resistances, 68,000 and 5,600 ohms. On the short-wave band, the former is shorted, leaving only a 5,600-ohm leak. This undoubtedly cuts the voltage output of the oscillator,

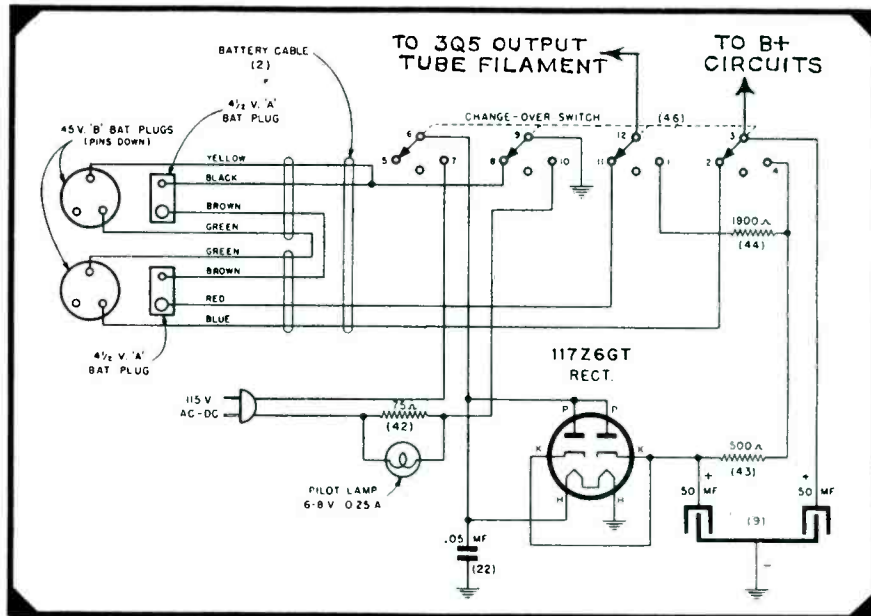
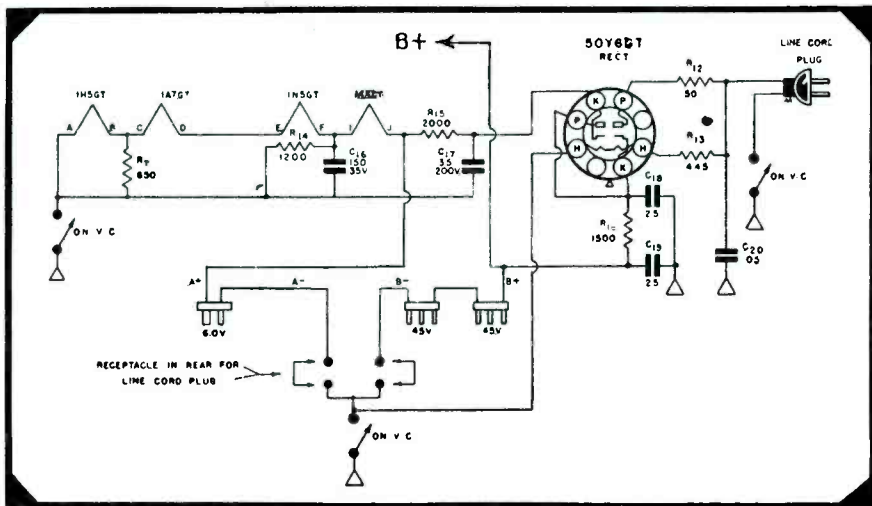


Fig. 6 (above). Firestone Air Chief S7397-2.



thereby increasing the translator sensitivity or overall gain.

Wilcox-Gay A100

Model A100 Recordio Jr. of Wilcox-Gay is a simple radio-recorder using only a standard 4-tube and rectifier superheterodyne with very few additions. A high-level crystal microphone is used necessitating no preamplification; the mike is fed directly into the volume control. The crystal pickup serves also as the cutting head and is fed directly from the 6K6 plate through a 0.05 coupling condenser for this function. A 2-meg resistor is shunted across

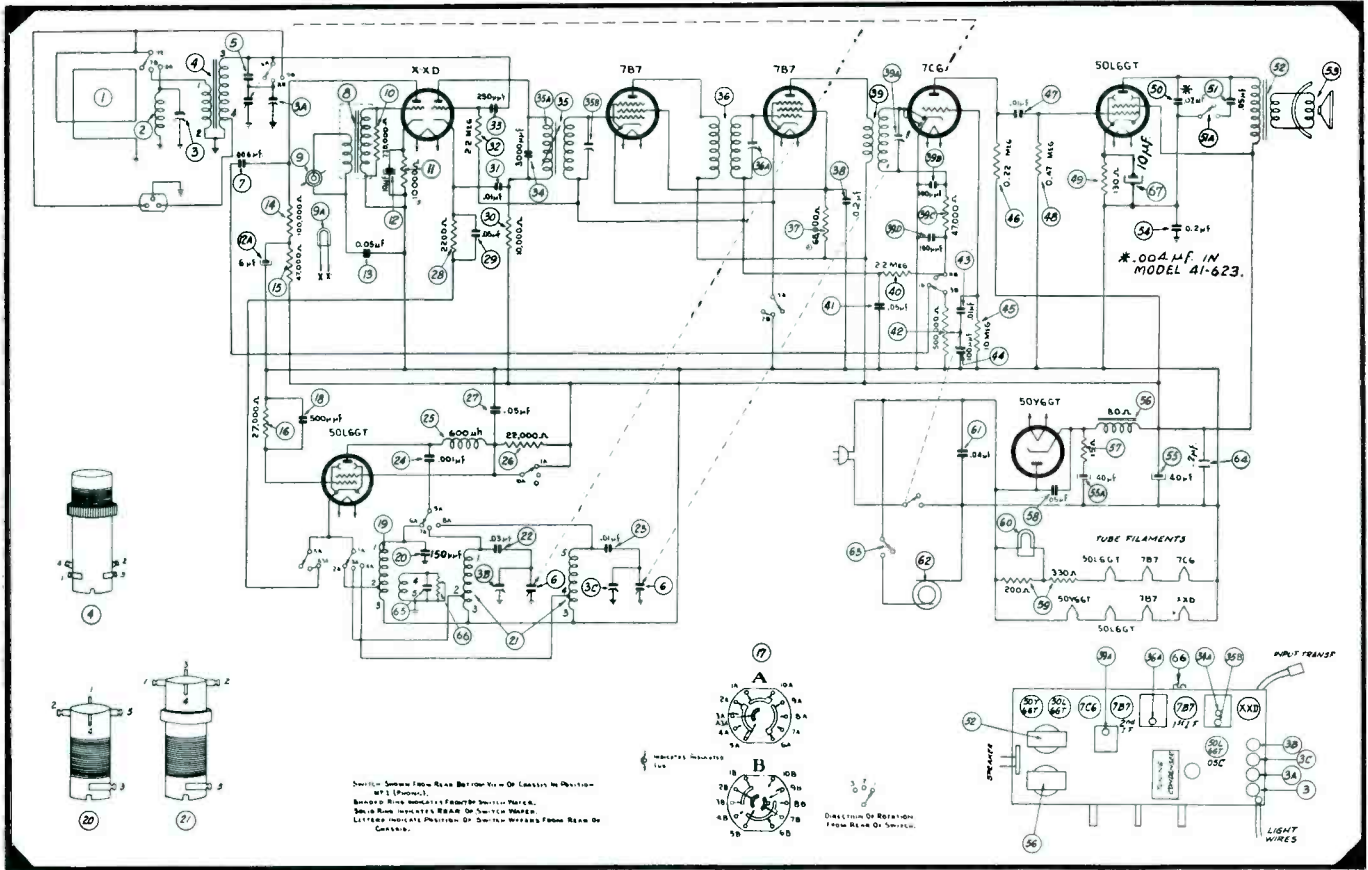


Fig. 4 (above). Philco 41-623, 41-624, 41-625 combinations.

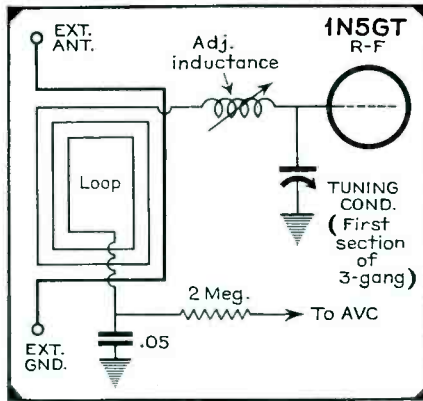
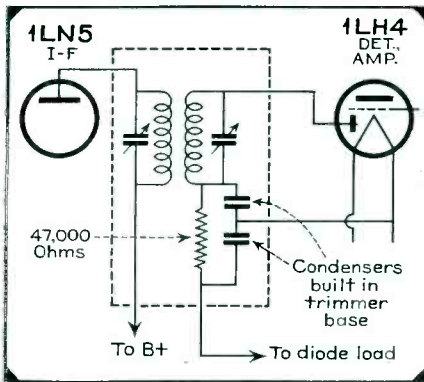
Fig. 9. Air Castle Models CP5120 and CP5121 (below).

the cutter to prevent injury should the coupling condenser develop any leakage. Fig. 3 shows the simple switching scheme. During recording or playback the detector output is grounded.

Philco 41-623, 41-624, 41-625

Philco has a new series of a-c, d-c phonograph models, one with automatic changer. They feature a 7-tube superheterodyne with a type XXD dual-triode converter and phono preamplifier, two 7B7 i-f stages, one 50L6GT as output tube and another as power oscillator, a p-m speaker, two tuning bands and the Philco light-beam reproducer. The 50L6GT power oscillator is used to light the reproducer lamp in the phono position. The frequency is so high that none of the ripple gets through the audio amplifier. In the radio position the oscillator power is reduced in

Fig. 10. Zenith battery portable.



a 22,000-ohm series plate resistor.

Two strings of heaters are used in these sets. One contains the pilot lamp and a 330-ohm series resistor. The circuit used in the Models 41-623, 41-624 and 41-625 is shown in Fig. 4.

Other Models

DeWald Model 672 combination a-c and 6-volt battery receiver covers 3 bands with partial band spread on the short-wave bands. The switching circuit includes a two-pole on/off volume-control switch and a three-pole double-throw line/battery changeover switch.

Sears Roebuck has a new 8-watt musical instrument amplifier, Model

8960, which contains a three-stage amplifier with microphone input into one 6J7 and four inputs into another 6J7 for contact mikes. The two channels are mixed in the second stage, a 6Y7 dual triode with plates tied together. A single 6L6 delivers the 8 watts. The gain approaches 115 db.

Battery Receiver Trends

The latest trend in battery receivers is toward 3-way, or universal operation of personal sets. To have the approval of the Underwriters' Laboratories no line cords with enclosed resistors are allowed. Yet there are no facilities for sufficient power dissipation within the set itself to take care of rectifier losses without causing a considerable temperature rise. With this situation in mind a special gas rectifier tube was developed which is very efficient, producing little heat. The main reason for this is the elimination of cathode power during operation; the tube operates as a cold-cathode rectifier. A filament is necessary to start the action, however, and a momentary switch is employed when turning on the receiver.

Another solution to this problem will appear with the new 115-volt, 75-ma, rectifier which will cut the heater input in half. This tube, not yet in production, is expected to be able to handle 60-ma d-c output.

Resistance line cords are continuing

(Continued on page 26)

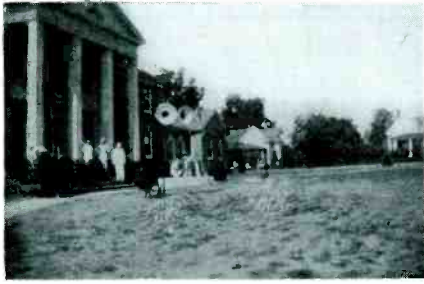


Fig. 1. C. T. Kimberly, Hawkinsville, Ga., uses sound to ballyhoo his own business at the Pulaski County Fair each year.

IN THESE columns each month we have been telling our readers how their customers have been using sound to boost their business. This month, however, it seems that the "worm has turned." One of our readers tells us how he uses sound to boost his own business.

Down Georgia way, C. T. Kimberly, of Kimberly's Radio Service, in Hawkinsville, takes a booth at the Pulaski County State Fair each year. In connection with his exhibit he runs a public-address system, operating it from the booth inside the fair grounds, with loudspeakers mounted on the outside in front of the county building. (See Fig. 1.) The system is used to plug announcements and to call the public to visit the Kimberly Booth while at the fair. The booth is all fixed up to demonstrate the latest methods in receiver testing and repair.

A 50-watt amplifier is used in the p-a system. It has four trumpets arranged for coverage of the midway and surrounding grounds in addition to those shown in the accompanying illustration (Fig. 1).

The population of Hawkinsville is only 3,000 but you would be surprised how all this gets nosed around. Kimberly feels sure that it does boost his business.

In addition to a sound truck for street advertising, he has other systems ranging from 7 to 50 watts. Years ago he started with an 8-watt job and a single speaker . . . the 50-watt system used at the fair can be operated with seven or eight aluminum trumpets, each four and a half feet long using p-m pot units. This job is rented regularly for all-day singing conventions in this territory, as well as for other outdoor events.

High-Power A-F Motor Drive

It is common practice among radio and sound men to use the 60-cycle power line as a source of audio-frequency tone for modulation and measurement purposes. In the equipment illustrated in Fig. 2 this process is exactly reversed. A precision 60-cycle tone generator is utilized to drive a half-kilowatt electric

SOUND IDEAS

By R. McEQUAINE

motor through the medium of a high-power audio amplifier system.

The purpose is to provide mechanical driving power of absolutely constant speed. For most purposes a synchronous motor operated directly from commercial power lines provides adequate stability of speed. But such lines are subject to instantaneous and short-period frequency variations and are therefore not capable of precise speed regulation. Mechanical means for speed regulation were also found unsuited to the requirements in this case.

In this apparatus a 60-cycle audio-frequency standard generator capable of maintaining its frequency accurate to one part in 100,000 constitutes the source of excitation. Its output is fed into an amplifier capable of 500 watts of undistorted output and this in turn supplies the driving power for the synchronous motor.

The design of this system is a development of the research section at the propeller division of the Curtiss-Wright Corporation to meet the requirements of certain critical test applications in the Curtiss-Wright plant. The actual equip-

ment as shown in the accompanying photograph was built by the Transformer Corporation of America (Clarion), its engineers collaborating with Curtiss-Wright engineers in design details.

Such equipment as this provides additional evidence of the expanding horizons being presented to the sound specialist in the electronic and non-sound applications for amplifier equipment. Already the defense program has resulted in tremendous advances in the application of electronics in industry. A great many of these are right down the alley of the capable sound specialist, offering potential possibilities for a vast and highly profitable extension of his field of activities.

Plant Intercommunication

In a previous issue* we have discussed how J. H. Fentriss, of Fentriss Sound Equipment Co., Bell Telephone Building, Oklahoma City, Oklahoma, has taken full advantage of the fact that manufacturers of defense materials are seeking every possible way to improve their efficiency. Whereas, in the past, other methods of inter-plant communication may have sufficed, amplifiers are

Fig. 5. The Newtown Creek oil depot of the Shell Oil Co., in Brooklyn, N. Y., uses four marine type speakers in an outdoor call system.

*"1941 Sound", by Robert G. Herzog, SERVICE, February 1941, p. 3.



rapidly finding their way into the factories in our "arsenal of democracy."

Mr. Fentriss canvassed many firms which he expected would have defense contracts. One of the orders that he received as a result was from the Beech

Fig. 3. R. K. Beech, vice-president of Beech Aircraft Corp., at his desk where efficient intercommunicator has been installed.



Fig. 4. Beatrice J. Lake, switchboard operator, whose duties have been made lighter since intercommunicating system was installed.

Aircraft Corporation, located in Wichita, Kansas. The order called for the immediate installation of six Webster Electric (Racine) Model 212S, twelve-station Teletalk intercommunicating units and one Model 5A45 loudspeaker unit in a new engineering and office building which was in the process of construction. Three additional Model 212S Teletalks have since been added and it is expected that as soon as the various offices are completed in the near future, other stations will be installed.

The system serves to supply instant intercommunication between the following executive departments: president, sales manager, secretary - treasurer, comptroller, purchasing agent, office manager, executive secretaries, purchasing department and switchboard operator—a total of nine stations. All stations are immediately selective, and interdepartmental conversations are strictly private. (See Figs. 3 and 4.)

Concerning this installation, William H. McDaniel, public relations director of the Beech Aircraft Corporation, writes:

"We are pleased to report that the Teletalk system installed in our offices is giving very satisfactory, trouble-free service. We have found it almost indispensable as a means of instant communication among our executives and office staff, and it has removed a heavy burden from our telephone system, in addition to saving a substantial amount of valuable and irreplaceable executive time.

"In aircraft manufacture, particularly under present-day circumstances, any means of reducing lost time and effort possesses tremendous value. From this viewpoint, our intercommunications in-

stallation is earning its way in our service many times over.

"We are in process of quadrupling our capacity to expedite fulfillment of orders for defense and commercial use. *Our system will of course be expanded, along with all our other essential facilities.* We have always believed in giving credit where credit is due, and the Tele-



Fig. 2. A 500-watt amplifier supplies power to drive a motor at absolutely constant speed for Curtiss-Wright.

talk system has well earned our commendation."

Mr. Fentriss, who made the installation, says: "Approximately 12 hours were spent in making the installations since suitable conduit and junction boxes had been included in the building plans."

To this might be added that Mr. Fen-

triss made a very desirable profit from the sale . . . and that he can reasonably anticipate additional sales to the same concern as the need arises for more intercommunication facilities.

Oil Yard Sound

Coil, oil and lumber yards may not classify directly as defense industries, but greater demands from customers, because of our defense efforts, have overtaxed their facilities to the extent that more efficient methods are especially welcome. Public-address and sound equipment can justify itself in these applications just as well as it can in those described above.

The Windsor Radio and Sound Service, Brooklyn, N. Y., has recently sold a typical system to the Shell Oil Company for their Newtown Creek oil depot in Brooklyn, N. Y.

This oil depot, which is a supply station for a major part of the Brooklyn territory, has facilities for loading gas and oil on twelve delivery trucks simultaneously. About 275 feet from the dispatcher's office, the oil company has a dock for tankers which pull up alongside in the Newtown Creek for delivery of petroleum products to the underground tanks in the supply depot. The station also has a number of office buildings, garages, warehouses, and repair shops which spread over an area of three city blocks.

The yard superintendent discussed his sound coverage requirements with Shell electrical engineers, and they planned a suitable paging system to cover the whole area.

The sound system used consists of: two Amperite RBH-M microphones and stands alongside the switchboard in the dispatcher's office; a 30-watt amplifier complete with three microphone inputs and loudspeaker plug panels; two Type WX12S1, 12-inch and two WX8HL, 8-inch Atlas Sound Marine loudspeakers

(Continued on page 21)

BATTERIES FOR PORTABLES

By ROBERT G. HERZOG

EDITOR

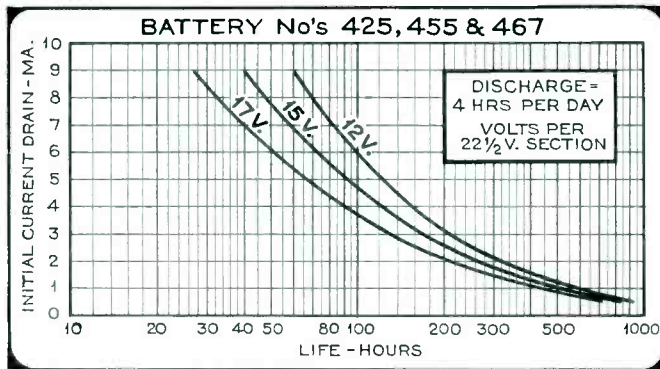


Fig. 1. The service life of the Mini-Max batteries for personal receivers is indicated for one four hour discharge period each day to the voltage indicated per 22½ volt section (Left.)

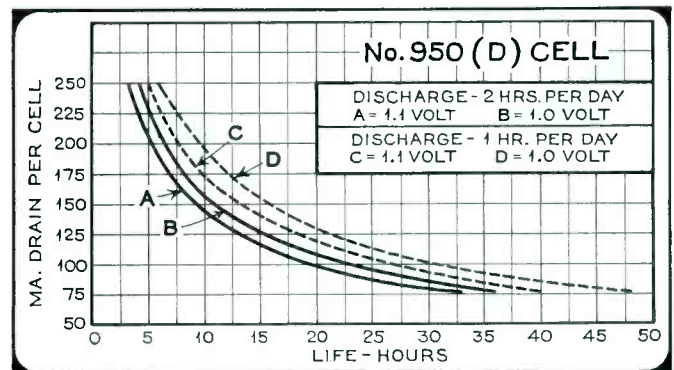
than radio equipped homes. In the final analysis, however, low battery replacement cost is the important factor in making these remarkable radio receivers universally popular.

B Batteries

Except for a few models that are de-

OF GREATEST interest in the field of batteries, as far as the Service Man is concerned, is the development of very small but efficient batteries for personal and pocket receivers. The sets themselves bid fair to revolutionize the radio industry, since through their introduction we can count radio equipped persons rather

Fig. 2. The service life of the Eveready 950 (D size) flashlight cell varies with the rate of discharge and recuperation, as that of the other types of batteries listed. (Right.)



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	—	—	—	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	—	—	F5A60	—	—	—	—	—
9-90	—	—	G6B60	—	—	—	—	—

signed to use a standard midget 45-volt B battery, most of the personal receivers introduced up to the time of this writing, use the Eveready No. 467, 67½-volt B battery known as the mini-max (or its equivalent).

This battery was specifically developed for the 8 to 11 milliamper B drain of the typical personal receiver and will give from 40 to 60 hours of service under average conditions. Its overall dimensions, including the connectors, are as follows: Height, 3 11/16; width, 25/8, and depth, 1 5/16 inches. As companion units to the 467 National Carbon is introducing two other small batteries. One (No. 455) has a rated voltage of 45 volts and the other (No. 425) 22½ volts. The 45-volt unit measures 3 11/16 inches high by 2 17/32 inches wide by 29/32 inch deep. The 22½-volt battery has dimensions of 4 5/32 by 1 5/16 by 15/16 inches. The estimated service of these units, based upon one four-hour discharge per day through constant resistance, is shown in Fig. 1 for three cutoff voltages expressed in volts per 22½-volt section.

A Batteries

From one to five standard D size flashlight cells have been used as A batteries in the current models of personal receivers. The lightest sets, weighing 3¾ to 4 pounds, use only a single cell, which will last from 3 to 5 hours, de-

(Continued on pages 13 and 35)

COMPARATIVE NUMBERS OF BATTERIES FOR PORTABLES

Acme	Advance	Bond	Bright Star	Burgess	Eveready	General	National Union	Philco	Rayovac	Usalife	Willard	Winchester
1½ VOLT A UNITS												
111	2	102	10M	D	950	D	D	D	2	1094	D	—
—	—	—	—	—	—	—	—	—	P24A	—	—	—
—	—	—	—	—	—	—	—	—	P24SA	—	—	—
—	—	—	—	—	—	2H1	—	—	—	—	—	—
—	—	—	461	—	—	—	—	—	—	—	—	—
—	—	—	—	2F	—	—	—	—	—	—	—	—
114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
—	—	—	—	—	—	4H1	—	—	—	—	4H1	—
—	—	—	—	—	—	4L1	—	—	—	—	4L1	—
115	—	—	—	—	—	—	—	—	—	—	—	—
116	—	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
118	147	4829	860	8F	741	8F1	A833	—	—	635	8F1	4819
—	447	—	—	—	—	3L1	—	—	—	—	3L1	—
—	—	—	—	—	—	—	—	—	—	644	—	—
118FM	547	—	865	8FL	745	8CF1	—	—	P98L	645	—	—
123M	—	—	465	4FL	—	—	—	—	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	—	—	P624A, P694A	639	4F4	—
—	—	—	—	F4PIX	—	—	—	—	—	636	—	—
—	—	—	661	—	—	—	—	—	—	—	—	—
118S	817	4827	866	2F4	718	8F4	A834	—	P698A	638	8F4	4817
—	—	—	—	4FL	—	F4	—	—	—	643	—	—
118S6	747	—	868	2F4L	747	8CF4	—	—	P698L *	646	—	—
7½ VOLT A UNITS												
115S	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	561	G5	—	5H5	—	—	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	—	—	430P	621	V30A	—
—	—	—	—	—	—	—	—	—	—	622	—	—
530	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	30-50	A30M	—	—	—	—	—	—	—	—
—	—	—	—	A30X	—	—	—	—	—	—	—	—
830	284	—	30-33	M30	482	W30B	B861	—	P5S30	640	—	—
—	—	—	—	Z30	738	V30AA	—	—	P7R30	—	V30AA	—
—	—	—	—	—	733	V30AAA	—	—	P3A30	—	—	—
—	—	—	—	W30PI	—	—	—	—	—	—	—	—
—	—	—	—	XX30	455	—	—	—	—	—	—	—

* Type 482 should be used.

Table I. Although the chart indicates that the various types of the different manufacturers may be interchanged, this is not always the case. There may be as much as a quarter of an inch difference in one or more dimensions between types.

F-M BROADCASTING

By RAY D. RETTENMEYER

EDITOR, COMMUNICATIONS

MUCH is heard these days concerning frequency modulation. While it is true that f-m is playing an ever more important role in radio broadcasting, the Service Man has had little servicing to do on f-m receivers. The obvious reason for this situation lies in the fact that only a small number of receivers are in the hands of the public. However, the Federal Communications Commission has granted some 43 construction permits for f-m stations in some 15 different states, and there are approximately 51 applications still awaiting official action. In view of this, it seems likely that the sale of f-m units will increase rapidly in the near future—and that the Service Man will soon be gaining practical f-m experience. In the meantime, it will be well to keep up to date on the subject.

The accompanying table lists the stations that have had FCC approval (to April 15) and gives their commercial call letters. In this connection it is interesting to note the method used in assigning these call letters. The first letter is either a W or K, depending upon whether the station is east or west of the Mississippi River. This is followed by two numbers indicating the frequency assignment in the 40-mc band. The final letters are used to designate the city or general locality of the station. For example, W63NY is a New York City station operating on 46.3 mc, while K47SL is located in Salt Lake City and operates on 44.7 mc.

As we go to press, at least two stations are operating on a commercial basis, the remaining stations are operating with experimental equipment while awaiting delivery of their commercial transmitters. Since the National Defense effort has made early deliveries questionable, many stations will be permitted to operate on a commercial basis with existing experimental transmitters.

Some sixteen or more f-m receiver manufacturers have been licensed under Armstrong patents, and eight or 10 of these have already launched production. In general these sets may be placed in three classifications: (1) combination a-m/f-m sets, (2) straight f-m receivers, and (3) f-m tuners to be used

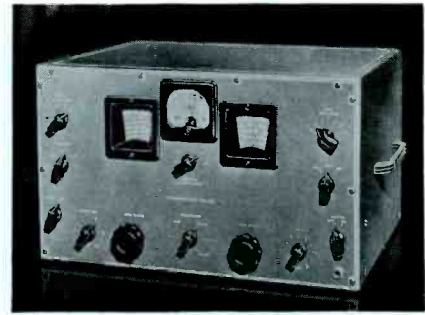
with the audio portion of conventional receivers. In some cases the tuners will cover both the regular broadcast and the f-m band.

F-M BROADCASTING STATIONS

State and City	Owner	Call Letters	Freq. Mc.	Coverage	
				Sq. Mi.	Population
CALIFORNIA					
Los Angeles	Don Lee Broadcasting System	K45LA	44.5	6,944	2,600,000
CONNECTICUT					
Hartford	The Travelers Broadcasting Svc., WDRG, Inc.	W53H W65H	45.3 46.5	6,100 6,100	1,036,400 1,118,000
ILLINOIS					
Chicago	NBC WJJD, Inc. WGN, Inc. CBS Moody Bible Institute Zenith Radio Corp.	W63C W47C W59C W67C W51C	46.3 44.7 45.9 46.7 47.5 45.1	10,800 10,800 10,800 10,800 10,800 10,800	4,500,000 4,500,000 4,500,000 4,500,000 4,500,000 4,500,000
Rockford	Rockford Broadcasters Inc.	W71RF	47.1	3,900	270,000
INDIANA					
Evansville	Evansville on the Air	W45V	44.5	8,397	465,000
South Bend	South Bend Tribune	W71SB	47.1	4,300	448,000
Ft. Wayne	Westinghouse Radio Stations	W49FW	44.9	6,100	420,000
LOUISIANA					
Baton Rouge	Baton Rouge Broadcasting Co.	W45RG	44.5	8,100	361,400
MASSACHUSETTS					
Boston	Westinghouse Radio Stations	W67B	46.7	6,700	3,400,000
Springfield	Westinghouse Radio Stations	W81SP	48.1	2,500	500,000
MICHIGAN					
Detroit	Evening News Assoc. John Lord Booth	W45D W49D	44.5 44.9	6,820 6,800	2,498,000 2,900,000
NEW HAMPSHIRE					
Mt. Washington	Yankee Network	W39B	43.9	31,000	2,000,000
NEW YORK					
New York City	CBS Bamberger Broadcasting Svc. W. G. H. Finch NBC Marcus Loew Booking Agency Frequency Broadcasting Corp. Metropolitan Television, Inc. E. H. Armstrong	W67NY W71NY W55NY W51NY W63NY W59NY W75NY W57A	46.7 47.1 45.5 45.1 46.3 45.9 47.5 43.1	8,500 8,500 8,500 8,500 8,500 8,500 8,500 15,610	12,000,000 12,000,000 12,000,000 12,000,000 12,000,000 12,000,000 12,000,000 12,200,000
Schenectady	General Electric Co. Capitol Broadcasting Co.	W57A W47A	45.7 44.7	6,600 6,589	968,000 967,000
Binghamton	Howitt-Wood Radio Co.	W49BN	44.9	6,500	256,300
Syracuse	Central New York Broadcasting	W63SY	46.3	6,800	600,000
Rochester	Stromberg-Carlson		45.1	3,200	585,000
NORTH CAROLINA					
Winston-Salem	Gordon Gray		44.1	69,400	4,346,000
OHIO					
Columbus	WBNS, Inc.	W45CM	44.5	12,400	1,100,000
PENNSYLVANIA					
Philadelphia	WCAU Broadcasting Co. WFIL Broadcasting Corp. Pennsylvania Broadcasting Co. Westinghouse Radio Stations	W69PH W53PH W47PH W57PH	46.9 45.3 44.7 45.7	9,300 9,300 9,300 9,300	3,846,000 3,850,000 4,500,000 4,500,000
Pittsburgh	Walker-Downing Radio Corp. Westinghouse Radio Stations	W47P W75P	44.7 47.5	8,400 8,400	2,100,000 2,100,000
TENNESSEE					
Nashville	National Life & Accident	W47NV	44.7	16,000	819,000
UTAH					
Salt Lake City	Radio Service Corp. of Utah	K47SL	44.7	623	194,000
WISCONSIN					
Milwaukee	The Journal Co.	W55M	45.5	8,540	1,522,000

COMMUNICATIONS RECEIVER

(HAMMARLUND HQ120X)



The Hammarlund HQ120X is a typical communications type receiver embodying the special features of such sets.

THE Hammarlund HQ120X communications receiver is a modern 12-tube superheterodyne that covers a continuous range of from 30 to 0.54 mc. (9.7 to 555 meters) in 6 steps. Each range has its own individual coil and tuning condensers.

Band Spread

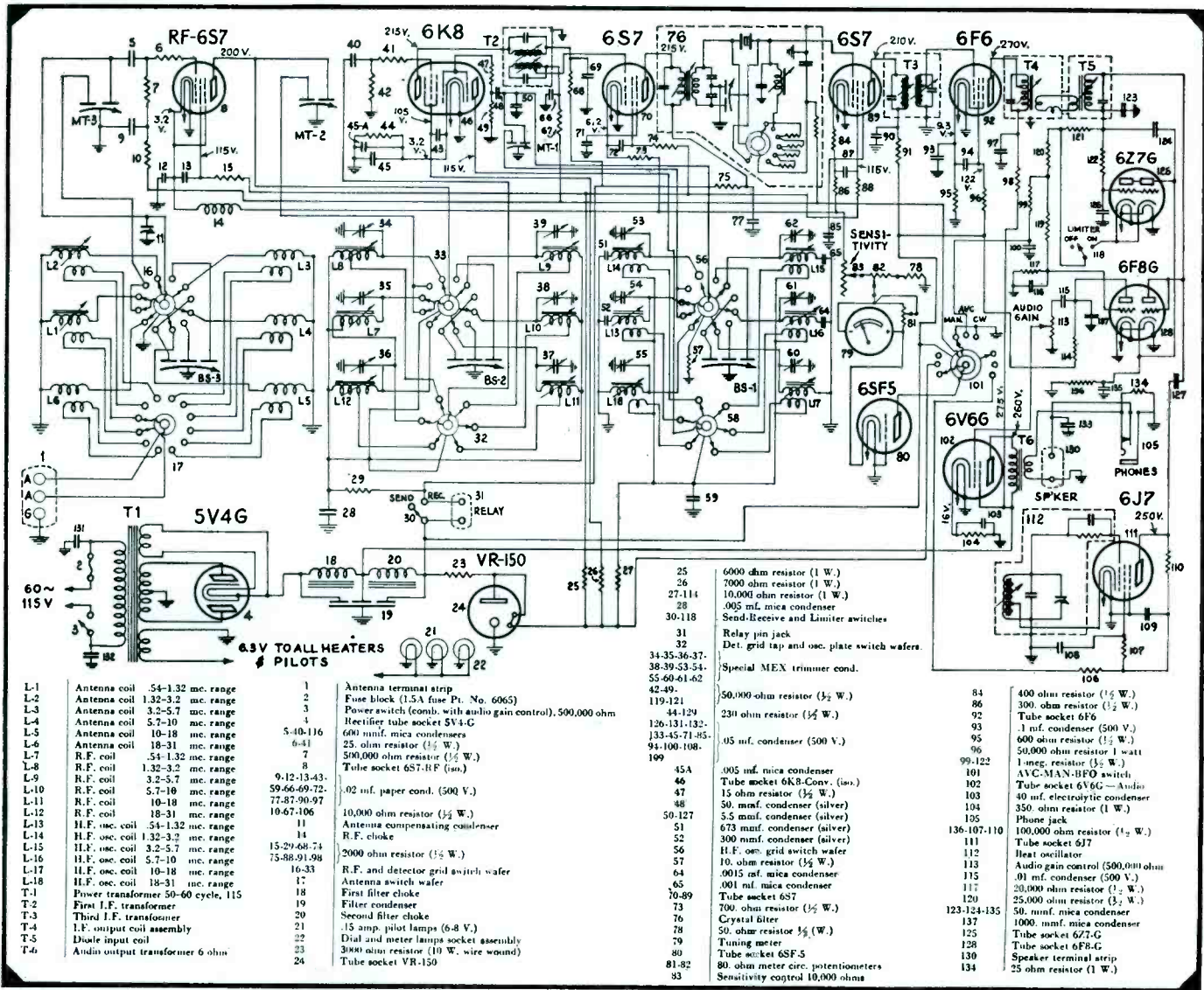
The band-spread tuning condenser has three main units and each of these is

Fig. 2. In addition to the many features of the HQ120X, it employs a type VR150 voltage regulator tube to stabilize the various plate voltages.

divided into three individual sections. This represents 9 individual condensers in the band-spread assembly. This arrangement makes it possible to employ the most suitable capacity for the particular wave range in which the condenser is operated. The main tuning condenser is also of this design and maintains the proper L/C ratio in each band, regardless of the range in which the receiver is operated. For the broadcast band, the condensers are of the usual capacity. These, however, would ordinarily be too large for proper circuit values at the higher frequencies,

Here, too, the condensers are sectionalized with the result that the usual difficulties encountered in a receiver covering both the short-wave and broadcast bands are eliminated.

The rotor plates of the condenser are of heavy brass, cadmium plated and soldered to the rotor shaft. The stators are also of the same material and soldered to the bars which support them on the Isolantite base. The rotor units



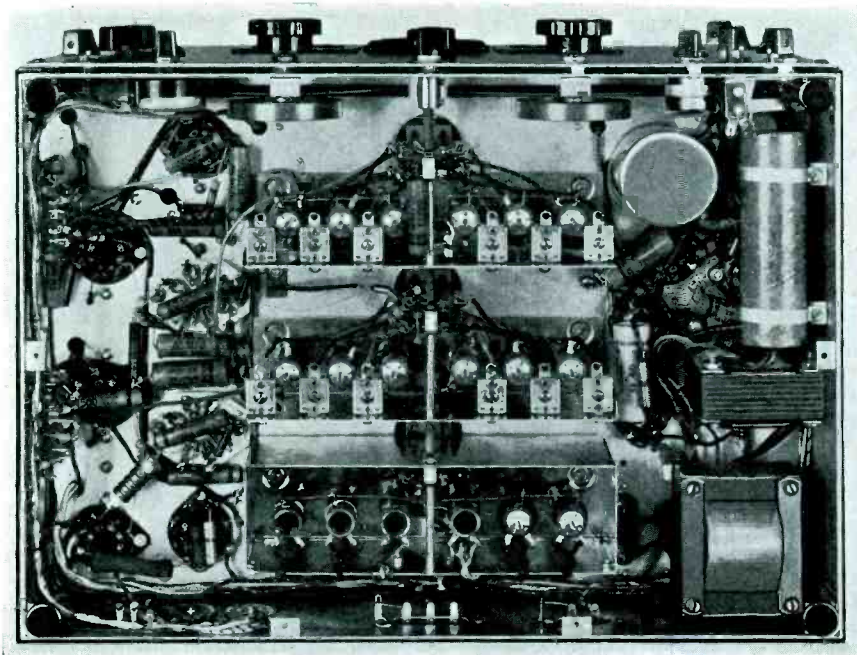


Fig. 3. The precision wound inductance coils are mounted underneath the chassis and employ both capacitive and inductive trimming.

are suspended on two ball bearings, one at the front and one at the rear, thus assuring smooth operation at all times.

There are three sets of dual, solid, in-laid silver-to-silver contacts, making six for each unit. These contacts are distributed along the rotor shaft to maintain symmetry and insure electrical contact without noise.

Dial

The tuning condensers are driven by a dial arrangement having over 310 degrees spread. Tuning is further simplified by a 9 to 1 ratio knob. Behind the panel, on the knob shaft, there is a heavy flywheel. It is only necessary to give the dial a twist in order to make it coast a considerable distance across the scale. The dial mechanism fastens to the shaft of the condenser on the inside of the bearing with a series of gears. These gears are of the split type with take-up springs to eliminate backlash. The dial is operated with a friction drive. Three pilot lights conveniently illuminate the two tuning dials, as well as the S meter.

Due to special tuning condenser and dial construction, the spread of 310 degrees is available for each of the amateur bands from 80 to 10 meters, inclusive. The band-spread dial has five scales, four of which are directly calibrated in each of the above amateur bands. The fifth scale is the arbitrary 0-200 scale for calibration at other frequencies. This band-spread feature, together with the calibrated band-spread dial, is exceptionally valuable in view of the new government regulations regarding monitoring of amateur sta-

tions. The main tuning dial of the receiver also has six bands, and these in turn are calibrated in megacycles.

Other Features

The precision-wound inductance coils for the various bands in this receiver

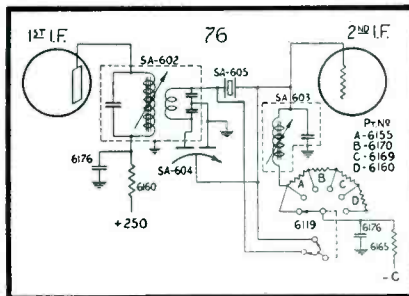
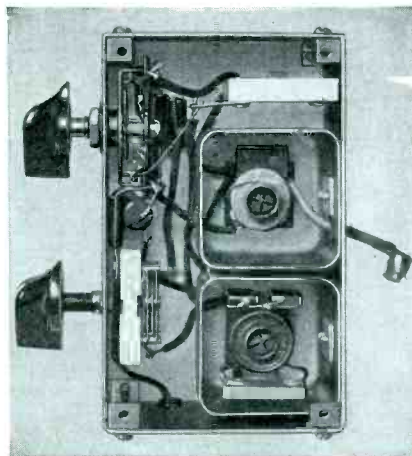


Fig. 1. Five degrees of selectivity are controllable from the front panel.

are mounted underneath the chassis and employ both the inductive as well as capacitive method of trimming in order to insure overall circuit alignment.

Fig. 4. The crystal filter circuit is doubly shielded.



Thorough shielding and proper placement of the various components in the receiver assure stability and guard against interlocking of circuits.

In addition to the features already mentioned, the receiver has variable selectivity, with crystal filter; a noise limiter; a beat oscillator; avc; send-receive switch (which also has relay connections) and headphone jack.

Circuit Arrangement

The preselector stage employs tuned-grid and tuned-plate circuits. An additional feature has been included in this stage in order to compensate for various types of antennas which may be used with the receiver.

The converter stages uses the 6K8 tube, which becomes more efficient as the frequency increases. Circuit adjustment has been made to permit accurate meter readings.

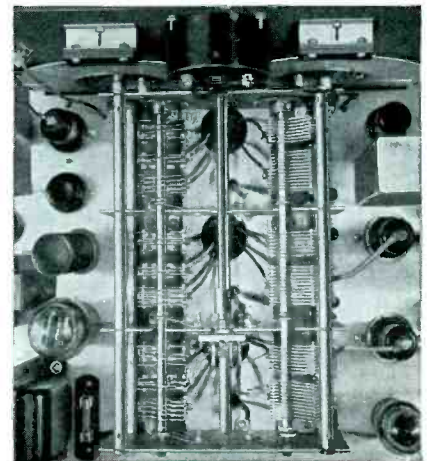
In order to increase stability, the oscillator is operated from a controlled voltage circuit employing the VR150 voltage-regulator tube. The use of the voltage-regulator tube in a very effective circuit assures that the voltage applied to the oscillator portion of the converter remains constant regardless of power line changes. Also, the calibration of the receiver is maintained more accurately.

Crystal Filter

The crystal filter included in the HQ120X has five ranges of selectivity. These five degrees of selectivity are controllable directly from the panel by operation of a rotary switch. These five steps include 1, 2, and 3 for phone reception, varying from broad to fairly sharp in convenient steps. The fourth and fifth are for cw or code reception. Four is moderately selective and five the maximum selectivity of the crystal filter. The crystal can also be cut out for general use, by the sixth contact on

(Continued on page 27)

Fig. 5. The tuning and band spread condensers have nine sections.



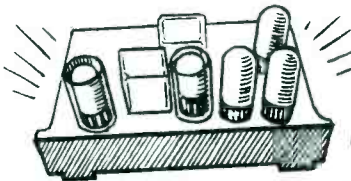
The 6 MOST INTELLIGENT QUESTIONS A RADIO SERVICE DEALER can ask

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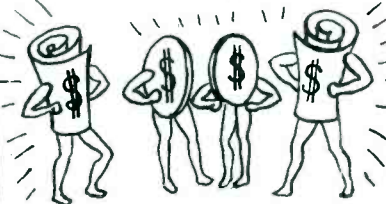
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It is recognized that there will always be a percentage of defects due to human frailties. When this occurs does the manufacturer make good easily and quickly? Just try N.U.

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No dealer likes to be caught with merchandise orphans. In dealing with N.U. you are assured of unquestioned financial stability.

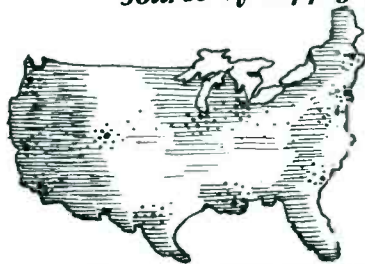


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N.U. specializes in selling the Radio Service Dealer. You can be sure your prices and selling conditions are as good or better than can be found elsewhere.

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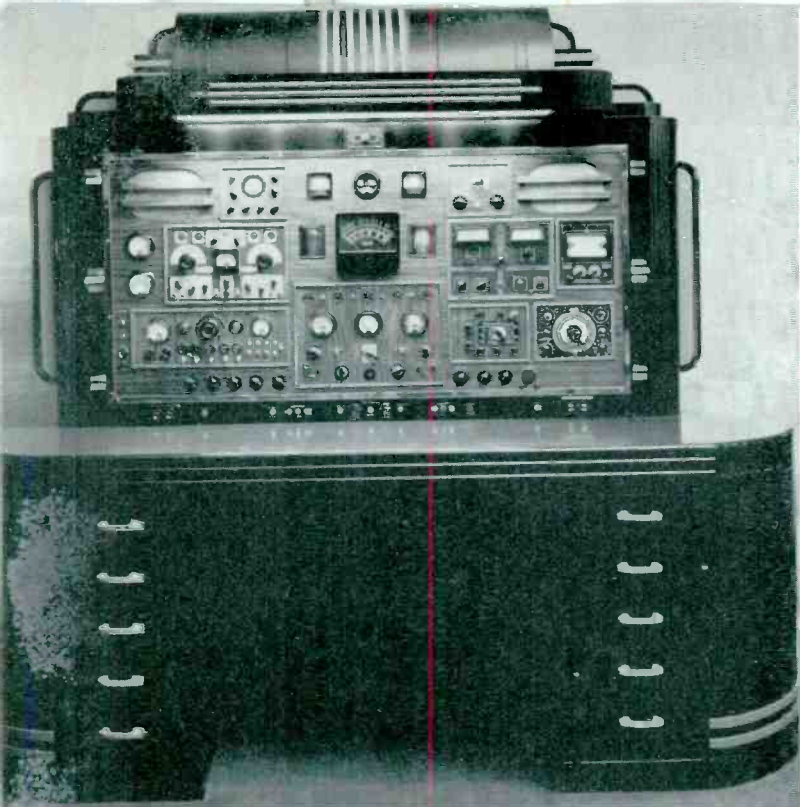


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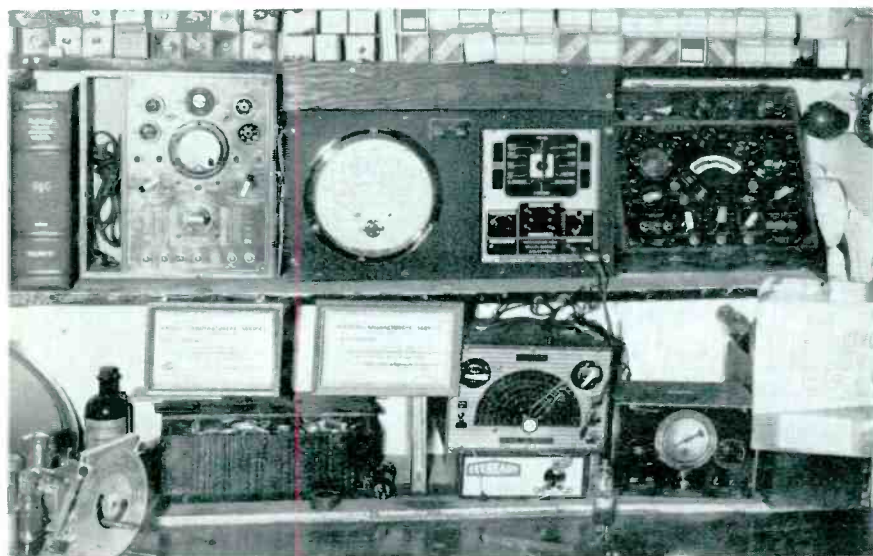
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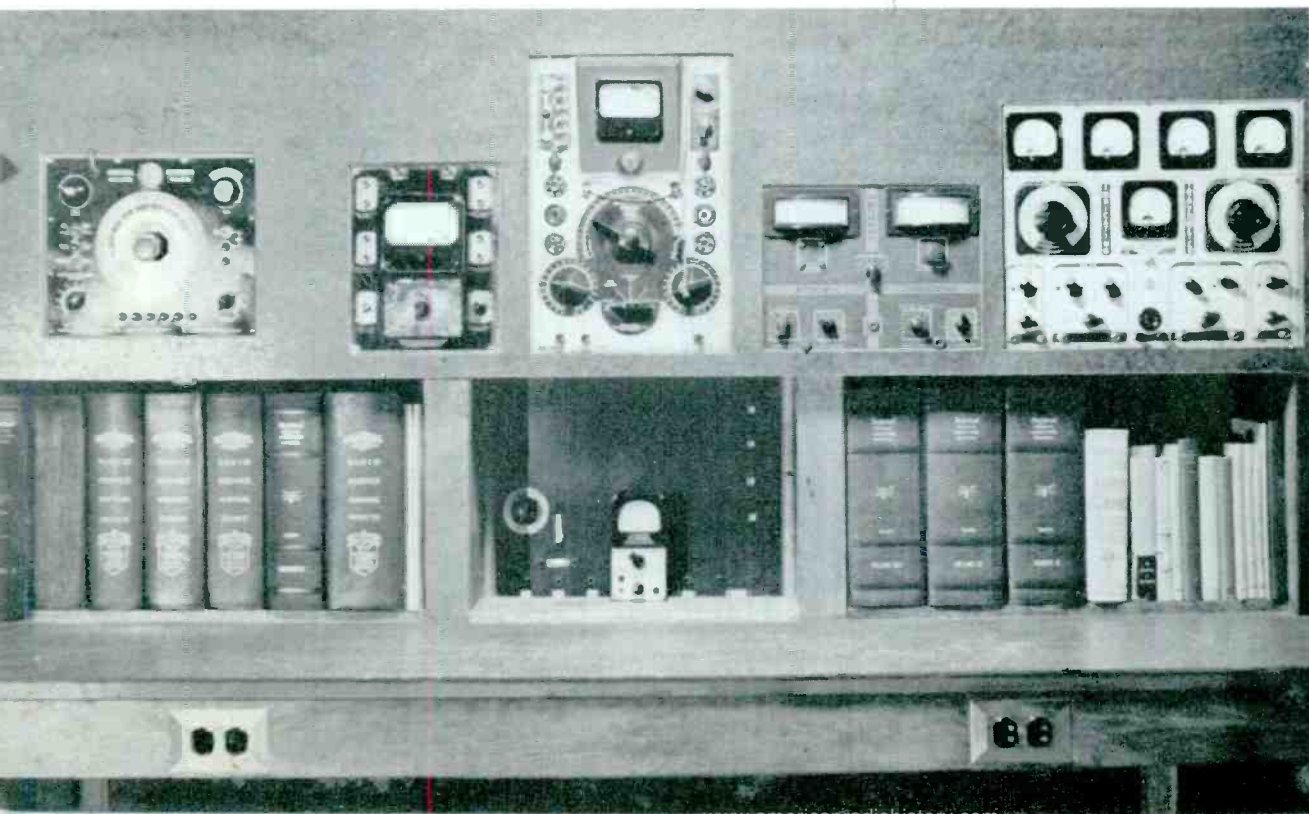
The modernistic bench shown to the left was built in the shop of the Olympic Radio & Television Corporation in Ballard, a business district about six miles from downtown Seattle, Washington. The shop was established about nine years ago by brothers Burnell and Wesley Dickinson. Today Olympic is "Ballard's Largest Radio Service." The Dickinson brothers employ a systematic plan which has proved successful in building their business to its present high level. Adequate test equipment has been a leading factor in Olympic's growth.



D. H. Thompson of Pecatonica, Illinois, believes that it is the function of the Service Man to render prompt, reliable and efficient service to radio receiver owners at a reasonable cost. He attempts to follow this formula by having plenty of reliable test equipment handy on his service bench. (Above)

The accompanying illustrations of service benches have been taken from recent issues of SERVICE. With prospects for more and better business in the immediate offing, it behooves the thoughtful Service Man to sweep out his old corner and modernize his own service bench.

C. T. Kimberly, of Kimberly's Radiō Service in Hawkinsville, Georgia, feels that it is not necessary for a service bench to be replete with gleaming chromium to be efficient. Enough sensible test apparatus to serve the needs of prompt receiver checking has earned Kimberly a reputation for reliability. (Left)



Close inspection is not required to see that George B. Morehouse, Box 161, Howard, Kansas, believes not only in a sensible array of test equipment but also in an imposing collection of service texts. It is needless to say that all this makes his shop one of the most efficient and most successful in his territory.



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Step right up, ladies and gentlemen! It's the one and only chance you'll have this year to see your great and glamorous industry on dress parade. Thrilling! Exciting! . . . The meeting of old friends, making new acquaintances from the north, the east, the south and the west . . . Magnificent displays of the latest developments for the coming season . . . Convention sessions of vital importance . . . Conferences with your suppliers. Something doing every minute . . . never a dull moment . . . Prepare now to attend . . . Don't miss the World's Greatest Radio Parts Trade Show!

Stevens Hotel, Chicago

JOBBER DAYS

start at 2:00 p.m. Tuesday, June 10 and run to 6:00 p.m. Thursday, June 12.

RSA SPECIAL PERIOD

Thursday, June 12, 6:00 p.m. to 10:00 p.m.

OPEN HOUSE

Friday, June 13, 11:00 a.m.-8:00 p.m.

Radio Parts National Trade Show

Sponsored by Radio Manufacturers Association and Sales Managers Club
Executive Office • 53 WEST JACKSON BOULEVARD • CHICAGO

SOUND IDEAS

(Continued from page 11)

mounted outdoors on the various buildings.

Tests were made by the Shell engineers with various types of cone projectors for coverage angles and general sound distribution, until the four loudspeakers were properly placed to cover the entire area.

The installation was surveyed in advance by the Windsor Radio and Sound Service who recommended the Marine speakers and associated equipment. The entire system was sold by Windsor and installed by Shell electricians.

In view of many installations now being made all over the country in this type of location, and in national defense plants, it would seem that the industrial market is just opening for high-powered loudspeaker systems.

Personnel...

• • • • Mr. A. Davis, president and general manager of Allied Radio Corp., Chicago, announces the appointment of Walter F. Marsh to the position of sales manager of the Chicago Metropolitan District.

Mr. Marsh has been identified with the radio industry in a number of capacities for the past 23 years. He will take full charge of the Chicago salesrooms, industrial, sound and dealer sales, the enlarged "Will Call" department, and the customer phone-order department.

• • • • Royal J. Higgins, for the past five years in charge of sales promotion for The Hallcrafters Co., Chicago, has been appointed director of advertising and sales promotion for Hallcrafters.

• • • • Ralph M. Hill, electrical manufacturer's representative, located at 1 N. Crawford Ave., Chicago, announces that Gordon E. Gray has joined his organization to aid in the sale of their electrical industrial lines.

• • • • Backed with a broad trade and technical experience, Harold G. Beebe has joined the staff of the Industrial Division of the International Resistance Co., Philadelphia, Pa. After thoroughly familiarizing himself with the products of the company, he will devote his efforts to the furtherance of IRC service to industrial and government users of resistance devices.

• • • • Major Fred Luther Kline, owner of Kladag Radio Laboratories, radio parts distributor since 1920, located at 105 W. Erie, Kent, Ohio, announces appointment of George Canaan, W8NQL, as technical manager.

• • • • After having been with National Union since its inception, Mr. V. Hamilton, Western sales manager, has resigned to devote himself to his own business, Hamilton Associated Industries, 646 N. Michigan Ave., Chicago.

• • • • Ray Wilson, formerly of Zenith Radio Corp., is now associated with Radex Corp., Chicago, manufacturers of test equipment for the Service Man.

THE BIG NEWS IN PORTABLE RADIO IS THIS LITTLE BATTERY



"Eveready" "Mini-Max" Radio "B" Battery No. 482 outsells all other portable batteries combined. Reason? It fits more than 90% of the 2,000,000 portable sets now in use. It lasts almost twice as long as ordinary batteries of equal size. It costs no more than ordinary portable radio batteries. Ask your distributor about this profit-maker now!

FREE PREMIUM OFFER!
ASK YOUR DISTRIBUTOR ABOUT IT!

Here's the battery for "personal" or "camera-type" radios!



"Personal" or "camera-type" sets were designed around "Eveready" "Mini-Max" Radio "B" Battery No. 467. It packs 67½ volts in a space 3⅝" x 2¼" x 1⅞". Folks in your neighborhood will ask you if you have it. Order now!

"EVEREADY"
"MINI-MAX"
RADIO "B" BATTERIES

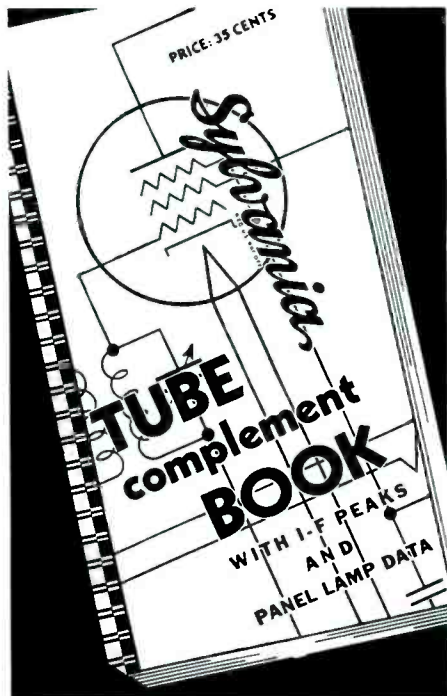
NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation



The words "Eveready" and "Mini-Max" are registered trade-marks of National Carbon Co., Inc.

FREE! Replacement Guide for portable receivers! Tells the proper batteries for portable sets. Accurate! Up to the minute! Write Dept. S, National Carbon Company, Inc., P. O. Box 635, New York, N. Y.



**SERVICEMAN'S
STANDBY
1941 EDITION...
NEW, IMPROVED
ONLY BOOK OF ITS KIND**

272 Pages—16,730 Radio Models shown—including data on '41 receivers. Tube replacement information for 100,380 Tubes or Sockets. 586 Trade Names of receivers. Names and Business Addresses of 190 Receiver Manufacturers. Patented, Hold-Tite, Wire-O Binding.

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Every Radio Serviceman should own one of these Sylvania Tube Complement Books. All the information you'll need—from the oldest set up to and including the latest '41 models — is packed into those 272 pages. And the book is bound by the WIRE-O process. It opens flat and there's no danger of it falling apart or of the pages pulling out.

This valuable compilation, the only book of its kind in the field, is one of the 125 silent salesmen Sylvania has created to help you build a sounder, more profitable business. Write today for Sylvania's Tube Complement Book, enclosing 35c in stamps or coins, and for a full list of the surefire, tested, dealer aids. Some are free and some are available at a very nominal cost—all of them are designed to help you sell more, and *make more!*

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Set-Tested Radio Tubes**

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Fluorescent Lamps and Miralume Fluorescent
Light Fixtures*

A S S O C I A T I O N S

Boston, RSA

On Thursday evening March 13, a very interesting and successful meeting was held at The Eastern Co. in their Memorial Drive building in Cambridge, Mass. Mr. Henry Jappe opened the meeting with a short address on Radio Moving Day. He stressed the opportunities open to the Service Man and the importance of taking immediate advantage of the situation.

Dan Fairbanks of IRC was then introduced by Mr. Jappe. This was Mr. Fairbanks first Boston talk. He remarked that the average Service Man seemed to be ever in search of knowledge and that knowledge was of prime importance to the success of a service business. The value of association and cooperative activity among Service Men was strongly encouraged by Mr. Fairbanks and to further cooperation among Service Men was an important factor in his lecture.

The Boston Radio Serviceman

Boston, RTG

George Feldman, our past secretary, is now giving his services to good old U.S.A. A small gift for our appreciation of his work in the Guild was presented to him. Well, George, maybe you can get us some new members.

Cupid played an important part in the Guild the last few months. He started with Charles Orifice of Waltham. Then Lawrence's RTG President Ronald Bernard got hitched and was tendered a banquet at the night club Capri and presented with a gift from the Lawrence chapter. Good Luck, Best Wishes and Prosperity to you both.

The Guild is receiving a great deal of calls from its advertisement in the New England telephone book.

New York, RSA

Our March meetings have set the pace for a busy year. With speakers like Bob Herzog, editor of SERVICE, Dick Purinton, radio engineer of Raytheon Production

reduction of the noise content in radio tubes.

Our course in frequency modulation got off to a flying start. While we are calling in outside lecturers we want reports from our own members whenever we can find the time.

Max Spitalny

Pittsburgh, RSA

The regular monthly meeting of the Radio Servicemen's Association of Pittsburgh scheduled for Mar. 13 in the Board Room of the Commonwealth Trust Co. had to be transferred to the Roof Garden of the Mayfair Hotel due to the great number attending to hear the address on "Frequency Modulation" by Ed Atkins, Radio Engineer of the Tung-Sol Radio Tube Co.

Emmett Tydings, the popular Parts Distributor, under whose sponsorship the meeting was held, had another "ace up his sleeve" when he introduced a very competent magician who gave the boys a mystifying half hour of entertainment.

There were a dozen door prizes given out and they were won by Service Men from all over Western Pennsylvania. We had members from Connellsville, Latrobe, Grove City and many other communities attending.

Richard G. Devaney

PRMSA

What a crowd, standing room, etc., at our meeting on March 18. Even the ladies were present. The distributors and WFIL certainly did their part. Thanks to all. Those who attended know what benefits they are going to receive.

Radio Electric Service Co., Century Radio Co., Raymond Rosen Co., Philco and Radio Station WFIL had displays.

Gene Rothman of Radio Electric gave a very nice talk on being prepared. Ty Yonker of Raymond Rosen Co. talked on how the Service Man can help himself by advertising. Century Radio tells us about their Radio Log by Sylvania. Bill Caskey of WFIL told us of the 18 different ways broadcasters are going to tell the public



Over a hundred radio sets, no longer of use to their original owners have been reconditioned by the Metropolitan, N. Y., Chapter of the R.S.A. and were sent to Camp Dix, New Jersey. The drive for the sets has been aided by Station WOR.

Photo Horace Guthman, New York R.S.A.

Corp.; Sandy Cowan, of Radio Service Dealer; and our own Jack Stuber, we hardly had time for our regular business meeting.

Bob Herzog gave us some excellent information on how to meet the various technical problems that resulted from the reallocation of station frequencies. Those who were not at the meeting certainly missed a lot.

Dick Purinton spoke of modern development in radio tubes. Such development to a considerable extent has been in the

and who gave out about 10,000 post cards to the Service Men.

Rochester, RTG

George C. Driscoll of Radio Station WHAM gave a very instructive and up-to-the-minute lecture to the Rochester boys recently at the Gas & Electric Building in Rochester, N. Y. A large number of Service Men were in attendance showing their appreciation for Mr. Driscoll's unstinted effort to diffuse knowledge—nowadays of prime national importance.

Catalogs, Bulletins, etc. . .

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

• • • • Allied Radio Corp., 833 W. Jackson Blvd., Chicago, have released their 180-page, illustrated Spring and Summer catalog of general radio items for the Service Man, amateur, and experimenter.

• • • • The American Television & Radio Co., 300 E. Fourth St., St. Paul, Minn., announce the ATR 1941 8-page, illustrated catalog No. 141 covering the ATR line of vibrator operated and rectifier power supplies, including d-c to a-c inverters, A-battery eliminators, battery chargers, etc.

• • • • The Spring 1941 catalog of the Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., contains many new titles of books of importance in technical and scientific fields, and to National Defense. A copy of this catalog will be sent upon receipt of a 3c stamp to cover postage.

• • • • The 300-page Cornell-Dubilier "Capacitor Manual for Radio Servicing" for 1941 presents data pertaining to capacitor replacements in standard receiver models. This new edition covers all models brought out within the last year, including older models on which data was not heretofore available, it is said.

• • • • A descriptive and illustrative folder, No. 1-21, on precision electrical instruments is available from DeJur-Amsco Corp., Shelton, Conn.

• • • • IRC Type FL resistors for d-c operation of fluorescent lamps are described in detail in the IRC Fluorescent Resistor Bulletin No. 13. International Resistance Co., 401 N. Broad St., Philadelphia, Pa.

• • • • National Carbon Co., is offering a handy battery replacement guide to all readers of SERVICE to help them solve the problem of what battery goes in which portable. Over 700 models are included. Dept. RG, National Carbon Co., POB 635, New York City.

• • • • United Radio Supply, 616 Main St., New Britain, Conn., have issued their 265-page 1941 general catalog with information and prices of radio and sound equipment.

• • • • Vertrod Manufacturing Co., 132 Nassau St., New York City, have released their latest catalog which illustrates and describes 5 antennae for broadcast; broadcast and short wave; broadcast, short wave and f-m; for communications receivers and f-m, a-m combinations.

RADIO BLUEPRINT READING

To help solve the training problem of thousands of new workers needed for America's increased production program involving radio and electrical work, Austin Technical Institute, of Newark, N. J., announces a new home study method of radio blueprint reading, called the Shadowgraph system. It is designed for teaching men of average intelligence to read radio blueprints quickly.

NEW IDEAS . . . OLD IDEALS

that's Simpson

THE first testing instrument bearing the name, Simpson, was announced less than five years ago. Today construction is booming on a new building that will double the capacity of the present Simpson facilities. What has brought about a sales growth as remarkable as this?

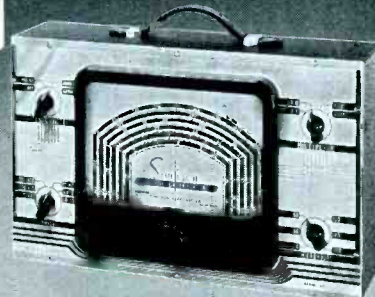
At first thought you would probably say that it was due to the new ideas originated in Simpson Instruments—ideas like "Roto-Ranger"—three-way switching—replaceable units—and the many other new ideas that have blazed the trail for instrument design across those five years.

But if you knew the men behind the Simpson product, you would know that there is a still better reason for this success. You would know that the new ideas have been expressed in old ideals of quality construction that date back to the days when Ray Simpson as president of the Jewell Electric Instrument Co., and a group of associates who are still with him, were building and maintaining the high standard of Jewell Instruments throughout a long, successful career.

That success is being repeated in the Simpson Instruments of today, typified by the instruments illustrated here.

SIMPSON ELECTRIC CO.

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**MODEL 310
SIGNAL GENERATOR**

Your kind of Signal Generator—designed down to the most minute detail for highest accuracy, greatest stability, minimum leakage and good wave form. Smooth vernier control permits close settings and knife edge pointer assures accurate readings. The big 9-inch meter dial makes it easy to read. Dealers net price \$37.50



**MODEL 260 HIGH
SENSITIVITY SET TESTER**

A great value in a fundamental instrument—a high sensitivity tester for television and general servicing. Ranges to 5000 volts—both A. C. and D. C.—at 20,000 ohms per volt D. C. and 1000 ohms per volt A.C. Resistance readings from 10 megohms down to 1/2 ohm and five Decibel ranges from -10 to +52 D.B. Dealers net price.....\$27.50

MODEL 300 TUBE TESTER A TYPICAL SIMPSON ACHIEVEMENT

Tests octals, single ended tubes, bantams, midgets, miniature, ballast tubes, gaseous rectifiers, Christmas bulbs, etc. Filament voltage from .5 to 120 V. Has three-way switching, neon short check, "good" and "bad" scale; percentage scale; tube charts in cover. Dealers net price.....\$26.50



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BECAUSE OF INCOMPLETE SERVICING DATA?

Is your production choked up—are your operating costs per hour too high—do you find yourself late on promised delivery dates? Trouble shooting is a bottleneck in any service shop that tries to "get by" without complete servicing data.

In successful shops, where work flows through smoothly, where hour costs are low and profits are high, you will find Rider Manuals. Speed up your trouble shooting—eliminate bottlenecks in your production—get all twelve Rider Manuals . . . Today!

What You Get in RIDER VOL. XII MANUAL

1648 PAGES *Just Out!* \$10.00

"Clarified Schematics"

Covering sets made since May 1940. Volume XII contains "Clarified Schematics"—breaking down over 200 models whose original schematics are extremely involved. From them you can see which coils, condensers, resistors and switch contacts are used in the r-f, mixer or oscillator sections of the complete circuit.

Vital Facts

More than just "wiring diagrams," Rider Manuals give data on i-f peaks, operating voltages, alignment frequencies, parts values, voltage ratings of condensers, wattage ratings of resistors, coil resistance data, dial cable adjustments, etc., etc. Cash-in-hand information, all in one place.

Complete Index

Covers Volumes XI and XII. Cross-indexed so you quickly locate facts on any set.

"Successful Servicing"

Rider Manual owners receive "Successful Servicing" magazine. Keeps servicemen up-to-date on developments and carries news from the "Successful Servicing" Laboratory. If you do not receive it write and you will be placed on the list.

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Book Reviews . . .

RCA RECEIVING TUBE CHARACTERISTICS CHART AND SOCKET CONNECTIONS, No. 1275B, prepared by Commercial Engineering Section, RCA Manufacturing Co., Inc., Harrison, N. J., 1941, 16 pages, 8½ by 11 in., self covers, free to readers of Service.

This chart, which now covers 309 types of receiving tubes, retains the convenient booklet form of the preceding edition. Included are data on all RCA glass and metal receiving types arranged in numerical-alphabetical order.

The first two pages show a classification of the types according to their cathode voltages and their functions. Types having similar electrical characteristics are grouped in parentheses. This classification will assist the tube user in identifying type numbers and in choosing a tube type for any application. The following nine pages make up the characteristics chart. Complete information is given as to dimensions, socket connections, cathode type and rating, use, plate supply, grid bias, screen supply, screen current, plate current, a-c plate resistance, transconductance, amplification factor, load and power output. On the last two pages are shown bottom views of socket connections for 116 types of tubes, with RMA designations (4AD, 4B, 4C, etc.).

The RCA Receiving Tube Characteristics Chart is an absolute must for the busy Service Man. M.L.

VACUUM TUBE VOLTMETERS, by John F. Rider, published by John F. Rider, Publisher, 404 Fourth Avenue, New York City, 1941, 179 pages, price \$1.50.

Until recently the vacuum-tube voltmeter was an instrument for the engineer and research worker, who used it to measure high-frequency voltages. The vtvm has now become one of the Service Man's most valuable tools and he uses it to measure r-f, a-f, d-c voltages and currents and even resistance.

The book "Vacuum Tube Voltmeters" provides, in the typical John F. Rider manner, a source for practical information on the many types of these measuring devices, such as the diode, triode, slide-back, rectifier-amplifier, tuned, audio-frequency, logarithmic, etc. A general discussion of the subject introduces the reader to the information on specific types. Several chapters have also been devoted to design, construction, calibration and testing of vtvm's as well as notes on their applications. Many new uses will undoubtedly be suggested to the readers of the book.

The vast amount of original research, done in the author's laboratory, is clearly evident in the exhaustive treatment given to the subject.

A bibliography of 145 references, compiled from the world's leading technical publications, and a detailed index complete the book.

It is this reviewer's opinion that no Service Man's bookshelf is complete without a copy of this excellent book. R.G.H.

CORRECTION NOTICE

In the March issue of SERVICE the title to the book "How to Make Good Recordings," published by Audio Devices, Inc., 1600 Broadway, New York City, was incorrectly listed.

The 128 page book presents a practical picture of the fundamentals of sound recording and was recommended as containing "many realistic tips for anyone interested in making recordings." It was also recommended for Service Men to sell to their clients. Price, \$1.25.

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but get more

WHEN YOU BUY RCP TEST EQUIPMENT

Every RCP high-precision test instrument does the work of several ordinary instruments, in some cases as many as 43! That's one reason RCP test equipment is in service in so many shops today. Add this to RCP's higher quality and lower cost, and you'll see how much you can save—in actual dollars and cents—when you use RCP dependable test equipment.



AC-DC
COMBINATION
TUBE AND
SET TESTER
RCP
Model 8C2

Tests all new and old tubes and ballast tubes. Hot interelement short and leakage tests on individual elements. Line voltage regulation 103 to 135 volts, indicated on meter. Meter is fused against burn out. AC and DC voltmeters, each 0/10/50/500/1000. DC milliammeter 0/1/10/100/1000. DC amps 0/10. Also, D.B. and output meter. Where else could you buy these two top-quality instruments individually, at this low price? Complete with tube, battery and test leads. Dealer Net Price. \$27.95

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Provides accurate measurements in ranges never before available in small instruments. Five AC and five DC voltage ranges. 0/10/100/250/1000/5000 volts. Six AC and six DC current ranges to 25 amps. Three ohmmeter ranges to four megohms. DC milliamps 0/10/100. DC microamps 0/200. In hardwood case. Dealer Net Price \$16.25

Send at once for new catalog describing complete RCP money-making line.

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

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NO TONE DISTORTIONS WITH A TURNER

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Serves P.A. Men, Recorders and H a m s t Snuggles in-to the hand, can be hung by the hook or mounted on desk of floor stand. Beautiful satin chrome finish. A mike that stays sold, and sells others for you. Dynamic Han-D, List, \$25.00. Crystal Han-D., List, \$22.50.



U9-S

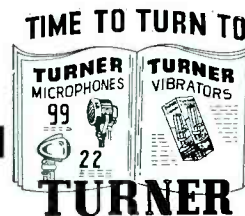
With Switch

Simply flick the switch to change this mike from a 50 ohm model to a 200 ohm mike, or a 500 ohm mike, or a hi-impedance unit!

Whatever your customers want and need in a mike, a twist of the switch fills the requirement. Gray satin finish. List, \$35.00.

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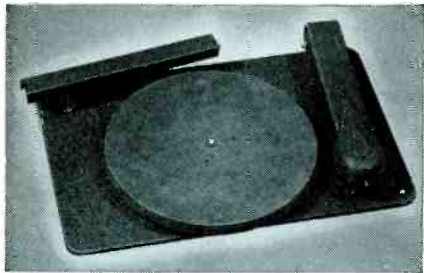
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Outstanding appearance—motor-board and arms in brown crystal finish—panel plates of two-toned etched brass—modern, styled case with bronze fittings—sturdy leather handle—a professionally artistic ensemble!

Complete—ready for use—5-tube built-in amplifier—may be used as Public Address system! Includes crystal microphone—mike and power cord pack into space beneath name-plate. Uses powerful magnetic cutting head and highest grade crystal pickup. Ample record storage space in removable cover.

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MOTOR TURNTABLE UNIT

Complete dual-arm mechanism for any installation; similar to unit used on above Recorder; powerful, constant-speed motor for 110-volt, 60-cycle operation. Heavy steel base; brown crystalline finish.

Low-impedance magnetic cutting head connects to voice-coil secondary of output transformer; high-impedance crystal pickup. Furnished with complete instructions.

No. 9-1039 Turntable Unit, List . \$31.50

Write Today for Free General Catalog

Address Dept. S-4



CIRCUITS

(Continued from page 9)

to appear on all types of universal battery sets, however, regardless of UL approval. There is a trend toward tapping the cord at about 80 ohms from the plug for the purpose of protecting the rectifier cathode and first filter condenser from surges. See Fig. 5.

There is a trend toward parallel filament operation on batteries in all types of portables although the tubes must be run in series on line operation. The advantages are uniform filament voltages and greater stability due to less stray coupling that exists with series filaments. There is a disadvantage, though, in switching from series to parallel filaments and some of the circuits are rather tricky. We heartily recommend consulting Rider or some other source for circuits rather than trying to dope some of them out. We'll have some of these changeover circuits shortly. Most of the present receivers are still series connected and we have two types that are typical.

Air Chief S7397-2

Fig. 6 shows a standard type portable with 5 tubes and rectifier, Stock No. S7397-2 Firestone Air Chief. This is a typical receiver with an r-f stage and untuned first detector. The switch is a 4-pole, 3-position affair, the middle position being off. Section 1 connects the a-c or d-c line. Section 2 is the B-minus chassis connection to either negative battery or the other side of the line. Section 3 is the A-plus switch and section 4 the B-plus switch.

Silvertone 6911, 6951

Silvertone Models 6911 and 6951 are standard 5-tube portables with a 3-pole switch on the volume control for on/off service and a changeover switch operated by plugging the line cord into a receptacle in the rear of the receiver. See Fig. 7.

RCA 15BP Series

The RCA Victor 15BP series standard portables are an example of parallel filaments on battery, series filaments on line. Fig. 8 shows a method of equalizing the load on both sections of the 3Q5GT power tube filament by running a shunting resistance of 820 ohms from the mid-tap to ground. This is necessary, when the filaments are run in series on line operation, because the two ends of the filament are at unequal potentials to the plate; the negative end draws the most plate current. The shunt resistor allows more filament current to pass through the positive sec-

tion, balancing the effect of the uneven plate current.

While the majority of five-tube (active) portables last year featured two i-f stages with some sort of aperiodic coupling circuit between them, this year's five tubers are featuring r-f stages with aperiodic coupling circuits to the converter stage—the same trend taking place in all sorts of receivers. Battery packs are less popular than last year, most models using separate A and B batteries. The B drain continues to be 8 to 11 ma. Short-wave bands are still lagging on portables but we expect to see this addition come along when other features have worn off and a lull in activity appears. Almost forgot—we haven't seen any t-r-fs in the new products this year.

Other Trends

Speaker magnets are going to constitute a real problem as alnico and other magnet alloys contain aluminum, nickel and cobalt which are rapidly becoming scarce to those manufacturers who are not actively engaged in defense production. Maybe some smart Service Man can make a real contribution to solving this situation. Zinc is gradually replacing aluminum for r-f and i-f shield cans. Variable condensers will suffer, too. There is a trend toward steel stators with aluminum rotors. The steel must be rendered rust-proof, of course, which is done by galvanizing or plating with non-peeling cadmium. A number of manufacturers are using continuous permeability tuning in many of their models. There is also a possibility that some manufacturer will take another outlet and return to variometers or other variable inductors without iron cores.

Air Castle is using an adjustable loading coil in series with the loop on the grid side in their a-c, d-c portable Models CP5120 and CP5121. This allows more spread at the high frequency end of the band and, surprising though it may be, no voltage is lost if the loading coil has a high Q. (See Fig. 9.)

We note a number of receivers which have detector by-pass condensers incorporated in the second i-f transformer. The condensers are built in the trimmer base. Note the Zenith portable in Fig. 10. Another Zenith model (5G510 and 5G534) has an insulated variable condenser frame isolating the condenser from the chassis. Watch out for this one! Greater stability is a probable reason.

Magnavox has a portable radio-phonograph combination, Model PBR378. On phono position, the radio end of the set consisting of a 1A7G converter and 1N5G i-f stage is turned off by opening the filament supply, saving both A and B batteries.

COMMUNICATIONS RECEIVER

(Continued from page 16)

the switch. (See Fig. 1.)

There is no interlocking of the controls in this crystal filter. The rejector or phasing control can be set to eliminate a heterodyne of some particular frequency within its range, and will not require readjustment when the selectivity control of the filter is changed. Also, the output, or overall gain, of the receiver is not noticeably affected by changes in selectivity of the filter.

I-F Amplifier

The intermediate frequency amplifier consists of three stages employing iron-core permeability-tuned transformers. The intermediate frequency is 455 kc. The avc arrangement in this amplifier provides smooth operation. There is a switch for cutting out the avc and providing manual control of volume or sensitivity.

Noise Limiter

The automatic noise limiter follows the carrier signal strength. It is intended to eliminate automobile-ignition interference and other similar disturbances. It works with the avc either on or off and is so arranged that its operation does not affect the intelligibility of the received signal by altering the audio form. There is also a switch on the panel for cutting out the noise limiter when it is not required.

S Meter

The S meter is calibrated to read in S units from 1 to 9. S-1 corresponds to approximately 0.39 microvolts input at the antenna terminals. S-9 corresponds to 100 microvolts. The meter is also calibrated up to 40 db above S-9. S-8 equals 50 mv; S-7, 25; S-6, 12.5, etc. Special compensating controls for the meter are provided so that, regardless of particular local conditions, corrections can always be made for irregularities.

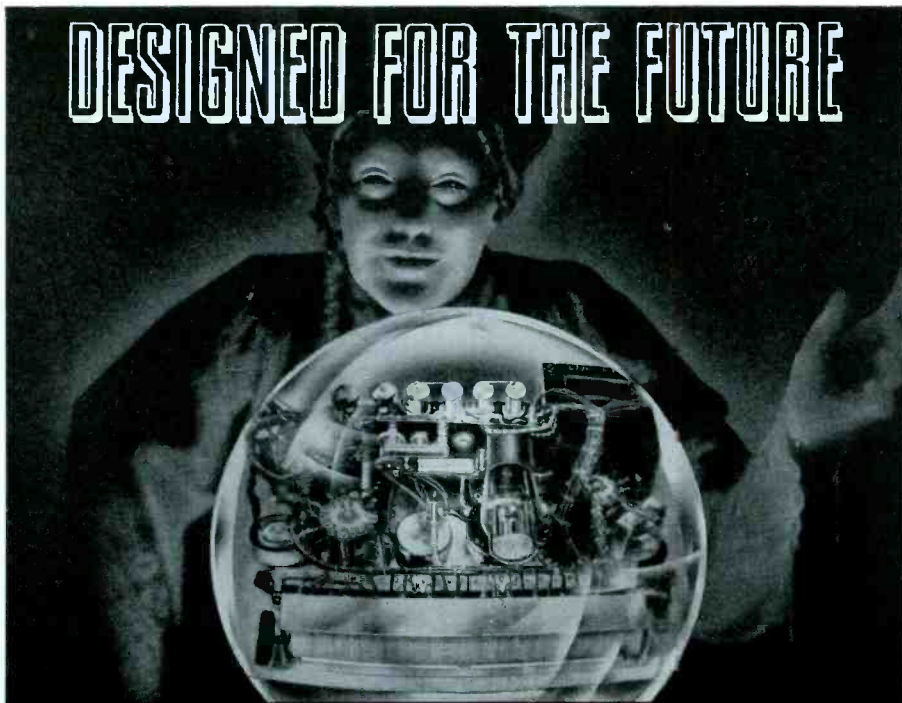
Beat Frequency Oscillator

The beat frequency oscillator circuit is designed to effectively heterodyne signals of varied signal level. This oscillator is so isolated that it has no material effect on the operation of the i-f amplifier. The variable control on the panel provides a wide selection of beat frequencies. A switch is also provided for disconnecting the oscillator.

A-F Amplifier

The a-f amplifier consists of a 6V6 tube with an output of approximately 4 watts. A manual gain control is provided in this stage in order that the operator may choose the proper amount of amplification. The output impedance is 6 ohms, and the output terminals

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connect directly to the voice coil of a permanent-magnet dynamic speaker.

A two-section filter is employed in the power supply circuits with a total inductance of 40 henries, and a total capacity of 40 microfarads.

REFINISHING LEATHER COVERED CABINETS

WHERE the original coloring of leather covered cabinets is not obtained by use of stain or dye, but is the natural color of the particular kind of leather used, the recommended process of restoring the finish for each type of cabinet is

given below:

Raw Hide: First wash the leather covering thoroughly with an alkaline soap and water to remove dirt and grease. Then re-wax the surface with an ordinary paraffine wax to restore the original new appearance. If it is convenient, a more lasting finish may be secured by supplying a thin even coat of clear lacquer instead of wax.

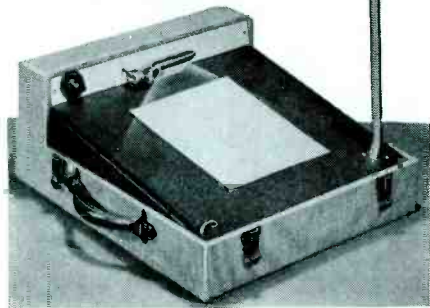
Cow Hide: Work leather covering with saddle soap until discoloration is removed and a uniformly colored finish is obtained.

Buffalo Hide: First remove all dirt and grease by washing with an alkaline soap and water. Then work with saddle soap until desired finish is obtained.

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Single unit P.A. system combined with reading lamp and deck. Wide virgin field and high dollar value. Simply plug in and operate.

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Complete low priced P.A. system of unusual performance and adaptability.

Excellent amplification for assemblies of several hundred. 5-tube amplifier, Crystal microphone, 10" P.M. speaker. Carrying case functions as baffle of sufficient area to assure full tone range. Reproduces the "highs" so necessary in good speech reproduction. Provision for additional speaker. Tone control for various acoustic conditions. Volume controls for microphone and phono inputs. Case 11" x 12½" x 13½".

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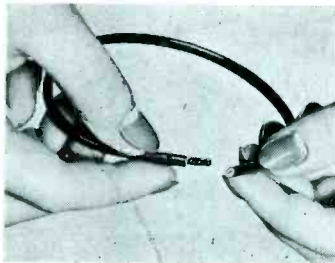


Parts, etc. . .

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

DIAL BELT

Walter L. Schott Co., 5266 W. Pico Blvd., Los Angeles, Cal., makers of Walsco products, announce an adjustable dial belt called the Walsco Unibelt. It is



claimed this belt speeds up dial repairs. It is adjustable to fit any dial and comes open, which means that the belt can be put on without taking the dial mechanism apart. A patented zipper-like fastening is employed.

FLOCK FINISH KIT

A flock-finish kit for finishing phonoturntables, cabinets, testers, tool chests, compartments, displays, etc., that gives a soft felt finish, is available from General



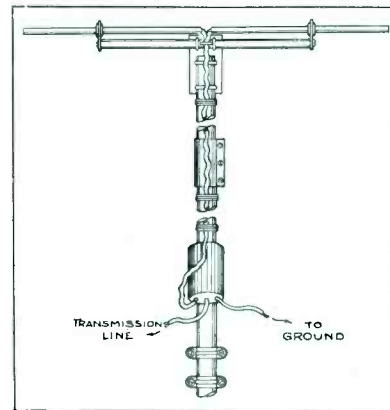
Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill. The kit consists of "Felt-Koat" flock, "Felt-Koat" undercoat, "Felt-Koat" undercoat thinner, brush, and a sifter-top can for sifting flock over the undercoat. Kits are available in popular colors of brown, taupe, and blue.

CONTEST FOR DISTRIBUTORS

National Union Radio Corp. has inaugurated a contest among their distributors, distributors' salesmen, countermen and other employees offering two free trips to the Chicago Radio Show as prizes. One will be given the winner from the East and another for the winner from the West. The contest calls for a brief statement showing how parts distributors can best develop a profitable over-the-counter business. The necessary entry blanks and detailed information can be obtained from J. H. Robinson at the factory, 57 State St., Newark, N. J.

COMBINATION ANTENNA

The Taco combination antenna system, introduced by Technical Appliance Corp., 17 E. 16 St., New York City, starts with



a dipole comprising two metal rods held by a center bracket mounted on the mast, whose transformer in turn feeds into the transmission line. Variations are available to suit practically any installation problem. The Taco antenna system is really a choice of antenna kits, accessories, transmission lines, and antenna and set transformers, with which the Service Man can make up the installation best suited to the case, it is said.

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fit your pocket**

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RANGER**

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739**

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VOLT-OHM-MILLIAMMETER**

Pocket Volt - Ohm - Milliammeter with Selector Switch. Molded Case. . . . Precision 3-Inch Meter with 2 Genuine Sapphire Jewel Bearings. AC and DC Volts 0-15-150-750-1500; DC MA. 0-1-15-150; High and Low Ohm Scales. . . . Dealer Net Price, including all accessories, \$9.90
 MODEL 738 . . . DC Pocket Volt-Ohm-Milliammeter. Dealer Net Price \$7.50

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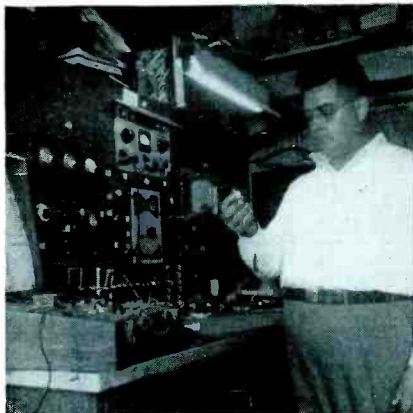
SECTION 417 COLLEGE DRIVE

READRITE METER WORKS, Bluffton, Ohio

PLAN CAREFULLY

By MARTIN FRANCIS

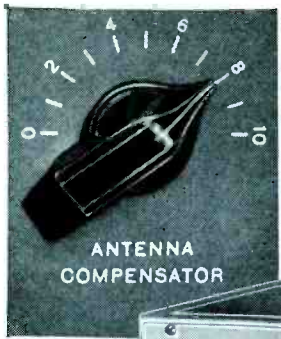
DIRECT mail, used three times a year to city and country customers and prospects brings good results for Cecil L. Alderman's Radio and Sound Service, Prairie du Chien, Wisconsin. Mr. Alderman uses about 500 post cards in his mailing and thus reaches



It is attention to the little things, both in attempting to attract business and in turning it out promptly, that has made Cecil L. Alderman's Radio and Sound Service, in Prairie du Chien, Wisconsin, a truly profitable business the year around. He keeps his shop, equipment and bench up to date and does not hesitate to make his customers aware of this fact. It is this, too, which makes for greater efficiency.

many prospects and customers. His cards are made up in fine form, urging set owners to have their sets checked periodically. A card used in a recent mail campaign is shown in the accompanying illustration.

Mr. Alderman has made contacts with several dealers in his trading area, dealers who have no service shops; regularly customers in those sections are advised of the exact day Alderman will be in their territory to give service. This service is especially appreciated by radio set owners who live some distance from



ANTENNA COMPENSATOR

You're always "IN TUNE"
with an
HQ-120-X



9.7-555 METERS

There's a good reason for the high signal-to-noise ratio in the "HQ-120-X." The first tuned circuit of any receiver controls the signal-to-noise ratio. When an antenna is coupled to this very important circuit, there is usually a detuning effect. This detuning effect lowers the signal-to-noise ratio. The antenna compensator on the "HQ-120-X" provides a control for restoring resonance, regardless of the effects of the antenna system. In high gain, highly selective circuits, this control becomes

a necessity if peak performance is to be had. Try an "HQ-120-X" and note its superior signal-to-noise ratio.

An improved highly efficient noise limiter; accurately calibrated main dial; band spread dial calibrated for 80, 40, and 20 meter amateur bands sensitive "S-Meter" and variable selectivity crystal filter are a few of the other features which have made the "HQ-120-X" one of amateur radio's most popular receivers.

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with the times," says Alderman. For example, modern receivers are small and compact and have no wires protruding. To facilitate testing, Alderman has a couple of long cords arranged so that they can be pulled out and attached to the set to test the B batteries or other voltages. This speeds up service work.

Every test instrument on the service board is lettered neatly, so that a minute's glance will tell anyone who might want to know just where things are. Customers who come back into the shop to see Alderman work on their sets like to read the labels and this promotes their interest.

Just a simple post card, but it sure does spell profits for Alderman's Radio and Sound Service. When Alderman leaves his shop to make repairs he has a well planned route. No time is wasted in travelling back and forth. These cards mailed shortly before each trip to prospects in one vicinity only, make planning easier.

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RADIO SERVICE

The best of radios sometime need attention. Tubes, parts, circuit alignment need periodical check-up to assure the best in radio performance.

Our expert service department is moderately equipped to give factory precision results. We have a complete stock of tubes and parts.

Any job, from replacement of tubes to complete overhaul, will be done to your complete satisfaction at reasonable prices.

We will be in your vicinity _____

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2 GREAT MIKES!



AMPERITE VELOCITY
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Actually a combination Velocity-Dynamic, having best features of both types.

Model RBHk, hi-imp: (RBMk, 200 ohms); LIST \$42.00

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ELIPSOID PICKUP PATTERN

Features new superior **UNI-DIRECTIONAL** elipsoid pickup pattern.

ELIMINATES FEEDBACK TROUBLE. HAS FLAT RESPONSE.



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New Test Equipment...

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

STATION LOCATOR

Allied Radio Corp., 833 W. Jackson Blvd., Chicago, have introduced the Knight station locator, No. B10060, which generates either a modulated or unmodulated



signal. A simply calibrated dial identifies stations and covers the broadcast band. The unit may also be operated from self-contained standard batteries. It measures 3 x 4 x 5 inches and is housed in a portable black crackle-finished case.

BC SIGNAL GENERATOR

The Radex broadcast signal generator and station finder was designed as a portable signal source covering the broadcast band for all around usage. It is 6½ x 4½ x 4½ and weighs 4½ lbs, with batteries. Current drain is 50 ma for the A battery and 1 ma for the B battery. Provision is made so that the Service Man can draw his own calibration curve by zero beating against broadcast stations.

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- ★ AC series, with slotted shaft enclosed in sleeve easily cut and holding center milled shaft in shape; FAC series, with slotted shaft inside bushing; MA series, with sufficiently long shaft milled on both sides, with sleeve. All controls are available with "slip drive," Code SD after series number.
- ★ Ask your jobber for these Clarostat Auto-Radio Controls. Ask for latest Clarostat Service Manual. Or write direct to Clarostat Mfg. Co., Inc., Dept. S-2, 285-7 N. 6th St., Brooklyn, N. Y.



Sound News...

TRI-ANGLE CABINET

A new line of Tri-Angle acoustic enclosures for corner mounting, side-wall hanging, and cluster arrangement in groups of two, three, and four has been



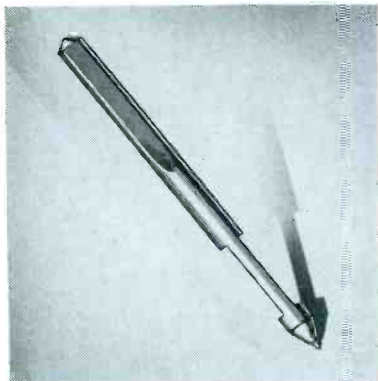
announced by the Atlas Sound Corp., 1443 Thirty-ninth St., Brooklyn, N. Y. Finish is in natural grain walnut with musical motif and Acousti-cloth grille. Infinite baffle with bass reflex design permits high quality music reproduction, it is said. Model TR-12 for 12" cones has overall height of 22 in, width 19 in, depth 10 in.

MOBILE AMPLIFIER

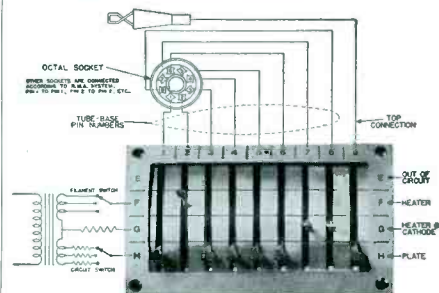
Thordarson Model T30W12 12-watt mobile amplifier operates from a 6-volt storage battery, weighs 20 lbs and measures only 13½ x 7½ inches. Several output impedances are available by means of a rotary switch selector. A standby switch is provided which allows operation when the switch is turned on without waiting for the tubes to heat up. The unit may be used with either a 6-volt or spring-wound phono motor and turntable for record reproduction. Thordarson Electric Mfg. Co., 500 W. Huron St., Chicago.

SAPPHIRE NEEDLE

Electrovox Co., 424 Madison Ave., New York City, announce the WN55 Kalco sapphire needle for low-pressure pickups. The specifications of this needle include a



genuine sapphire point mounted in a straight duraluminum shank. The shank has two parallel in-cut flats, ground near the tip to provide a lateral flexibility, which are said to eliminate needle talk and minimize surface noise. The shank also has flat on its upper extremity for set screw.



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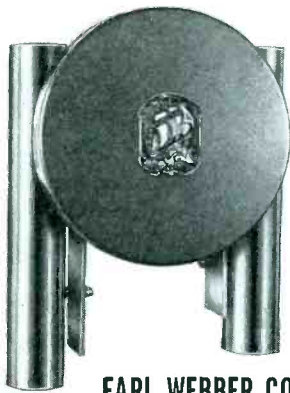
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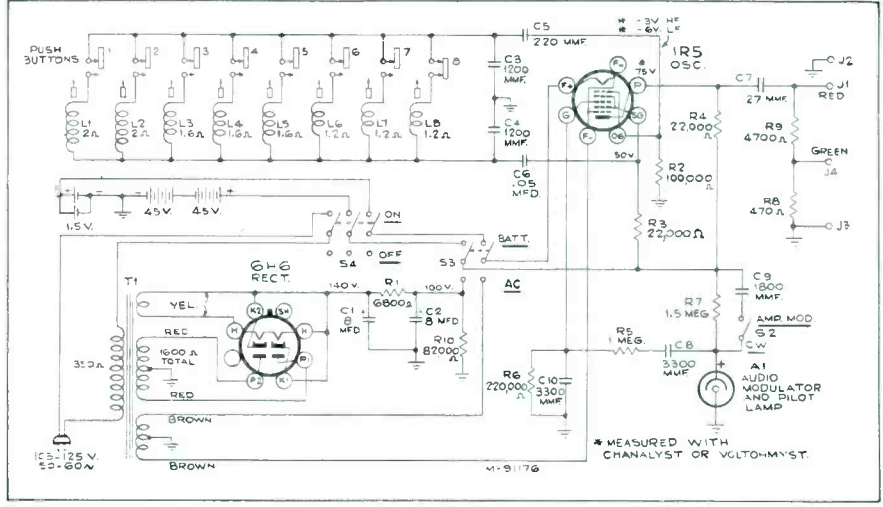
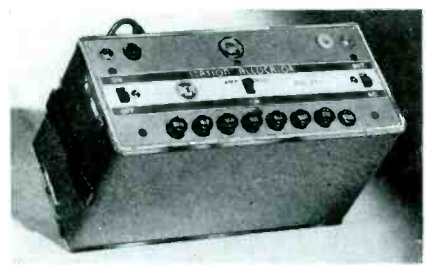
By buying the Webber Imperial Signal Tracer Model 230, featured in our other advertisement on page 34 of this issue, you get the Model DiB double tone, double purpose Westminster Electric Door Chimes F.R.E.L. Take advantage of this offer now and start making extra profits. You'll agree it's a natural.

WESTMINSTER GUILD DIVISION
4358 ROOSEVELT RD. CHICAGO, ILL.

RCA 171 STATION ALLOCATOR

THE RCA station allocator affords push-button selection of eight adjustable frequencies in the range from 405 to 1,700 kc. Tuning is accomplished with adjustable core inductors wound on polystyrene forms and fixed condensers using polystyrene dielectric. Screws are concealed under the name plate.

Push-buttons No. 1 and 2 may be set at the i-f peaks while the others may be set at test frequencies throughout the broadcast band, thus providing flexibility for push-button setting and align-



The RCA 171 station allocator provides push-button controlled signals, c-w or modulated, in the i-f and broadcast bands.

and on the service bench and is of great advantage when working on automobile receivers.

ment work. The unit operates from the 60-cycle power lines or from self-contained batteries. This can save time in the home

Operation may be obtained either with or without 400-cycle modulation and both high and low outputs are available on separate pin jacks. Convenient

L-C CHECKER



for resetting those

PUSH-BUTTON TUNERS

- You can certainly speed up and simplify that job of re-calibrating the dials and push-button tuners due to the new broadcast frequency allocations, if you use the L-C Checker.

This remarkable aid—often called “The Miracle Instrument”—will help you check the alignment of r.f. circuits, tracking of oscillators, alignment of i.f. circuits, and the checking of the frequency ranges. It will aid in retuning oscillator and i.f. stages to eliminate heterodyne whistles that will develop in certain localities with the new frequency allocations.

Meanwhile, of course, the L-C Checker can be used for many other well-known functions, such as checking effective capacity of condensers; checking for opens, shorts, intermittents, while condenser is still in circuit; measurement of resonant circuits; determining location and frequency of absorption loops in r.f. equipment; resonant frequencies of r.f. chokes; measuring antennae and transmission lines; tuning wave traps, etc., etc.

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ground jacks are provided for using a shielded coupling connection if desired. A neon oscillator gives the 400-cycle modulation and also functions as a pilot lamp.

Specifications

Range:
Button No. 1, 2: 405 to 825 kc.
Button No. 3, 4, 5: 600 to 1,185 kc.
Button No. 6, 7, 8: 820 to 1,700 kc.
Frequency stability: 0.05%.
A-c operation: 105-125 volts; 50-60 cycles; 5 watts.
Output: High: 2.0 volts approx.; low: 0.2 volts approx.
Batteries: A: Two 1½-volt cells; B: Two 45-volt.
Battery drain: A: 50 ma; B: 2.6 ma.
Tube complement:
Rectifier, 6H6.
Oscillator and electron coupler: 1R5.
Relaxation oscillator: Neon lamp (¼-watt).
Dimensions: 5 by 8½ by 3¾ inches.
Net weight: 5½ pounds.
Finish: Blue-grey crinkle, oven baked.

Factory Expansion . . .

• • • • • Cornell-Dubilier Electric Corp., S. Plainfield, N. J., manufacturers of electrical capacitors, announces through its president Octave Blake, Jr., the purchase of the million-dollar plant of the Kendall Co., at New Bedford, Mass. This new plant will add over a quarter-million square feet of manufacturing floor space to C-D facilities now existing at S. Plainfield, N. J. The S. Plainfield plant will continue its operation.

Production at the new C-D plant was begun Thursday, March 14, 1941 and deliveries have already started.

• • • • • The General Electric Co. has established a new Metropolitan distributing branch, with headquarters in the General Electric Building, 570 Lexington Ave., New York City. As announced by H. L. Andrews, vice president, the new branch will distribute, at wholesale, G-E products of the Radio and Television and of the Appliance and Merchandise Departments, of Bridgeport, Conn.

Earle Poorman, who has been district manager of appliance sales for General Electric in New York since 1931, has been appointed manager of the Metropolitan distributing branch. He will continue as district appliance sales manager, in addition to his new responsibilities.

• • • • • Although the Simpson Electric Co., Chicago, is only five years old, operations have outgrown the original factory and a new building is under construction which will ultimately double the capacity of the Simpson plant.

• • • • • Several years ago, Sprague Specialties Co., and Sprague Products Co., acquired a big second factory on Brown St., North Adams, Mass., just about a mile from their original plant. With defense orders piling in, this Brown St., plant has been devoted almost exclusively to them. Meanwhile, the original Sprague factory in North Adams is turning out more of its regular products for the radio trade than ever before and Sales Manager Harry Kalker is assuring jobbers and Service Men of prompt deliveries.

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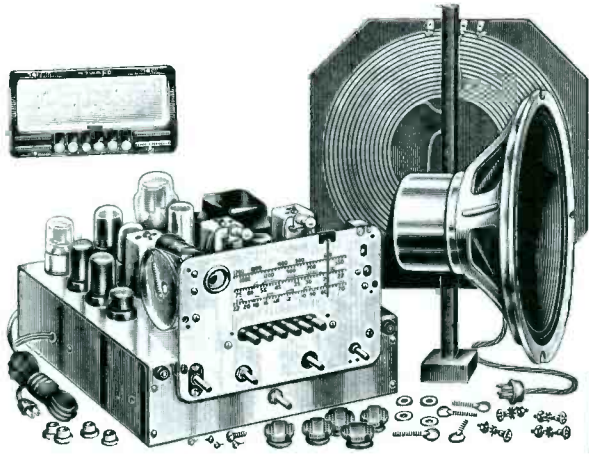
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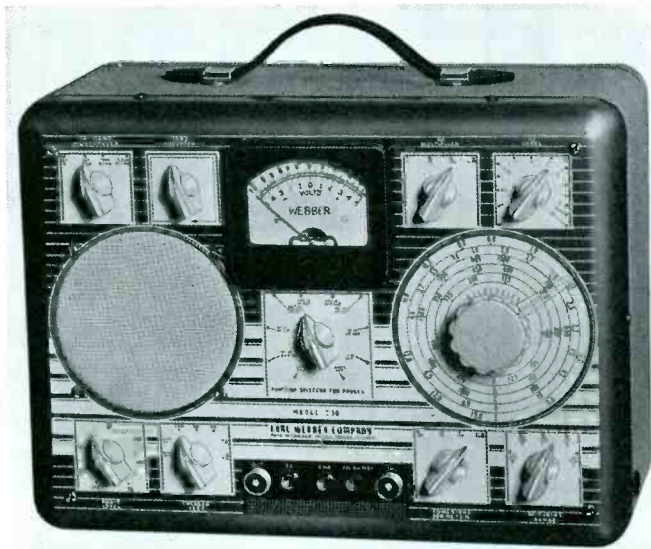
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Its many features include tracing signal through all stages of set under test showing where signal exists and loss or gain through different stages. Also affords means for "listening-in" on all stages for audible checking, for distortion, noise or hum. Get the full facts on the Model 230 Imperial and take advantage of the offer below.



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MANUFACTURERS reserve your advertising space NOW for the important June Convention Issue of **SERVICE**

PREFERRED POSITIONS ARE GOING FAST.

BATTERIES FOR PORTABLES

(Continued from page 13)

pending upon the period of operation and recuperation. (See Fig. 2.) Most of the plastic models use two D-size cells providing 10 to 15 hours of operation. A few manufacturers, including Fada, are using three cells, allowing 22 to 30 hours of service. The Motorola three-power Model 3A5 uses 5 cells with a corresponding increase in life. This model uses series filaments on

SPECIAL BATTERIES

Voltage	Burgess	General	Eveready	Rayovac
22½	—	—	425	—
30	W20PI	V20AAAG	—	—
45	XX30	—	455	—
51	W34	V34AAAG	—	—
60	W40	—	—	—
67½†	XX45	W45A	467	—
88½	Z59	—	—	—
90	A60	—	—	BB60P
90	—	—	—	7S60P

† For personal receivers.

both line and battery operation.

The flashlight cells, while seemingly adequate for the A battery job, are not being used under optimum conditions in most cases. Because of this, new type A cells are being designed specifically for a 125-milliampere load, figuring on two cells in parallel for the 250-milliampere filament drain of the typical personal receiver.

The phenomenal growth of the battery portable should bid fair to bring back recollections of the early days of

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National defense needs come first!

Sprague is putting them first — fully and wholeheartedly. One of our two big factories in North Adams, Mass., is now devoted almost solely to defense work. Meanwhile, our other factory is turning out more Sprague Condensers, Koolohm Resistors and Test Equipment for the Radio trade than ever before. Deliveries are prompt. Full Sprague quality is being rigidly maintained. Development work continues as in the past.

Thus, thanks to Sprague's size and unique facilities, we are able to put defense first—and still not neglect our long-time-friends of the Radio profession.

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North Adams, Massachusetts

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radio when the battery manufacturers were hard put to meet the demands of the public for replacements. Once again these same manufacturers are pressing every available facility toward improving units for use in radio receivers. We can look forward to better batteries that are smaller, lighter and that stand

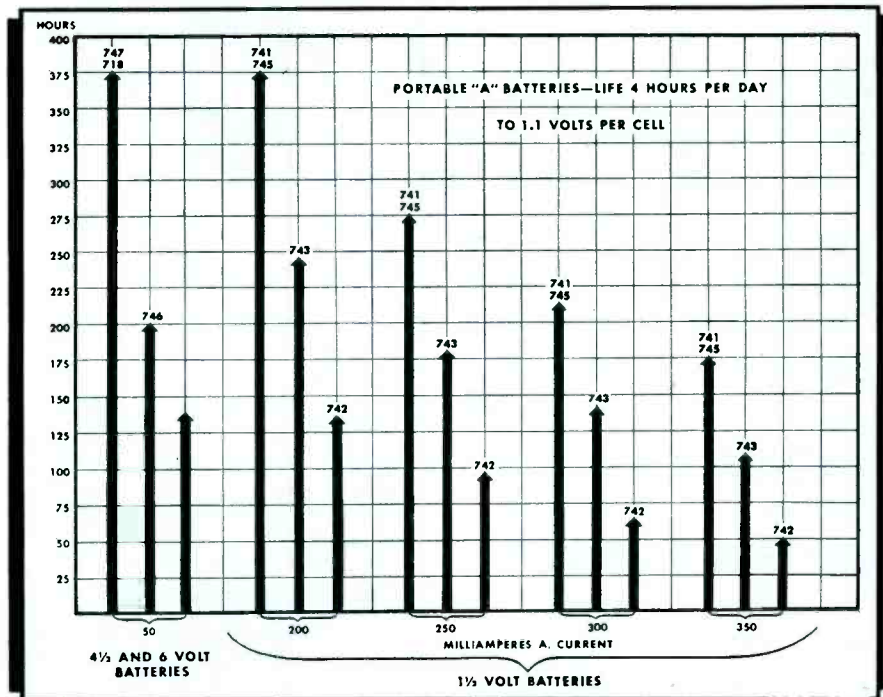
up better under adverse conditions.

The comparative charts shown on the accompanying pages attempt to list the numerous batteries of the various manufacturers that are supposedly interchangeable. In general, no difficulty will be experienced in attempting to substitute one type for another. It should be remembered, however, that there is little agreement between the same types as made by different manufacturers in so far as its dimensions are concerned. In the case of the A and B batteries listed, there is often as much as ¼-inch difference in any one dimension between supposedly interchangeable types. In the case of packs there is as much as ½-inch difference between types listed as interchangeable.

If a particular battery (let us say Type M) is smaller than a similar unit (say Type N) of another manufacturer, the maker of Type M will list his as interchangeable with Type N, because it can readily fit in the space allowed for N. This is the procedure followed by all the manufacturers in making their listings, irrespective of the fact that in many instances Type N could not be substituted for Type M. It is for this reason that interchangeable charts published by individual manufacturers are good only in so far as batteries of that particular manufacturer are concerned.

Fig. 3. The service life for various A batteries is indicated for one continuous four hour discharge per day.

Illustration from National Carbon Co.





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



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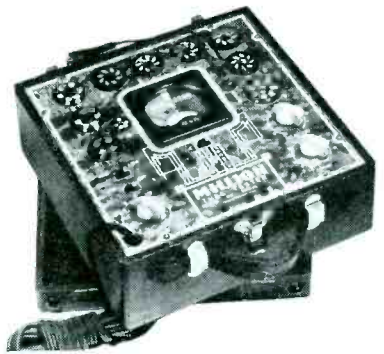
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New, with wider application range. Tests emission of all tubes. Ten sockets cover all types from "hearing aid" peanut tubes to the new 10ktals and S series. Filament switch covers 1.4 to 110 volts with spare positions for the future. Gives instant "good-bad" readings on oversize D'Arsonval meter. Makes neon short or leak test with tube hot. Tests by-pass condensers, etc. Literature on request.

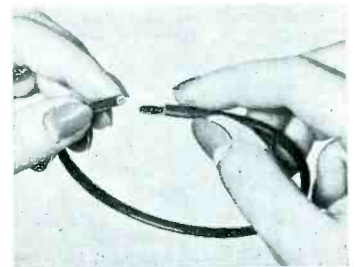
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With this new belt you will always have the right size and can do a replacement job in two minutes which used to take an hour or more. Patented zipper-like fastener gives instant connection. This belt cannot slip or stretch.

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Inexpensive outfits (starting from 99¢ net) to patch most cabinet damages without any experience in refinishing.
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41-S

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NEW

SOLAR

"SEALDTITE" TUBULAR PAPER CAPACITORS

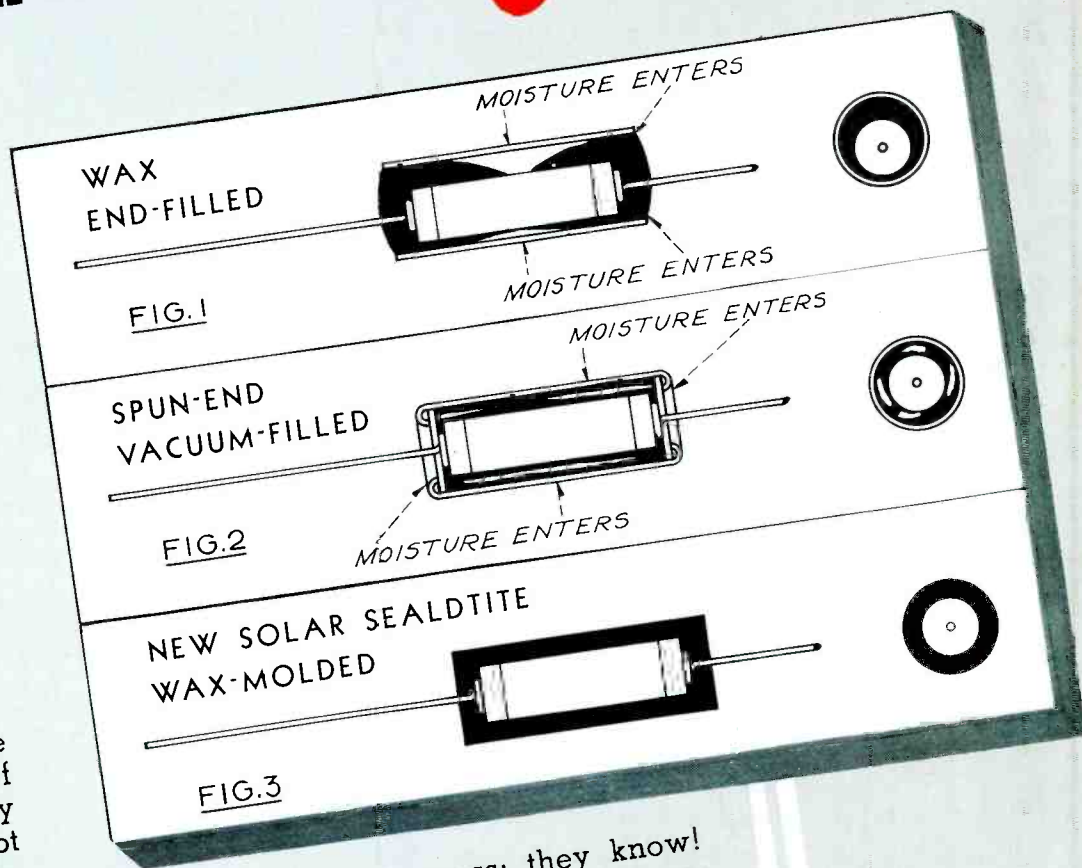
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**the only major advance
in the last decade**

**2 to 5 times
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Now has an engineer's dream come true! Here is a new paper tubular of standard size and price, but totally sealed so that immersion does not harm it. It speaks for itself in any laboratory, any climate.

The new Sealdtite has a standardized non-inductive winding with full-diameter hot-soldered leads. But this assembly is not stuck into a tube with the doubtful results shown in figures 1 and 2. It is held mechanically centered in molds; an exclusive newly developed Sealdtite wax compound is molded around it. The even walls totally exclude moisture. Hard; will not soften at any ordinary operating temperatures. For convenience, enclosed in a labeling tube.



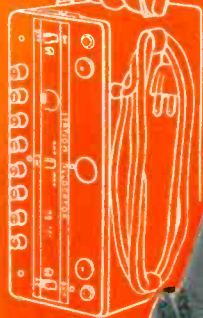
Engineers do not guess; they know!
You too will be astounded at test results, for the new Sealdtite is a major advance in the capacitor art. Sealdtites for Safety!

Your jobber can supply this most modern Tubular in factory-sealed cartons or in bulk.

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Bayonne, New Jersey**

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RCA Station Allocator

Covers all push-button setting and alignment work. **\$17.50**
Operates from either self-contained batteries or a-c.
Stock No. 171—Price

The RCA Station Allocator is an indispensable instrument for the service dealer who really plans to "cash in" on his greatest business-building opportunity in years. With it, you can handle more push button receiver re-tuning jobs in less time, with less effort and at greater profits. Moreover, it will serve as a useful shop instrument long after the present re-allocation is forgotten.

The Allocator is speedy, accurate, portable. Eight push buttons can quickly be set up to desired frequencies. Operation is with or without modulation. It then serves as an oscillator for rapid identification of desired stations during the re-tuning of receivers. Two buttons can be tuned to i-f frequencies if desired, thus providing remarkable flexibility for all alignment as well as push-button setting work. The Allocator operates from either a-c or self-contained batteries.

Only one adjustment is required for each frequency. What's more, thanks to the Allocator's magnetite core inductances and polystyrene condensers, these adjustments *stay put*. Weight is only 5½ lbs. with batteries. Size is 5" high, 8⅞" long and 3⅝" deep.

See the Allocator at your RCA Test Equipment Distributor's today. Prepare now for faster work and bigger profits!

SPECIFICATIONS

PUSH-BUTTON RANGES:

Buttons 1 and 2	(approximately) 405-825 kc.
Buttons 3, 4, and 5	600-1185 kc.
Buttons 6, 7, and 8	820-1700 kc.

TUBE COMPLEMENT:

1 RCA-1R5 as r-f oscillator, 1 RCA-6H6 for a-c rectification, 1 neon tube for a-f oscillator and pilot lamp.

Another RCA Time-Saving Money-Maker

RCA Junior VOLT OHMYST

Costing only a little more than an ordinary volt-ohmmeter, the RCA Junior VoltOhmyst gives you electronic push-pull operation with all the time and money-saving features of the famous Rider VoltOhmyst circuits plus

the addition of an isolated rectifier-type a-c voltmeter! Special protective features guard against meter burn-out for d-c volts and ohms measurements. It is an instrument no wide-awake technician can afford to miss!

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