

Radio SERVICE-DEALER

SOUNDMAN AND JOBBER

Reg. U. S. Pat. Off.

Vol. 3. No. 3 ★ March 1942

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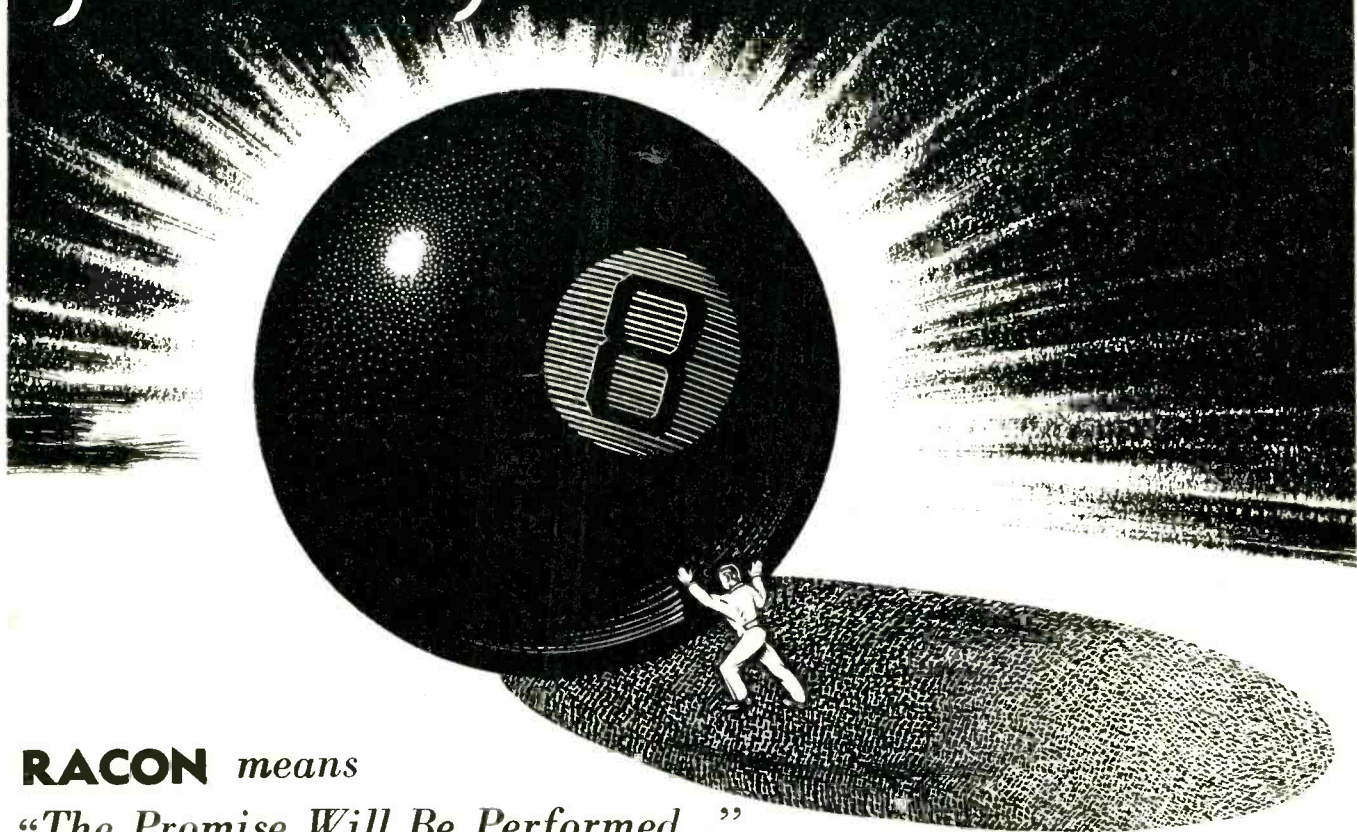
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RADIO SERVICE DEALER, published monthly at 34 N. Crystal Street, East Stroudsburg, Pa., by the Cowan Publishing Corp., Executive and Editorial Offices at 132 W. 43rd Street, New York, N. Y. Subscription rates—United States and Possessions, \$2.00 for 1 year, \$3.00 for 2 years; elsewhere \$3.00 per year. Single copies 25c. Printed in U.S.A. Entered as Second Class Matter October 3, 1941, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879.

*use RACON REPRODUCERS and
you won't get behind the 8 BALL*



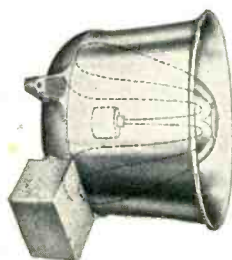
RACON means

"The Promise Will Be Performed..."

In war, lives often depend upon the clarity of a command from the Bridge of a ship, or upon orders given to ground forces from a diving plane, or upon orders given to soldiers engaged in battle on the fighting front. The sound reproducing equipment entrusted to vital tasks like these, must in every respect be the finest and most dependable that engineers can design and competent manufacturers produce. We are proud that RACON REPRODUCERS are doing their share, at Sea, on Land and in the Air. That RACONS are capable of performing the most difficult jobs, under any kind of weather or atmospheric condition and in most efficient fashions, is a tribute. And . . . now, more than ever before, we find RACON sound reproducers being used on board ships, in factories engaged in defense work, by Police departments and defense agencies, in schools, stadia, etc. These sound reproducers, too, are the acme of dependability and tone fidelity at low cost. Soundmen, be wise! Specify and use RACON products in every sound installation. They've won acceptance, and they'll keep you from behind the 8-Ball.

There is a RACON REPRODUCER for every purpose. Here are just a few

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RACON ELECTRIC CO. 52 EAST 19th ST. NEW YORK, N. Y.

DANGER—SOFT SHOULDER

WE HAVE HAD THE doubtful pleasure of reading a red, white and blue window placard, amply decorated with the stars and stripes, enclosed in copies of a recent issue of a radio retailing publication. The gaudy placard is a "Wartime Pledge" for radiomen, and it enumerates eleven promises you are asked to make to yourself, your Government and your community.

"WARTIME PLEDGE"

The pledges, on the whole, are commendable, and we would be hypocrites were we to under-rate them, as most of the promises have been suggested as methods of conduct and cooperation in past issues of RADIO SERVICE-DEALER. But one pledge, which forces a concession on the serviceman in much the same manner as a "rider" tacked onto a Congressional Bill, not only is *not* commendable—it is actually subversive to our Country's best interests, and damaging to the future prospects of all legitimate radio repairmen.

We might be willing to overlook this pledge if it were none of our business; but it so happens that the welfare of the radio serviceman is more our business than it is the business of a publication originally instituted as a periodical in the radio merchandising field, and therefore "sales-minded," and which has suddenly become "serviceman-conscious" too. And so long as the interests of the radio servicemen are our first thought (and not our second), we will consider it our duty to warn him against unfair and unpatriotic practices.

Rather than quote the pledge itself, which is second in the list of eleven on the placard, let us analyze a portion of the editorial run in the issue containing the "Wartime Pledge," which expresses the intent of the promise.

Our contemporary suggests that servicemen in all communities should cooperate with their local defense organization by making a community-wide "radio census." The serviceman is told to keep a card record showing make of set, operating condition, etc.

PARTS INFLATION

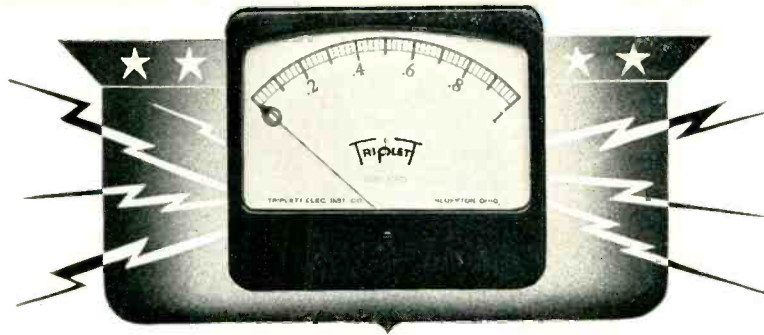
With all this we have no complaint, because in the near future such information *might* be useful to defense authorities; but the brazen, unmitigated suggestion that followed—that where servicemen find sets that are not working, repairs should be offered at an agreed price . . . gentlemen, that is nothing less than proposed inflation and the creation of a false servicing boom which would have untold repercussions in Washington if it were ever put into effect. We'll go further and say that the "go-after-repair-business" campaign method as suggested is subterfuge of the worst kind, because no one has the right to use his local defense agency as a cloak for drumming up extra business, especially if the sales made deterred manufacturers in their defense production efforts.

And how do you suppose the radio owner would like it when he found out that your "patriotic" motive was, in reality, a selfish, personal one? The implication in the pledge that the "survey" records would be of present value to the local home-defense authorities is so much hogwash.

KEEP IN LINE

Each citizen is capable of judging for himself how valuable radio is to him during these trying times; and he requires no mentor to drum it into his head. And if he wants his radio fixed, he knows where to go. Moreover—and we know this from conversations with responsible gov-

(Continued on page 25)



“THERE IS A BRIGHT SIDE”

An Open Letter to Users of Electrical Measuring Instruments

Much more than instruments is needed to fill the vast requirements of America's gigantic production program. Experience gained by many years of actual instrument manufacturing is vital. Triplet's broad experience in filling peace-time needs is answering the call to arms—is doing its part in re-establishing in the world the Democratic ideals of freedom.

Private business must undergo restrictions for the sake of National security. As good Americans we will bear these willingly.

And there is a bright side. Rapid expansion, new fields and improved processes mark today's instrument program. New developments unbelievably revolutionary in their scope are growing out of the vast proving ground of war-time production. When war ends, these advantages will be passed on to all of you. From the experience of today will come many new and greatly improved instruments to better serve the peaceful world of tomorrow.

N. A. Triplett

Sales Manager

THE TRIPLETT ELECTRICAL INSTRUMENT CO.

FOR DEFENSE



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STATES
SAVINGS
BONDS
AND STAMPS**

We Can Also Help in Another Way

Buy Defense Stamps and Bonds. Buying them regularly is the best way you can help General MacArthur and our fighting men. We must all pull together now, and your dollars can best serve in stamps and bonds.

THE TRIPLETT ELECTRICAL INSTRUMENT CO.

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WAR-TIME SERVICING—BATTERIES*

ALL 1.4-volt radio receivers require a low "A" and high "B" voltage for their operation. Most portable receivers are designed around standard, readily available separate "A" and "B" batteries, but a few require special, hard-to-find "A-B" battery packs. In the latter type, the battery power supply consists of "A" and "B" batteries wrapped up as one unit and equipped with a single socket, in some cases of special type. Of necessity, the battery cable furnished with receivers requiring an "A-B" pack is equipped with a plug that fits only the pack socket.

In view of restrictions placed on civilian production due to the war effort, and the possible difficulty of obtaining special "A-B" packs, it is worth looking into means of simplifying the "A-B" pack problem, if for no other reason than reducing the number of battery types stocked. This, in itself, will aid you, your customers, the battery manufacturers and the government.

As matters stand, it is necessary to stock some 25 or more special "A-B" packs, each designed for only a few receiver models. By simple conversion, these 25 or more special packs may be replaced by a stock of only 2 types of "B" batteries and 4 or 5 types of "A" batteries. These seven types will service more than 800 portable receiver models.

CONSERVATION

There are many reasons why, in these times, it is desirable to use individual "A" and "B" batteries with portable sets, rather than "A-B" packs. For one thing, the "A" and "B" sections of packs do not become exhausted at the same time. It is more economical to replace the "A" and "B"

* The material for this article was provided by the National Carbon Company, Inc.

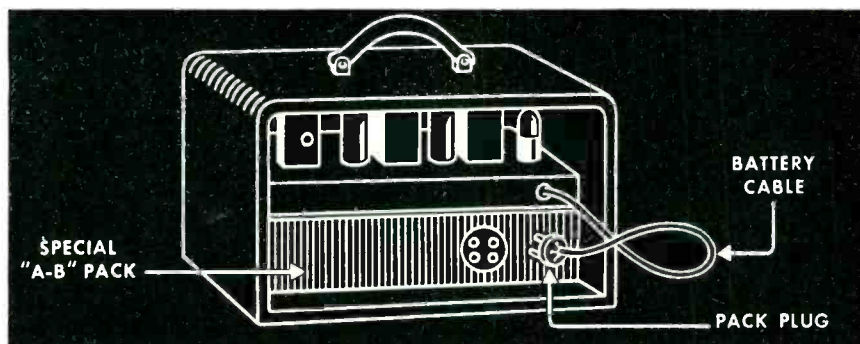


Fig. 1. Special "A-B" packs can be replaced by standard-type "A" and "B" batteries by changing plugs, as shown in Figs. 2 and 3. All you need determine are the dimensions and voltage requirements.

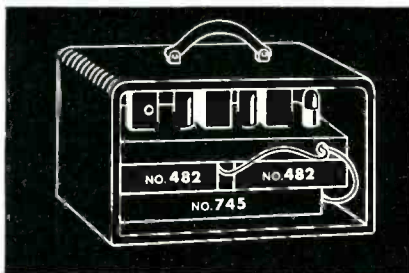


Fig. 3. The "A-B" pack shown in Fig. 1 has been replaced here by one "A" battery and two "B" batteries of standard type that fit the "A-B" pack compartment.

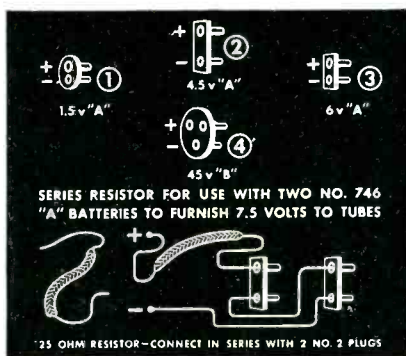


Fig. 4. The numbers in circles are the plug numbers as given in the "A" and "B" battery table on page 6. Plugs of these types can be obtained from your jobber.

batteries as required. This conserves much-needed raw materials. Moreover, "A-B" packs often are hard to find when required, whereas separate batteries are available almost anywhere. Third, individual batteries are less expensive on a cost-per-hour basis.

CONVERSION

It is a simple matter to convert most portable receivers originally designed to use special "A-B" packs to the use of standard "A" and "B" batteries. In most cases a change of connectors on the battery harness is all that is required—and once the change is made, standard individual batteries can be used exactly as if the receivers were originally designed for them.

As an illustration of how to make the necessary changes in a portable receiver, refer to Fig. 1. To convert this receiver, the first step is to determine the nominal voltage of the "A" and "B" sections of the battery pack. For explanatory purposes, assume that it is a 1.5-volt "A", 90-volt "B" pack. This calls for one 1.5-volt "A" battery and two 45-volt "B" batteries.

After checking the dimensions of the

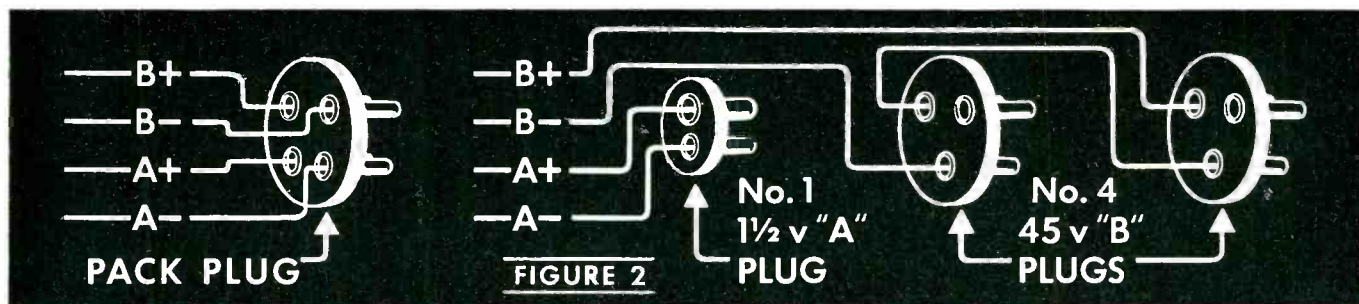


Fig. 2. Showing how a pack plug, left, is replaced by three plugs for standard "A" and "B" batteries.

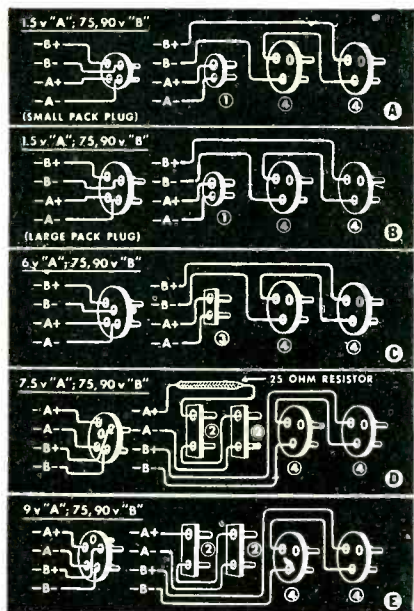


Fig. 5. Connection diagrams for other types of "A-B" pack plugs are shown here.

receiver battery compartment and referring to the accompanying "A" and "B" Battery Table, it might be found, for example, that one "Eveready" No. 745 1.5-volt "A" battery and two "Eveready" No. 482 45-volt "B" batteries could be substituted for the original "A-B" pack, as shown in Fig. 3.

"A" BATTERIES

PACK "A" VOLTAGE	"A" BATTERY REQUIRED	DIMENSIONS—INCHES			** PLUG NUMBER
		LENGTH	WIDTH	HEIGHT	
1.5	742	2 ¹⁷ / ₃₂	2 ¹⁷ / ₃₂	4	1
1.5	743	3 ¹ / ₄	2 ¹ / ₁₆	3 ¹¹ / ₃₂	1
1.5	745	10 ³ / ₄	3 ²⁷ / ₃₂	1 ¹¹ / ₃₂	1
6.0	747	10 ³ / ₄	3 ²⁷ / ₃₂	1 ¹¹ / ₃₂	3
7.5	(2) 746*	2 ²⁹ / ₃₂	1 ¹ / ₁₆	4 ¹ / ₁₆	2
9.0	(2) 746	2 ²⁹ / ₃₂	1 ¹ / ₁₆	4 ¹ / ₁₆	2

* Use two No. 2 plugs and a 25-ohm resistor in series to furnish 7.5 volts across tube string.

** See Figs. 5 and 6.

"B" BATTERIES

PACK "B" VOLTAGE	"B" BATTERY REQUIRED	DIMENSIONS—INCHES			PLUG NUMBER
		LENGTH	WIDTH	HEIGHT	
75	(2) 482*	3 ¹ / ₂	1 ³ / ₄	5 ⁷ / ₁₆	4
90	(2) 482	3 ¹ / ₂	1 ³ / ₄	5 ⁷ / ₁₆	4
90	(2) 738**	2 ¹ / ₁₆	2 ¹ / ₁₆	4 ¹ / ₁₆	4

* Sets now using 75 volts "B" will operate satisfactorily with two No. 482 batteries.

** Required on only a few models where No. 482 battery will not fit.

The next move is to unsolder the special "A-B" pack plug on the receiver battery cable and substitute individual standard "A" and "B" battery plugs as required. In the example given, we would use one No. 1 "A" plug and two No. 4 "B" plugs, with the original

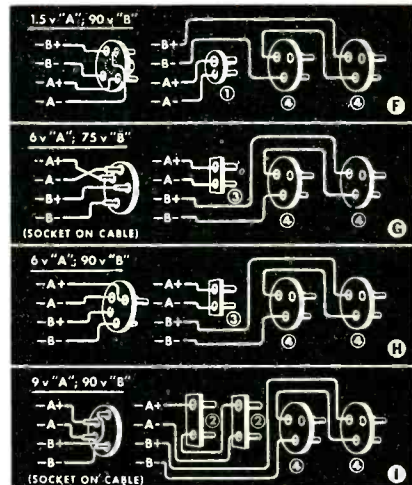


Fig. 6. The four diagrams above apply to Zenith portables only. The new plug type numbers are given in each case.

connections altered as shown in Fig. 2.

A small stock of inexpensive plugs and a few resistors will be sufficient for most conversion jobs. The plug numbers listed in the "A" and "B" Battery Table are illustrated as to type in Fig. 4.

Connection diagrams for other types of "A-B" pack plugs are shown in Fig. 5. These apply for all makes of portable receivers but Zenith. The four connection diagrams shown in Fig. 6 apply to Zenith portables only.

AROUND THE FIELD

MATERIALS SAVED BY RCA

Tons of metals and chemicals desperately needed for the United States war production program are among the strategic materials conserved by an all-embracing program worked out by development engineers of the RCA Manufacturing Company.

In addition to discovering alternate materials—and then alternates for the alternate materials—RCA engineers have also been able to develop domestic alternates for imported materials, thus freeing shipping space for other commodities.

What has been done may be gathered from the following: tons of nickel, needed to make armor plate, were saved by replacing its use as a plating material with a lacquer polish; cobalt went into the defense effort after a way had been found to eliminate it entirely from certain types of magnets; brass parts have been replaced with wood and other less critical materials.

Co-operating in RCA's Company-wide conservation program, the Indianapolis plant has designed a new type of high-frequency horn required for motion picture sound reproducing

systems. The new horn is made entirely of wood, excepting for the throat, and will save a substantial quantity of metal.

Further, RCA executives are now writing inter-office communications on the back of once-used paper, while all material duplicated for Company use is now printed on both sides of the paper, halving the quantity of paper required.

★

BRIGHT FUTURE FOR ELECTRONICS

Electron tubes will be put to work in countless new applications and will provide employment for hundreds of thousands of persons after the war, Dr. W. R. G. Baker, Vice President in charge of General Electric's Radio and Television Department, predicted March 3. He spoke at a dinner held at Hotel Ambassador in New York inaugurating the company's "electronic" program, designed to show the war and peacetime benefits derived from the use of electronic tubes.

"Out of the crucible of war, new science, new methods, processes and materials always come," Dr. Baker

pointed out. "Electron tubes (such as the popular 'electric eye'), so simple in appearance yet so mysterious, will touch our lives in countless ways wherever and however we live and work," he explained. "Electronics will become the bright new word of the future, and promises new and higher standards of living."

★

ELECTRONIC GADGETEERING

Recognizing the fact that radio amateur activities are being seriously curtailed for the duration of the war, so far as "ham" communications are concerned, Aerovox engineers are compiling and already releasing practical data on electronic gadgeteering as a promising outlet for the equipment, skill and ambition of the radio hobbyist. Articles on radio control circuits and the industrial applications of electronic devices, are currently appearing in the monthly *Aerovox Research Worker*. Copies will be sent to anyone writing Aerovox Corporation, New Bedford, Mass. Also, a free subscription may be obtained by getting the endorsement of any Aerovox jobber.

(Continued on page 31)

SPRING CLEANING — 1942

John H. Potts

IN the past spring cleaning has meant merely a general overhaul of equipment, dusting off of benches and shoving a little further back in corners the abandoned trade-ins which every service shop is bound to accumulate in the course of time. But now these trade-ins, unwept, unhonored and unfixed, acquire a hitherto unforeseen importance. For, in the light of the recent order stopping the manufacture of home radios, it is going to be worthwhile to get these castoff sets back into operation.

In some cases this isn't going to be easy; needed parts may be difficult to obtain, the troubles may be hard to find, or the set may have had inherent design faults which caused it to render poor service even when operating normally. Often, on small sets, it won't pay to spend the time and effort necessary to correct major design faults, but on the larger console models the fact that the set will not have to compete with new models will enable a sufficient return to be had to compensate for the work necessary to recondition the instrument and improve its performance.

HIGH-RESISTANCE CONTACTS

Insofar as the smaller sets are concerned, it will often be found that a very thorough cleaning will correct obscure faults which, no matter what type of test equipment is employed, will be baffling to locate. An example of this is found in the Philco 59 and similar models of other manufacture. The chassis forms part of the return circuit for r-f current. Corrosion at the junction of such circuits to the chassis causes a high resistance ground which results in poor sensitivity. In other instances, with different makes, oscillation results due to high resistance contacts developing between the gang condenser rotor contacts and ground.

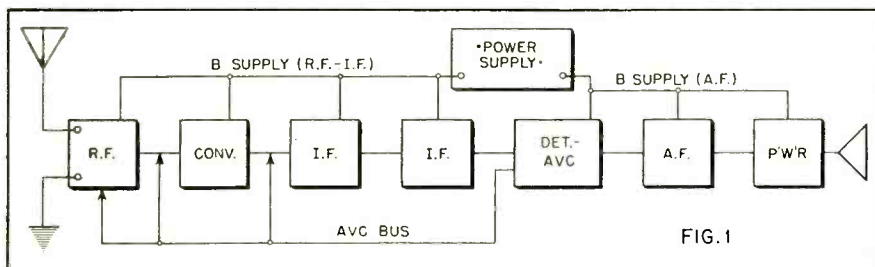
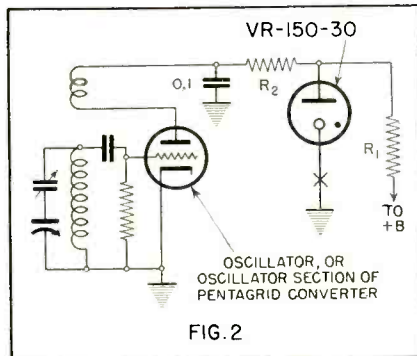


Diagram explaining motor-boating due to avc and plate-voltage changes.



Use of voltage regulator for correcting motor-boating.

The remedy in the former case is obvious; in the latter instance cleaning with sandpaper (not emery) and increasing the spring tension of the rotor forks will serve to correct the trouble.

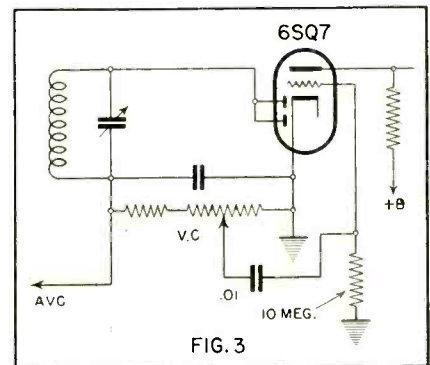
Volume controls are best cleaned with carbon tetrachloride (Carbona), and this cleaner may also be employed to advantage on any contacting surface where radio or audio frequencies are handled. Often the reduction in noise which results from simply cleaning tube, switch and socket contacts with carbon "tet" is simply amazing.

MOTOR-BOATING

In many of the earlier receivers employing 6A7 or 6A8 pentagrid converters and operating on short-wave as well as broadcast bands, unsatisfactory performance often resulted on short-wave reception due to motor-boating or "flutter," particularly when the gang condenser was tuned to the high-frequency end of the band being used. The trouble is usually most evident when receiving strong signals, and is caused by fluctuations in the supply

voltages applied to the converter tube.

Just how this voltage fluctuation results may be understood from a consideration of the block diagram of Fig. 1. When a strong signal is being received, the signal level reaching the second detector is high and the resulting avc voltage is also high. This avc voltage is applied to the r-f, converter and i-f stages of the receiver, increasing the grid bias on each tube and consequently reducing the plate current. This reduction in plate current reduces the drain on the power supply and the power-supply voltage therefore increases. When the power supply voltage is thus raised, all voltages applied to the controlled stages are also increased. Insofar as the r-f and i-f stages are concerned, this is of no importance, but the effect on the penta-



Diode current through volume control introduces noise.

grid converter is to change the oscillator voltage and likewise the oscillator frequency. This causes the i-f signal to become momentarily changed from its proper frequency and the i-f voltage reaching the second detector and avc is accordingly reduced, lowering the avc voltage and restoring normal operation. Since this cycle of changing voltages, frequency and avc correction does not take place instantaneously, but rather at the time constant of the avc system, "flutter" or motor-boating results.

Various means of correcting this trouble have been employed. Sometimes merely grounding the signal-grid return on the converter, thus removing avc operation from this tube, will do

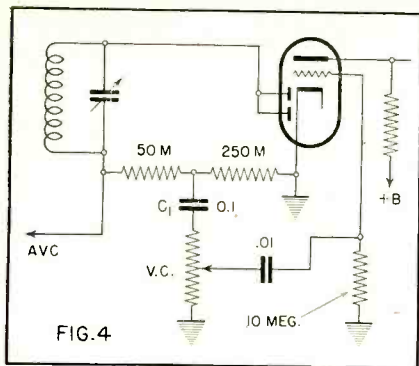


FIG. 4
Method of keeping diode current out of volume-control circuit.

the trick, and this should be tried first. Care should be taken not to ground the avc voltage applied to other tubes.

Another method is to use a 25,000-ohm bleeder across the power-supply output. This tends to stabilize the power-supply voltages by improving the voltage regulation, but should not be done when the power transformer is skimpily designed. It is well to let the receiver operate for several hours and note if any excessive heating occurs as a result of the increased power-supply load.

Still another method is to feed the converter tube from a voltage regulator. This method, or a modification in which the voltage regulator is used to control the oscillator voltage when a separate oscillator is employed, is used in some of the finest communication receivers and is recommended when the space and value of the receiver being fixed warrant the extra expense. A suitable circuit is shown in Fig. 2.

In choosing the voltage regulator for this job, the receiver oscillator voltage should be maintained at the voltage normally present when no regulator tube is employed. For this purpose it is possible to select a VR-90, VR-105 or VR-150. If the oscillator voltage is some value other than is supplied by these tubes, a series resistance R_2 may be employed to reduce it to the required value. In operation, the resistor R_1 should be adjusted until the current through the voltage regulator—

as indicated by inserting a milliammeter at x —is about 20 ma, with the oscillator connected and the set operating. The voltage applied to the oscillator will then remain constant to within a few volts as the current in the voltage regulator varies from 5 to 30 ma.

See that no tubes or other heat-producing components are placed close to the oscillator coil. Often changes in temperature thereby occurring cause mysterious cases of fading.

V.C. REPLACEMENTS

Next to filter condensers, volume-control replacements have long constituted the most frequent cause of unsatisfactory receiver operation. In these days, when volume controls are apt to become scarce, it behooves us to make new ones that are installed last as long as possible. We can do this by choosing the proper type of control and by so using it in the circuit that it will be less likely to become noisy.

In general, composition (carbon) type volume controls which have abrupt tapers are more likely to become noisy in a short time than those which have more gradual tapers. In selecting the proper control, where several tapers are offered, choose for audio grid work a taper which does not show too sharp a change at about 65% of rotation. It should be understood, of course, that all controls suitable for audio grid use require a taper which is gradual over the first 65% of rotation and much steeper thereafter, but you will find that there are some tapers which are more abrupt in change of resistance than others. Noise generally develops at the changeover point.

All composition volume controls are more noisy when used in circuits in which direct current is flowing than in other circuits. This is rather unfortunate, too, for the popular zero-bias form of operation for detector-a-f stages, as shown in Fig. 3, usually results in the volume control being placed in the diode circuit where the

rectified signal voltage is applied across the control. A method of avoiding this, which, it is believed, is unique with the author, is shown in Fig. 4. In addition to isolating the volume control from d.c., the extra condenser C_1 serves to double the insulation resistance between the a-f grid and the diode, thus supplying an additional safeguard against leaky condensers. This idea has been used in the past in a-f stages, of course, where no volume control is employed, but where the additional insulation resistance between the plate of the a-f tube and the grid of the succeeding tube is of importance.

OFFSETTING "BOOM"

Many of the older receivers suffered from boomy bass, resulting from cabinet resonance, and were further affected by employing tone controls to reduce distortion in the output stage. Both of these effects may be made less objectionable by employing a means of

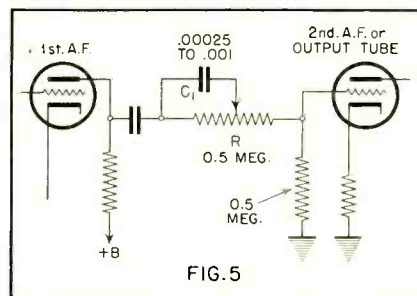


FIG. 5
Simple variable tone control for correcting "boom" in old receivers.

accentuating the higher frequencies and thus compensating in some degree for the deficiencies present.

A simple circuit which does this is shown in Fig. 5. The small condenser C_1 serves to bypass the control, R , for higher frequencies, but becomes increasingly ineffective at the lower frequencies. The high-frequency response is greatest when the condenser shunts the entire control and becomes less as the amount of resistance being shunted is decreased.

Methods of applying negative feedback were discussed in the "Portfolio" last month, and it is recommended that they be considered as a means of improving receiver performance. It should be remembered, of course, that some gain is always sacrificed in negative feedback circuits so that it may be necessary to add another audio stage to the receiver to make up for the loss in gain resulting from negative feedback. However, if the feedback is employed simply to compensate for deficiencies in the response characteristic of the amplifier, and is so arranged

(Continued on page 27)

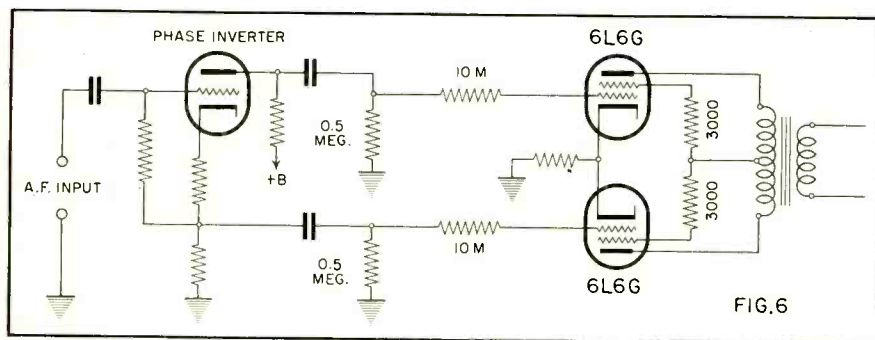
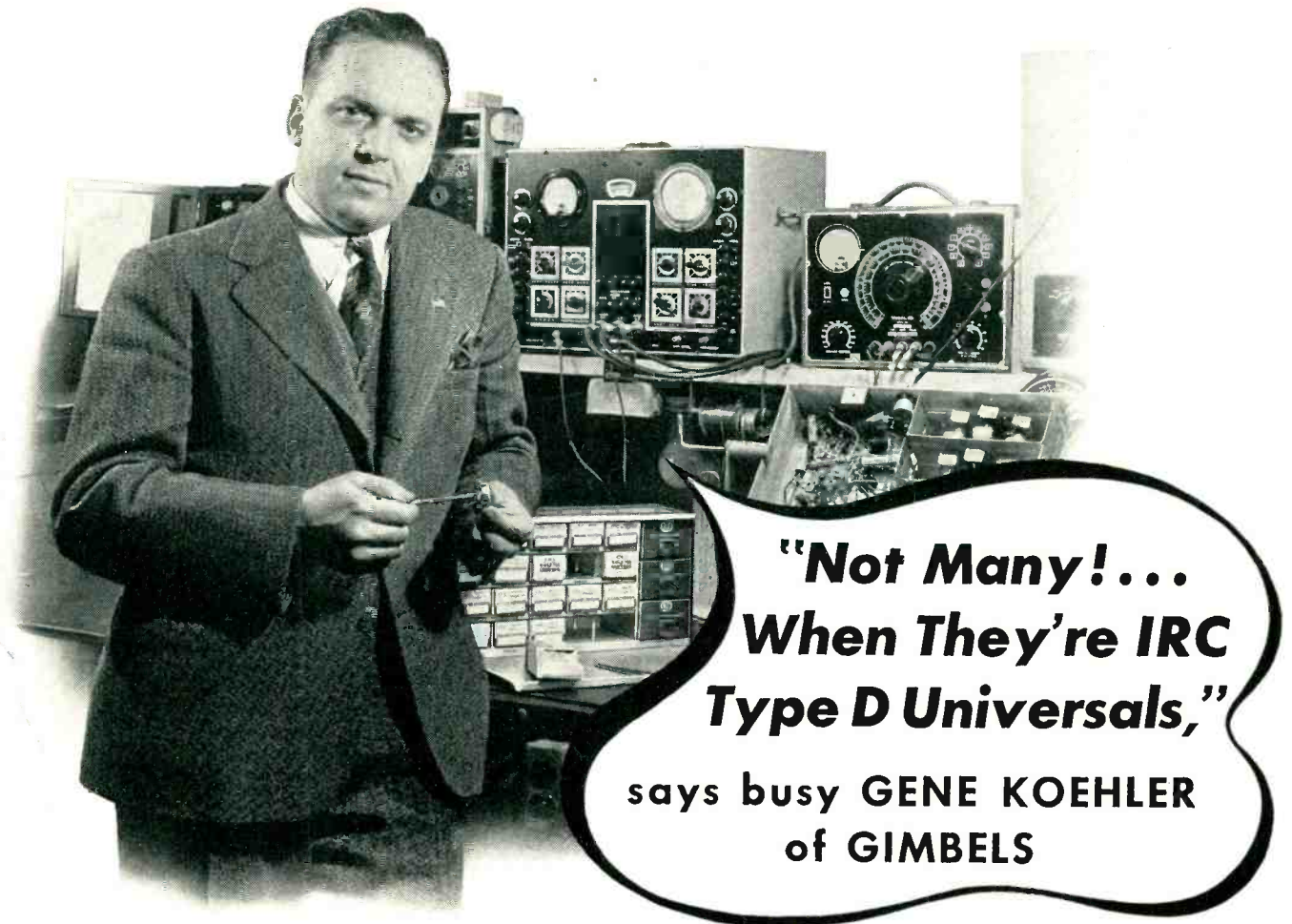


FIG. 6
Grid and screen suppressors in beam-power amplifier to eliminate oscillation at high frequencies.

HOW MANY VOLUME CONTROLS MAKE A SERVICE STOCK?



**"Not Many!...
When They're IRC
Type D Universals,"**
says busy **GENE KOEHLER**
of **GIMBELS**

Probably one of the busiest radio service departments in the East, is that of Gimbel's department store in Philadelphia, managed by Gene Koehler—and there you'll find the IRC Volume Control Cabinets with their 18 Type D Universal Tap-in Shaft Controls on the job in a big way.

"I've never checked your claim that the 18 controls in this cabinet will handle up to 87% of all control replacements," says Mr. Koehler, "but it sounds just about right. In handling hundreds of jobs a month, we seldom have to buy a control type that isn't included in the cabinet. This means a big saving in our time and a worthwhile increase in our efficiency—especially today when it is often difficult to get certain special controls.

"Often, when we think we're 'stuck' for a replacement that might take time to get from the factory, we're pleasantly surprised to

find a control of the proper electrical specification in the IRC Cabinet. Then, all we have to do is select the proper Tap-in Shaft. Seldom do we get a job where one of the four available IRC Shafts will not fill the bill.

"The IRC Control Kit also makes it easy to check our control stock. Actually, in a shop the size of ours, we have three Cabinets, each containing the full 18-control assortment so that we won't run short of any item on busy days. A glance at the empty compartments then tells us in an instant just what controls should be re-ordered.

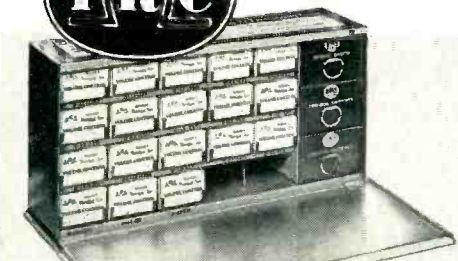
"Type D Controls with Tap-in Shafts are a great idea—and so are the Kits. We certainly wouldn't want to be without either!"

Take a tip from Mr. Koehler! Put your servicing in tune with the times. See the IRC Master Control Kit at your IRC jobber's today.



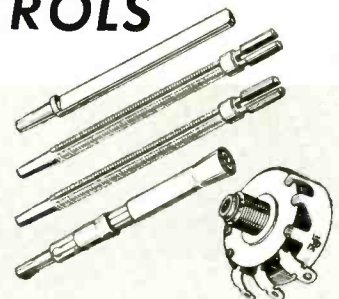
Type D UNIVERSAL CONTROLS

... WITH TAP-IN SHAFTS



Four shaft types make it easy to select the right one for almost any job. Will not pull or vibrate loose, once tapped securely into the control socket.

HANDLES 4 OUT OF 5 JOBS!...The 18 Type D Controls, 6 switches and 5 extra shafts in this IRC Master Control Kit handle from 70% to 87% of all control replacements. You pay only the regular net of \$14.97 (\$24.95 list) for the controls, switches and shafts. The All-Metal Cabinet is included at no extra cost!



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

RADIO SERVICE-DEALER, MARCH, 1942

CIRCUIT COURT

Now that the nation is moving into complete war economy, with at least half, if not more, of the national income allocated to armament production, many domestic markets face a complete blackout.

Civilian radio production will cease altogether on April 22nd, and that means the windup of commercial receiver design—and new circuits. And it also means the windup of "Circuit Court" in its previous form, but not its suspension; for servicing henceforth will deal with frozen designs, and we are now afforded the opportunity of catching up with the many special and complex circuit functions involved in the multitude of "for-the-duration" receivers that will come up for repair in ever-increasing numbers.

In the meantime, however, the last few new circuit features to be found in the final 1942 designs are still coming through, and this month has brought forth some very interesting ones.

NE PLUS ULTRA (FIG. 1.)

Topping the list is the latest Zenith

Models 22H698 and 22H699 (Chassis 22B1) 22-tube a-fm superheterodyne receivers, each with an output of 50 watts! The audio amplifier will warm the heart of every perfectionist in sound.

Not shown is the circuit of the a-fm receiver proper, as it departs little from the 1941 Zenith designs—an r-f stage for both a-m and f-m bands, a-m and f-m push-button tuning, dual-band i-f amplifiers with the a-m and f-m transformers series connected, and dual limiters.

The first innovation is to be found in the a-f voltage amplifier, shown in Fig. 1. A 7A4 triode is used in the first a-f stage, and the input circuit includes the tone-compensated volume control R28 with five tone-selection push-button switches providing low bass, treble, voice, normal, alto and bass.

The output of the 1st a-f stage is divided between two 7A4 triodes used in the 2nd a-f stage, the upper one serving as the low-frequency amplifier and the lower one serving as the high-frequency amplifier. These are separate channels and feed separate power

amplifiers and loudspeakers through the chassis cable socket shown at the right.

It should be observed before going further that the cathode circuit of the 7A4 h-f amplifier is opened when the phone-radio switch 22 is in the phono position, thus making this amplifier inoperative when the phonograph is in use. This is necessary, as the h-f amplifier would serve only to reproduce needle scratch and surface noise.

It should also be observed that the cathodes of all three of the 7A4 tubes are at ground potential, the grid bias being provided by the drop across the resistor R34 in the negative leg of the power supply. The bias is applied to the three 7A4 tubes through the filter resistor R33 which has a value of 10 megs. This bias arrangement has the advantage of being semi-fixed, and introduces less hum than the conventional cathode bias system.

POWER PLUS (FIG. 2)

The a-f voltage amplifier shown in (Continued on page 12)

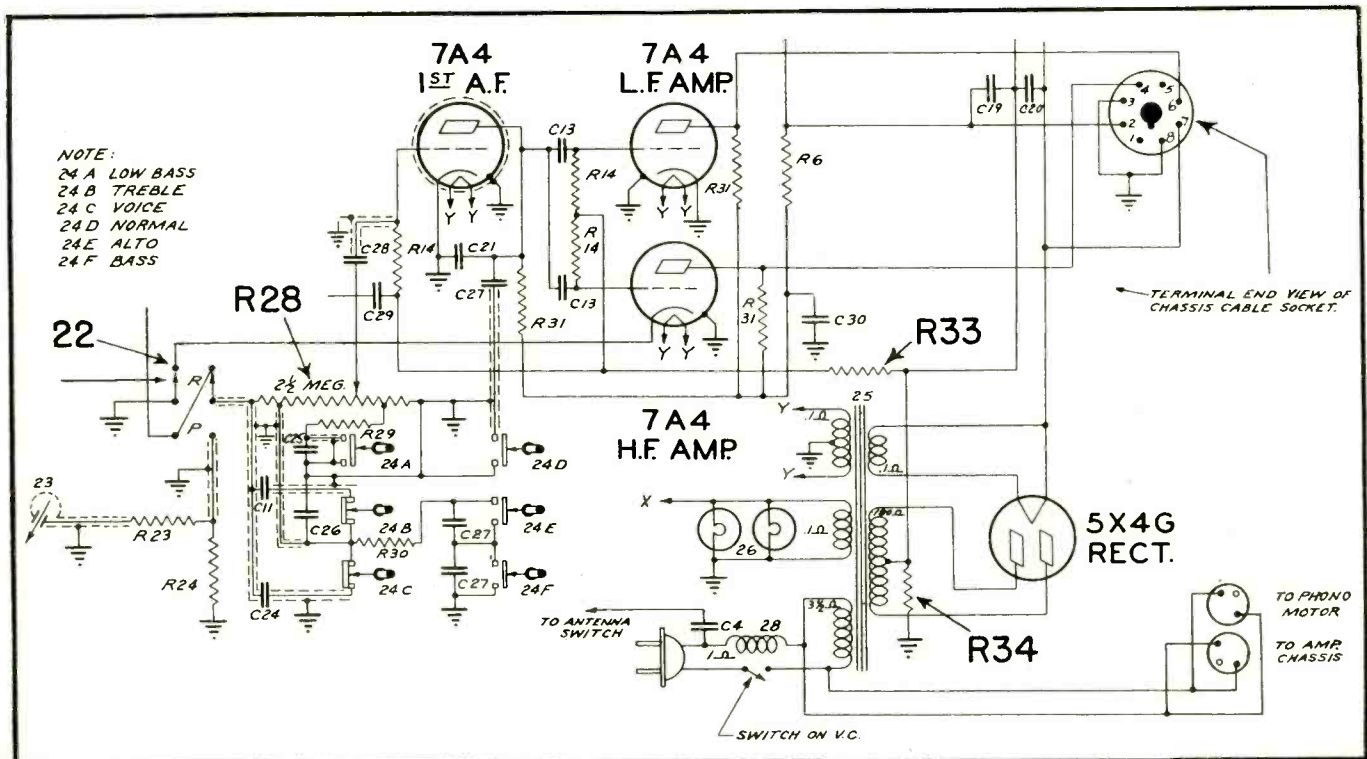


Fig. 1. Low- and high-frequency voltage amplifier stages of Zenith 22B1 Chassis.

Do Your Customers Know a BARGAIN When They See It?

Here's One-
45

powerful
1½ volt
cells packed
in the smallest
possible space!



A MIRACLE of compact power—the greatest “B” battery value ever wrapped up in such a small package!

It's the battery that “personal” radio sets were designed around! . . . the “Eveready” “Mini-Max” Radio “B” Battery No. 467.

Yet customers sometimes speak of its expense! That's because they don't realize what they're buy-

ing—they look at the small size instead of the *big* output. It does a man-sized job!

There's your answer for such customers—in the cutaway picture above.

Or put it another way: Many batteries *twice* the size deliver *less* power. No wonder the “Eveready” “Mini-Max” Radio “B” Battery No. 467 is such a whale of a bargain!

“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 Company, Inc.



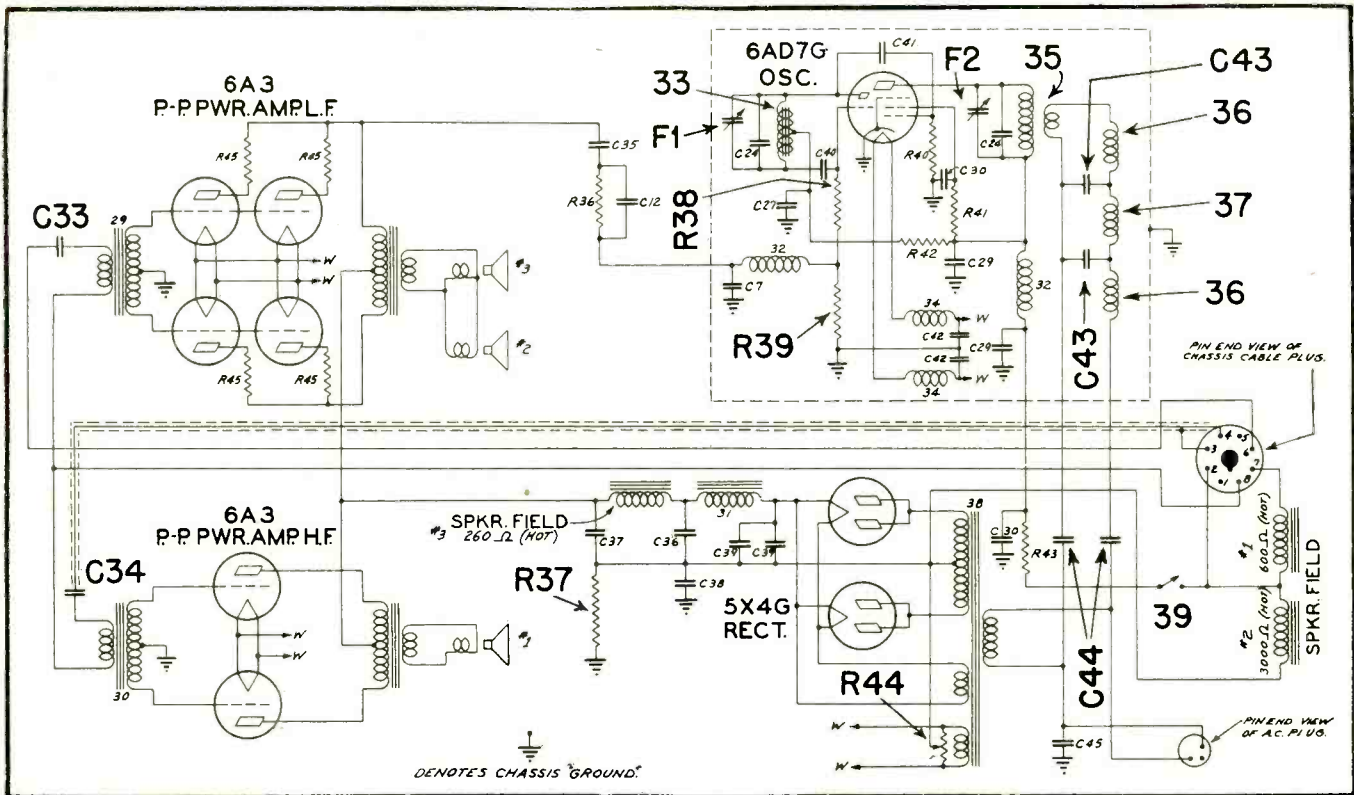


Fig. 2. Schematic of Zenith 22B1 power amplifier and f-m transmitter.

Fig. 1 connects to the two-channel power amplifier through the chassis cable socket, and the connections can be readily followed through by reference to the pin numbers.

The circuit of the two-channel power amplifier is shown in Fig. 2. The low and medium-frequency channel uses four 6A3 power triodes in parallel push-pull. They feed two 12-inch electro-dynamic speakers with paralleled voice coils.

Two 6A3 power triodes in push-pull are used in the high-frequency chan-

nel, and these tubes feed a 6-inch high-frequency speaker.

The 7A4 i-f amplifier is coupled to the primary of the i-f driver transformer through the .04 condenser C33, the connection being through pin 6. The 7A4 h-f amplifier is similarly coupled to the h-f driver transformer through the .005 condenser C34, the connections being through pin 4.

Semi-fixed bias for all six of the 6A3 tubes is developed across the 1000-ohm resistor R37 connected from the mid-point of the 6A3 filament wind-

ing to ground. Mid-point is established by the hum-control potentiometer R44. Aside from the combined plate currents of the six 6A3 triodes, bias resistor R37 also carries the current through speaker fields 1 and 2, which is supplied by the 5X4G rectifier on the receiver chassis (Fig. 1).

F-M CARRIER SYSTEM (FIG. 2)

Of further interest is the f-m carrier-current transmitter which may be used in conjunction with a remote

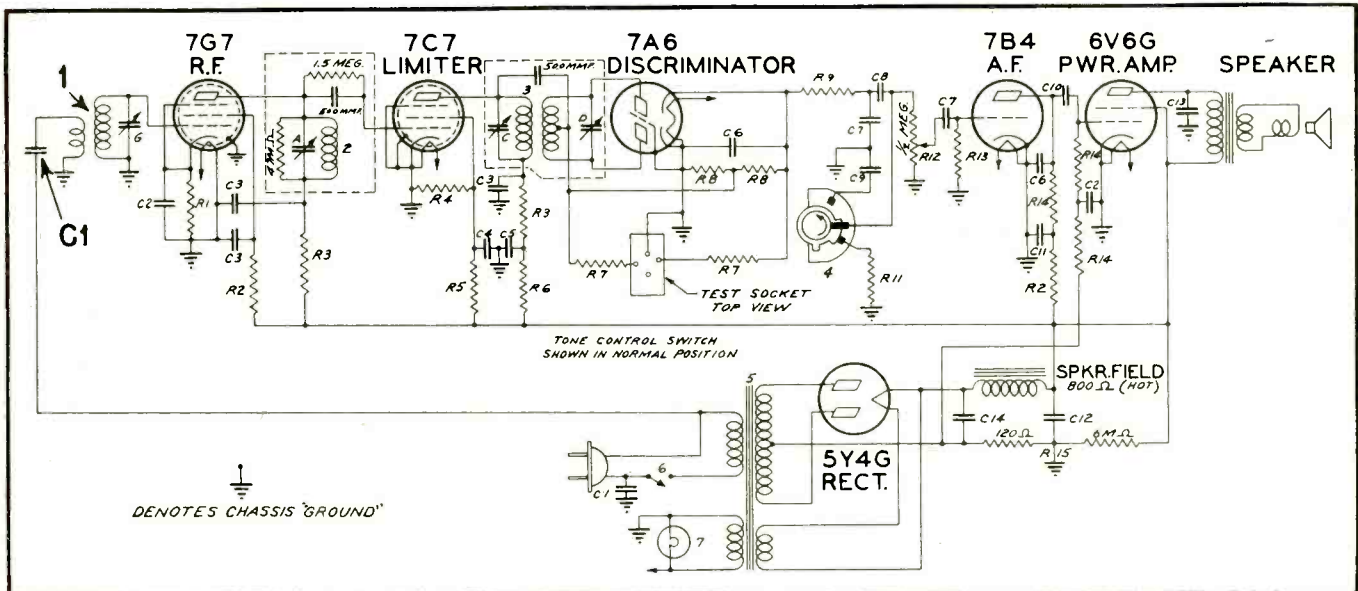


Fig. 3. The Zenith "Remote Speaker"—a miniature f-m receiver.

speaker system for providing phonograph or radio reproduction over the power line to any desired point remote from the receiver proper.

The transmitter is a part of the power-amplifier chassis, and the circuit is shown in Fig. 2. The triode section of the 6AD7G tube serves as the oscillator, and the pentode section of the same tube serves as an r-f power amplifier. The unmodulated carrier frequency is 250 kc.

Observe that the oscillator is directly modulated by applying a portion of the output of the low-frequency power amplifier to the oscillator grid, at midpoint of grid resistors R38-R39. Though this arrangement develops an amplitude-modulated signal, it also develops a frequency-modulated signal because a change in oscillator grid voltage tends to alter the oscillator frequency. Hence, during modulation, the 250-kc carrier frequency is swung (in this case) over a range from 240 to 260 kc or more, or approximately 10 kc either side of the rest frequency.

This combined amplitude- and frequency-modulated oscillator signal is amplified by the pentode section of the 6AD7G, and applied to the power line through a line filter composed of the coils 36 and 37 and the condensers C43. The power line is isolated from the filter by means of the blocking condensers C44.

The carrier-current transmitter is turned on and off by means of switch 39 through which the plate and screen voltages are applied to the 6AD7G.

The trimmer F1 shunting the oscil-

lator coil 33 is used for adjusting the carrier frequency to 250 kc. Trimmer F2 permits the peaking of the r-f amplifier tank circuit or line-coupling coil 35 at 250 kc.

REMOTE SPEAKER UNIT (FIG. 3)

The circuit of the remote speaker unit (Model S-9005; Chassis 6B25) is shown in Fig. 3. In reality, it is a fixed-tuned radio-frequency f-m receiver, with all circuits—r. f., limiter and discriminator—tuned to the carrier frequency of 250 kc. Line pickup is from the primary of the power transformer to the r-f transformer 1 through the blocking condenser C1.

The output of the discriminator feeds a conventional audio amplifier and a 10-inch electrodynamic speaker. The power tube is biased by the drop across the 120-ohm resistor in the negative leg of the power supply.

On first thought, it might be assumed that an f-m system employing a carrier frequency of 250 kc would not provide sufficient frequency swing for proper operation; but it must be remembered that the transmission and reception conditions in this case are a good deal different than they are in commercial f-m broadcasting. The fact remains that the swing either side of 250 kc is sufficient to encompass the audio range; and the other problems of f.m., such as ether space, etc., do not enter the picture.

It is well to observe, however, the necessity for a limiter stage in the remote speaker unit. If there were

only line noise to contend with, then the limiter might be dispensed with; though its use, of course, provides the advantage of reducing line noise to a point below audibility. But, aside from this, it is a necessary factor in ironing out the amplitude modulation developed in the oscillator circuit of the carrier-current transmitter, and preventing changes in amplitude from reaching the discriminator.

The system is not restricted to a single remote speaker unit; a number of them may be used at various remote points.

F-M ALIGNMENT (FIG. 4)

The schematic diagram of the latest Wilcox-Gay Model A-106 frequency-modulation receptor is shown in Fig. 4. The design is conventional with the exception of the coupling between r-f and converter tubes. Impedance coupling is employed, with a single coil in the plate circuit of the 6SK7 r-f tube. The variable tuning condenser, C4, however, is in the grid circuit, where it is isolated from the r-f tube plate voltage by the condensers C5 and C7. The large capacity (at ultra-high frequencies) of these condensers present negligible reactance, and they have no effect on the tuned circuit; but the arrangement permits the grounding of the 3-gang condenser frame.

Wilcox-Gay provides data on a simple method of alignment without the use of a frequency-modulated oscillator or a cathode-ray oscilloscope, and (Continued on page 28)

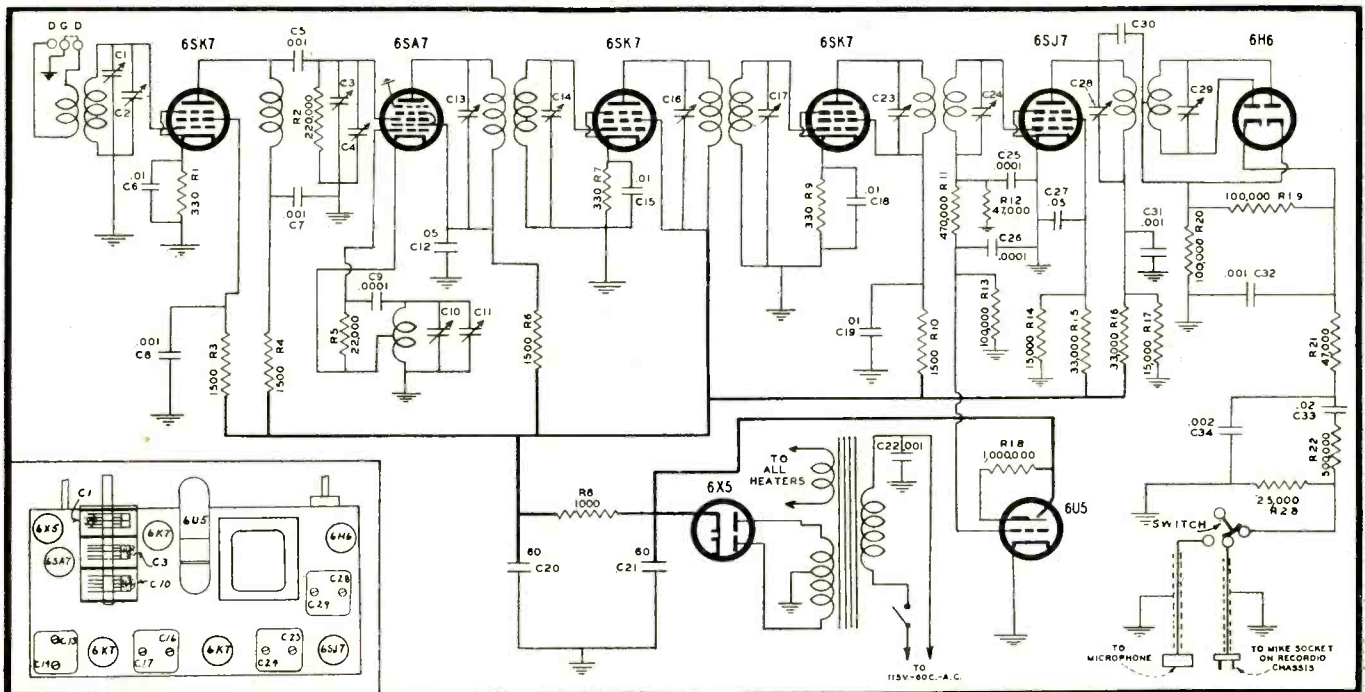


Fig. 4. Wilcox-Gay A-106 Frequency-Modulation Receptor Unit.

Set of the Month—

MOTOROLA MODEL 101C31

OF interest in the realm of full automatic tuning is the latest *Motorola Model 101C31* home receiver. Aside from its push-button, motor-operated tuning mechanism as a subsidiary to manual tuning, the receiver embodies an electric clock mechanism by which a day's program schedule may be set up, after which the receiver is turned on and tuned to the selected station at the proper time, and turned off again at the conclusion of the program.

THE CIRCUIT

The complete schematic diagram of this receiver is shown on the opposite page. Three bands are covered by means of a ganged selector switch. The antenna, r-f and oscillator circuits are tuned by a three-gang condenser. In the broadcast band, the r-f tube is coupled to the mixer by means of an r-f transformer; in the short-wave band, a single coil is used in the mixer grid circuit and a load resistor used in the plate circuit of the r-f tube. Coupling is by means of the 250-mmfd condenser 23 which is connected into circuit by section F of range switch 78-B. In the police band, resistance coupling is used between the r-f and mixer tubes, and the r-f gang condenser is disconnected from the mixer grid circuit.

Oscillator voltage is tapped off the grid of the 6J5GT oscillator tube and

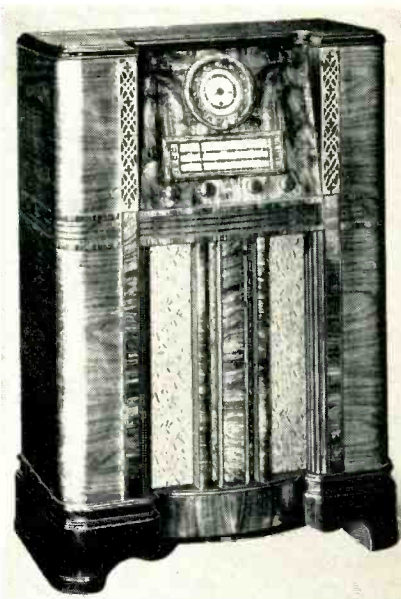
applied to Grid No. 1 (prong 5) of the 6A8GT mixer.

Automatic control voltage is applied to the 6SJ7GT r-f tube and the 6SK7GT i-f tube. This avc voltage is developed in the diode-connected 6J5GT detector tube.

The 6SQ7 a-f amplifier receives its grid voltage from a bias cell. This and the remaining 6SQ7 feed 6V6G tubes in push-pull through a balanced phase-inverter circuit.

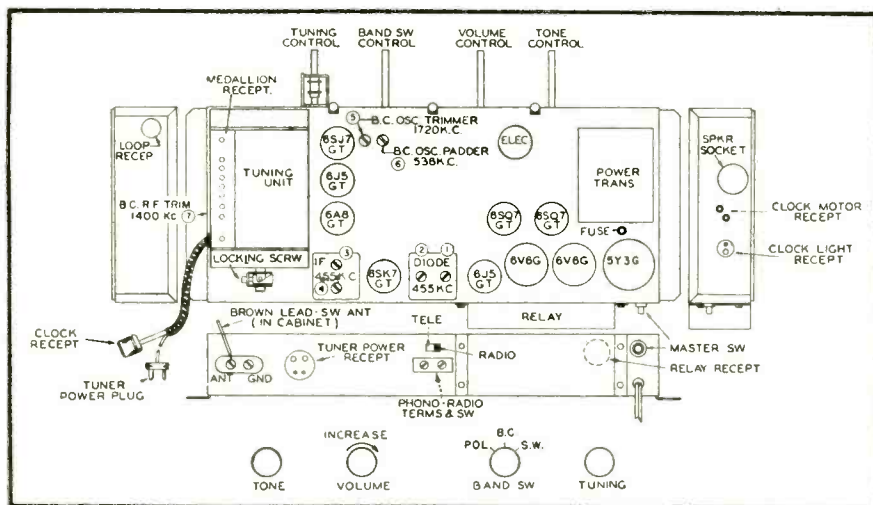
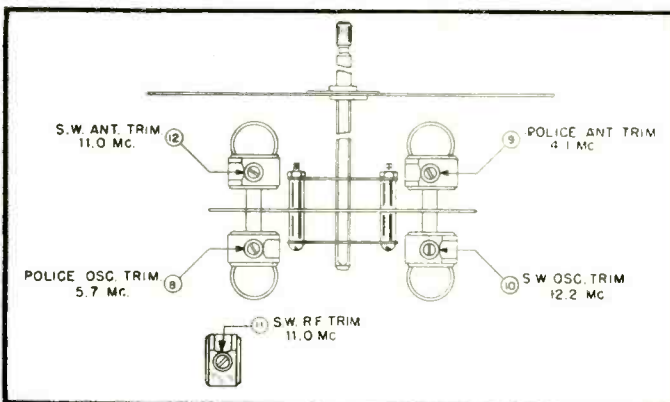
TUNING SYSTEM

The principal units involved in the operation of the automatic tuning system are; the push-button and cable assembly 98, the tuner assembly 94, the clock assembly 87, and the relay assembly 97.



The clock motor plugs into a receptacle connected across the power line, on the far side of the master switch 76. This switch is left on at all times when automatic operation is desired, so that voltage is available for the operation of the "On" and "Off" relays and the tuning motor. Both are energized from a 28-volt winding on the power transformer.

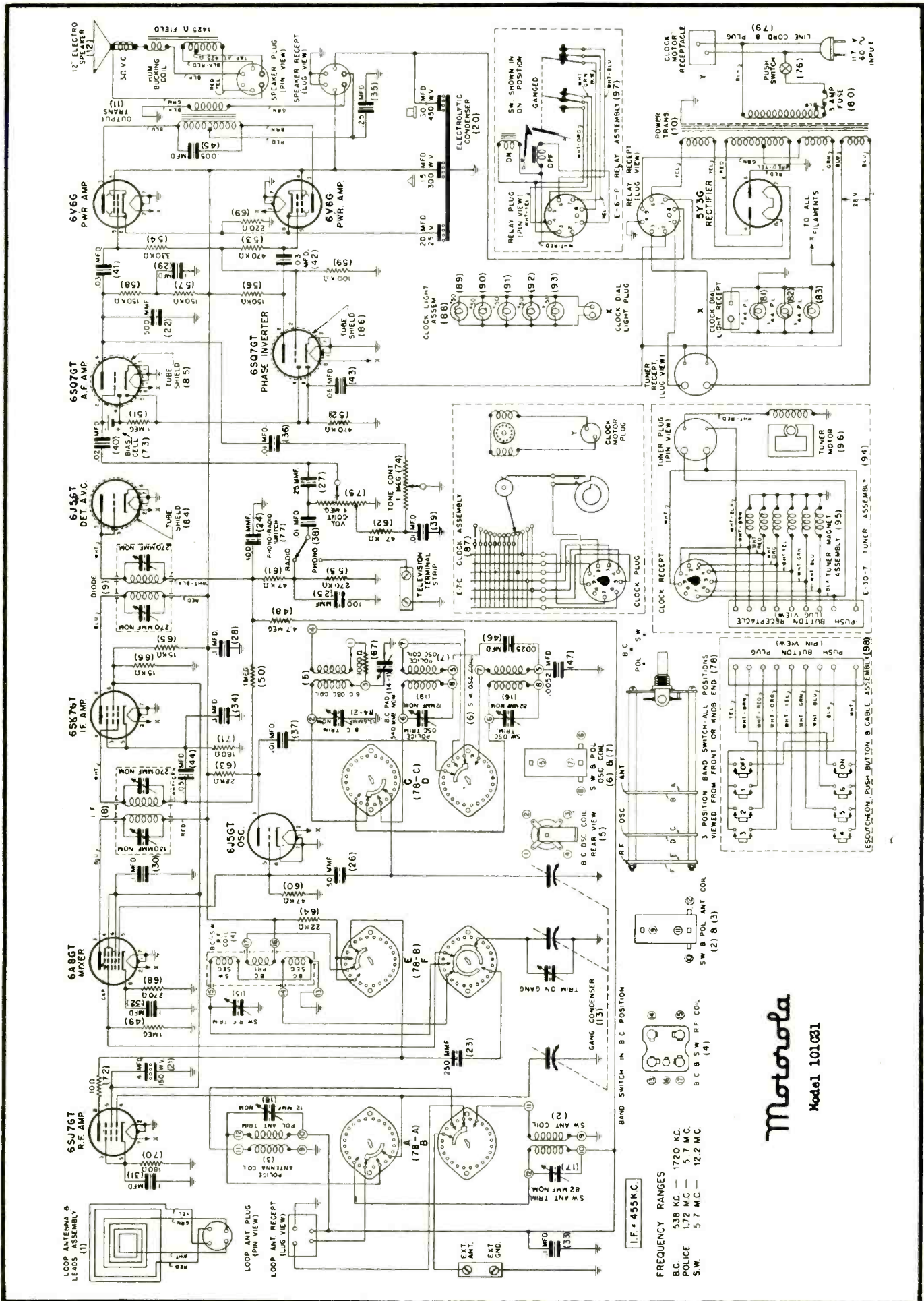
Figs. 1 and 2. Chassis layout, below, and coil assembly, right, showing trimmer locations.



By tracing the connections between the power supply circuit and the relay unit 97, it will be seen that the relay contacts close or open the filament and high-voltage circuits, thus turning the receiver on or off.

Turning to the push-button unit 98, it will be seen that the "Off" push-button closes the 28-volt winding on the power transformer to the "Off" relay winding, thus opening the contacts on the ganged relay switch. Conversely, closing the "On" push-button in the lower row, energizes the "On" relay, and closes the ganged relay contacts.

By tracing the connections between
(Continued on page 32)



Serviceman's Diary

J. P. Hollister

SATURDAY: Sometimes it's kind of hard to figure Jerry out. He'll do one thing under certain conditions and you think he's going to do the same thing every time. And then all of a sudden he'll do precisely the opposite.

Take the Van Tuyls, for instance. They've always been our best customers, ever since they first called us about two years ago and Jerry got up on his high horse and refused a two-dollar tip. That is, of course, he wouldn't take it as a tip. He just apologized for undercharging them and tacked it onto the bill. Nobody had ever done that to the Van Tuyls before—nor, for that matter, to anyone else in the neighborhood—and, believe me, the story spread and, again believe me, it didn't hurt our business. But, after all, not everyone around these parts has seven sets, like the Van Tuyls. Nor are they all as fussy, wanting every set checked on every call.

But today it was different. I had

hardly walked in the door when Jerry yelled to me to keep my coat on and pick up the tube checker and volt-ohmmeter. I sort of had a hunch we were going to the Van Tuyls, because if it had been anyone else, Jerry would have made them wait until we had other calls in the same section. After all, we can't usually afford to hop out on a single call these days when no one knows what's going to happen after the tires are worn out. In fact, I think the Van Tuyls should wait, too, as others do, under the circumstances, and I told Jerry so. But it didn't make much of an impression.

"Now, listen!" he answered. "You said I'd get us in bad the very first time we went to the Van Tuyls, when I put the extra two bucks on the bill. And now you're telling me how to handle them again, after they've been the best customers we've got. Better lay off!"

"After all," I told him, "You must

remember that times aren't what they used to be. Now radios need servicemen more than servicemen need sets to fix, and there's no reason why we've got to follow the same policies which worked out so well when business was bad. I don't see why the Van Tuyls can't take their turn with the rest of 'em. Who else are they going to get?"

"That's where you're all wet," Jerry growled. "Once you start to neglect a good customer, you're going to lose him, no matter how many times you put yourself out for him before. And this rush isn't going to keep up forever, don't forget. Better let me set the policies here. I get results. You see what happened when I showed you how to meet the tipping problem. When I put the tip on the bill we moved right into the professional class. And we're going to stay there, if I have my say."

I let him get away with it. He's made plenty of mistakes which I could have pointed out, but he sure struck it right regarding the tip, and as long as he stuck to that line, there wasn't much I could say.

The Van Tuyl place is on top of a hill, a long, sprawling white house with a big, two-story garage adjoining. I drove up the winding road to the rear, where there was plenty of parking space and we went in through the kitchen, then upstairs to the housekeeper's room. She's a super-efficient female, with thick ankles, who rules the place with an iron hand. She likes Jerry and the two usually get into a lengthy confab while I'm checking the sets.

I was just working on the last of the house sets, a big Capchart, when Jerry came down and asked for the tube checker. Said he was going to check a set in one of the maid's rooms. I gave it to him and, after going over the Capchart record changer and discarding a few warped records, I wandered back to see how Jerry was getting along.

I found him in a room in the back wing of the house. He had been working on a Gloritone table model and was just explaining to a very charming young maid that it needed three tubes. She was begging him to make the bill as reasonable as possible because, she said, she had so little money. Jerry seemed somewhat impressed, much to my astonishment, and said that perhaps he might be able to get replacements on one or two of the tubes, though just how he'd expect any manu-

(Continued on page 23)



"Now you just watch!" She started counting one-two, one-two, and going through the steps and hip motions of the rumba.

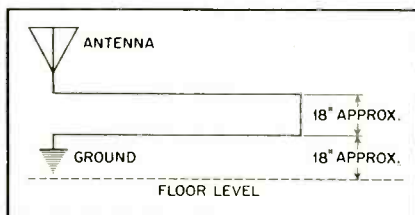
Shop Notes

Aerials

LOOP RECEIVERS

Store Demonstration

It is sometimes difficult, if not impossible, to obtain satisfactory radio reception on loop receivers in dealers' stores because of "shielding" caused by metal structure of the particular building. This handicap can be conveniently and effectively overcome by installing an antenna, which will be loosely coupled to the receivers. The coupling should be in the form of a long loop, attached to, or concealed in, a wall, and connected to an external antenna and a ground as illustrated.



Any loop receiver(s) placed adjacent to this "long loop" will have ample signal strength induced by transformer action or magnetic coupling. The receiver loop should be turned in a direction parallel to the antenna loop.

★

LOOP RECEIVERS

Hi-Impedance Primaries

The primary winding of the loops used in many 1941 models is of the high impedance type and the natural period of this winding is within the broadcast band. When an antenna is connected to the primary winding the additional capacity tunes it below broadcast frequencies which is very desirable for energy transfer.

However, this requires that the primary winding be short circuited whenever an external antenna is *not* attached in order to preserve the tuning characteristics of the loop winding. A shorting bar is provided for this purpose, and should *always* be in place when the receiver is operated on the loop alone.

★

Alignment

AC-DC RECEIVERS

Alignment Precaution

When aligning ac-dc receivers, it is

advisable to use a blocking condenser in series with the ground connection to the signal generator. If the signal generator is ac-operated, it may not be possible to connect to the modulator grid for i-f alignment because of hum. If this is so, in the case of many 1940 sets, feed the i-f signal into the antenna lead, advancing signal generator attenuator accordingly. In loop models, connect to the coupling turn in the loop.

★

SHOP NOTES

★ With the advent of our second anniversary, we have this month provided you with an array of Shop Notes that are of special significance. Many of these notes have run in previous issues, but referred to specific receiver models. The data, however, suggest cures for noise, hum, etc., that can be applied to other receivers and conditions as well, if you use your head.

Beginning next month, Shop Notes will take on new form. Watch for special announcement that will be of particular interest to you.

AC-DC RECEIVERS

Alignment Precaution

If the signal generator is ac-operated, use an isolating transformer between the power supply and the receiver power input. The use of an isolating condenser is not recommended, as a.c. through the condenser will introduce hum modulation and may also burn out the signal generator attenuator.

★

Auto Radio

ANTENNA CHECK

Don't pull an auto set when the complaint is weak or noisy reception, without first checking the antenna. More often than not the trouble is due to a poor or inadequate antenna installation. Hence, always make the antenna your first point of attack.

★

REDUCING IGNITION NOISE

If excessive motor noise is encountered in the cars listed below, the procedure given, in addition to the regular steps taken for the suppression of motor noise, may prove helpful.

Pontiac—1940

These cars have an under-seat heater hose which must be shielded to reduce radiated interference. This heater hose must be wrapped with braided shielding starting at the motor block, continuing through the motor compartment and for about one foot under the car body. Ground this shielding at both ends.

Ford

In some models the battery wire to the heater and the low-tension wire to the distributor are run through the same conduit that carries the spark-plug wires. Remove the heater wire and low-tension distributor wire from this conduit and run them over separately to the heater and distributor, adequately spaced from the conduit which carries the spark-plug wires.

Studebaker—1941

Ground the radiator core and place the heater hose as close as possible to the car frame.

★

Distortion

LOW OUTPUT AND/OR DISTORTION

Check the following:

- Rectifier tube 25Z6GT (slow in coming up to full plate voltage).
- Output tube 25L6GT (usually accompanied by high hum).
- Bias cell reversed. The negative side should connect to the grid.

★

TUNING EYE DISTORTION

Distortion and overloading on strong signals in sets using the 6U5 and 6AB5 tuning-eye tubes may be caused by grid current in these tubes. Try one or more new tubes and check results.

The control grid of the triode section of the 6U5 and 6AB5 tubes is connected to the avc circuit and grid current will affect the avc voltage.

★

BATTERY SETS

Low Output

Low power output on battery models that use a 3Q5GT output tube may be caused by burnout of one-half of the double filament in this tube. Check for continuity between prongs 2 and 8 and between 8 and 7.

★

PERSONAL SETS

Low Output

Low output on sets that have elliptical

speaker may be due to the 1S4 output tube lying close to the speaker magnet, causing disturbance of the space charge in the tube. To remedy this condition, install a felt pad between the speaker frame and the tube to keep the tube upright in its socket and spaced away from the magnet.

General

PUSH-BUTTON TUNING

Drift-Proof Adjustment

A method of setting up broadcast station automatic selector buttons which will assure drift-proof adjustment is to screw the iron core all the way out and then turn slowly inward until the desired station is tuned in.

★

F-M RECEIVERS

Replacement of Components

When servicing f-m receivers and especially when replacing parts, care should be exercised to return all components including wiring to the original position occupied in the chassis. The positioning of parts and wiring is very critical. When replacing coils or i-f transformers, maintain the lead lengths provided and use the same terminals to which the original coil or transformer was connected.

★

PUSH-BUTTON SWITCHES

Tarnished Contacts

Proximity of rubber-covered wires may produce tarnish on the silver-plated push-button switch contacts. This condition may be remedied by wiping the contacts clean, and moving any adjacent rubber-covered wires or other rubber material away from the switch.

★

UNTUNED R-F SETS

Increasing Sensitivity

In models having an untuned r-f stage which is resistance-coupled to the 1st-detector, the sensitivity may be increased by changing the r-f plate load resistor to a higher value, between 6,000 and 10,000 ohms. This change is not recommended in metropolitan localities owing to possibility of cross-modulation.

★

HUMID CLIMATES

Transformer Breakdown

In some receivers, a 10-meg, ¼-watt resistor is connected across the +B circuit electrolytic capacitor to discharge it when the set is turned off. This eliminates any voltage difference (retained by the electrolytic capacitor) between the chassis and the i-f and a-f transformer primaries while the set is off, and therefore reduces transformer breakdown due to electrolysis in humid climates.

MINIATURE TUBES

Removal Precaution

When a miniature tube is removed from its socket, the tube should be pulled straight away from the socket without rocking motion. Rocking the tube in its socket produces a transverse pressure on the base pins which may crack the glass base. Keep this in mind when you're working on one of these coat-pocket jobs.

★

Hum

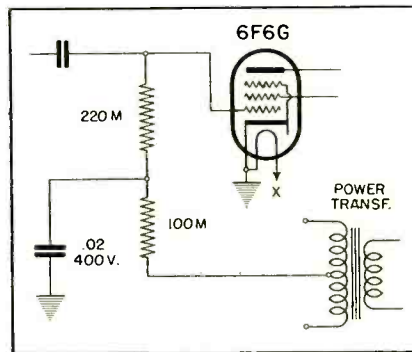
6AD7-G TUBE HUM

Occasionally a type 6AD7-G tube may have internal leakage which produces hum in the receiver. This leakage may be of such a high value that it is difficult to measure, and such tubes will test OK in a tube checker. When this condition is encountered, the tube should be replaced.

★

POWER-TUBE HUM

In some sets the 6F6G grid resistor was 470,000 ohms. The hum level in



these sets can be reduced by replacing resistor with one of 220,000 ohms and the addition of a 100,000-ohm resistor and .02 mfd., 400-v. condenser, connected as shown.

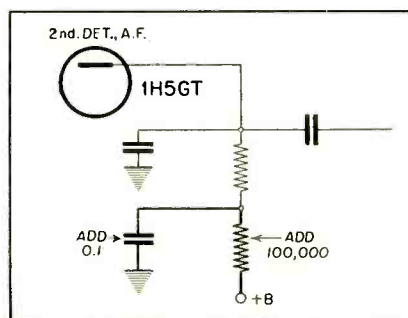
★

A-F TUBE HUM

Occasional cases of hum in some 3-way sets may often be reduced by application of the following:

Shield the 1H5GT 2nd det. a-f tube by means of a tube shield securely grounded.

Insert a filter network in the 1st

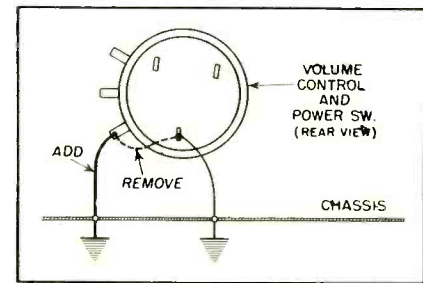


audio plate circuit as shown in the accompanying diagram.

★

RESIDUAL HUM

In some instruments the ground return of the volume control is made to a



lug on the power switch, and has a mutual path through several inches of lead with the power circuit. This introduces a certain amount of hum into the first audio stage input. Hum due to this cause can be eliminated by removing the present grounding lead of the volume control from the power switch, and connecting it directly to the chassis, as shown.

★

HUM MODULATION AND HOWL

Tendency of occasional receivers towards hum modulation and howl may be alleviated by:

Rubber-mounting the loudspeaker by means of rubber grommets.

"Rigid-izing" loop antenna by taping winding in six places (2 each side, 1 top, and 1 bottom), using cellulose ("Scotch,") tape.

★

Phonograph

RADIO BREAK-THROUGH ON PHONO

Radio break-through may occur in some models, due to capacity coupling between the i-f 6SK7 plate lead and 6F6G grid leads. When this condition exists, dress the 6F6G grid leads down against the chassis well away from the 6SK7 i-f plate lead.

★

RECORD PLAYERS

Connecting Switch

To avoid hum in connecting a record-player switch to ac-dc sets in which the common negative wiring is insulated from the chassis, the shielding on the record-player switch should be connected, through a 0.25-mfd condenser, to the common negative wiring, *not* to the chassis.

★

PHONOGRAPH PICKUPS, CRYSTAL

Unaccountable Distortion

Distortion on loud passages which cannot be traced to any other source may be due to a loose crystal cartridge.

(Continued on page 25)

The RADIOFRONT

KARL A. KOPETZKY

Coming Events Cast Shadows Before . . .

TO our desk the other morning came the small magazine of a contemporary. Entirely devoted to serviceman's parts business, it foretold in profound words that the editor of that paper had found what he called a "trend" by watching the automobile industry. Thanks for the lift, fellow. The readers of this column learned that "oldie" long ago. They have been using it for months and months. They have been able to prognosticate as well as we have. And they have been getting the right answer, too.

For the benefit of that editor, it's not a trend. The Government has not changed a bit, even with the advent of War, and still does things in the "groove." They figure what is good for one industry, will work for another. Witness the typewriter situation. We recall just the same type of order for automobiles and for radios. Don't you?

Well, perhaps radio replacement parts may be next. In spite of the howls of the "misunderstood" manufacturers; in spite of the bromide that "President Roosevelt wants radios to be kept in good repair so that he can reach the people"; in spite of the often-repeated statement by radio's representatives that radio is a "necessity," *parts will be curtailed* to some extent. Remember, auto repair and replacement parts are already on a limitation basis.

CARRYING ON

WPB release 459 leaves the radio service-dealer and replacement parts manufacturer out on a limb. Let's quote from, and try to analyze this War Production Board order. We quote: "March 7, 1942. The War Production Board today ordered the manufacture of radios and phonographs for civilian use to be discontinued after April 22, 1942. The plants may complete sets on which they begin assembly work on or before April 22, 1942, under the limited production quotas provided for in the original order (L-44). They may also continue to make replacement parts. . . . The provision in the order for the continued manufacture of replacement parts will enable the bulk of the existing home receivers to be kept in efficient operating condition during the war."

Sounds good, doesn't it? *But*, do you note the *joker*? (The word is italicized

advisedly.) Radio replacement parts manufacturers are still struggling under what is in effect the original OPM order and its amended versions which specifically placed the production of civilian radio products under Classification B-7. What jobber can get even reasonably good delivery schedules on parts rating an A-10 which applies to repair parts required for maintenance of existing equipment engaged in speeding up defense orders?

Suppose you were told to go out and buy all the bubble gum you wanted, and then you found that there was no bubble gum to be had because no one could make it due to the impossibility of obtaining the needed ingredients? Would you feel better because you had the permission but not the possibility of buying the gum?

Zero added to zero still equals zero in anyone's language, and that just about represents the status of the radio serviceman at this moment.

However, we are given to understand by WPB and OPA officials that a study is now being made so that effective measures in the interests of radio repairmen can soon be effected.

As a straw in the wind, orders have come through from Boss Nelson (He's doing one grand job, too, isn't he?) that no more copper wire can be furnished without at least an A-10. The same restriction has been applied to toggle switches. Next will come the end-products of copper, such as transformers, potentiometers, tube sockets, etc. Under consideration also is the variable and electrolytic condenser. These will very soon join the "100% Priority Club."

If that isn't curtailment, brother, we don't know what is!

What to do?

Two ways are open for the serviceman to stay in business. One is to gather unto himself as many priority certificates as he can, and use them to get parts. This, of course, is not workable except for those servicemen who are doing repair work in defense plants, for utilities, police radio departments and the like. The other way is to hoard all the old, broken-down midgets and trade-ins. Break these down, test all the parts and "return them to stock" to be used again. There may be a bare chance that when the smoke clears away, the serviceman may be able to swap these old parts for new

—sort of a "prove - that - you - need - it deal"—or he may be able to use them as a basis to determine how many new parts he may be able to get.

This, gentlemen, is *war*! There is no room for complacency! We cannot tolerate those who throw monkey wrenches into the works merely because they feel that their business is suffering. Just remember that some of us—and we speak of the people of these United States—are dying in this war! Under the circumstances those whose only contribution must be to learn how to operate under difficulties, will get short consideration. We are all in this, you, and you, and *you*! We must all learn to "take it". And to keep one's business going in spite of trouble. To use some of that world-famous Yankee ingenuity to meet an unpleasant, even ruinous situation, is part of "taking it"!

We may state that at present the civilian radio industry is under the closest scrutiny by Uncle Sam. The Old Gentleman did not like the "scene" it put on when the shut-down order was discussed. He looks critically at those who are crying that radio service *must* go on. And that they *must* get out parts for that purpose. We agree with Uncle Sam. Service *should* go on, *but not at the expense of the war effort*! Millions of parts are needed for War Radio. It has been freely said that the industry will have to go much, much faster than ever before to turn out what the United Nations need, without even thinking of the civilian. That, then, is the situation. And that is what you servicemen will have to face, and overcome!

Can you do it? We'll just bet you can!

ODDS 'N' ENDS

The hams may—and please note we say, "may"—be allowed, under strictest supervision, to return to the air on 112mc and 224mc for work with the OCD, only. Their frequencies are being utilized by nearly every Government agency. To state what services are where would be to reveal what we think is a military secret! To the ARRL we say, "now is the time to start working on getting back what the hams had before the war". There seems to be a doubt in some Government officials' minds on this. They are of the opinion that 112mc and *higher* (Continued on page 23)

RSA NEWS



"Cooperation is not sentiment, it is an economic necessity"—Steinmetz

THE response of our entire organization to the recent request for their renewal dues has been overwhelming. Many paid the new two-dollar rate well in advance of the deadline. This mass activity involved a tremendous amount of extra work, and taxed the facilities of the National Office beyond capacity.

This is the spirit of the present-day RSA! Keep it up! We are extremely thankful for this heartening response. RSA can now go on to accomplish the greater goals it has set out to achieve.

To you, as radio men, essential ratings for replacement parts are of prime importance. The rate at which present stocks are vanishing is alarming, and we will soon scrape the bottom.

Then what? What will you do about it? What *can* you do about it? A greater RSA can be a potent force of action for *you*. Do your part to make it that force.

★

RSA RADIO COLUMN

RSA's Chicago Chapter runs a question and answer department in the *Chicago Herald - American*, titled "Your Radio Health Column." It's run for the benefit of the public, and with things as they are it should develop into a very important feature.

RSA, Chicago Chapter, runs a group advertisement in the same paper, as an aid to better servicing, and from what we hear, it has paid out well.

The day may come when National Headquarters will be in a position to underwrite all or a part of such advertising expenses; but in the meantime local chapters will find it a paying proposition to advertise the services of their members, and make arrangements for the publication of a question and answer column in the newspaper selected for the campaign. Most newspaper publishers can be made to see the advantages of such a department to their readers.

★

WORLD OF IDEAS

This is a world of ideas, and ideas put to active use are what make for progress and better living conditions.

Ideas today are of even more importance than in the past, for each and every one of us must resort to new methods of doing things under the altered conditions of the times.

In this respect, we should like to point out to chapter secretaries that many good ideas have been put to use by local groups, but many of these ideas have never reached *RSA News* where they could be acted upon by other Chapters; or if the new schemes have been reported, they have not been covered in sufficient detail to form a working basis for others who would be interested.

We'd like to see more along these lines in *Chapter News*, with more details of new plans and how they worked out. We're all in this together, and if you'll give us the dope on suc-



Oakley Otis, of Danville Chapter, somewhere in England, with friend.

cessful undertakings, the time will come when you'll find the other fellow giving *you* ideas.

Don't think for a moment that we're suggesting that you leave out the human-interest angle, for we're all interested in each other and our profession. But remember that many of the things that you report are of definite local interest, yet not necessarily of national interest. It's of interest to the local boys if John Smith gets married, because you local boys all know John Smith. But it's of no interest to the rest of us who don't know John Smith. On the other hand, if the same John Smith gets up at a meeting and proposes some new plan or idea for the betterment of servicing, then we're *all* interested in what he had to say and to know that it was John Smith or Bill Jones who said it.

Let's get more real meat into our reports from now on and be mutually helpful.

★

CHAPTER NEWS

Danville Chapter:

The RSA Hall was turned into a junkman's paradise and a janitor's nightmare at the last RSA meeting on February 26th. About 15 RSA men and Sea Scouts started wrecking old radios. About 25 sets were scrapped and there are about that many more left to be wrecked at a future meeting.

Due to sugar rationing, we can't get as much Coca-Cola as we used to get. When the RSA Pop Case is short on Coke, don't cut the Treasurer's throat 'cause it's not his fault.

The RSA Bowling Team is now bowling on Monday nights instead of Wednesdays. The beginners' league got too easy for them and they are now in the Civic League. Fast company, too. They have won one game so far, but they can't all get hot on the same night or the same game.

Oakley Otis is still in England and is getting along fine with his schooling. Oakley's wife hears from him regularly and is expecting him back in the U.S. *most any time now* (which means tomorrow or next year or 1945, just to put the Jerries off the scent). The accompanying photo was taken of Oak and a Mr. Beekman in England a short time ago (my, how the RSA photographer gets around!). Oakley says the town he is in is so quiet that they never know there's a war going on.

Steve Goth has two brand new tires on the front of his car! Of course, Steve purchased them BRF (Before Rubber Froze). And you can bet he keeps his garage locked!

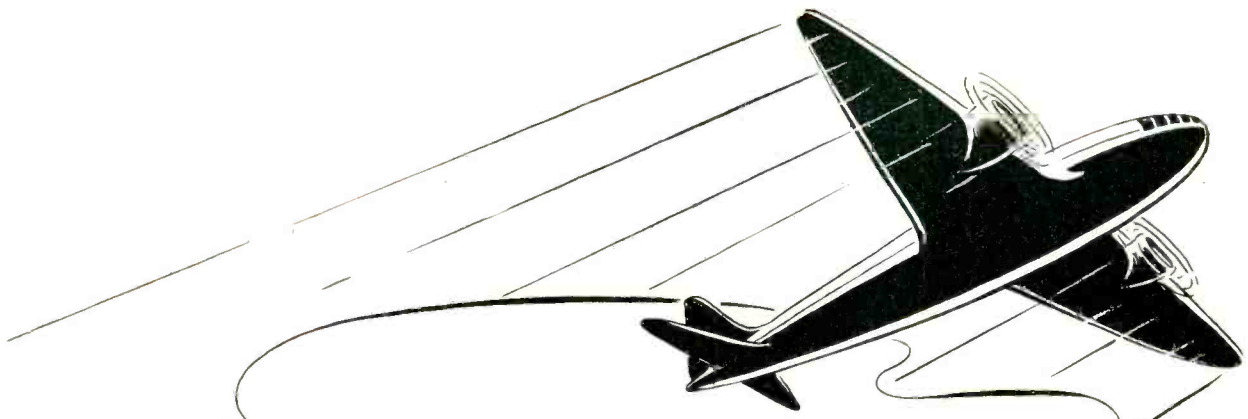
Charley Snyder was down from Hammond, Ind., last weekend. He's installing radios in Army Tanks now. George Frahm also works in the same department and plant with Charley.

From the "Serviceman's Dirt"

★

Wichita Chapter:

We certainly had a lively meeting Feb. 11th. In fact, our seating facilities were taxed slightly beyond capacity. The RCA Service Notes were arranged "cafeteria style" and the boys filed past, compiling their own manuals on the hoof.



**Keep 'em flying...
Keep 'em playing!**



It's vitally important to our Nation's Defense that most of the 60 million radio sets now in use, the thousands of sound systems and all electronic device installations that help speed-up war goods production, must be kept at peak operating efficiency.

Your task, Mr. Service-Dealer, will not be easy, even if sufficient repair parts and tubes are available. Prepare now so you will be able to do a lot of substituting and circuit revising with but a minimum of components. In this regard RSD will continue to lead the way in helping Service-Dealers. We'll publish especially prepared, exclusive articles and technical data showing how radio sets, p-a systems and electronic device installations may be repaired more efficiently, in less time, at greater profit.

This distinctive six-inch decalcomania lithographed in four colors (red, white, blue and gold) which will help your business, available FREE to all subscribers classified as Independent Radio Service-dealers on request.

Put your profits into Defense Stamps! Also, subscribe to RSD today and urge your associates to do likewise so they too will have a complete file of data every Service-Dealer will need and use during the months to come.

-----TEAR OUT AND MAIL TODAY-----

RADIO SERVICE-DEALER
132 West 43rd Street, New York City, N. Y.

Sirs: Here is my check (or money order) for \$.... Enter my subscription order to RSD for the next issues. (12 issues cost \$2.—24 issues cost \$3.) Canadian and Foreign subscriptions are \$3 annually. (Subscription rate for men in the U. S. Military Service—\$1.00 a year)

Name (print carefully)

ADDRESS FIRM NAME Est. 19.....

CITY STATE My position is, Owner Service Mgr. Serviceman

Please check whether firm is (If any other, state what it is)

- An independent servicing organization, we do not sell sets.
- An independent service-dealer (engaged primarily in service work)
- A service-dealer (does servicing, but is primarily interested in retailing)
- Selling, renting or servicing Sound Equipment
- Jobber Any other classification
- Manufacturer (State it)
- I belong to a serviceman's organization Yes No

We stock the following checked items:

- TUBES
- PARTS
- RECEIVERS
- BATTERIES, etc.
- SOUND EQUIP.
- ELEC. APP'L'S.

We own the following instruments:

- V-T Voltmeter
- Tube Checker
- Analyzer
- Oscillator
- Signal Generator
- Volt-Ohm Meter
- Others
- MANUALS

Our technical discussion hit a new high. We exhausted all the applications of Ohm's law, Kirchhoff's laws and Watt's law as they affect our work. We're going to take inductance apart at our next session, and Art Koop, our Vice President, is going to do the conducting.

Mack Lovern, Acting Secretary

★

Interstate Chapter:

The regular meeting of the Interstate Chapter was held at the LeClaire Hotel Apartment of our President, Edward H. Gordon, on Feb. 20th.

President Gordon stressed the necessity for a national organization at the present time, and it was decided to hold an open meeting in the near future.

Interstate Chapter nominated Edward H. Gordon as Director for the 5th District.

Considerable discussion on membership drive, price changes, membership dues and the shortage of materials and tubes.

After the meeting Mr. Gordon was host to a very fine four-course dinner, starting out with shrimp cocktail, for which we give Ed's mother full credit.

Next meeting is scheduled for March 13th.

Oscar W. Olson, Sec'y-Treasurer

★

Fremont Chapter:

The Fremont Chapter had one of the finest Annual Banquets in quite some time. We had a good crowd, who later really got steamed up over RSA. Maybe it was the steak dinner.

We have five new members, and nearly 100 percent renewal of old members—which indicates the growing strength of RSA.

We heard a timely talk by Mr. Goldman of the Cincinnati office of the U.S. Civil Service Commission. Mr. Owen Smith presented the speaker and followed him with a discussion on priorities and general parts conditions.

Robert M. Uhl, Secretary

★

Pittsburgh Chapter:

Our regular February meeting was held on the 12th in the Corporation Room of the Commonwealth Trust Co.

The request for men to operate Radar Equipment for the Navy was made by Pres. Bert Bregenger, and additional details were given by R. G. Devaney.

Our attorney, Samuel Avins, submitted a report on "Group Hospitalization" which is available to our members through the Hospital Service Association—a non-profit organization

sponsored by the Buhl Foundation. (*All Chapters ought to go in for Group Hospitalization. You never know when illness will strike. We got stuck with a lousy appendix that had to be yanked out—and we wish now, that the bills have come in, that we had had such insurance.*—Ed.)

The RCA Service Notes were given to all members, and 1942 Zenith Service Notes given to all attending.

The speaker at the March 12 meeting was Professor G. A. Scott, of the University of Pittsburgh, and his subject, "Electronics and Radio," opened with fundamental electronic theory. Future talks by the professor will deal with the more complex aspects of the subject.

R. G. Devaney, Publicity

★

Chicago Chapter:

Our chapter held an open meeting in the North Ballroom of the Stevens Hotel, on Feb. 25th. Prospects for the future of radio servicing were discussed in the light of anticipated conditions.

William Schoening, representing the NRPDA, presented the outlook as concerns the parts situation and the prospects for future supplies of essential components such as electrolytics, volume controls and tubes. He painted a rather dismal picture, but suggested that servicemen throughout the country write to their respective jobbers and outline customer requirements in the way of really essential repair parts. Mr. Schoening felt that this procedure might result in action in the proper government circles.

Collaborating with Mr. Schoening, and reinforcing his statements, Mr. Robert Miller, representing the Service Section of the Western Division of RMA, spoke to the gathering about the possibilities of essential parts curtailment to the manufacturer's Service Departments. In a great many cases in the future it will be practically impossible for a manufacturer to supply exact duplicate replacement parts; and servicemen must get used to the idea of making repairs with equivalent parts of the proper electrical values. With a war on and an all-out effort to increase military production, the serviceman should increase his knowledge and versatility in his repair work and his home-defense assignment.

The boys in the audience were asked to express themselves as to what they expected to do in the future, and it was evident that they feel like carrying on in spite of uncertainties. They expect to retrench as far as is necessary to keep up their shops (operating as service shops only, but they hope to be able to exist as independent operators at least another year.

All expressed willingness to cooperate with the government in the matter of alien radio problems, and in any other manner in which they could be of aid.

Mr. Al Schuster, a radio tube representative, remarked that the radio serviceman should keep his nose to the grindstone at the present time, remembering that the other factors in the radio industry are doing all they can to assure the serviceman's future.

Lowry E. Easley, Publicity

RSD RADIO QUIZ

WELL, how did you make out last month? Did we stump the experts? No? Then let's see if we can stump you this month. Give yourself 10 points for each question you get right, and see if you can hit better than 70, which is good.

1. What is another expression (not abbreviation) for "direct current"?

2. What does UHFI mean?

3. Explain the principal differences between a 2A3, a 6A3 and a 6B4-G tube.

4. What is a Radio Hammer?

5. In its normal operation in an f-m receiver, does a limiter tube draw grid current?

6. What is a Cathode Follower?

7. Can the human ear hear fundamental frequencies that are not reproduced by the loudspeaker?

8. What is an Ignitron?

9. Is there anything related to radio known as the "Tropical Swing"?

10. What, in the name of heaven, is a micron?

(Answers on page 30)

RADIOFRONT

(Continued from page 19)

should be enough for the hams later. They say that our greatly expanded Army and Navy will have to keep the present frequencies, because never again will this country be so under-powered! So watch out!

Following the expected curtailment in the production of parts, will come price ceilings on repair. Get your organizations ready, servicemen, to make a "good case" on the prices you think you ought to get for your radio repair work.

Rubber-covered wire for any purpose will be entirely out. Ditto silk-covered or even rayon-covered. Asbestos-covered wire will get scarce, too.

Antenna wire will be very hard to obtain. Also the flexible kind "you throw around the room". So save the stuff you get in trade-ins. Bell-wire, which started radio in about 1912, will go out, and the sets will have to work off the radiator (hot-water) without any sky-hook.

If Uncle Sam thinks he can take spare tires from you—and it seems that he can—there is no doubt he can take the parts off your shelf, if you have a large inventory. 'Nuff said!

The Treasury, we hear, is thinking of putting out a new sized bill, and after a time declaring the present ones without value. So don't think that you can hoard them. They will be as useless as *Confederate Shin Plasters*. Buy Defense Stamps!

And finally, we saw this significant line in a reputable information sheet privately circulated. "Donald Nelson & Leon Henderson are both acting on the theory that private interests must be sacrificed ruthlessly if they stand in the way of the war effort. They say the war will be won on the home grounds, and they do not intend to have any industry get away with doing civilian work as long as war work is needed."

Thought for the month: Keep your mouth closed—"Be smart, act dumb!"

SERVICEMAN'S DIARY

(Continued from page 16)

facturer to replace a slow-heater type 24 in these days is beyond me. It may have been that the Spanish accent and general appearance of the maid had something to do with it. In fact, there was no question about it.

"You know," Jerry was saying, "I've always wanted to learn the rhumba and, being born in the Argentine, you must know all about it. Why can't you

give me a lesson and I'll knock off the charge for the radio service?"

"Fine!" she replied, delightedly. "Now you just watch!" She started counting one-two, one-two, and going through the steps and hip motions of the rhumba. Jerry watched attentively, but I could see that this was not exactly what he wanted.

"I think," I interposed, "that my partner would like the opportunity of attempting to dance with you. If you keep one eye on his feet and are reasonably alert, you'll probably avoid getting your toes crushed."

"I'll be careful," she replied. And they danced for several minutes. Finally I reminded him that we had a

lot of work to do and he stopped, rather reluctantly, I'd say.

"Well," he said, "I guess we're about square all around. You've showed me the rhumba and I've got your radio working."

"You're so nice," she said prettily, "Please take this and buy a smoke for yourself and your partner." And she extracted a dime from a tiny, badly-worn purse and extended it to Jerry. I held my breath, knowing how Jerry feels about tips.

He took the dime and looked at it gravely for a moment. Then he smiled, thanked her and put the dime in his pocket.

(Continued on page 25)

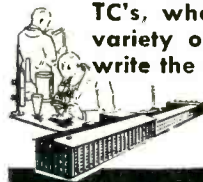


WINNERS

OF THE WORLD'S MOST CONVINCING

AWARD OF MERIT

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



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

SPRAGUE TC TUBULARS

"NOT A FAILURE IN A MILLION"

SPRAGUE PRODUCTS COMPANY, North Adams, Mass.

INDUSTRY ANSWERS THE CALL!

A WAR MESSAGE
to
ALL EMPLOYERS
From the United States Treasury Department

Wherever you live you are going to take the mightiest effort America has ever made—in men, materials, and money!

An important part of the billions of dollars required to produce our Army and Navy need must come from the sale of Defense Bonds. Only by regular pay-day investment of the American people can this be done.

Facing these facts, your Government needs, urgently, your cooperation with your employees in immediately enrolling each time his allotments accumulate to an amount sufficient to purchase a Bond.

You are under no obligation, other than your own interest in the future of your country, to install the Plan after you and your employees have given it consideration.

WHAT THE PAY-ROLL SAVINGS PLAN DOES

1. It provides immediate cash now to produce the guns, tanks, ships, and equipment of the Army and Navy.
2. It gives every American wage earner the opportunity for financial participation in National Defense.
3. By storing up wages, it will reduce the current demand for consumer goods and services.
4. It reduces the percentage of Defense financing that must be placed with banks, thus relieving our emergency financing in a sounder basis.
5. It builds a reserve savings fund for the post-war purchase of civilian goods to keep our factories running after the war.
6. It helps your employees provide for their future.

The voluntary Pay-Roll Savings Plan (approved by organized labor) provides for regular purchases by your employees of Defense Bonds through voluntary pay-roll allotments. All you do is build the total funds authorized from pay-roll allotments in a separate account and deliver a Defense Bond to the employee.

To get full facts on installing the Pay-Roll Savings Plan, write TODAY to:
Pay-Roll Savings Plan, Section B,
Treasury Department, Section B,
709 Twelfth Street, N.W.,
Washington, D. C.

U. S. Defense BONDS ★ STAMPS

This space contributed to National Defense by
YOUR NAME HERE

10-20190-1 0-0

32,145 Firms With Over 17,700,000 Employees Have Installed the . . . PAY-ROLL SAVINGS PLAN



Have YOU Started the Pay-Roll Savings Plan in YOUR Company?

Like a strong, healthy wind, the Pay-Roll Savings Plan is sweeping America! Already more than 32,000 firms, large and small, have adopted the Plan, with a total of over seventeen million employees—and the number is swelling hourly.

But time is short! . . . More and more billions are needed, and needed fast, to help buy the guns, tanks, planes, and ships America's fighting forces must have. The best and quickest way to raise this money is by giving every American wage earner a chance to participate in the regular, systematic purchase of Defense Bonds. The Plan provides the one perfect means of sluicing a part of ALL America's income into the Defense Bond channel regularly every pay-day in an ever-rising flood.

Do your part by installing the Pay-Roll Savings Plan now. For truly, in this war, this *people's* war, **VICTORY BEGINS AT THE PAY WINDOW.**

Plan Easy to Install

Like all efficient systems, the Pay-Roll Savings Plan is amazingly easy to install, whether your employees number three or ten thousand.

For full facts and samples of free literature, send the coupon below—today! Or write, Treasury Department, Section C, 709 Twelfth Street N.W., Washington, D. C.

MAIL THIS COUPON NOW

Treasury Department, Section C
709-12th St., N.W.
Washington, D. C.

We want to do our part. Please rush full information regarding the Pay-Roll Savings Plan.

NAME

POSITION

COMPANY NAME

ADDRESS

NUMBER OF EMPLOYEES

MAKE EVERY PAY-DAY . . . BOND DAY! U. S. Defense BONDS ★ STAMPS

This space is a contribution to NATIONAL DEFENSE by "Radio Service-Dealer"

When we got out to the car I spoke to him.

"Didn't you once say, and not so many hours ago, that we shouldn't ever take tips? And didn't you also say that you were setting the policies for our business and that business principles don't change and . . ."

"Yes!" he interrupted. "But circumstances do. That poor kid would have been only too glad to accept a tip if she had rendered a service to someone. And she treated us as she would have others treat her. You can't expect more from anyone."

I guess he's right, after all.

EDITORIAL

(Continued from page 3)

ernment officials—Uncle Sam will look with disapproval on any move to use up radio parts over and above those actually required to keep *one set* in every home in *satisfactory* operating condition.

Conservation is the keynote of the defense effort, and we warn you that opportunism has been put in moth balls for the duration. And if you don't think the public, as well as Uncle Sam, will resent "sales stunts" on your part, just go ahead and tie business to the tail of a "defense survey" and see where you end up!

SHOP NOTES

(Continued from page 18)

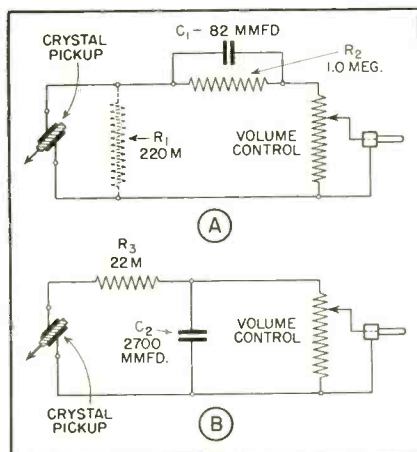
Examine the mounting and make sure that the cartridge is secure. If there is any play, the cartridge rather than the needle will vibrate where the record groove amplitudes are great enough to move a large mass.

★

RECORD-PLAYER ATTACHMENT

Tone Compensation

Because of the widely varying frequency characteristics of various types



of audio amplifiers with which a record-player may be used, it may be desirable in some cases to alter the pickup circuit to compensate for the characteristics of the amplifier. The accompanying circuits show means of making such refinements.

In circuit *A*, the resistor *R1* controls the low-frequency response; larger values of *R1* give increased lows. For maximum low-frequency response, remove *R1*. Resistor *R2* controls pickup output, smaller values of *R2* giving increased output. Condenser *C1* controls high-frequency response; to increase highs, increase the value of *C1*.

Where a decrease in high-frequency response may be desired (to reduce

needle scratch, for instance) circuit *B* is applicable. In this circuit, *C2* acts as a load on the pickup and is also a controlling factor on the high-frequency response. Smaller values of *C2* give more pickup output and also more highs. Resistor *R3* gives a sharper high-frequency reduction; increasing *R3* decreases highs.

The suggested values shown in circuits *A* and *B* should serve as a basis from which slight alterations may be made to suit individual cases.

★

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OUT APRIL 15th

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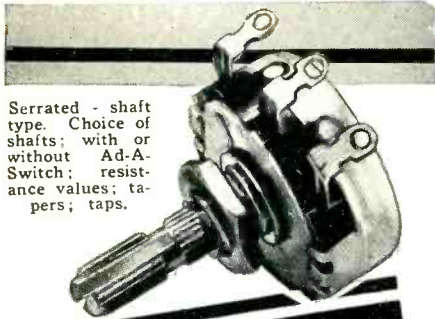
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CIRCUIT COURT

(Continued from page 13)

this method may be used in aligning any f-m set of similar design.

Discriminator Alignment—Connect the a-f output leads of the f-m receptor to any convenient audio amplifier, and connect an output meter (having a low range of 1 to 5 volts) across the voice coil of the speaker. Temporarily increase the gain of the 6SJ7 limiter by shunting a 2000-ohm resistor across the transformer. Apply a 4.3-mc signal to the grid of the limiter tube through a .05 coupling condenser.

When a frequency-modulated signal is used for aligning the discriminator, the adjustment is made for maximum output in much the same manner as the conventional alignment of a 456-ke (a-m) i-f transformer on an a-m signal; but if only an a-m signal generator is available for aligning the discriminator, the primary is aligned for maximum output and the secondary for balance or zero output, since one of the functions of the discriminator is to eliminate amplitude-modulated signals.

In tuning the secondary of the discriminator, there are three places of minimum response; 1) out of resonance, with the condenser too tight; 2) correct; and 3) out of resonance, with the condenser too loose. The proper minimum has the characteristic that the signal rises very rapidly as the trimmer is turned in either direction. The other two minima mentioned above do not have this characteristic and are incorrect. The trimmer farthest from the 6SJ7 tube (C29 in diagram and chassis layout) tunes the secondary of the discriminator and by slowly rotating this trimmer the point of minimum audio response will be found and will indicate correct alignment.

Now mistune this trimmer as little as possible, but enough to hear a signal and to obtain an output meter indica-

tion with which to align the primary trimmer (C28) for maximum response. Leaving the secondary trimmer C29 mistuned, to assist in the i-f alignment, move the signal input to the grid of the 2nd 6SK7 i-f amplifier, and align this stage, always reducing input as sensitivity increases so as to remain below the level at which the limiter works. Unless this precaution is observed, the resonance indication is broadened. In the same way align the remaining i-f transformers, finishing with the signal applied to the 6SA7 grid. The secondary of the discriminator should then be returned to minimum response, as previously outlined, and the 2000-ohm resistor removed.

Radio-Frequency Alignment—For reasons of stability, the oscillator in the f-m receptor operates on the low side of the r-f signal. Because of the high intermediate frequency (4.3 mc) there is no possibility of aligning the oscillator on the image.

If there is reason to believe that the trimmers are badly out of alignment, a very practical initial adjustment would be to adjust all three trimmers (C1, C3, C10) to a position about one-fourth turn from maximum capacity. Then apply a 48-mc signal (or equivalent harmonic of some lower frequency) to the antenna terminals through a dummy antenna of 200 to 400 ohms. Then set the dial pointer to 48 mc and adjust trimmer C10 (oscillator) to give maximum response of the 6U5 tuning eye. Align the antenna trimmer C1 and r-f trimmer C3 for maximum response in the same way and check the sensitivity at various points within the band. When properly aligned the antenna and oscillator trimmers are about one-fourth turn from maximum capacity with the r-f trimmer about two turns from minimum capacity.

WIRELESS RECORD PLAYER (FIG. 5)

While on the subject of remote operation, the new Silvertone Model

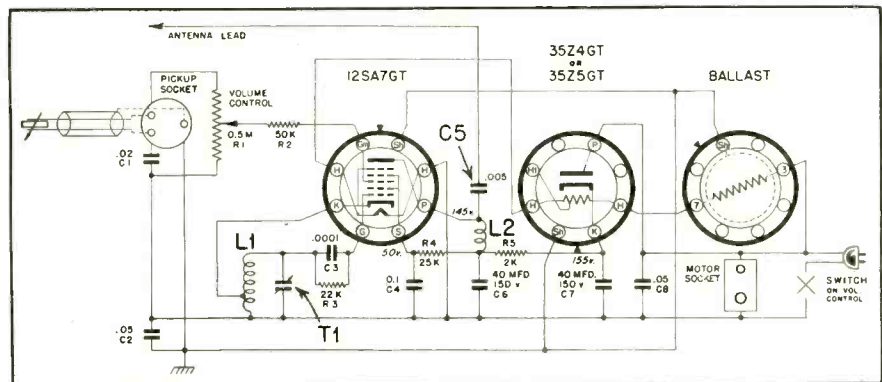


Fig. 5. Wireless record player with cathode-coupled Hartley circuit.

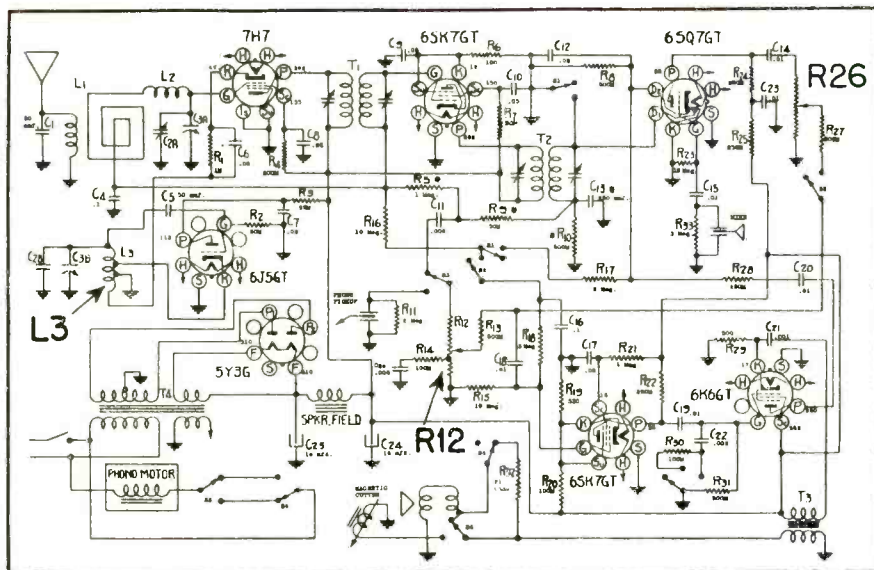


Fig. 6. Silvertone 7057 phono-radio-recorder. Note the two volume controls.

7063 ac-operated wireless record player is worth discussion. The complete circuit is shown in Fig. 5.

This unit uses a 12SA7GT in which the screen, cathode and oscillator grid are used in a Hartley oscillator circuit which may be tuned from 540 to 1100 kc by means of the trimmer *T1*. The output of this oscillator is electronically coupled to the plate circuit of the 12SA7GT which is loaded with a 2 millihenry choke *L2*. Amplitude modulation is effected by means of an audio signal impressed on the control grid. This signal serves to control the space current and the oscillator strength is not dependent upon modulation. Thus it may be seen that any energy radiated from the oscillator coil *L1* is not modulated. The modulated signal is radiated from an antenna capacitatively coupled to the plate of the 12SA7GT by means of the .005 condenser *C5*.

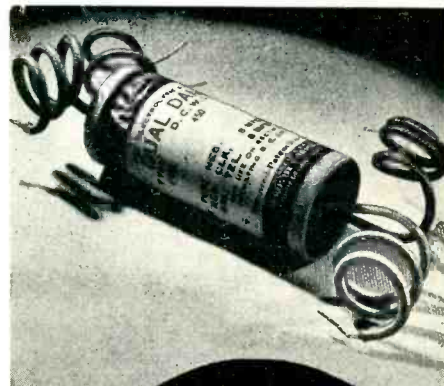
OSCILLATOR COUPLING (FIG. 6)

Separate oscillator and translator tubes are used in the Silvertone Model

7057 receiver, as shown in Fig. 6. Note that there are two taps on the oscillator coil *L3*; one for the 6J5GT cathode connection and the other connecting to ground. Then note that the cathode of the 7H7 translator tube connects to the lower end of oscillator coil *L3* and is grounded through the second tap previously mentioned.

Hence, the oscillator voltage is injected into the cathode circuit of the 7H7 by inductive coupling, the voltage being developed across that portion of *L3* in the 7H7 cathode circuit.

It will be observed that this job is a combination radio, phonograph and recorder of simplified design. A 6SK7GT is used as the a-f voltage amplifier for radio and phonograph, while the triode section of the 6S77GT is used as the microphone pre-amplifier, and feeding through the 6SK7GT. There are two volume controls, *R12* and *R26*, which permit mixing of mike output with phonograph or radio program.



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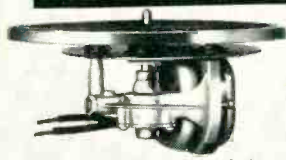
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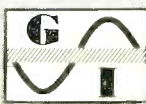
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RADIO SERVICE-DEALER

reports to the industry

In April, RSD enters its 3rd year . . . publishes its 25th issue. The industry we serve is entitled to an accounting of our progress and stewardship. Here it is:

1. In the past 24 months our *paid* circulation has risen from ZERO to nearly 8,000 monthly.* In that same period our competitor's paid circulation dropped from over 9,600 to less than 7,000 monthly and of this 7000 only 4300 are service-dealers.* RSD now leads all other radio magazines in paid circulation amongst Independent Servicemen, Dealers (who operate their own service departments) and Parts Jobbers.

2. In the past 2 years our distribution has averaged over 15,000 copies monthly . . . against 9,500 for our competitor. RSD has always been 1st in radio servicing industry coverage.

3. In the past 12 months RSD carried a greater \$ volume of replacement parts and instrument advertising than our contemporary.

4. During the past 2 years RSD published more technical data and more exclusive, timely circuit and servicing material than any other publication catering to radio servicemen.

5. During the past year RSD's exclusive editorial predictions about shortages, impending curtailment and changing market conditions have without exception come to pass. No other radio publication has such a successful record of prognostication. What better proof of RSD's realistic editorial policy could be asked?

6. Since World War II began, and particularly since the inception of Priorities, RSD representatives have worked closely with Government officials that the best interests of all service-dealers, parts jobbers and manufacturers might be served. RSD will continue its efforts in this regard.

To all subscribers, readers and advertisers the staff of RADIO SERVICE-DEALER says, "THANKS FOR YOUR VALUED SUPPORT AND COOPERATION." In consideration of that support we shall strive even harder during the coming year in your best interests.

RADIO SERVICE-DEALER

S. R. Cowan
Publisher

*Publishers' Sworn Circulation Statements available on request.

RADIO QUIZ ANSWERS

1. Uni-directional current.

2. UHFI is the abbreviation of an expression of English origin, meaning "ultra-high-frequency-indeed," and is used to differentiate between ultra-high frequencies in the neighborhood of 50 megacycles or so which were once considered high, and *really* high frequencies.

3. The 2A3 and 6A3 have different filament voltages but fit the same type socket; the 6B4-G takes an octal socket.

4. An RCA development, similar to what is known as a radio bombardier, used for firing TNT charges in airplane rivet cavities. The charge drives home the rivet.

5. Yes, during positive cycles.

6. A tube with all or part of the load in the cathode circuit, the coupling being from this point.

7. If all the harmonics of the fundamental are present, the ear groups them and, like putting Humpty-Dumpty together again, fools the brain into thinking it hears the fundamental.

8. The Ignitron is a type of mercury-arc rectifier employing a cold, pool-type cathode of mercury, said pool being "ignited" by a momentary spark.

9. Yes. The Tropical Swing goes by other names, too, but by any name it is a slow, rhythmic method of sending code with an ordinary hand key, with the dots and dashes given longer time intervals. The purpose is to over-ride static in tropical climates.

10. A micron is one-millionth of a meter.

AUTOMATIC BLACKOUT

See Front Cover

THE "electric eye," used for years to count traffic, open doors for busy waitresses, sort coffee beans according to color and do a dozen or more other jobs which previously had to be done by hand, has just come into a real wartime occupation, that of standing by as all-night guard for alert warnings of possible air raids. Focused on the street lights, which will be turned off the instant a warning is received in any city, the "electric eye" sounds an immediate warning and likewise turns off the lights in the home, store, display signs or wherever lights are to be extinguished to perfect a city blackout.

The idea originated with Andrew Tessier, who with his brother conducts a small machine shop in Schenectady, N. Y. and is engaged in wartime de-

fense orders. When war was declared, orders were issued to all people, including business houses, that lights must be extinguished within five minutes after an air raid warning. Tessier's shop is too small to afford an all-night watchman, yet he felt that it would be dangerous to put out his night lights. However, he tried it and the first night his lights were all out, his place was broken into.

It was then he hit on the idea of using a photo tube. He installed this at the window on the second floor of his shop, with the eye pointed toward the street light on the corner, and adjusted it so that whenever the street light went out, all lights in his place would go out. When the street lights came back on again, on would go his all-night lights.

The electric eye equipment, secured from General Electric, cost about \$30. It cost him \$10 more to install it, so for an expense of less than \$50, Mr. Tessier has an all-night guard on the lighting of his plant for the duration of the war, as against \$20 or \$25 per week he would have to pay a watchman to perform the same duty.

The setup which Mr. Tessier has installed could be used by merchants who cannot afford an all-night watchman, and it would mean good business for you. Since the war these merchants have been turning out their lights when they close their places of business at 6 o'clock at night, and thus have sacrificed whatever advertising might come from window shoppers during the evenings.

Get going, servicemen!

AROUND THE FIELD

(Continued from page 6)

NATIONAL UNION EXPANDS

The National Union Radio Corporation of Newark, New Jersey, have leased the entire tenth floor of the American Insurance Company Building

at 15 Washington Street, Newark, New Jersey.

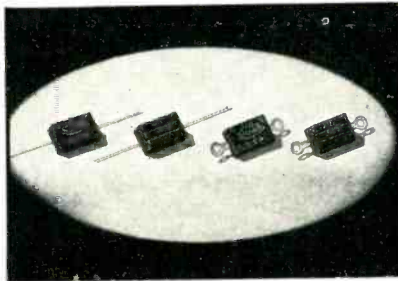
The Executive, Sales and Accounting Division of the corporation will be located at this new address.

This move has been brought about by the necessity of increased production.



SOLAR MICAS

Solar Manufacturing Corp., Bayonne, N. J., have announced a series of receiving-type mica capacitors of small dimensions. Type MK have flexible leads; Type ML are provided with terminal lugs, as illustrated.



Both types are available in 29 capacity ranges, from .00001 mfd to .01 mfd. Working voltages are 500 v.d.c. to .005 mfd, and 300 v.d.c. above .005 mfd.

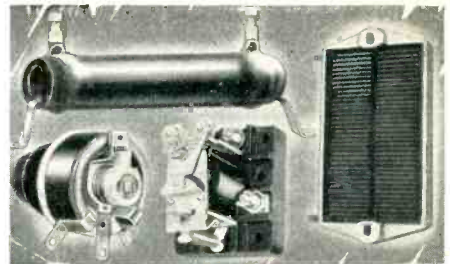
All types are molded in brown bakelite.



SOUND INSTALLATIONS

With commercial installations of RCA sound systems feeling the pinch of material shortages, installations of sound amplifying networks in war industries for communication and air raid warning uses has taken a turn to new heights.

Plans were recently completed for the installation of RCA Municipal Air Raid Warning Systems in _____, N. J., and _____, Calif. These systems will employ a signal generator producing a "warble" signal different from any fire, police or other type



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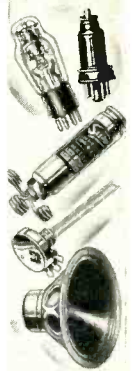
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alarm. Standard amplifiers, speakers and microphones round out the systems, with the power and number of amplifying stations varying with the needs of each individual city.

Operations are underway for the installation of another RCA Air Raid Warning system in Saks Fifth Avenue department store in New York, by the Commercial Radio-Sound Corporation of that city. 195 speakers mounted throughout the store provide, besides air raid coverage, facilities for issuing personal instructions, paging and reproduction of music.

The defense systems of many air fields in the _____, Calif., area have shown increased effectiveness since the installation of RCA sound equipment. Outdoor systems, which include weatherproof speakers, amplifiers and alarms, provide coverage to and from any point on the fields.

The placing of an RCA sound system on the firing range at Camp _____, Calif., by the Leo J. Meyberg Company of Los Angeles has resulted in a marked increase in the speed with which results of firing tests are transmitted back to the firing line. Ability to transmit instructions over a wider area than was possible before the advent of the sound system is noticeable.

SET OF THE MONTH

(Continued from page 15)

the 28-volt winding, the tuner unit 94 and the clock unit 87, it will be observed that the rotating clock unit contact will close the circuit to the field of the tuning motor through any one of the six tuner magnets (one for each of six stations). The same operation may be accomplished by closing any one of the six station-selector push-buttons.

Whether the operation is fulfilled by the clock mechanism or one of the station-selector push-buttons, the motor is placed in operation and rotates the gang condenser. The magnets are so

disposed and set up that the circuit to the motor is broken when the selected station is tuned in.

During the operation of the tuning motor, the 28 volts ac is applied to the diode plates of the 6SQ7GT tubes through the .05 condenser 43. The rectified voltage developed across the load resistor 52 is applied to the grid of the 6SQ7GT a-f tube, and biases it to cut-off so that the automatic function is accomplished in silence.

ALIGNMENT

Complete alignment data is provided in the accompanying chart. Trimmer locations are given in the sketches of Figs. 1 and 2.

ALIGNMENT CHART

OPERATIONS IN ORDER	GANG CONDENSER SET AT	DUMMY ANTENNA	BAND SWITCH SET AT	GENERATOR CONNECTED TO	ADJUST TRIMMERS NO.	GENERATOR SET AT
1	MINIMUM 1720 K. C.	.1 Mfd.	B. C	Osc. Mod. Grid.	1-2-3-4	455 K. C.
2	1720 K. C.	.1 Mfd.	B. C	Osc. Mod. Grid.	5	1720 K. C.
3	538 K. C.	.1 Mfd.	B. C	Osc. Mod. Grid.	6	538 K. C.
4	1400 K. C.	400 Ohms	B. C	External Antenna Terminal	7	1400 K. C.
5	5.7 MC.	.1 Mfd.	PO1	Osc. Mod. Grid.	8	5.7 M. C.
6	4.1 M. C.	400 Ohms	PO1	External Antenna Terminal	9	4.1 M. C.
7	12.2 M. C.	.1 Mfd.	S W	Osc. Mod. Grid.	10	12.2 M. C.
8	11.0 M. C.	400 Ohms	S W	External Antenna Terminal	11	11.0 M. C.
9	11.0 M. C.	400 Ohms	S W	External Antenna Terminal	12	11.0 M. C.

Volume Control set at Maximum Tone Control set in Treble Position

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