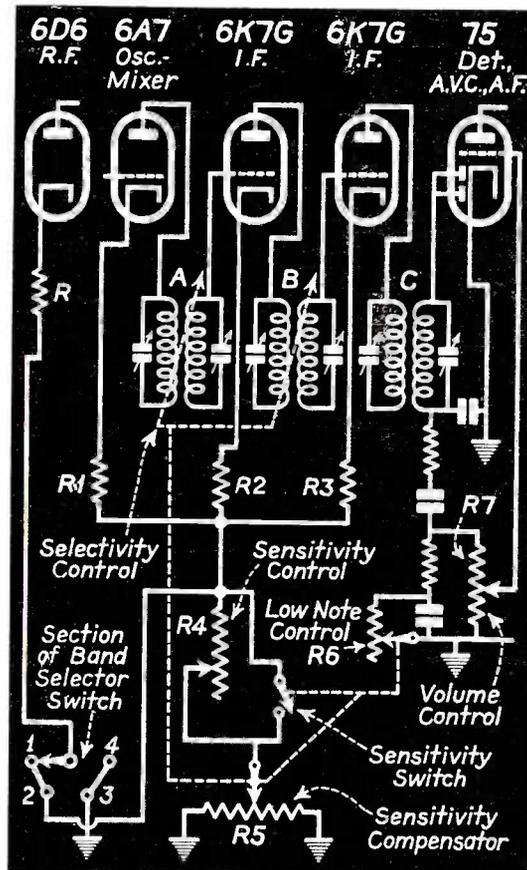


SERVICE



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Selectivity—High-Fidelity Control Circuit

(See Page 550)

DECEMBER
1935

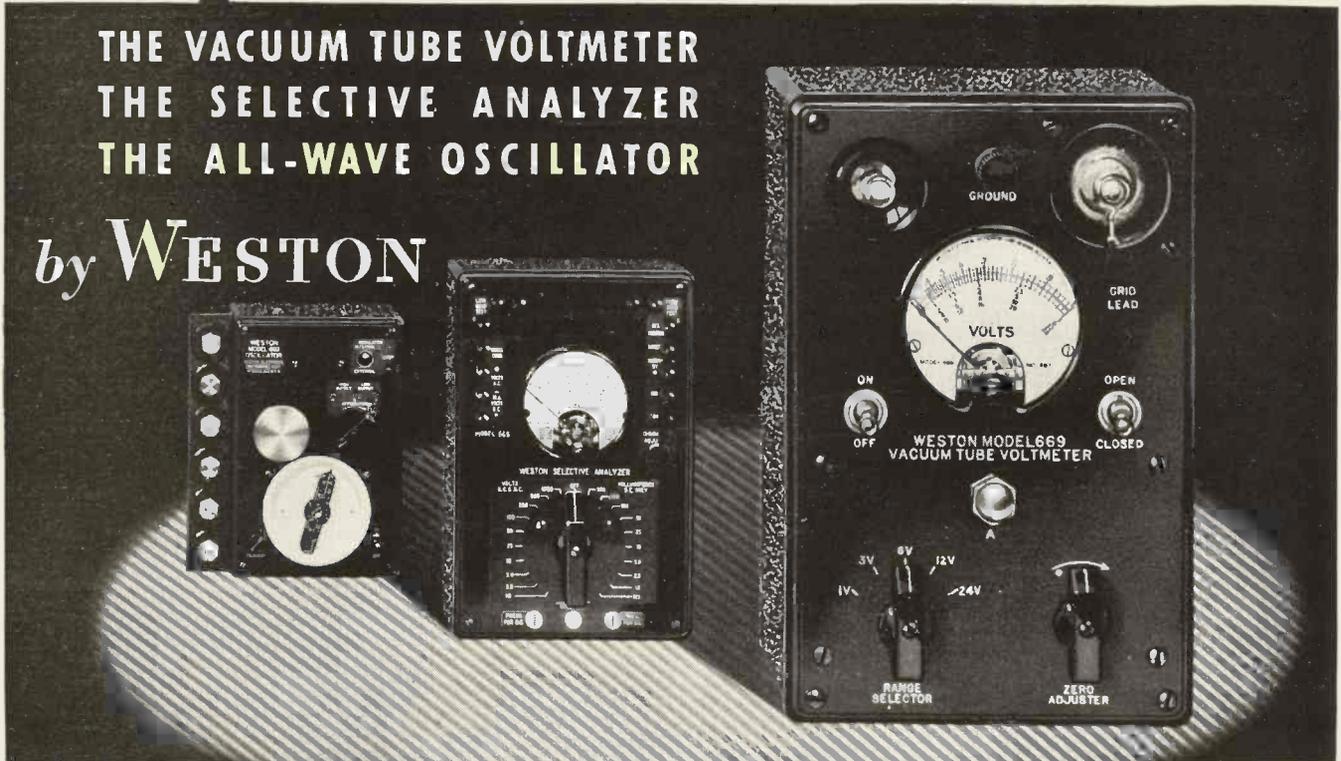
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Nothing can surpass this group of servicing instruments . . . from a standpoint of *efficient* servicing, or profitable servicing.

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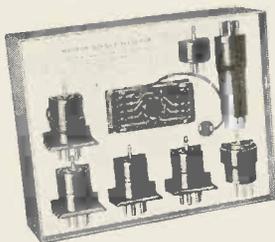
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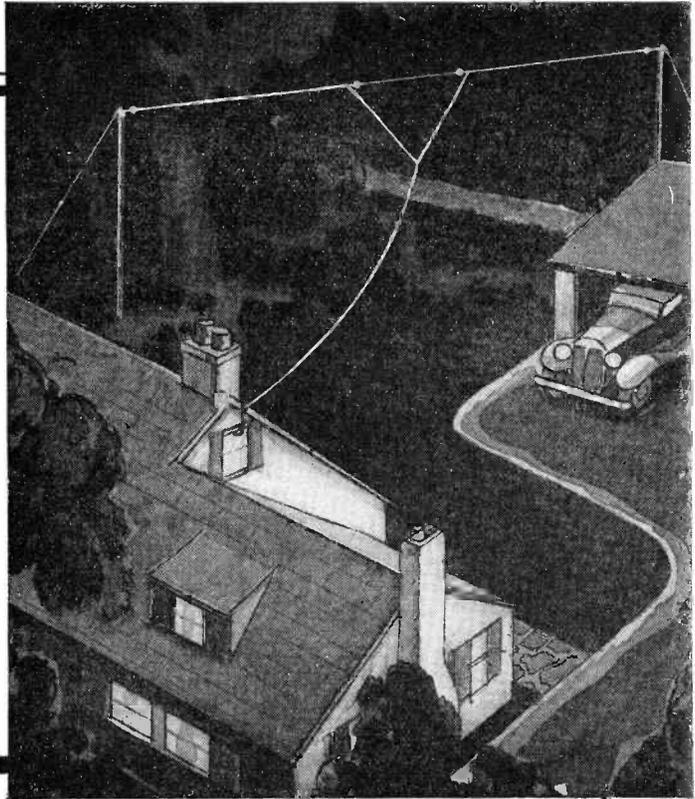
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See your G-E Radio Distributor for additional information or write to Section R-7812, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

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The Original Metal-tube Radio

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SERVICE

A Monthly Digest of Radio and Allied Maintenance
Reg. U. S. Patent Office. Member, Audit Bureau of Circulations

Vol. 4, No. 12
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Experimenter Amateur Call
Serviceman Employed by dealer
Independent

Member Service Organization
NAME
ADDRESS
CITY STATE
NAME OF JOBBER
ADDRESS

THE ANTENNA . . .

ALL-METAL TUBES

THE ALL-METAL TUBE has come into its own. From now on these little "iron bottles" are going to play an important part in the shaping of the entire radio industry.

No doubt some of the first-production metal tubes were not what they should have been, but it is a tribute to the tube-design engineer that the deficiencies of the metal tube have been eliminated. The metal tube of today is a practical device, and when we say practical, we mean that it is altogether suitable for use by the public.

It has been said that the metal tube was designed with no consideration given to its mechanical properties. This may or may not be so, but the fact remains that the metal tube of today is quite a different device than the metal tube first introduced in April of this year.

For one thing, leakage at the points where the Ferrico eyelets pass through the header, has been eliminated by brazing each eyelet. A small ring of copper is dropped over the sleeve of each eyelet and the header passed through a furnace with a temperature high enough to fuse the copper around each eyelet.

The elements and supporting members of a metal tube are much closer to the base or header than they are in the glass tube. Moreover, the glass beads through which the leads are passed, are only a fraction of an inch above the surface of the header. In the first production tubes, trouble was experienced due to vapor from the flashed getter condensing on the glass beads and lower mica spacer. This condensed vapor produced numerous leakage paths across the surface of the glass beads and also across the surface of the mica spacer. Though a metal shield was, and still is, used in each tube to prevent the vapor from reaching these insulation points, it still manages to collect in the lower parts of the tube where the getter is flashed.

The above problem has been solved by spraying both the glass beads and the mica spacer in each tube with a liquid ceramic. When this liquid dries, it forms a pebbly surface which, if magnified, would appear like a series of mountain ranges with deep valleys. The result is that any vapor that may condense on the beads or mica spacer, can condense only on the "mountain peaks." Since the peaks are separated by comparatively deep depressions, the condensed vapor cannot form a continuous conductive path.

Grid losses have also been greatly reduced. A new molded material is now being used to insulate the grid cap from the shell of the tube. The insulation now presented to weak signal voltages may be said to be as good as the insulation presented by glass.

These are but a few of the improvements that have been made in metal tubes. The ones we have dealt with will serve to indicate that the tube engineer has been right on his toes from the very start. It is surprising indeed that he has been able to whip the problems in such short order. It speaks well for the future to say the least.

The Service Man may continue to run into "bad actors" among metal tubes, but he can rest in the assurance that the new "iron bottles" will be good troopers.

SPRUCING UP

THE FIRST THING you know it will be 1936. If you're like the average mortal, you'll probably make a bunch of New Year's resolutions, some of which you'll keep, but most of which you'll forget the morning after.

But, you might think about sprucing up your test equipment whether or not you are addicted to resolutions. When we say "sprucing up," we mean getting the equipment in shape for the servicing of the 1935-1936 sets, which, in turn, means getting more accuracy into analyzers, capacity and resistance bridges, test oscillators, etc.

For, what you will need this coming year will be accuracy, and plenty of it—accuracy particularly in conjunction with the all-wave signal generator.

And it is necessary that such accuracy as the various devices may have be maintained. Every instrument should be checked and calibrated periodically. The average Service Man can do this in his shop without much difficulty.

You can't hope to do good work if the equipment you use is inaccurate.

• • •

CHECK-UP

WE HAVE RUN into all sorts of definitions of the radio Service Man, some of which have been good and some pretty poor. But, no matter how good any such definition may be, we doubt if it can help the business of servicing.

On the other hand, it might be very valuable if the Service Man knew just what sort of a fellow he is—in the aggregate, so to speak. If he knew just what his attributes and his shortcomings were, he might be able to get along better in the field.

Look at it this way: The average man follows his inclinations; the factual man may turn out to be a butcher or a doctor, depending upon which way the wind blows for him; the sensitive fellow may become a poet or an artist; while the fellow who is born curious, may turn out to be a physicist or, the Lord forbid, a Peeping Tom.

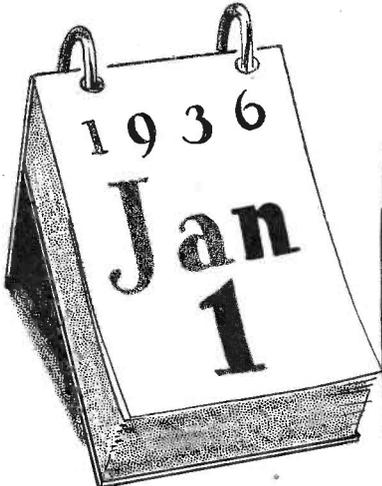
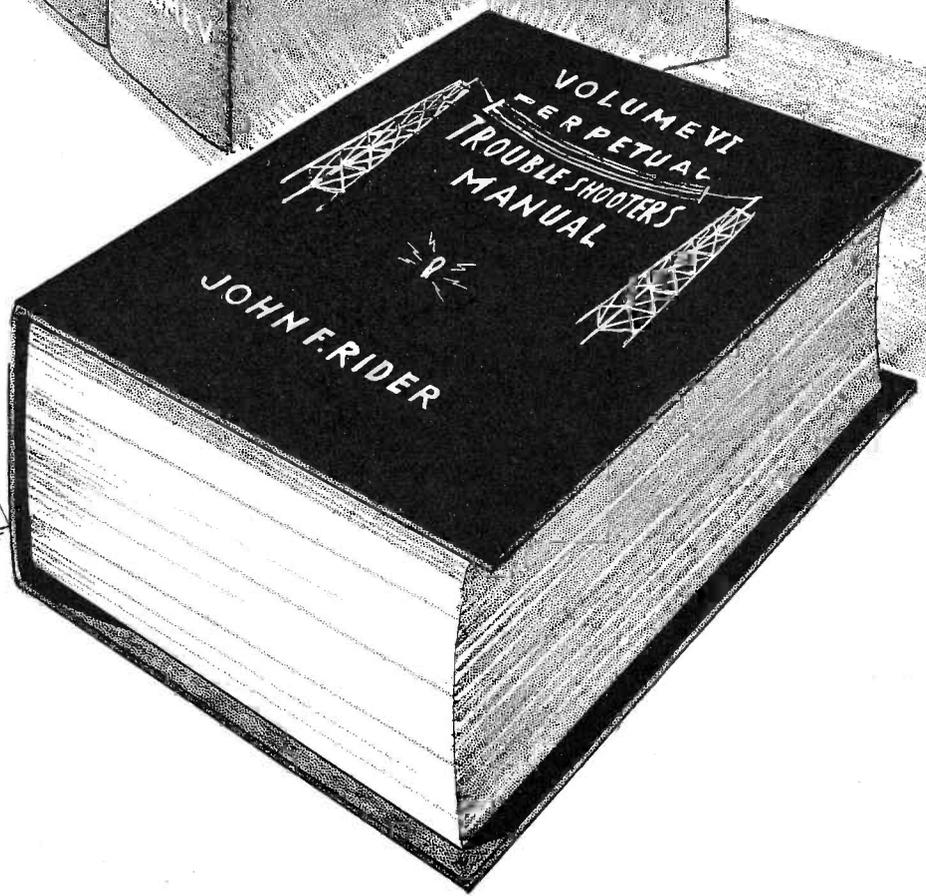
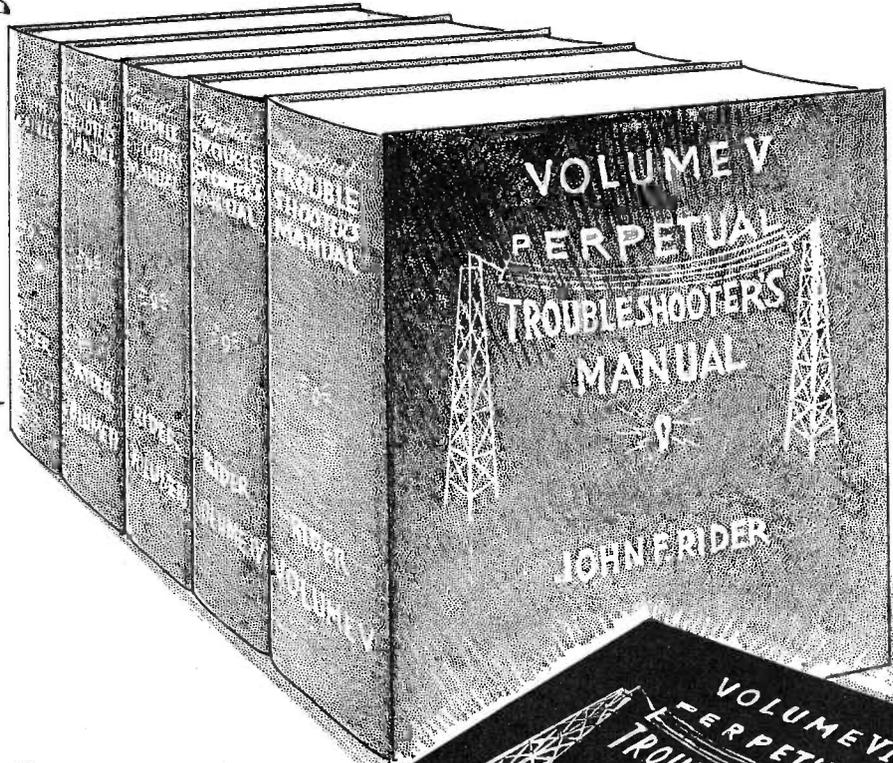
Maybe you fellows are all different, but we have a hunch that most of you have a great deal in common in so far as personal characteristics are concerned—else you wouldn't be Service Men.

Are you a Service Man because you have a thirst for knowledge? Or because you are imaginative, and radio happened to grip that imagination? Or because as a child you took clocks apart to see what made them go? Or why?

We'd like to know, and if you fellows will give us the low-down, we should be able to work up a very interesting "composite" individual typical of the average Service Man.

Come on—let's see what you're made of!

Resolved

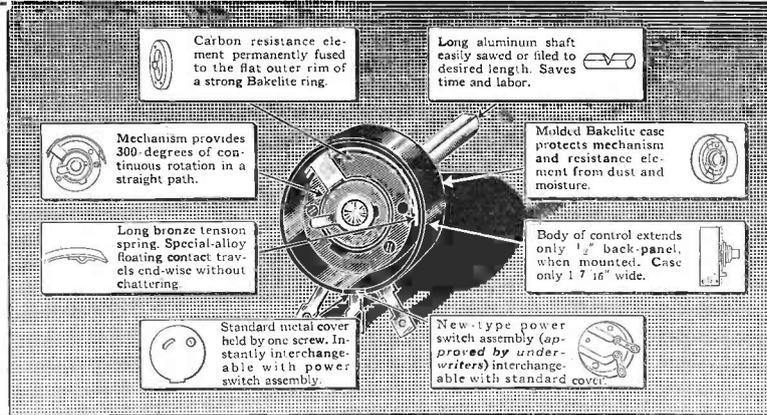


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RESISTOR SPECIALISTS IN RADIO AND ELECTRICAL INDUSTRY SINCE 1923

New ELECTRAD CARBON VOLUME CONTROL

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**METAL,
BAKELITE
and
CARBON
Construction**



Mechanically
**SMOOTH
and
STRONG**

Electrically
**QUIET
and
EFFICIENT**

SMOOTH · · QUIET · · LONG-LIVED

The DIRECT-CONTACT, CARBON VOLUME CONTROL With ONLY ONE MOVING UNIT

SIMPLICITY is the keynote of Electrad design—simplicity which performs efficiently without waste motions.

Direct floating contact on the carbon resistance element, with only one moving unit in the entire assembly, mean freedom from mechanical complications—no gadgets to go wrong. They also mean longer life, *more positive and finer variation of current regulation.*

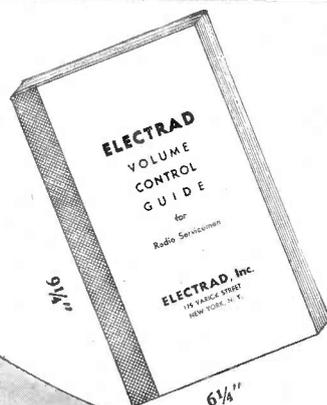
With nothing but established electrical materials—Metal, Bakelite and Carbon—in its construction, the Electrad Volume Control is immune to changes in resistance value or variation in resistance curves caused by temperature, water, salt air or humidity.

The resistance element is *permanently fused* at high temperature (not merely dipped or painted) to the flat outer rim of a warp-and-wobble-proof Bakelite ring. The special-alloy floating contact is self-cleaning—polishes the carbon to icy smoothness—keeps it clear of dust. No skipping, leaping or stuttering to make noise. Electrad individually tests each volume control for noise before it leaves the factory.

Study the additional features in the above illustration and you will understand why Electrad *unqualifiedly guarantees trouble-free performance.*

Install the Electrad Carbon Volume Control in your next service job.

**Write For This
FREE New
VOLUME
CONTROL
GUIDE**



100 pages, listing in alphabetical order all receiver models for which Electrad standard or special replacement controls are made. Gives names of receiver manufacturers, model numbers, resistance values and list prices.

Mailed FREE if you send us the flap (showing specification and resistance) from any new-type Electrad Carbon Volume Control carton, together with your business letterhead or card. Address Dept. S-12.

175 Varick St., New York, N.Y.
ELECTRAD
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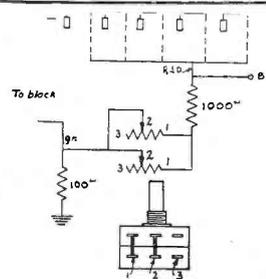


Diagram shows one of many special applications described in the **ELECTRAD VOLUME CONTROL GUIDE**. (See free offer on this page.)

Special Application of Electrad Control No. 200-T to the A.C. DAYTON NAVIGATOR RECEIVER

Due to the large power dissipation required of a control used in the circuit shown, volume controls in this position have been generally unsatisfactory.

Electrad, by using a tandem unit, has doubled the power rating of the control, thus assuring long life and excellent performance. The connections for this unit are shown in the accompanying diagram.

RESISTOR SPECIALISTS

Featuring:

**QUIET CARBON VOLUME
CONTROLS
VITREOUS RESISTORS
TRUVOLT RESISTORS
POWER RHEOSTATS**

Write Dept. S-12 for 1936 Catalog

SERVICE

A Monthly Digest of Radio and Allied Maintenance

FOR DECEMBER, 1935

PROFITS IN OLD SET CONVERSION WITH MODERN METHODS

By TOBE DEUTSCHMANN*

In this, the final article, Mr. Deutschmann describes two more practical conversions—the General Motors 120 highboy and the Victor RE-32—as made by an aggressive Service Man; and shows how best to capitalize the possibilities of this work through solicitation, advertising and display.

THE old story about the world beating a track to the shop of a man in the middle of the woods just because he made a better mouse-trap is a pretty tale—but that's about all. Certainly it has little significance in these competitive days, where the quality of one's product is only one factor in its sale, and is no factor at all unless potential customers can be made acquainted with it. Today, the genius with his A-number-one mouse-trap would starve to death in his sylvan shop, while somebody else with an inferior product, but an attractive window display on a busy corner, would prosper.

SERVICE A PRODUCT

In a sense, radio service is a product—a commodity. It should of course be a quality product. But a complete set of Rider's manuals, adequate knowledge, intelligence and adeptness with the analyzer and oscilloscope—all this will not, in itself, build up a successful service business. Like any other endeavor, if it is to survive, and then some, every reasonable and ethical advantage should be taken of advertising and publicity.

The modernization end of servicing has unique possibilities from the advertising angle—points that may be readily emphasized and which have selling power with millions of set owners—every set owner who is using a receiver purchased prior to the all-wave auto-

matic-volume-control days. There are more than five millions of them, and few Service Men, who have been in business over a year, who cannot point to a dozen or more such instances on his own customer list.

MAIN SELLING POINTS

It should be borne in mind that modernization is to be recommended only

RADIO MODERNIZATION I

Enjoy static-free programs
—listen to police calls all
over the country, select any
station you want between
13 and 550 meters, soothe
your ears and nerves with
fadeless programs.

In other words, enjoy modern reception on your present receiver at one third the cost of a new set. We guarantee work for one year. Estimate and demonstration cheerfully given—without obligation!

THE RADIO SHOP
111 Main Street - Phone M399

Fig. 1. An inexpensive ad that has proved its effectiveness in selling modernization jobs.

when the sale of a new set which would give results comparable to those of an efficient modernization job and from which new set sale the Service Man would profit, is out of the question. The amount of profit should also receive consideration. If the Service Man has the agency for the receiver sold, his profit will be adequate to justify the recommendation of a new set rather than modernization. However, when he has to split profits with a dealer, as is often the case, modernization will usually ring up more on the cash register, and should be prescribed regardless of how much money the client is willing to spend. The Service Man can do this in all fairness to his customer, for by choosing the proper chassis as the basis of modernization, any desired performance can be obtained at a lower cost. (It is of course always assumed that the client is satisfied with his original cabinet and that it is adequate for the contemplated modernization job.)

Regardless of the classification into which the prospect falls—old customer, new contact, etc.—or the type of advertising—direct, by mail, display, etc.—the following sales points should always be emphasized:

SALES POINTS

1.—Protection of the original investment. The majority of out-moded receivers were purchased during a time when the average cost of a set was well over \$100. Such receivers have practically no turn-in value, and in purchasing a new receiver, the owner is practically throwing away his old. As a matter of fact, many radio listeners have been deterred from buying new sets by the thought of how much they paid for their present equipment and how little they

*President, Tobe Deutschmann Corp.



Fig. 2. An attractive window display will be most effective in making the passerby modernization conscious.

can get for it. Such persons are most favorably inclined toward modernization.

2.—Many of the old receivers are housed in luxuriously beautiful cabinets, often custom built to conform with a certain scheme of interior decoration. Occasionally there is a sentimental attachment for the old set, which, as far as the owner is concerned, is represented pretty much by its externals. The entire works could be ripped out, but if the cabinet remains it is still his original set from an emotional point of view. This process (modernization) is a sort of radio face-lifting.

3.—Economy in first cost and in operation. If you select a reliable chassis as the basis of modernization, you can assure your customer of superior results at a lower cost than a new set. This is particularly true if you select a chassis which requires the Service Man to do at least a part of the construction work. Such chassis are necessarily less expensive, and the Service Man himself pockets a good bit of the

assembling costs. Old receivers are notoriously inefficient from an electrical point of view, and consume considerable electricity. It is not uncommon for such receivers to consume 200 or more watts, whereas a modern chassis, such as the Browning-35, consumes less than 70 watts.

4.—Results: Primarily this is what

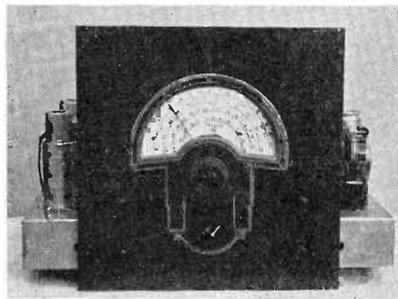


Fig. 4. The chassis and new panel ready for mounting in the General Motors cabinet.

the prospective customer is most interested in, or he would not be considering a new receiver or modernization of the old. The fascination and entertainment of short-wave foreign reception should be stressed, as well as the novelty of police and aircraft reception. Improved selectivity and sensitivity that will reach out and pull in distant stations on the conventional broadcast band—stations that can really be enjoyed, thanks to automatic volume control—are additional features to be mentioned. These advantages are best brought out in a demonstration.

5.—The reliability of a modern receiver should not be neglected as a sales point. The fool-proof character of such sets is a guarantee against costly service calls. This point can be stressed to particular advantage if the potential customer is a regular client and you have a record of repeated service calls with which to emphasize the argument.

THE BEST BET

The sales possibility of the highest potentiality is always a customer who

has called you in on a service job. His set is not working, and, momentarily at least, he is dissatisfied with it. Under such auspicious circumstances, a modernization sale is a relatively simple matter.

It is a good idea to remove the ailing receiver to the shop leaving a modernized receiver with the customer. This is always an excellent procedure at any time. It is a courtesy the customer always appreciates, and in this instance may serve a double purpose. As the customer is not being deprived of his radio entertainment, there need be no hurry in repairing the faulty set. Call him up in a day or so, and suggest modernization rather than repair, explaining that his old receiver can be made to perform exactly as the one he is now temporarily using, and with a concomitant improvement in appearance. Explain to him that you will make him an allowance on the parts removed from the old receiver.

Full advantage should be taken of this trade-in psychology. In the first place, the customer will not expect much. If the parts removed were of any real value, you wouldn't be taking them out. (It should be obvious that this is a different proposition than a trade-in allowance on the *whole* set against a new one. The customer will usually consider himself well treated if you allow him ten dollars for most of the chassis, whereas, he would be dissatisfied with a twenty-dollar allowance on the whole set.) Always offer the client a trade-in value of more than the parts are really worth to you, and tack the difference on to the bill for modernization. In other words, if you estimate you can do a modernization job for \$50.00, the net cost to the customer should be \$50.00 less a five-dollar allowance for the old parts, or a net price of \$45.00. However, it is better psychology to estimate



Fig. 3. The General Motors 120 highboy before rejuvenation.

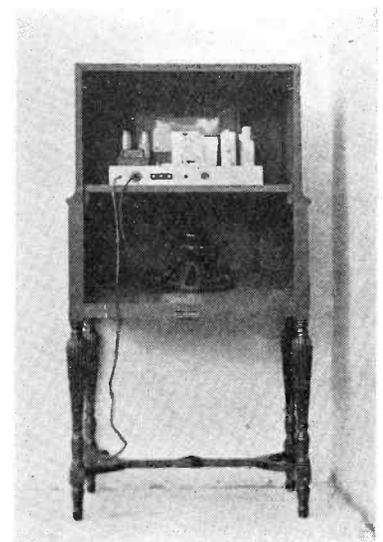


Fig. 5. Rear view of the completed job. The original speaker was retained.

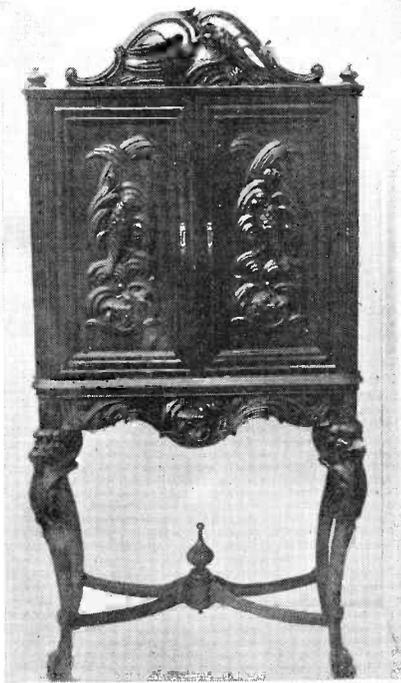


Fig. 6. The Victor cabinet alone represents a considerable investment which is protected by modernization.

the bill at \$55.00 and offer him a ten-dollar allowance—the net cost still being \$45.00, and your profit, obviously, is not affected. The psychology works as follows: The customer figures (more or less subconsciously) that he is getting quite an expensive job—in other words a quality proposition—which he can afford, nevertheless, because of the liberal allowance on the scavenged parts.

The next best bets are your regular customers—who, at the moment, are not in need of your repair services. From your records, which every Service Man should studiously keep, you can immediately ascertain the vintages of their present receivers. You have already established contacts with them, and, if you have done your work well and charged them reasonably, they will be favorably inclined toward your advice regarding the rejuvenation of their old sets. They should be circularized, preferably with personal letters, outlining the advantages of modernization as indicated a few paragraphs back. Do not malign or otherwise run down their old receivers. Rather the correct psychological approach is to praise the present equipment, indicating that it is a shame that so excellent a set should not be brought up to date.

POTENTIAL CUSTOMERS

Anyone who has an antiquated receiver is, of course, a potential customer for modernization. By conducting a radio census of your neighborhood, you can usually scare up a score or more such radio homes. Such a census con-

sists of a house-to-house canvass, which is a simple and not unpleasant task. As you have nothing to sell, no doors will be slammed in your face. The Service Man merely explains that a radio census is being conducted, and that all he wishes to know is the make and model of the receiver. This information will almost invariably be forthcoming when the person answering the door can give it. In many instances the Service Man will be invited in to ascertain the facts for himself. If the party contacted cannot supply the desired information, and indicates no willingness to obtain it or permit the Service Man to inspect the set, he or she can usually tell you the make of the receiver, approximate number of tubes and the year in which it was purchased—which is, in most cases, enough for the expert.

A list of potential customers can also be compiled by advertising a prize contest for the oldest radio in the neighborhood—offering as a prize a complete modernization job. Such a contest wings several birds with one stone. It advertises the Service Man, it advertises modernization and it contacts the Service Man with the most logical prospects for such work.

A more conventional advertisement, such as that in Fig. 1, is also effective. This ad has been attractively set up from standard type fonts, and your local newspaper can duplicate it. It has been designed for three-inch one column space.

A window display is always effective, and will draw well if the Service Man

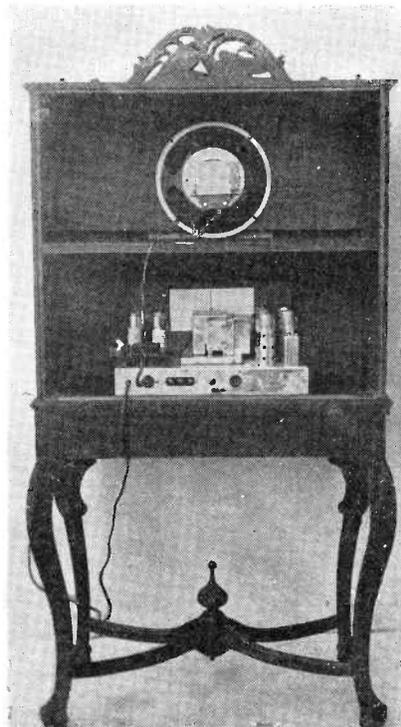


Fig. 7. Behind the scenes. The Victor RE-32 brought up to date.

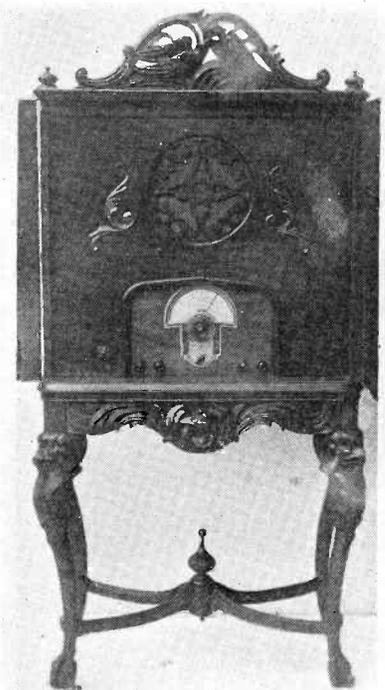


Fig. 8. Front view of the modernized Victor. The small panel is new, the larger one being retained from the original set.

is located on a busy street and has the space available. Such a display—which has resulted in considerable business for a Massachusetts Service Man—is shown in Fig. 2. The receiver in the window will be recognized as a General Motors highboy—which, incidentally, brings us down to the brass tacks of receiver modernization, and it's as good a receiver as any to start with.

MODERNIZING THE G.M. 120

This receiver is a popular—and expensive—example of a once-upon-a-time good set sadly in need of modernization. The original receiver is shown in Fig. 3—which may be contrasted with the modernized version displayed in Fig. 2.

The mechanics of modernization have been adequately covered in the preceding articles, so we shall confine ourselves to points special with this set. The chassis and speaker were first removed, followed with the chassis shelf which is fastened with four wood screws to cleats on the side. This shelf has a large opening in it which was partially closed with strips to accommodate a Browning-35 chassis. The original panel was removed—it is held by wood screws—and a new panel cut and drilled for vertical control mounting as described in the previous articles.

Fig. 4 shows the chassis and new panel ready for mounting in the cabinet, while Fig. 5 is the rear view of the finished job. The original speaker was

(Continued on page 550)

General Data . . .

General Electric A-70, A-75

Models A-70 and A-75 employ seven metal tubes in a superheterodyne circuit, giving the excellent selectivity and sensitivity inherent in this type circuit. Separate groups of coils are used for each frequency band. Ample undistorted output is obtained through diode detection and two audio amplifier stages.

The signal from the antenna is applied to the control grid of the 6K7 r-f amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The secondary of the coil for the band next lower in frequency to the one in use is short-circuited by the band switch to prevent absorption of energy at its resonant frequency which falls in the next higher band.

The amplified radio-frequency signal is impressed on the control grid of the 6A8 converter and oscillator tube through the r-f coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465 kc higher in frequency. The local signal is generated by the oscillator elements of this tube and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction

with the oscillator coil and padding capacitors. The oscillator section of the main tuning condenser, although of the same capacity as the other two sections, is larger physically to permit wider spacing of the plates, thereby reducing the possibility of microphonic feedback howl.

The combination of the signal frequency with the local oscillator frequency in the converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance. The intermediate-frequency amplifier consists of a 6K7 tube and two transformers, each with two tuned circuits.

The output of the i-f amplifier is applied to the 6H6 diode rectifier, which is a combined detector and automatic volume control tube. The direct-current component of the rectified signal produces a voltage drop across R-12. This voltage drop provides automatic bias for the r-f and i-f amplifier and converter tubes and so gives automatic volume control action. Full automatic bias voltage is applied to the r-f amplifier tube, while half this voltage, from the midtap of R-12, is applied to the converter tube and i-f amplifier, which handle a somewhat larger signal voltage than the r-f amplifier.

The manual volume control selects the

amount of audio signal applied through coupling capacitor C-36 to the grid of the 6C5 audio amplifier tube, and this regulates the output of the receiver. The output of the 6C5 tube is resistance coupled to the grid of the 6F6 power amplifier pentode. The plate circuit of the 6F6 is suitably matched to the loudspeaker by means of a step-down output transformer.

The tone control circuit consists of a .03-mfd capacitor connected in series with a continuously variable 0-100,000-ohm resistance across the primary of the output transformer. When it is desired to reduce the high-frequency output of the receiver, resistance is cut out of the circuit by operating the tone control knob.

Plate and grid voltages for all tubes are supplied by the power-supply system employing a 5Z4 full-wave rectifier tube which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

ALIGNMENT PROCEDURE

The receiver should first be allowed to run for fifteen minutes in order to reach its approximate normal operating temperature. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal at the alignment frequency from the test oscillator to the receiver and inserting a "Tuning Wand" into the coil involved.

In order to align these receivers properly, it is necessary to have available the following test equipment:

1. A modulated test oscillator with frequencies available of 465, 580, 1740, 6,000 and 18,000 kc.
2. An output indicator, such as a high resistance a-c voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp output indicator.
3. An alignment tool consisting of an insulating shaft with a small screw-driver blade.
4. A tuning wand.

The location of all trimmer capacitors, as well as socket voltages to chassis, is shown to Fig. 2.

I-F ALIGNMENT

Set the frequency band switch of the receiver to Band "B," short-circuit the antenna and ground terminals and tune the receiver at some point above 1500 kc so that no signal is heard. Set the volume control at its maximum position and ground the chassis.

The i-f amplifier is tuned to 465 kc; set the test oscillator dial at this frequency. Connect the test oscillator output between the converter tube (6A8) control grid and chassis. Connect the output meter across the cone coil of the speaker and adjust the test oscillator

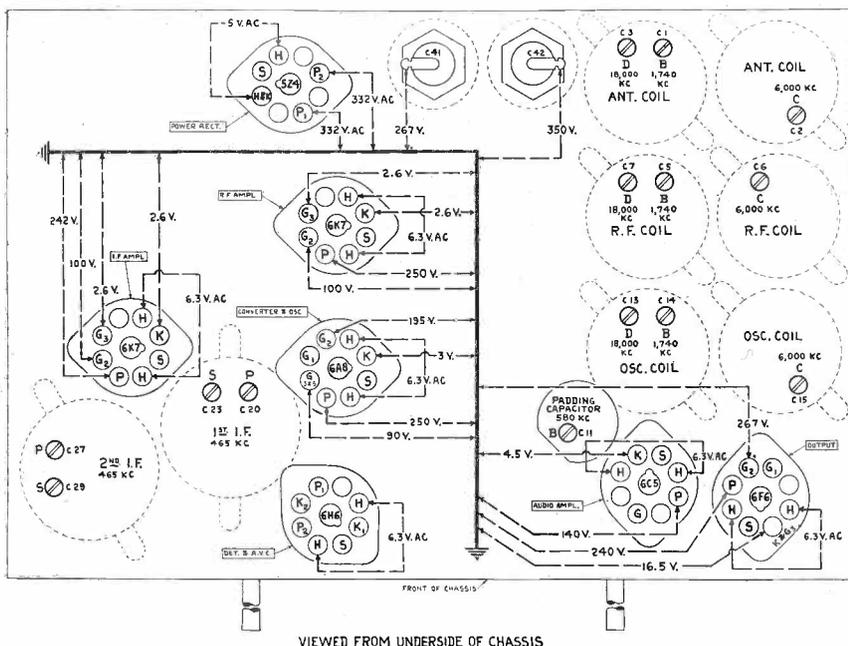


Fig. 2. Chassis layout giving tube voltages and locations of trimmers.

GENERAL DATA—continued

output control so that, with the receiver volume control at maximum, a small deflection is observed in the output meter. During both i-f and r-f alignment, the test oscillator signal should be maintained at the lowest level that will give a good readable output indication.

Adjust the secondary trimmer of the second i-f transformer until a maximum output reading is obtained. Maintain a small deflection on the output meter throughout alignment by adjusting the test oscillator output. Next, adjust the primary trimmer of the second i-f transformer for maximum output. Continue this procedure, adjusting the secondary trimmer of the first i-f transformer and lastly the primary trimmer of the first i-f transformer. After completing this procedure, repeat it a second time for final alignment. The i-f alignment will then be complete.

R-F ALIGNMENT

Band "B" requires four trimmer adjustments, while Band "C" and Band "D" each require three adjustments. Care should be taken to adjust only the trimmers of the band under test. Check the position of the dial pointer. Make

sure the antenna and ground terminals of the receiver are not short-circuited and connect to them the output from the test oscillator, preferably using a dummy antenna of 250 mmfd in series with 200 ohms between the test oscillator and receiver antenna terminal. Connect the output indicator across the speaker cone coil.

BAND "B"—540-1740 KC

Set the frequency band switch to the position where the dial indicates the above range. Tune the test oscillator to 1740 kc and set the dial pointer on the receiver to this frequency. Adjust the Band "B" oscillator trimmer for maximum output, keeping the receiver volume control at its extreme clockwise position and adjusting the test oscillator output to maintain a small reading on the output indicator. When optimum adjustment on the Band "B" oscillator trimmer is obtained, adjust the Band "B" r-f and antenna trimmers for maximum output.

Now tune the test oscillator to 580 kc and set the receiver to that frequency. Slowly rocking the tuning condenser back and forth through the signal, adjust the 580-kc padding capacitor for maxi-

mum output. When this has been done, return to 1740 kc on the receiver and test oscillator and recheck the alignment for maximum output. Band "B" should now be in alignment.

BAND "C"—1.75-6.0 MC

Set the band switch to the position where the dial indicates the above range. Tune the test oscillator to 6000 kc and set the dial pointer on the receiver to this frequency. Adjust the Band "C" oscillator trimmer for maximum output, using the first peak obtained when increasing the capacitance from minimum to maximum.

Check for the image signal which should be received at about 5070 kc on the receiver dial. It should be necessary to increase input to the receiver from the test oscillator for this check. Retune the receiver to the correct scale reading (6000 kc) and reduce the test oscillator output to its previous value. Then adjust the Band "C" r-f and antenna trimmers for maximum output.

BAND "D"—6.0-19.5 MC

Set the band switch to the position where the dial indicates the above range. Tune the test oscillator to 18,000 kc and

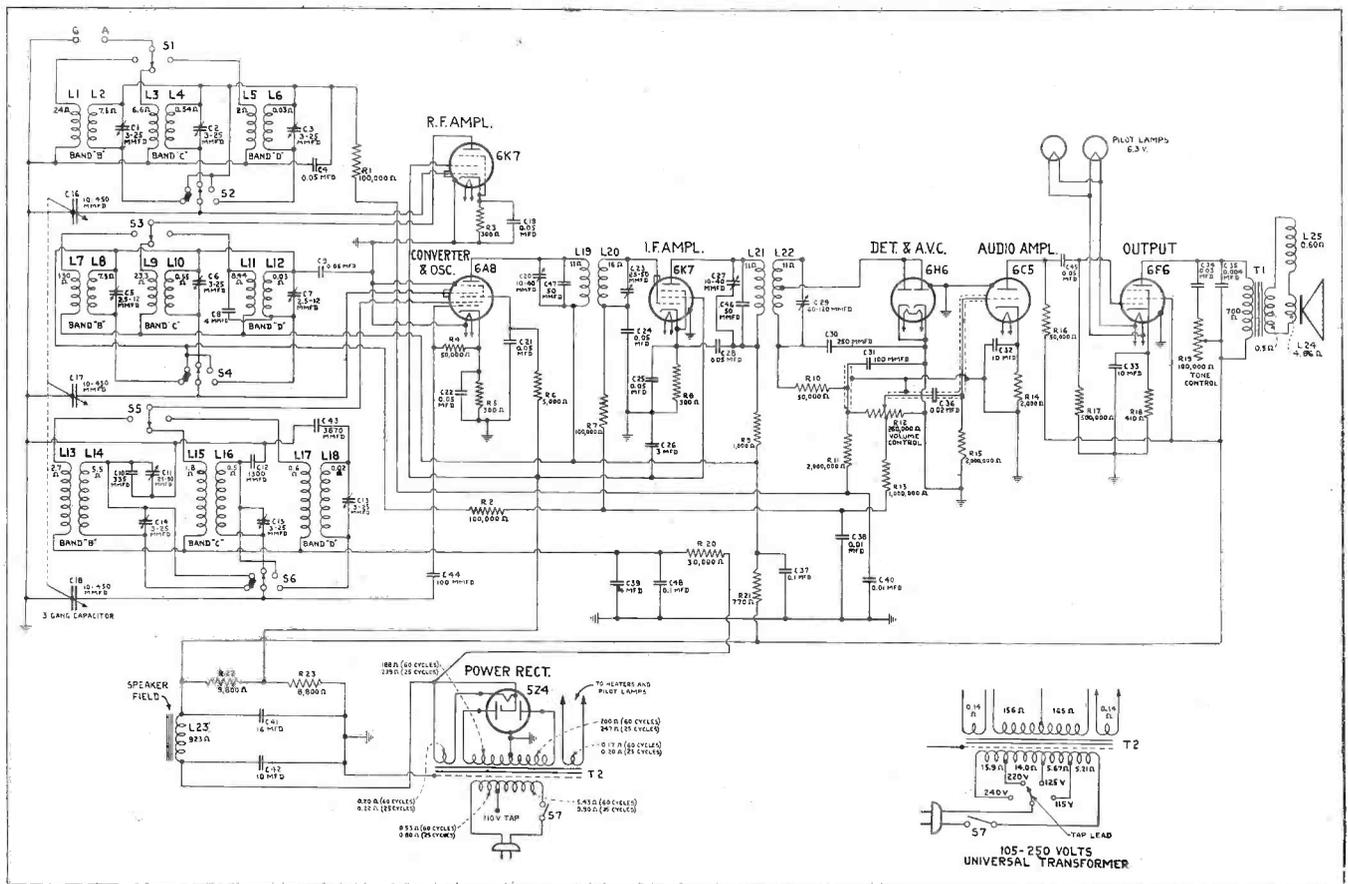


Fig. 1. Circuit used in G.E. Models A-70 and A-75.

set the dial pointer on the receiver to this frequency. Adjust the Band "D" oscillator trimmer for maximum output, using the first peak obtained when increasing the capacitance from minimum to maximum.

Check for the image signal which should be received at about 17,070 on the receiver dial. It may be necessary to increase input to the receiver from the test oscillator for this check. Retune the receiver to the correct scale reading (18,000 kc) and reduce the test oscillator output to its previous value.

Reduce the capacitance of the r-f trimmer to a minimum. While slowly rocking the tuning condenser through the 18,000-kc point, increase the Band "D" r-f trimmer capacitance until a maximum response point is obtained. The Band "D" antenna trimmer should next be peaked. It is not necessary to rock the tuning condenser while making this last adjustment.

Stewart-Warner Model R-134

This receiver is a six-tube, two-band superheterodyne. It covers the broadcast band from 540 kc to 1750 kc and the short-wave band from 2200 kc to 7000 kc. Each one of the bands may be aligned without affecting the other.

ALIGNMENT

During alignment the volume control should be set at maximum. Trimmer locations are shown in the sketch on the opposite page, and the order of their adjustment is given below:

- (1). First i-f (at 456 kc.)
- (2). Second i-f (at 456 kc.)
- (3). Repeat Nos. 1 and 2 if considerable trimmer adjustment was required.
- (4). Calibrate the broadcast band by adjusting trimmer No. 3 at 1400 kc, the signal being applied to the antenna input through a 400-ohm carbon resistor.
- (5). Align with trimmers Nos. 4 and 5.
- (6). Using a 600-kc signal, adjust oscillator padding trimmer No. 6 to maximum output *while rocking the condenser gang*.
- (7). Recheck trimmers Nos. 4 and 5 at 1400 kc.
- (8). Calibrate the short-wave band by setting the dial indicator to 6 megacycles, feeding a 6-megacycle signal to the antenna input through 400 ohms and adjusting trimmer No. 7 for maximum response *at the lesser of the two possible capacity settings* at which resonance may be obtained.
- (9). Align with trimmers Nos. 8 and 9.

SELECTIVITY — HIGH - FIDELITY CONTROL CIRCUIT

(See Front Cover)

THE circuit conditions required for the reception of distant stations are entirely different from the conditions necessary for high-fidelity reception. In the first instance, high gain and selectivity are required; in the second instance selectivity must be reduced in order that the bandwidth of the receiver may be sufficient to pass the complete band of audio frequencies transmitted. At the same time it is preferable that the r-f gain of the receiver be reduced for high-fidelity reception so that there is no chance of interstation interference due to the overlapping of sidebands.

Such an arrangement is used in the new Silvertone Models 1918 and 1968. It is, in a sense, a selectivity—high-fidelity control circuit which assures correct operating conditions.

Referring to the circuit on the front cover, it will be seen that the conditions for high-fidelity reception are met by providing variable coupling in the i-f transformers A and B. When the coupling between the primary and secondary windings is tight, selectivity is decreased and the bandwidth consequently increased. When the coupling is loose, the selectivity is increased for dx reception.

Now note that the r-f, mixer and i-f tubes are initially biased by the voltage drop in resistors R, R-1, R-2 and R-3. However, the gain of these four tubes, when the band-selector switch is in the broadcast or medium short-wave position, is set by the Sensitivity Control R-4 and the Sensitivity Compensator R-5 which are common to all four cathode circuits. (As an incidental to the discussion at hand, it might be pointed out that when the band-selector switch is at positions 3 and 4, corresponding to the two shortest short-wave bands, the cathode of the r-f tube is connected directly to ground, in which case the added r-f gain required on these short-wave bands is obtained by releasing the r-f tube from the high bias produced by the sensitivity controls and leaving it only with its initial bias, produced by resistor R.)

Before going further, it should be pointed out that the Sensitivity Control R-4 is not manually operated from the front of the receiver panel, but is located at the rear of the chassis where it may be adjusted for a degree of sensitivity best suited to local noise conditions, etc. Once set, it is left alone.

On the other hand, the Selectivity

Control is on the front panel, and it will be seen from the diagram that this control is mechanically coupled to the Sensitivity Switch, the Sensitivity Compensator R-5 and to the Low Note Control R-6, in such a manner that when selectivity is decreased for high-fidelity reception, the sensitivity control R-4 is effective (by the automatic opening of the Sensitivity Switch) but the process of sensitivity control is taken over by the Sensitivity Compensator R-5.

Now, the arm of R-5 moves with a movement of the Selectivity Control, with the result that the correct amount of sensitivity is provided for any given position of the Selectivity Control—that is to say, a movement of the Selectivity Control automatically changes the bias on the r-f, mixer and i-f tubes.

The Low Note Control is also coupled to the Sensitivity Switch in a manner such that when the knob is turned to the right, the Sensitivity Switch is automatically opened. In this, the high-fidelity position, the bass reproduction can be controlled.

When the Selectivity Control is set for maximum selectivity (loose coupling of the i-f transformers) the Low Note Control closes the Sensitivity Switch and the bias supplied to the tubes is equal to the drop across the individual bias resistors and a portion of the Sensitivity Compensator R-5. The bias is therefore less and the sensitivity greater.

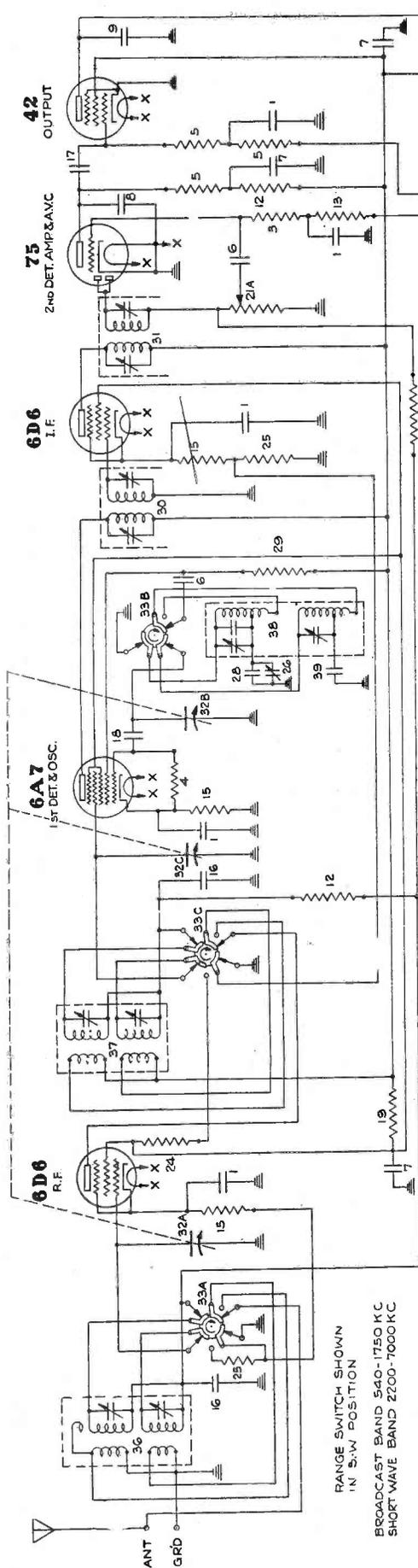
SET CONVERSION

(Continued from page 547)

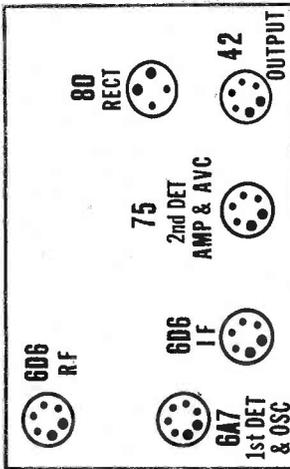
retained. As the speaker plug in the original G.M. 120 fits the Browning socket, it was only necessary to disconnect the center tap of the speaker field in the speaker cable.

THE VICTOR RE-32

This receiver presents an excellent example of the expensive, if ornate, cabinet—as the reader may judge for himself by inspecting Fig. 6. No difficulties of any order were encountered in effecting this modernization. The standard horizontal control panel layout was employed. The speaker was defective, so a Wright-DeCoster was substituted in conjunction with the Browning-35 chassis. Fig. 7 is a rear view of the modernized version, while Fig. 8 shows the front with the doors open and the new panel installed—a perfect combination of antique beauty and modern performance!



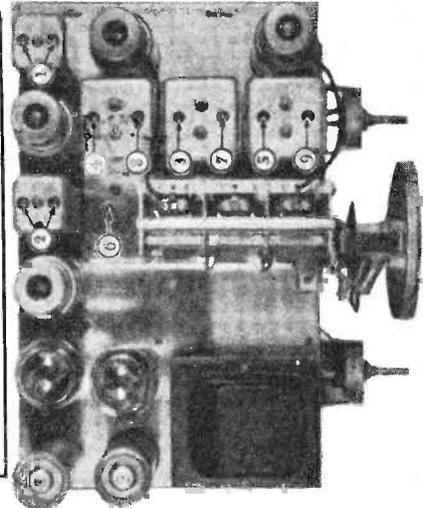
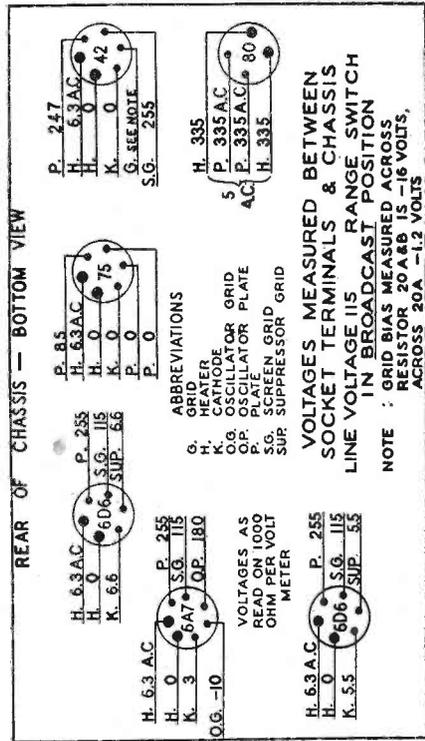
TUBE LOCATIONS
FRONT OF SET



I.F. FREQUENCY
456 KC.

REF. PART NO.	DESCRIPTION
1	81630 1MFD. 175V. PAPER COND.
2	83072 50,000 OHM 1/2 W. CARBON RES.
3	83060 81,000 OHM 1/2 W. CARBON RES.
4	83518 20 MFD. 500V. PAPER COND.
5	83440 1 MFD. 400V. PAPER COND.
6	83508 500 MFD. 50V. PAPER COND.
7	83509 500 MFD. 50V. PAPER COND.
8	84508 2MFD. 50V. PAPER COND.
9	84509 2MFD. 50V. PAPER COND.
10	84507 R-227-A SPEAKER FOR R-227-A SET
11	84507 R-227-A SPEAKER FOR R-227-A SET
12	84188 110,000 OHM 1/2 W. CARBON RES.
13	84775 110,000 OHM 1/2 W. CARBON RES.
14	84775 PILOT LAMP
15	84688 300 OHM 1/2 W. W.W. RES.
16	85009 50 MFD. 50V. PAPER COND.
17	85008 50 MFD. 50V. PAPER COND.
18	85001 50 MFD. 50V. PAPER COND.
19	85005 15,000 OHM 1/2 W. CARBON RES.
20	85007 845 RESISTOR - 220 OHM
21	85073 VOLUME CONTROL - 250,000 OHM
22	85074 TONE CONTROL - 800,000 OHM
23	85075 DUAL 0MFD. 175V. PAPER COND.
24	85116 150,000 OHM 1/2 W. CARBON RES.
25	85285 PADDING TRIMMER
26	85426 PRIMER TRANS. (115V.-60 CYCLE) (USED ON MODEL 134-B) 115 V. 25 C.
27	85441 00052 MED. MICA COND.
28	85441 00052 MED. MICA COND.
29	85784 1ST I.F. TRANSFORMER
30	85785 2ND I.F. TRANSFORMER
31	85786 1ST I.F. TRANSFORMER
32	85787 2ND I.F. TRANSFORMER
33	85788 1ST I.F. TRANSFORMER
34	85789 2ND I.F. TRANSFORMER
35	85790 THREE GANG COND.
36	85791 1G MFD. 475V. ELECT. COND.
37	85792 1G MFD. 475V. ELECT. COND.
38	85793 1G MFD. 475V. ELECT. COND.
39	85794 1G MFD. 475V. ELECT. COND.
40	85795 1G MFD. 475V. ELECT. COND.
41	85796 1G MFD. 475V. ELECT. COND.
42	85797 DEC. COIL & SHIELD ASSEM.
43	85798 DEC. COIL & SHIELD ASSEM.
44	85799 DEC. COIL & SHIELD ASSEM.
45	85800 DEC. COIL & SHIELD ASSEM.
46	85801 DEC. COIL & SHIELD ASSEM.
47	85802 DEC. COIL & SHIELD ASSEM.
48	85803 DEC. COIL & SHIELD ASSEM.
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53	85808 DEC. COIL & SHIELD ASSEM.
54	85809 DEC. COIL & SHIELD ASSEM.
55	85810 DEC. COIL & SHIELD ASSEM.
56	85811 DEC. COIL & SHIELD ASSEM.
57	85812 DEC. COIL & SHIELD ASSEM.
58	85813 DEC. COIL & SHIELD ASSEM.
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76	85831 DEC. COIL & SHIELD ASSEM.
77	85832 DEC. COIL & SHIELD ASSEM.
78	85833 DEC. COIL & SHIELD ASSEM.
79	85834 DEC. COIL & SHIELD ASSEM.
80	85835 DEC. COIL & SHIELD ASSEM.
81	85836 DEC. COIL & SHIELD ASSEM.
82	85837 DEC. COIL & SHIELD ASSEM.
83	85838 DEC. COIL & SHIELD ASSEM.
84	85839 DEC. COIL & SHIELD ASSEM.
85	85840 DEC. COIL & SHIELD ASSEM.
86	85841 DEC. COIL & SHIELD ASSEM.
87	85842 DEC. COIL & SHIELD ASSEM.
88	85843 DEC. COIL & SHIELD ASSEM.
89	85844 DEC. COIL & SHIELD ASSEM.
90	85845 DEC. COIL & SHIELD ASSEM.
91	85846 DEC. COIL & SHIELD ASSEM.
92	85847 DEC. COIL & SHIELD ASSEM.
93	85848 DEC. COIL & SHIELD ASSEM.
94	85849 DEC. COIL & SHIELD ASSEM.
95	85850 DEC. COIL & SHIELD ASSEM.
96	85851 DEC. COIL & SHIELD ASSEM.
97	85852 DEC. COIL & SHIELD ASSEM.
98	85853 DEC. COIL & SHIELD ASSEM.
99	85854 DEC. COIL & SHIELD ASSEM.
100	85855 DEC. COIL & SHIELD ASSEM.

- ① 1st I.F. TRANS. TRIMMERS
- ② 2nd I.F. TRANS. TRIMMERS
- ③ BROADCAST OSCILLATOR SHUNT TRIMMER
- ④ BROADCAST DETECTOR SHUNT TRIMMER
- ⑤ BROADCAST ANTENNA SHUNT TRIMMER
- ⑥ BROADCAST OSCILLATOR SERIES PADDER
- ⑦ S.W. BAND OSCILLATOR SHUNT TRIMMER
- ⑧ S.W. BAND DETECTOR SHUNT TRIMMER
- ⑨ S.W. BAND ANTENNA SHUNT TRIMMER



Temporary diagram, socket layouts and voltages for Stewart-Warner R-134.

Wells-Gardner Series 7GM

This is a 7-tube, 3-band receiver covering a frequency range from 535 to 18,300 kc in the following steps: 535 to 1730 kc; 1715 to 5800 kc; 5750 to 18,300 kc. The power consumption is 68 watts and the power output is 3 watts undistorted. The selectivity is given as 28 kc broad at 1,000 times signal.

THE CIRCUIT

Referring to Fig. 1, T-1 and T-2 are the antenna and interstage r-f transformer assemblies and T-5 is the oscillator coil assembly. The standard wave and 1st and 2nd short-wave coils in each assembly are indicated by the letters B, C and D respectively.

The band switch completes connections to the coils in use. It also short circuits the r-f transformer secondary and oscillator coil of lower frequency not in use.

The antenna transformer with tuned secondary feeds into a type 6K7 r-f tube. The output of this tube is fed through the interstage r-f transformer with tuned secondary into another 6K7 tube which functions as the first detector or mixer.

A separate type 76 tube is employed in the oscillator circuit. Referring to the oscillator assembly T-5, B, C, and D refer to the standard wave, 1st short-wave and 2nd short-wave oscillator coils respectively. The oscillating circuit is always resonant at 456 kc above the frequency to which the r-f amplifier is tuned.

The oscillator potential is fed into the cathode circuit of the 6K7 first detector tube. This results in the intermediate or beat frequency of 456 kc being present in the plate circuit of the tube.

One stage of i-f is employed, using a 6K7 tube. The primaries and secondaries of the first and second i-f transformers are tuned by small trimmer condensers.

SELECTIVITY CONTROL

Referring to the first i-f transformer

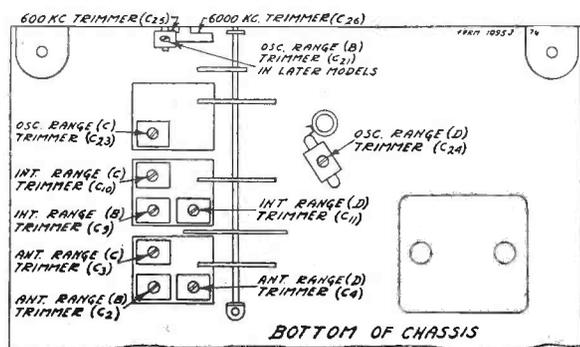
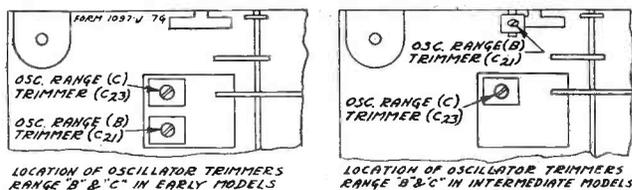


Fig. 3. Two sketches, showing location of trimmers in early and intermediate models.



T-3, it will be noted that there is a coupling winding below the primary. Refer also to the bypass arrangement in the pentode plate circuit of the 6B7 tube.

When the selectivity control is in the sharp position, the coupling winding is open circuited and the loose coupling which exists between the primary and the secondary of this transformer results in high selectivity. High audio frequencies are bypassed to ground through condenser C-35.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

In order to allow passage of the higher audio frequencies in the broad position, the capacity of the bypass condenser to ground is greatly reduced (C-35 and the capacity of shield E in series).

DUAL VOLUME CONTROL

A dual manual volume control is employed. In one section the audio voltage applied to the first audio section of the 6B7 tube is varied (R-2). The purpose of the latter section is to reduce the sensitivity of the receiver at low volume settings in order to cut down noise pick-up between stations. The variable section R-2 is shorted out through contact No. 4 of the interstage section of the band selector when in the 2nd short-wave position.

A type 6B7 duo-diode pentode tube functions as the second detector and a one stage audio amplifier. The two

diode plates are connected together. The avc voltage is applied through isolating resistors to the control-grid circuits of the r-f and i-f tubes. The audio voltage developed across volume-control resistor R-10 is applied through the movable arm to the control grid of the 6B7 tube. Resistance coupling is used between the first audio stage and the output stage which employs a type 6F6 output pentode tube. A type 80 full-wave rectifier is used in the power unit.

ALIGNMENT AND CALIBRATION

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 5800, 5000, 18,300, 15,000 and 6000 kc and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used. If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I-F ADJUSTMENT

Set the signal generator for a signal of 456 kc.

Connect the output of the signal generator through a .1-mfd condenser to the grid of the 1st detector.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position.

Turn the selectivity switch to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the avc.

Then adjust the four i-f trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis.

(Continued on page 554)

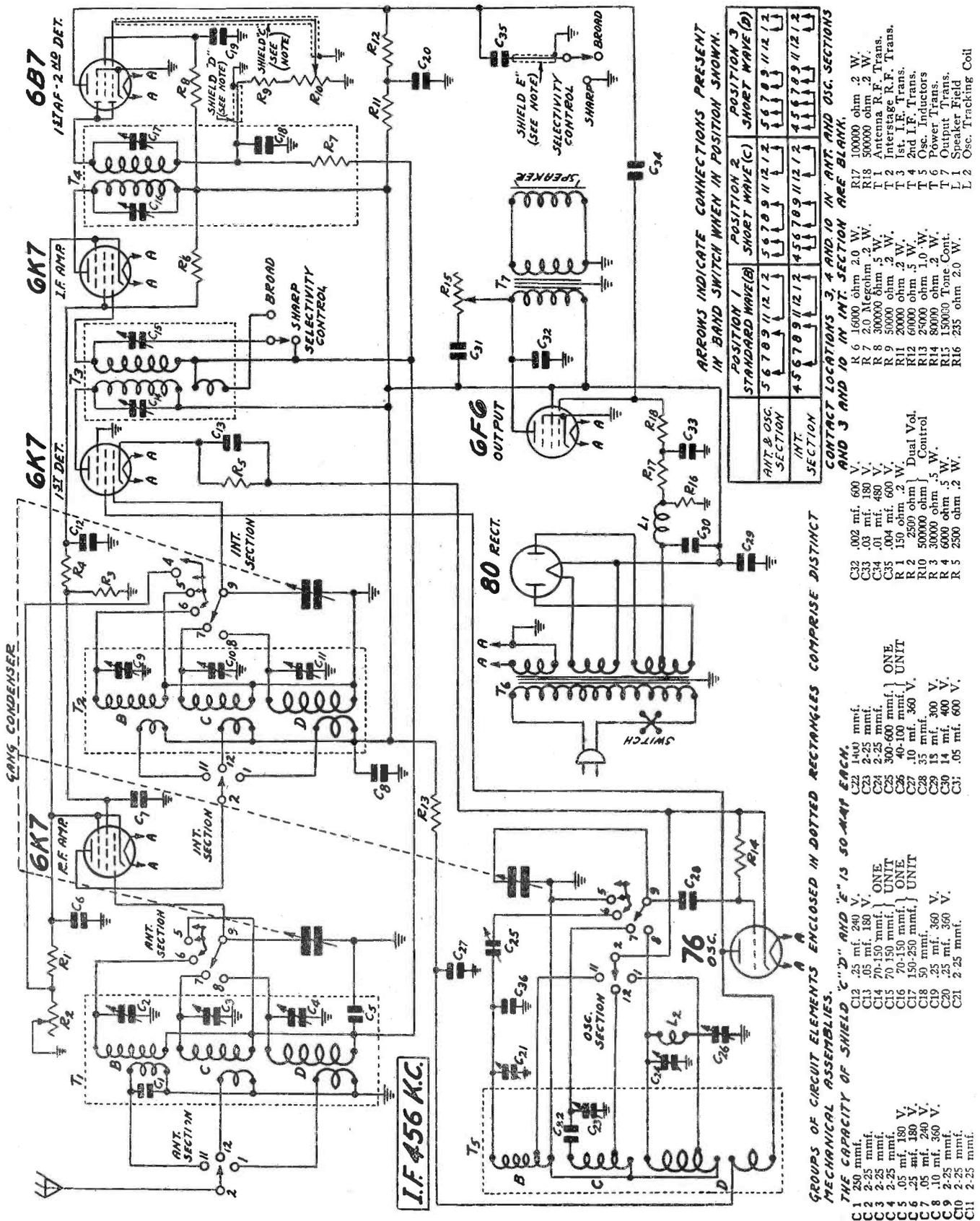


Fig. 1. Complete circuit diagram of the Wells-Gardner Series 7GM chassis. It should be noted that groups of circuit elements enclosed in dotted rectangles comprise distinct mechanical assemblies. A separate sketch is included showing connections of the band selector switch. Voltages are not included in the above diagram. They will be found in the table of Fig. 4.

GENERAL DATA—continued

RANGE B ALIGNMENT

1730-kc Adjustment

Set the signal generator for 1730 kc. Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200-mmfd condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent avc action.

Adjust the oscillator Range B trimmer (C-21) until maximum output is obtained. The location of this trimmer is shown in Figs. 2 and 3.

1500-kc Adjustment

Set the signal generator for 1500 kc.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

There is a lever arm in front of the large gear on the tuning condenser shaft by means of which the position of the station pointer may be adjusted. Set the station pointer at the 1500 kc mark on the dial scale by adjusting this lever arm.

Adjust the interstage Range B trimmer (C-9) and antenna Range B trimmer (C-2) to maximum.

600-kc Adjustment

Set the signal generator for 600 kc.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 kc trimmer until the peak of greatest intensity is obtained. See Fig. 2 for location of this trimmer.

RANGE C ALIGNMENT

5800-kc Adjustment

Set the signal generator for 5800 kc. Connect the antenna lead of the receiver through a 400-ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range C position.

Adjust the oscillator Range C trimmer (C-23) until maximum output is obtained. See Figs. 2 and 3 for location of this trimmer.

5000-kc Adjustment

Set the signal generator for 5000 kc. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Then adjust the interstage Range C trimmer (C-10) and antenna Range C trimmer (C-3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

RANGE D ALIGNMENT

18,300-kc Adjustment

Set the signal for 18,300 kc. Keep the antenna lead of the receiver connected through the 400-ohm resistor to the output of the signal generator. Turn the rotor of the tuning condenser to the full open position. Turn the band selector switch to the Range D position.

Then adjust the oscillator Range D trimmer (C-24) until maximum output is obtained. See Fig. 2 for location of this trimmer.

15,000-kc Adjustment

Set the signal generator for 15,000 kc and turn the rotor of the tuning condenser carefully until maximum output is obtained.

Then adjust the interstage Range D

trimmer (C-11) and antenna Range D trimmer (C-4) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 18,300 kc adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000-kc adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000-kc Adjustment

Set the signal generator for 6000 kc and turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth at the same time adjusting the 6000-kc trimmer until the peak of greatest intensity is obtained. See Fig. 2 for location of this trimmer.

VOLTAGES

The voltages at sockets are given in the table of Fig. 4. All necessary data is included in the table.

Silvertone Models 1923, 1933, 1983, 1993

Pilot Light Switch: Occasionally, the pilot light switch bracket must be bent to make the pilot light switch work when the volume control knob is pushed down.

Wave Switch Knob: A very few sets may have gone into the field with the flat of the wave switch shaft improperly positioned, so that the lettering on the Wave Switch knob faces down instead of up. If one of these sets should be encountered, the easiest remedy is to file a new flat in the shaft.

Condenser-Drive Gears: Occasionally a set is found in which the condenser-drive gears do not mesh properly. To correct this, proceed as follows:

Remove the dial pointers, the station selector dial, and the metal pointer-drive gear. Then adjust the lower bracket, that mounts the small condenser-drive gear, by slightly loosening its two mounting screws and shifting the bracket until proper meshing of the gears is secured. Then re-assemble the dial and pointers. Correct dial calibration can be secured either by tuning in a station of known frequency and setting the pointer to that frequency, or by fully meshing the condenser plates and putting the dial pointer horizontal.

VOLTAGES AT SOCKETS						
Line Voltage, 115 - Volume Control at Maximum Antenna Shorted to Ground						
Type of Tube	Function	Heater or Filament	Plate to Ground	Screen to Ground	Cathode to Ground	Plate M. A.
6K7 (6D6)	R. F.	6.1	230	95	3.0	6.4
6K7 (6D6)	1st Det.	6.1	230	100	9.0	3.2
76	Osc.	6.1	100			5.2
6K7 (6D6)	I. F.	6.1	230	120	3.0	9.
6B7	2nd Det.	6.1	55 ⁽¹⁾	40		2.3
6F6 (42)	Power	6.1	215	230	17 ⁽²⁾	30.0
80	Rectifier	4.7				34. per plate

(1) As read with 500,000 ohm meter
(2) As read across R16

Fig. 4. Here is the complete table of voltage readings for the Wells-Gardner Series 7GM. These voltages apply to either the metal or metal-glass tubes.

GENERAL DATA—continued

Emerson Model 36

The Model 36 uses Chassis Model B5. The circuit is shown on this page.

There are two waveband positions, as follows: Broadcast Band, 540 to 1530 kc; Short-Wave Band, 1500 to 3200 kc.

TRAP CIRCUIT

Referring to the accompanying diagram, it will be seen that the antenna circuit includes a trap which resonates at 456 kc, the same as the intermediate frequency. This prevents signals from code stations at or near the intermediate frequency from riding through to the i-f amplifier where they would be amplified the same as any other signal.

The antenna circuit is both inductively and capacitively coupled to the secondary windings of the input transformers. The capacity coupling is obtained by using single-turn open-ended coils in close proximity to the secondary windings.

BAND SWITCHING

Switching from the broadcast to the short-wave band is accomplished by placing coils in the detector and oscillator circuits in parallel with each other. When two coils are paralleled, the inductance of the combination is decreased and consequently higher frequencies may be reached.

The output of the first detector is fed to the i-f tube through a double-

tuned i-f transformer. A second i-f transformer of the same type couples the 6D6 i-f tube to the type 76 second detector tube. This latter tube functions as a power detector and has high bias. The detector is resistance coupled to a type 42 power pentode which in turn feeds a dynamic speaker the field coil of which is used as the filter choke in the power supply.

Bias for the first detector tube is supplied by the drop across the 300-ohm and 4500-ohm resistors in series with the cathode and ground. The bias on the i-f tube is variable, and is supplied by the drop across the 150-ohm (initial bias) portion of the 5000-ohm potentiometer, plus the amount of additional potentiometer resistance in circuit between the initial bias unit and the movable arm (ground). The voltage drop across this potentiometer is substantially increased by bleeding current through it from the high-voltage source.

Thus, the control of the bias on the i-f tube, plus the shunting action in the antenna circuit which is connected to ground through the potentiometer arm, controls the volume of the receiver.

Voltage readings are given in the diagram. These should be taken with the volume control turned on full and with the antenna wire grounded to the chassis. The readings are based on a line voltage of 117.

Motorola—Intermittent Ignition Interference in Cars of All-Steel Body Construction

Interference of this type may evidence itself in the later model cars when accelerating or decelerating the engine.

If the interference feeder of the Magic Eliminode is connected at a point where an appreciable amount of this interference is flowing, as well as the normal interference from the spark plugs, it will of course be balanced out in regular balancing procedure of the Magic Eliminode.

If, however, this is not the case, the balancer of the Magic Eliminode will not eliminate it.

To avoid the necessity of having to cast about for the proper pickup point for the interference feeder, a Motorola Dome Lite Filter can be connected in series with the *Distributor Breaker Point Wire*.

Mount the filter on the distributor.

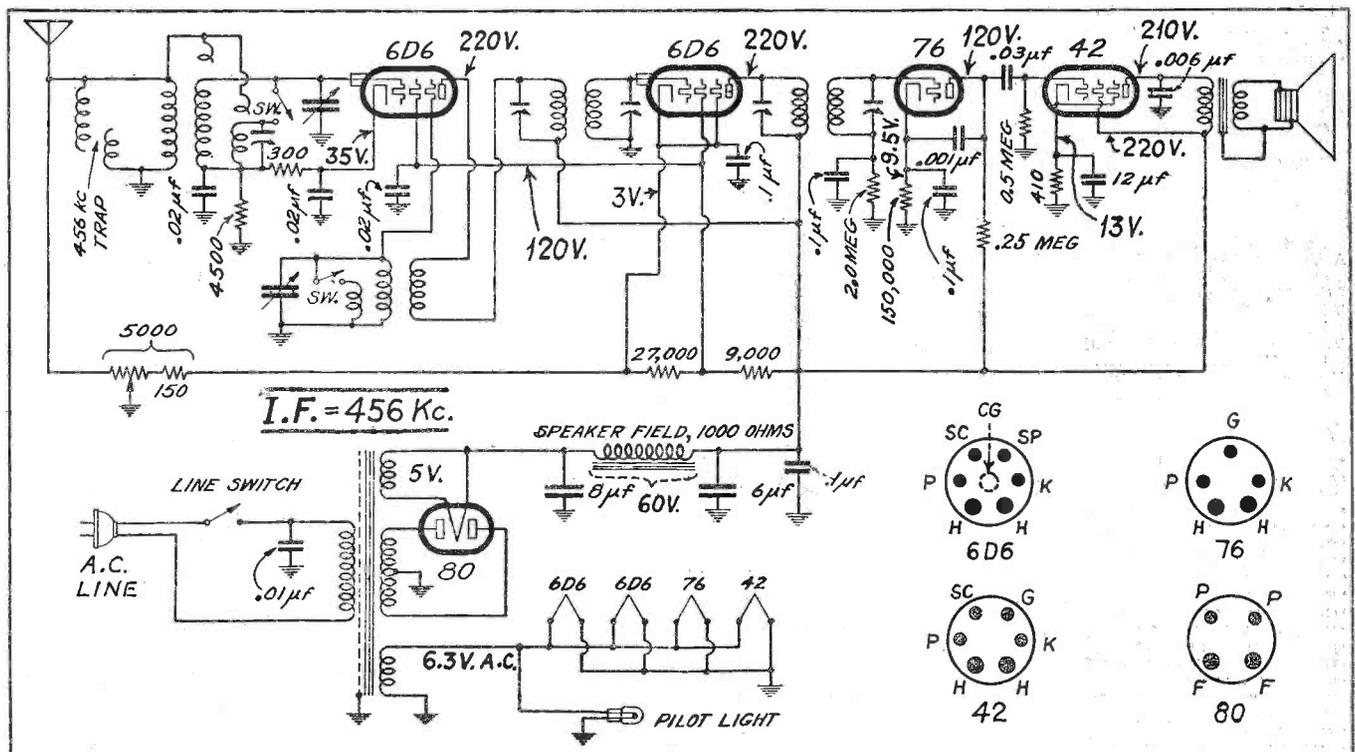
Secure a good ground to the distributor base.

Connect the "Bat" side of the filter toward the distributor.

Connect the "Load" side of the filter toward the ignition coil.

Caution—Keep the connection between the filter and distributor as short as possible.

Practically every case of intermittent interference of this type may be eliminated by this method.



Diagram, with voltage and parts values, of Emerson Model 36.

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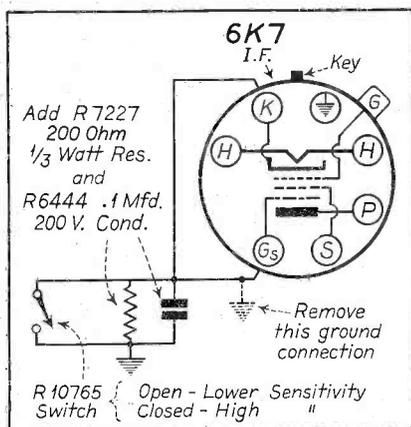
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Adding Sensitivity Switch to Silvertone Models 1905, 1915, 1955 and 1965

In locations that are electrically noisy, it may be desirable to reduce the sensitivity of the receiver to prevent between-station noise as the receiver is tuned from station to station. This can be done by disconnecting the present direct connection of the 6K7 cathode to ground and inserting a 200-ohm, 1/3-watt resistor between the 6K7 cathode and ground, as shown in the accompanying diagram. An 0.1-mfd, 200-volt condenser should be connected di-



Method of adding sensitivity switch to Silvertone receivers listed above.

rectly across the 200-ohm resistor. A single pole single throw switch, connected from the 6K7 cathode to ground, will then act as a sensitivity control. When the switch is open, the sensitivity will be lowered.

If a separate sensitivity switch is undesirable, the present on-off switch can be replaced with a combination on-off and sensitivity switch (R-10756). Rotating this switch part way to the right, turns the receiver on. When the switch knob is turned all the way to the right, the sensitivity control switch incorporated in it is closed and maximum sensitivity is had.

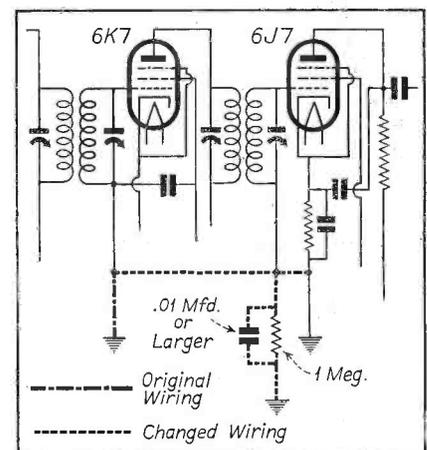
Adding AVC to Kadette Models 53 and 553

The Kadette (International Radio Corp.) Models 53 and 553 using the 6J7 second detector tube do not incorporate automatic volume control. When operated in the vicinity of powerful broadcast stations a tendency toward overloading may be found on strong signals. It is evidenced by blocking out of the signal as the volume control is advanced. This condition may be corrected easily by making the simple change illustrated in the accompanying diagram.

Originally the grid returns of the 6K7 and 6J7 tubes go direct to ground. These should be removed from ground, tied together and returned to ground through a one-megohm resistor shunted by a condenser of 0.01 mfd or larger capacity.

PRECAUTION

In making this change, be sure the cathode of the 6J7 tube is connected as shown and not left connected to the low end of the second i-f transformer grid winding.



Method of adding automatic volume control to Kadette Models 53 and 553 to prevent overloading on strong signals.

Look for this trade mark. It is your guarantee of Quality—always!



HAVE YOU

QUALIFIED YOURSELF AS A MODERNIZATION ENGINEER, Mr. SERVICEMAN?

ANOTHER TOBE WINNER!

When in need of condensers you look for quality . . . which means that TOBE is a name that at once comes to mind. But TOBE gives servicemen an ADDED measure of value . . . FREE Add-a-Unit cabinets which may be locked together horizontally or vertically to make a complete file for condensers or other small parts. If you've already bought one or more kits—better check your stock now; it may be running low. If you haven't bought a kit—start building NOW.

FREE!
ADD-A-UNIT CABINETS



Above—Kit No. 1

Right—Kit No. 2

Kit No. 1—Tubular Surgeproof and Openproof Oil Processed Condensers.

Amt.	Cap. MFD	D. C. Volts Working	Type	Price List	Total
3	.001	600	M-1	@ .18	.54
2	.002	600	M-2	@ .18	.36
3	.005	600	M-5	@ .18	.54
5	.01	600	M-10	@ .18	.90
5	.02	600	M-20	@ .20	1.00
5	.05	400	M-50	@ .22	1.10
5	.10	400	410-T	@ .25	1.25
3	.25	400	425-T	@ .25	1.05
3	.50	400	450-T	@ .50	1.50

Total List Price \$8.24
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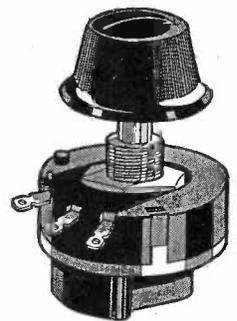


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FIXED RESISTORS**

RECEIVER CASE HISTORIES

A-C, D-C Midgets

Overloading, low volume, distortion: Frequently detector plate resistor is too high in value, begins to burn out, or opens completely. Replace with a 250,000-ohm $\frac{1}{2}$ -watt resistor. Most of cheaper midgets can be improved as far as volume handling capacity is concerned by substituting a 0.25-meg resistor for the 0.5- to 3-meg unit.

Allan Epstein.

Atwater-Kent "L" Chassis

Oscillation; set dead: Dirty rotors are fairly common due to low tension on rotor springs. Clean, increase tension and apply a little mineral oil. Lack of voltage on detector or first audio tube is usually due to burned-out filter resistors and not to shorted condensers or even plate resistors or input transformers burning out.

F. C. Wolven.

Cadillac Master 1935

Shorted resistor: If large 2,000-ohm resistor under sub-panel is found to be burned, check last i-f coil. Although not shown on wiring diagram, this unit has a third winding, one end of which goes to ground while the other is floating. This coil is interwoven with the primary, and often shorts it.

Remove coil from set. Cut ground lead of shorted winding on bobbin of assembly, leaving primary clear of ground. Replace coil and resistor. Slightly stagger last i-f to compensate for removal of third coil.

A. H. Schoss.

Edison-Bell No. 35

The power transformer in this set is rather frail and may cause trouble. In making replacement, use unit with electrostatic shield if possible, otherwise a severe hum will be heard on every carrier. Conversely, if this trouble is noticed in one of these sets, a broken lead to shield may be cause. If it is necessary to use a replacement without such a shield, connect two 0.25-mfd, 600-volt condensers in series across the a-c input and ground their common connection to chassis.

F. C. Wolven.

Freed NR 65-78-79

Intermittent fading: Look for corroded connection under rubber insulation on end of 1-watt, 500-ohm fixed bias resistor which is in series with the

volume control. The value varies from 500 ohms to 25,000 ohms. *Note: Resistance test on cold chassis may check OK.*

Al. Beers.

G.E. H-31; Radiola 80

Crackling: Symptoms of metal filings in tuning condenser. Probing disclosed just that but source of particles was a mystery. Finally traced to heavy gilt trimming on wallpaper which was dusted periodically thereby loosening the gilt which proved a good conductor.

F. C. Wolven.

Lyric A-65

Resistors: Have had a good deal of trouble with 15,000 (2-watt, standard code) and 10,000 (1-watt, solid blue) ohm resistors forming the voltage divider for the screen circuit. They usually drop to 5,000 ohms or less and burn up. These sets occasionally operate over only part of the dial due to failure of oscillator to function. Drop the value of the cathode resistor to half.

F. C. Wolven.

Majestic 70

Dial cables: For the benefit of those who have not yet tried it, the only good way to replace Majestic 70 dial cables is to disconnect the gang condenser electrically and mechanically from the chassis and lift out the whole assembly. This can be done by swinging the tuner endwise in cabinet and does not necessitate removal of chassis. Wind the rear drum first and finish on the front one.

F. C. Wolven.

Majestic 130-A

Short circuit: Often blows 0.3-mfd plate bypass across either i-f or r-f plate circuit. Check with 0-500 ohmmeter for quick location of defect. Plate circuit with least resistance to ground is the offender. These condensers have two white wires connected to one side and with the other side connected to the common ground to can. Symptoms are: Very low plate and screen voltages with overheating and peeling of enamel on black 4875-ohm wire-wound resistor. Set may not work except with volume control in center position or may play very faintly.

F. C. Wolven.

Motorola Junction Box

Antenna Junction Box: We wish to again impress upon all Service and Installation Men the great importance of securing a perfect ground connection on the antenna junction box.

Practically every case of interference difficulty that has come to our attention has been remedied by better grounding at this point.

Clean the paint from the metal before mounting the junction box.

Mount it to the inside of the cowl *not* to the instrument panel.

When installing the GM models with under-car aerial, attach the grounding lug of the lead-in under one of the bolts that join the front fender to the splash apron of the car.

A good ground at this point is as important as when using the junction box.

Again we repeat . . . *This is the most important part of the entire installation.*

Galvin Manufacturing Corporation.

Motorola Receivers

Elimination of Ignition Interference When Using Running Board Aerial on Ford V-8: Due to the extremely high level of interference from the running board of the Ford V-8, the following method of installation may prove advantageous:

Mount the aerial, preferably under the left running board. Ground the shielded antenna lead to the frame of the car at a point opposite the front edge of the running board aerial. Extend the aerial lead and shield it with a piece of $\frac{3}{8}$ -inch shielded loom. Ground this loom again at a point opposite the rear support of the running board aerial. Connect the aerial lead to the aerial near its rear edge. Connect the interference feeder to the throttle rod about 2 inches from the point where it passes through the bulkhead. If the aerial is under the right running board, ground the exhaust manifold and muffler to the car frame.

Motorola Model 100

Installation in Ford V-8: When mounting the Model 100 in the motor compartment of the V-8 Ford, be sure to mount it at least 5 inches above the rear spark plug of the left motor block.

If it is mounted too close to spark plugs, interference difficulties may occur.

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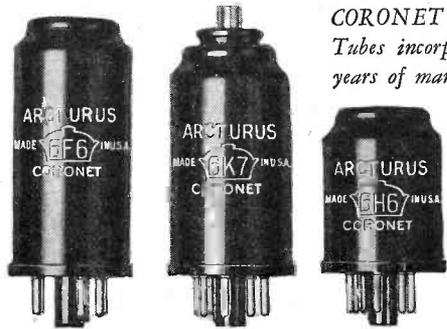
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Philco 20

Oscillation: A drop of mineral oil on the wiping contacts and bearings of the variable condenser is quick and easy cure in many cases. When everything is OK and set still oscillates, try a larger mica condenser in the detector plate circuit. These sets seem to be hard on input transformers. Resistance-capacity coupling into the primary is advisable.

F. C. Wolven.

Philco 90; Grebe SK4

Distortion on low volume: If set is located near powerful station it is necessary to turn volume control down a great deal. This causes bias on tubes (24s) to reach a point where they act as detectors and cut off. This causes considerable distortion on low volume. To remedy, change the 24s to 35s or use a double control—a bias control and an antenna shunt. The Philco 90 has this double control. All that is necessary in this case is to short to ground the tap on the voltage divider next to the grounded one, *not* the tap connected to c.t. of the high voltage. Shorting this tap to ground reduces the bias voltage and thereby uses the antenna control chiefly to reduce the volume. *Note: Latter procedure is only possible on the Philco 90 using two 45s.*

Allan Epstein.

Silver-Marshall Model "Q"

Motorboating, only on resonance on strong stations: The avc plate resistor was low. Replacement helped but did not cure complaint. Replacement of the plate bypass across this resistor finished the job. The leakage in this condenser was about 30 megohms.

F. C. Wolven.

Silvertone Models 1925, 1935 1985, 1995

Tube selection: Because of the low voltage at which these models are operated, more than usual care must be used in selecting 6A7 and 75 tubes that will operate properly on the short-wave band. This will be particularly true for installations where the line voltage is lower than average. Tubes which do not operate properly in these models may be entirely satisfactory for use in other sets operating at a higher voltage.

Sparton Models Using 485's

Low volume: If voltages are normal in models using six or seven 485 tubes,

examine all 5-prong sockets for defective contacts.

E. M. Prentke.

Sparton 930-931

Intermittent reception, cutting off: Rotor section of tuning condensers become loose causing them to rock slightly. Because of space between rotors and rotor shaft corrosion causes the rotors to lose ground, introducing up to 10 ohms resistance between the rotors and shaft. This ruins the resonant circuit. Usually touching condensers is enough to show up the condition. To remedy solder a piece of dial cable from one stator to another and ground with pig-tail to rotor shaft. The best place to solder this wire is on end of stator where all plates are joined together.

Allan Epstein.

Stewart-Warner 102-A

Resistors forming voltage divider for screen voltage do not stand up well as evidenced by excessive screen voltage or total lack of it. Coupling condenser to grid of 47 is 400 volts; becomes leaky, should be 600 volts. Severe intermittent hum was traced to grid circuit of 47. Even slight jar would bring set back to normal. Finally found short to chassis on the low end of the 47 grid resistor which is connected to decoupling resistor on mounting board spaced very close to chassis.

F. C. Wolven.

Stromberg-Carlson 82

Audio-frequency howl on strong carrier: This is due to vibration of oscillator coil assembly. Remove shield and place several tight-fitting soft-rubber washers or disks inside the coil form.

E. M. Prentke.

TCA Clarion 260

Voltage dividers: Trouble with defective voltage dividers, typical indications being high screen voltages, lack of screen voltages, etc. These units may be intermittent.

F. C. Wolven.

U. S. Radio 9A

Oscillation, motorboating: Often caused by open 7100-ohm section in voltage divider which causes all voltages to rise abnormally. (This, of course, applies only to one-speaker jobs.) If oscil-

lation persists, check condenser across output of filter. If condenser is still good, add 0.5-mfd, 600-volt unit across screen or cathode circuit to ground on i-f stage. Motorboating may accompany open voltage dividers but is more often due to loss of capacity in filter condensers.

F. C. Wolven.

U. S. Radio & Television 28, 28A, 29

Whistle: Check 0.04-mfd first audio bypass condenser for drop in value (sometimes drops to 0.007 mfd). Replacements should be made with 0.05-mfd unit.

Al. Beers.

Wells-Gardner 5E and 9B

Change in bias of sets using type 19 tube: Considerable variation has been encountered in the type 19 output tubes as used in the above mentioned receivers. In some of the sets using these tubes, poor tone quality is encountered when operated at 6 volts bias as specified in the receiver instructions. For this reason the bias on this tube has been changed to 4½ volts. All of them will function satisfactorily at that value. With regard to the receivers in the field the change is made as follows:

Series 5E: Connect the white battery lead with the "C-6" marker to the 4½-volt tap on the "C" battery. (If separate 22½-volt and 4½-volt batteries are used for the "C" connections, connect this lead to the 4½-volt tap on the 22½-volt battery.)

Series 9B and 9BM: Connect the white battery lead with the "C-6" marker to the 4½-volt tap on the "C" battery. This lead and the green and yellow lead with the 4½-volt marker will then be connected to the 4½-volt tap on the battery.

Wells-Gardner 65

Intermittent audio howl: Replace double audio electrolytic condenser (this is a 12-12 mfd unit). When replacing this unit it is necessary to remove chassis from case (but not speaker). Cut both red leads short and use them for the replacement unit.

A. H. Schoss.

Wells-Gardner 65

Low volume: Check coupling condensers in series with volume control.

A. H. Schoss.

RAYTHEON

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- 6K7**—Detector Amplifier
- 6Q7**—Diode Triode Amplifier
Detector
- 6L7**—Pentagrid Mixer Amplifier
- 6J7**—Pentode Amplifier Detector
- 6F5**—Triode Amplifier

- 6C5**—Oscillator Amplifier
- OZ4**—Full-Wave Gas-filled Rectifier
(exclusively Raytheon)



- 6H6**—Detector (Diode)

- 6F6**—Power Amplifier
- 25A6**—Power Amplifier
- 25Z6**—Rectifier
- 5Z4**—Full-Wave Rectifier
- 6X5**—Full-Wave Rectifier
(Auto Sets)



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ON THE JOB . . .

HINTS ON ELIMINATING TRAFFIC SIGNAL INTERFERENCE

BY J. R. STEEN
(Radio Service Engineer)

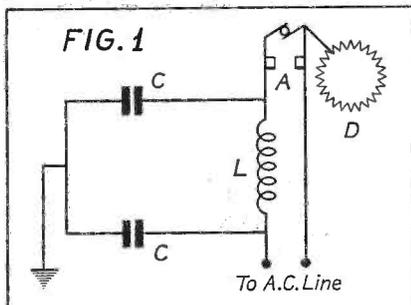
RADIO interference from traffic signals is a common cause of disturbance on both home and automobile radio receivers. Generally, however, nothing is done about it largely because people who are bothered with this type of interference either do not know where it comes from, or, if they do, they assume that it cannot be eliminated. Even Service Men have hesitated to approach the problem for lack of a definite plan for going after this business.

PROFITABLE FIELD

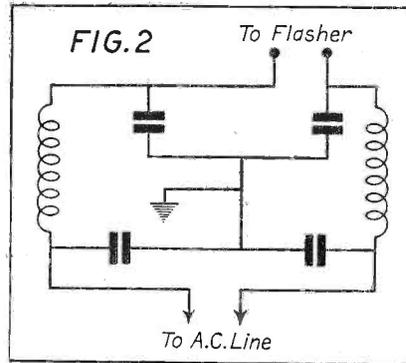
On the other hand, my own personal experience as a Service Man has convinced me that there is a profitable field here for the fellows who will go after it. Just as they did in my town, many city officials will be glad to cooperate if you go to the trouble of explaining the matter carefully and even demonstrating how much radio interference an innocent-looking traffic light can actually cause. With the number of lights now used in the average town or city, I hardly have to point out what a juicy slice of business can be had if you obtain the job of eliminating interference from them. Certainly it is a field well worth the time and effort required to win it.

LOGGING COMPLAINTS

Complaints regarding traffic light interference should be made to the local police commissioner, public works commissioner, city electrician or contractor—whichever is in charge according to your local set-up. This information can



Circuit of traffic signal contactor with filter installed.



This type of filter circuit should be used for the more obstinate cases.

easily be obtained at city headquarters.

The yellow caution light or blinker (flasher) is usually the worst offender. This is good for the Service Man, for such lights are generally installed at minor traffic intersections in residential districts where many radio receivers are in use. The red and green lights operating at regular 10- or 30-second intervals do not often cause really serious interference.

INTERFERENCE ELIMINATION

Fig. 1 shows one type of contactor. "D" is a saw-toothed disc operated by a small motor. "A" represents the contacts in series with the flasher lights. Choke L consists of approximately a ½-pound roll of No. 18 bell wire (up to a 5 amp circuit), wound on a core of about 1½-inch diameter. Condensers "C" are from 1 to 1.5 mfd, 220 volt a-c ratings.

More obstinate cases of traffic light interference will require the filter shown in Fig. 2. If interference still persists after using such a filter, add circuit of Fig. 3. The combination of either circuits 1-3 or 2-3 will eliminate radio noises from this source in just about every case. The values of condensers and chokes in Figs. 2 and 3 are the same as those for Fig. 1.

As is well known, much of this interference elimination work is experimental up to a certain point. It means working by the method of "cut and try." However, if the Service Man

has the filter parts shown in each of the three diagrams he will be well equipped to go out and show real results.

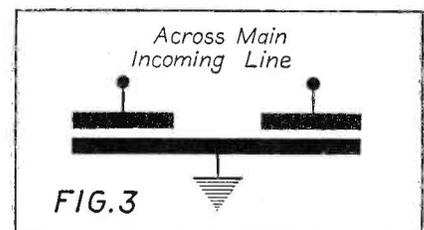
HOW MUCH FILTER?

In my own work along these lines, I have dispensed with the "cut and try" method in favor of the Sprague Interference Analyzer. This is the last word in noise elimination work—one as valuable in ordinary home interference jobs as it is when approaching traffic-light problems. Simply by cutting this Analyzer into the circuit and then applying various filter banks by turning the dial you are enabled to find in short order the exact filter combination to produce best results. After working "cut and try" for several years with many loose filter units, I find that the Sprague Interference Analyzer reduces my working time on a job by more than half.

INSTALLING FILTER

After the correct filter combination has been determined these units can be installed directly in the signal box if there is room, or in a metal container fastened outside of the box. The traffic-light maintenance crew will often dig up a container and attach it to the signal box for you. Westinghouse makes a good weather-proof marine box which is ideal for the purpose.

A car radio, close to the control box, is a great help while working on the job, or have a helper stand near a window of an adjacent house so he can



This arrangement should be added to that of Fig. 2, if interference still persists.

signal to you while he is listening to the radio. By listening to the radio you can tell at once when you have hit upon the proper filter combination to eliminate the interference.

BROAD FIELD

This sort of work represents a broad field warranting real consideration from every Service Man who is looking for ways and means of expanding his business along practical, profitable lines—and it is one which will become increasingly important as more auto radios are used and as short-wave reception becomes even more popular with the consequent necessity for still more sensitive home receivers.

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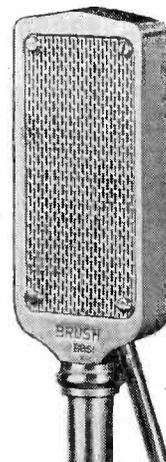
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HIGHLIGHTS . . .

RIDER'S VOLUME VI

There has been—until the advent of Rider's Perpetual Trouble Shooter's Manual, Volume VI—exactly 18.25 inches of diagrams and what have you to Mr. Rider's bookshelf. The sum total width occupied by the Rider Manuals is now 21.5 inches . . . almost two feet, and God knows how many thousand pages.

Volume VI of the perpetual series is identical to the others in dimensions, cover, manner of presentation, etc., but unlike the others, it actually has more data per average page than previous Rider Manuals. There are 100 more "strip-in" pages in the new manual, and each "strip-in" page represents an average of four pages of manufacturer's data. There are altogether 275 "strip-in" pages in Volume VI, which represents alone about 1,000 pages of actual data.

Over 115 manufacturers are represented in Volume VI. There are 1,240 pages of circuits and information, which includes 15 double-spread pages. The new metal-tube jobs are in abundance; as a matter of fact, the Manual is right up-to-the-minute, and includes practically everything released up to as late a date as November 19th.

Volume VI not only includes practically all the new receiver circuits and servicing data, but also quite a group of old, hard-to-obtain diagrams which have not, to our knowledge, ever been published before.

Volume VI will be of particular value to the Service Man since it contains so much new and valuable data on metal-tube receivers. This data is an education in itself.

Accompanying each copy of Volume VI is an 80-page Index which covers the complete group of Rider Manuals. The Index is a great help in quickly locating a desired circuit hidden somewhere in a stack of pages which, if placed end to end, would reach, we should say, to Mars.

MAKING A LIVING IN RADIO

It has been somewhat of a mystery to this reviewer as to why Zeh Bouck, a man whose unique talents are more often directed toward the criticism of the broadcasting set-up than toward the more technical and commercial phases of the art, should have written a book relative to the job of making a living in radio. Why should he have put himself to the back-breaking task of pounding out the equivalent of 220 printed pages of material on this subject when he could have easily pocketed more fluff by confining his activities to words of sheer brilliance which bring high rates.

There is only one answer as we see it—Bouck is vitally concerned over the fellow who is either just starting out in the field of radio, or the fellow who is desirous of forging ahead; he wants to see them get at least an even break.

And, because we believe Bouck wrote "Making a Living in Radio" for the express purpose of clarifying a subject which has too often been distorted, we also believe that every word in the book is sincere.

Bouck never dresses facts in petticoats. If a man is a louse, Bouck won't call him a hummingbird, any more than he will tell you that your chances in a given phase of

radio are excellent if the facts show that such is not the case.

And that's where you get a break—for, if you want the real low-down, you can get it straight from "Making a Living in Radio." If you want to be soft-soaped, okay—there are plenty of people who will apply the old fat—but, if you want to know your chances in any branch of radio, from servicing to engineering and from brass pounding to writing radio drama, written by a man who knows the field from A to Z, then run along and buy yourself a copy of Bouck's opus. It costs \$2.00; it's worth the price of a university extension course, if you're that sort of a fellow. And you are, if you want to stick to radio for the rest of your living days.

MILLER DISPLAY STAND

Dramatizing the theme, "Eliminates Noise," a convenient display stand for the Miller line filter is offered to dealers by the J. W. Miller Company, Los Angeles.

Effective use of orange, black and white on a small card produces a display that



has sufficient attention—getting value for use in the front window and is convenient enough for an inside counter or table. The stand measures only 10½ inches wide by 11½ inches high.

The copy on the card reads "Eliminates Noise! Miller Line Filter. Just plug it in." The illustration shows a listener driven to distraction by power-line noises, and another listener thoroughly enjoying a program.

AEROVOX CONDENSER AND RESISTOR CATALOG

A larger and still more varied line of condensers and resistors is featured in the 1936 Aerovox Catalog, just off the press. Several pages have been added over previous editions, particularly to accommodate the rapidly growing assortment of exact duplicate replacement condensers for servicing standard radio sets, to feature wire-wound vitreous-enamel Pyrohm Jr. and Slideohm resistors, and to introduce a superlative carbon resistor. In the strict sense, this is a new catalog, replete with added items and many revisions, so as to bring the entire line of electrolytic, paper, mica and other condensers, as well as several types of resistors, up to the anticipated 1936 standards and requirements. A copy may be had from local jobber or direct from Aerovox Corporation, 70 Washington St., Brooklyn, N. Y.

PHILADELPHIA RADIO SERVICEMEN'S ASSOCIATION

At the recent Radio and Electric Show held in Philadelphia, P.R.S.M.A. drew thousands of spectators to their two elaborate booths by inserting a fifty-line advertisement in the largest local newspaper. The heading of the ad stated "SEE SOUND."

The booths were set up as a complete, modern workshop, equipped with newest test instruments and a complicated radio chassis under test. To this receiver was attached an oscillograph, which was demonstrated to put the story across that "a pair of pliers and a screw-priver were not sufficient equipment to repair a modern receiver satisfactorily."

Another oscillograph was connected to a microphone and amplifier. The spectators were invited to speak into the mike and SEE their voices. The crowds drawn to the booths by this stunt remained long enough to be highly impressed by the excellent service set-up and demonstration. During the show, about 80,000 pamphlets were distributed by P.R.S.M.A., which contained the name, address, and phone number of each member, listed both alphabetically and sectionally.

In November P.R.S.M.A. issued Volume 1, Number 1 of "THE PRSMA NEWS," their new monthly publication devoted to better radio repairs and improved reception. Every radio dealer and Service Man in the Philadelphia area received a copy. Many letters of congratulation have been received complimenting P.R.S.M.A. upon the excellent presentation and interesting material contained in the NEWS.

In December the following newly elected officers were installed: Mr. E. Ohldack, Pres.; Mr. E. M. Ward, Vice-Pres.; Mr. J. Bishop, Treas.; Mr. H. R. DeLong, Sec. To the Advisory Board were elected Mr. R. Thorn, Mr. J. H. Jackson, Mr. R. Mauger.

At this meeting, the speakers of the evening were Mr. H. R. Shaw and Mr. M. A. Feldstein of the General Electric Company, who gave technical lectures on new circuits and visual alignment.

PAUL G. FREED,
Chairman, Publicity Committee,
5053 Baltimore Ave., Phila., Pa.

G-E RADIO TO CONDUCT NATION-WIDE SERIES OF SERVICE MEETINGS

Concluding its current series of service meetings for radio Service Men and dealers' salesmen, G-E Radio, General Electric's Merchandise Department, Bridgeport, Conn., will conduct meetings in 100 cities over the country from November 12 to December 15. Supervision will be in charge of G-E Radio field engineers.

The meetings will be open to anyone with a technical training who is interested in the fast-moving developments in radio engineering, design and application. Attendance of more than 7,500 is expected.

Subjects will embrace clinical discussions of power amplifiers and technical data pertaining to the circuit design and operation of the G-E Deluxe Model All-Metal Tube Receiver, which incorporates General Electric's latest developments for long- and short-wave radio reception.



WIN a CASH PRIZE

Design an Amplifier using
CONTINENTAL Carbon, Inc.,
Resistors and Condensers

\$25.00, 1st prize; \$10.00, 2d prize;
10 consolation prizes of \$2.50 each

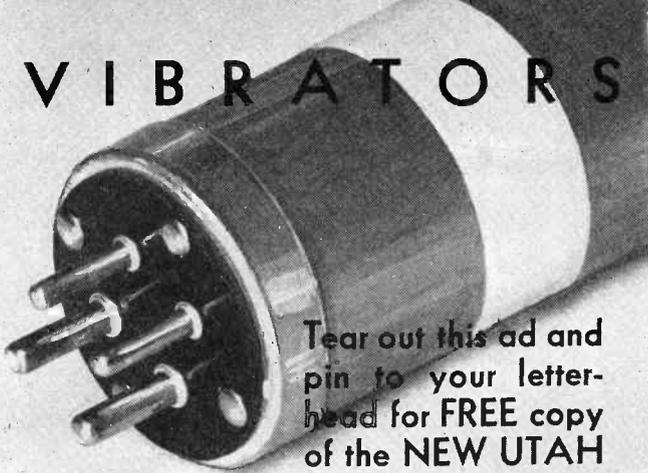
1. Secure an entry blank and rules of the contest from your distributor or directly from CONTINENTAL Carbon, Inc. A post-card will bring you full information and the latest CONTINENTAL Technical Bulletins.
2. You have only to submit an ink diagram and list of parts as described in the rules of the contest. If you build the amplifier, submit a photograph of it.
3. All entries must be postmarked not later than February 28, 1936.
4. Use any parts, but all resistors and condensers must be standard CCI products.

CONTINENTAL CARBON Inc.

13912 Lorain Ave., Cleveland, Ohio Toronto, Ontario

UTAH

VIBRATORS



Tear out this ad and pin to your letter-head for FREE copy of the NEW UTAH General Catalog of vitalized radio parts

UTAH RADIO PRODUCTS CO.,
Orleans St., Chicago

WRIGHT-DECOSTER Port-A-Case



Model 890

This handsome ruggedly constructed carrying case complete with a Model 790—10" D. C. Speaker—

for Only \$14.40 List

or make it an A. C. Speaker by using a Model 470 field supply, at the low additional list price of **\$4.70**

There is plenty of extra room in the Port-A-Case for the field supply and a small amplifier besides.

Write for catalog giving full description and showing our astonishing prices for the Port-A-Case Complete with the different 12" Speakers.

*Remember the quality
always remains the same*

Buy through the Wright-DeCoster distributors. You will find them always anxious to cooperate.

WRIGHT-DECOSTER, Inc. 2253 University Ave.
ST. PAUL, MINN.

PROBLEM

To find a reliable source for all your radio supplies which will bring you the highest grade of merchandise at the lowest prices—a vast selection to fill every Radio Service need—and a speed and accuracy in shipment that cannot be excelled.

APPLY —



ALLIED's 1936 Catalog—the leading Radio Supply Guide. A real index to radio progress—brimming over with fine standard merchandise lines at lowest prices—sparkling with new test equipment developments, new P.A. systems, new metal tube radios—rich with fine selections of tools and thousands of high grade parts—everything to save you money and help you succeed.

RESULTS :

Save time—save money—get any part, any brand any time you want it—at the lowest prices—and enjoy ALLIED's speedy, helpful personal service, besides. Keep an ALLIED Catalog by your side—it pays!



ALLIED RADIO

833 W. Jackson Blvd.
Chicago, Ill. Dept. N.

Send me your FREE 1936 Catalog—the most complete Radio Supply Guide ever published.

Name

Address

City State.....

FREE

HIGHLIGHTS—continued

STORE DEMONSTRATION OF ALL-WAVE SETS

How to demonstrate one or more all-wave sets successfully in the store itself, regardless of surrounding electrical equipment and usual background noises, is explicitly told in an illustrated bulletin just issued by Technical Appliance Corp., 17 East 16th St., New York. Copies are available on request.

The Taco all-wave store demonstration system is based on the well-known all-wave noiseless antenna, which swings its aerial proper high above the inductive-interference zone and conveys the powerful, clean-cut signals over a non-pickup transmission line, down to the remote radio set. Thus maximum signal-to-noise ratio is obtained, which makes it possible to operate any set at full sensitivity and volume with minimum background noise. By means of a multiple position double-pole switch, signals may be delivered to a plurality of radio sets on the floor, for quick comparison of their respective operating characteristics. Two methods are suggested: one, a fully noise-proofed system up to the set itself, calling for a set coupler for each set; the other, a noise-proofed system with exception of leads from single set coupler at switch, to the set itself, where lowest-priced installation is sought and noise conditions are not severe. Standard Taco antenna system components are used, plus any standard multiple position double-pole switch.

FERRANTI BULLETINS

Ferranti Electric, Inc., 130 West 42 Street, New York City, have recently released two interesting bulletins. One bulletin covers the New Ferranti electrostatic voltmeters for a-c and d-c measurements; while the other one deals with a clip-on ammeter, a split-core current transformer, the primary of which is formed by the conductor whose current is to be measured, the secondary being connected to a milliammeter.

NEW SOLAR CONDENSER CATALOG

A new type of condenser catalog has been issued for the benefit of the radio Service Man by Solar Manufacturing Corporation, 599 Broadway, New York City, who make fixed capacitors of all types. This new catalog, known as No. 7-S, lists wet, dry, paper, mica and trimmer condensers in a clearly defined manner so that "he who runs can read." A special feature of the catalog is a large tabulation of exact replacement dry electrolytics with an illustration of each one so the Service Man can be certain he is ordering the correct type.

The catalog carries a complete listing of the new ultra compact Solar "little giant" dries, which have caused quite a sensation in the trade because they almost literally "fit anywhere." "Elim-O-Stats," the new Solar radio noise suppressors, designed to eliminate man-made static in connection with modern receivers and electrical appliances, are also listed. Established radio Service Men as well as interested amateurs can obtain copies of this catalog by addressing the manufacturer.

OXFORD-TARTAK COMBINE

Of interest to Radio Jobbers, Dealers and Service Men is the announcement of the formation of the Oxford-Tartak Radio Corporation at 350 West Huron Street, Chicago, Illinois, to merge the business, equipment and assets of the Oxford Radio Corporation and the Tartak Manufacturing Company, both of Chicago.

Increased space is being taken at the above address and production facilities are being increased to take care of the growing demand for the new Oxford Hi-Fidelity line of Speakers and to give better service to customers.

Featured among the items of the new line will be Oxford Chromavox Speakers, Dynatest Universal Speaker Testing Devices, and a most complete line of replacement Speakers for Radio and Sound Amplifying equipment. The line is said to be

exceptionally complete and to offer advantages both from a technical and a merchandising standpoint. Jobbers are now being appointed for many new territories.

Paul H. Tartak is President and General Manager of the combined organization.

LAUNCH BIG METAL TUBE ADVERTISING CAMPAIGN

A giant advertising and promotional campaign designed to further educate the public on the advantages of metal tubes has been launched by the RCA Radio Tube division with the cooperation of 48 of the leading radio set manufacturers who are using metal tubes in their new radio models.

Large newspaper space, ranging from full pages to 1000-line advertisements in over 100 newspapers in the principal cities; special metal tube newspaper sections with cooperative advertising, publicity stories and photographs; special window and store displays, and radio broadcasting are among the media being used in the campaign.

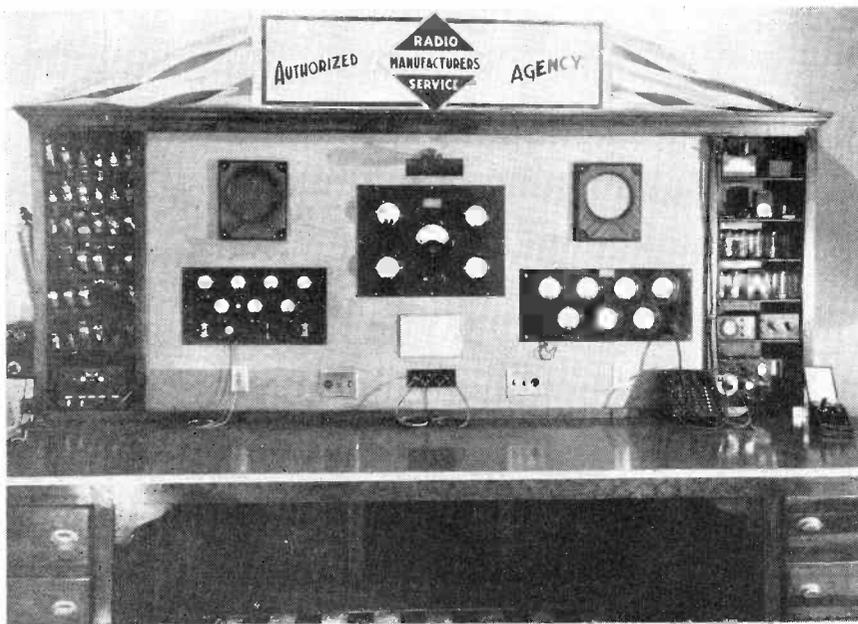
The first full-page advertisement has already begun to appear and is to be followed by similar ads. Blazened with a headline reading "48 RADIO MANUFACTURERS NOW USE METAL TUBES", the first ad lists these prominent set makers in alphabetical order at the top of the page to point out that the Radio Industry has enthusiastically adopted metal tubes by an overwhelming majority. "Metal tubes", the ad continues in a sub-head, "are the Sign of an Up-to-date Radio", "Be Modern—Get a Radio Set with Metal Tubes!" The copy then goes on to name the milestones in radio progress, up to the advent of metal tubes, which are hailed as the greatest tube advance in 28 years. The illustrations consist of a number of metal tubes and a cut-away drawing of a metal tube showing its special features. Enclosed in a box is the following pungent paragraph.

"This is the age of steel and electricity. Metal tubes, designed by the famed General Electric laboratories, and made by RCA and other tube makers licensed under RCA patents, are manufactured with a precision that is possible only in steel. Precision is the cause and measure of radio efficiency. Metal tubes give you more efficient reception. They are quieter, more stable, more enjoyable and especially superior in all-wave sets. Let any radio dealer prove this to you".

Reprints of this ad in large quantities are being widely circulated by all of the 48 manufacturers. In addition, special kits made up of window streamers, stamps, set signs and other material are being sent out to all dealers. Each of the manufacturers has notified his dealers and distributors to tie in locally with the appearance of these big metal tube ads and to arrange for metal tube radio sections.

NEW BRUNO CATALOG

A new catalog has been issued by Bruno Laboratories, 22 West 22d St., New York City, illustrating their line of velocity microphones for amateur, experimental, public-address and broadcasting uses. Methods used to attain improved tone quality and sensitivity are described. The entire line of microphones represents a complete redesign by the engineers of Bruno Laboratories.



The attractive (and very efficient) test bench used by Shannon Radio Service, Mount Vernon, N. Y.

Thousands of All-Wave Antennae
Were Boiled Down to Produce This



TACO Noiseless ANTENNA

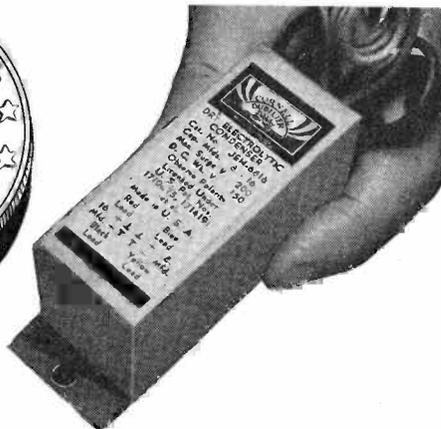
- Designed by same engineers responsible for transoceanic communications antennae.
- This No. 20 Kit the result of thousands of combinations and tests.
- Startling results in broadcast, amateur and short-wave bands.
- Sells on demonstration . . . in home or store . . . and stays sold. A safe money-back-if-not-satisfied item. \$6.75 list, less discounts.
- Positively out-performs any all-wave antenna on market. Test it for yourself . . . or insist on our evidence.

DATA Send for technical and merchandising facts. Meanwhile, order a kit from local jobber. And don't lose any more time getting behind this money-making item.

TITANCO

TECHNICAL APPLIANCE CORPORATION

17 East 16th Street :: :: New York City



SERVICEMEN ACCLAIM THE NEW TYPE J-EH and here's why—

• COMPACT—CONVENIENT

Encased in handy flanged cardboard containers, approximately 3" long by 1 1/4" square. Separate leads coded for polarity and capacity. Ideal for tough AC-DC midgeet assignments.

• DEPENDABLE

Type J-EH "stays put"—no kicks or return calls to make good. You build your "rep"—and add "steady" customers by using Type J-EH, because they stand up!

When you buy C-D you get more for your money. Get the full dope from your local C-D jobber. Catalog 128 on a complete condenser line available free for the asking.

• INEXPENSIVE

By buying from the world's largest manufacturer of condensers you enjoy quantity prices due to volume production, on quality condensers. Type J-EH is a real money saver!

Type	Cap.	List Price
J-EH-6404	4-4	\$.85
J-EH-6408	4-8	.95
J-EH-6803	8-8	1.20
J-EH-6416	4-16	1.25
J-EH-6816	8-16	1.35

CORNELL-DUBILIER

C O R P O R A T I O N

4375 BRONX BOULEVARD
NEW YORK



ONE OUT OF FOUR SERVICEMEN FAIL!

According to conservative estimates, one out of four servicemen fail or go out of business EVERY YEAR!

Will you be among them? Will you be one of the even larger group making only a bare living from the work. . . . Or, will you join the select, ambitious few who, in every town and city, grasp existing opportunities and build an outstanding success?

Sprayberry Training is specifically designed for men who aim to be in the latter group. Through it, I want to help you forge ahead as I have already helped hundreds of others. I want to help you do all types of radio work easier and quicker—help you build a REAL future. And, as proof of what I might do for you, I can point to a record of success that is second to none.

Let Me Help You Build A REAL Future!

Mine is not a "course" for beginners. It is **ADVANCED SERVICE AND BUSINESS TRAINING** for men who believe in looking ahead. No "fluff," fancy bindings or useless theory. From beginning to end, you get sound, **PRACTICAL HELP**—at a fraction of the cost you might expect to pay. Investigate!



F. L. Sprayberry 2548 University Place, N. W.
Washington, D. C.

Without obligation, please send your free booklet "PUTTING PROFITS & EFFICIENCY INTO SERVICING."

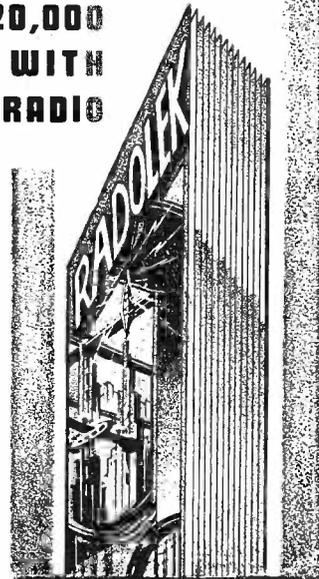
Name

Address S-12-35

Radio Parts Specialists

... SUPPLYING 20,000
SERVICE MEN WITH
EVERYTHING IN RADIO

• The New Radolek 1936 Profit Guide is NEW! BIGGER! BETTER! The most complete Radio Parts Catalog ever published—it's colossal—gigantic—it's the "top"! Never has there been a Radio Parts Catalog comparable to this superb book. Every page brings you extra profits. Completely revised—right up to the minute, bringing you everything in radio—at the right prices. Over 160 pages of valuable, money-saving "radio-buying" information. Over 10,000 separate Repair Parts—hundreds of new items—a complete, new selection of Radio Receivers and Amplifiers. Contains the most complete, exact duplicate, replacement parts listings of volume controls, condensers, transformers, vibrators ever compiled. This is your book—it's FREE. Send for IT!



THE
RADOLEK
COMPANY

567 W. Randolph St., Chicago

Name

Address

City

SERVICE MAN DEALER

Send Coupon →

THE MANUFACTURERS . . .

MILLER IRON-CORE I-F'S

Designed to have twice the selectivity and gain of an air-core type, a new iron-core intermediate-frequency transformer, with duo-lateral wound coils, has been developed by the J. W. Miller Company, Los Angeles, for distribution through regular trade channels.

The rustless and corrosionless core of uniform quality is known as "Crolite," a finely divided magnesium alloy imbedded in a ceramic body. The mica compression type tuning condensers assembled on a special ceramic base are adjustable from the top of the shield.

Aluminum, rather than the less expensive zinc alloy, is used for the shield, which measures only 1½ x 1½ x 3½ inches overall.

Miller engineers point out that a single-stage intermediate amplifier using Miller iron-core transformers can be designed to have the selectivity and gain of a two-stage air-core type with approximately half the inherent noise level, resulting in a better signal-to-noise ratio.

ARCTURUS INTRODUCES METAL TUBE LINE

The Arcturus Radio Tube Company, Newark, N. J., announces its "Coronet" Metal Tube line, utilizing a new and exclusive principle in receiving tube structure. It is claimed that the "Coronet" seal in these tubes enables the application of the manufacturing technique perfected by the industry over the past 28 years.

By using the tried and proved advantages of the vacuum tube art in the manufacture of "Coronet" metal tubes, the inherent weaknesses of the original metal tube are overcome. This special construction also results in a material reduction of the input and output capacities and makes possible uniformity in inter-element capacities. A special process has been developed to permit proper bombardment of the inner elements to the temperature necessary to dispense with residual gas troubles. The "Coronet" seal also precludes the possibility of shorts between wires and ground.

In addition to the foregoing advantages of Arcturus "Coronet" metal tubes, the manufacturer claims that they have more dependable vacuum than the original metal tube; lower operating temperatures permitting closer arrangement of chassis components; rugged structure eliminating metallic sleighbells and resulting in quiet operation.



The types already in production are 5Z4, 6A8, 6C5, 6F5, 6F6, 6H6, 6J7, 6K7 and 6L7.

MULTIPLE-SECTION MIDGET ELECTROLYTICS

Extreme compactness and utility are combined in double- and triple-section midget electrolytic condensers recently made available by Aerovox Corporation, Brooklyn, N. Y. Such units provide entirely separate and distinct sections in a single cardboard container, with individual positive and negative flexible leads for each section. The double-section units are available in 250 and 525 volt peak ratings, in combinations of 4-4 to 8-16 mfd. A single 8-8-8 mfd, triple-section unit is offered. Heavy cardboard cases, thorough impregnation, positive sealing and handy mounting flanges characterize these units.

NEW BLILEY 20-METER CRYSTAL

The Bliley Electric Company announces a new type mounted quartz frequency control unit for the 20-meter amateur band covering ranges from 14,000 kc to 14,400 kc.

Over a year has been spent on research and testing this crystal before placing it on

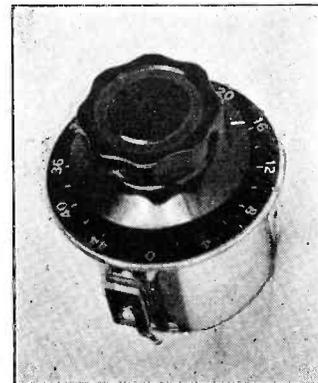


the market. Several new features are incorporated into the design. The crystal itself is thicker than an X-cut would be for this band, which gives it greater power handling ability and makes it less sensitive to mechanical shock. Likewise the temperature coefficient of the new 20-meter unit is considerably less than that of an X-cut, assuring greater frequency stability.

Known as the type HF-2 Unit, the Bliley 20-meter crystal delivers excellent power, will not jump from one frequency to another. The crystal is mounted in a circular holder of Victron G, a special material having extremely low radio-frequency losses. The holder plugs into any five-prong tube socket. Standard conventional crystal circuits are employed when using the Bliley HF-2 Unit.

NEW P-A ATTENUATOR

The Tech Laboratories of 703 Newark Avenue, Jersey City, N. J., announce a new improved attenuator specially designed for p-a and portable equipment. This attenuator meets the demand for a low priced compact unit of wide range and high quality



construction. It has been possible to construct an attenuator of remarkably small dimensions (2 1-8 inch diam. by 1 13-16 inch depth) having 22 steps of attenuation covering a range of 50 decibels.

Besides sound recording, public-address and broadcasting applications this attenuator is also ideal for use in the laboratory in all types of experiments requiring low d-c or a-c voltages. Particularly in chemical, physical and medical research many uses for this instrument are apparent. By, for instance, connecting two of these attenuators in series and connecting a 1.5 volt battery to the input leads the output will give voltages from 0.000047 volt.

A bulletin describing the new attenuator and some of its many uses is now available for distribution.

CLAROSTAT VOLUME CONTROL REPLACEMENT KIT

Volume control replacements for the bulk of the more popular radio sets are met by a handy and inexpensive kit now made available to Service Men by the Clarostat Mfg. Co., Inc., 285 N. 6 St., Brooklyn, N. Y. The kit is offered in two types: one, made up of composition volume controls; the other, comprising wire-wound volume controls. Each kit has five volume controls, three power switches that snap on to any Clarostat volume control, and five ½-watt flexible resistors used as external biasing resistance. The volume controls are of assorted resistance carefully chosen to serve the greatest variety of popular sets. Buying these kits, the Service Man gets the full benefit of big-lot prices, and, in addition, receives the five flexible resistors free of charge.

HYGRADE SYLVANIA ANNOUNCES TYPE 6E5

Hygrade Sylvania Corporation announces production of Type 6E5 intended primarily for use as a visible tuning indicator of the electron-ray type. Structurally, the tube consists of two parts—a triode which functions as a d-c amplifier, and the electron ray device. The latter unit has a round conical plate or "target" visible through the top of the bulb, which fluoresces during operation, showing a shaded or unlighted section when the receiver is not directly in tune. The triode section of the tube is of the conventional indirectly heated construction.



Dual Midget ELECTROLYTICS



Aerovox PBS midgets in 250 and 525 v. peak ratings.

Wide range of combinations for every need.

Heavy cardboard cases. Thoroughly impregnated. Fully sealed.

With flanges for ready mounting. Break off if not needed.

Colored pigtails.

Most capacity for least cost. Least bulk for greatest service.

Two entirely separate sections in one handy unit. Four leads—two positive, two negative. Most compact yet consistent with safety and long life. Unit shown is 8-8 mfd. 525 v. peak. Compare it with screwdriver alongside! Ideal for AC-DC midget set repairs. Or for crowded assemblies. Also triple 8 units, slightly larger. Send for new 1936 catalog covering complete condenser and resistor line.



CORPORATION

80 Washington St., Brooklyn, N. Y.

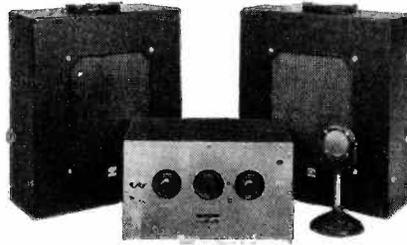
P.A. Systems



GET YOUR SHARE!

... of profit on P.A. Sales and Rentals

The market exists. It's just a matter of having the right equipment and then suggesting its use. And alert service men throughout the country are making "important dough" with Bell P.A. Systems . . . they're so efficient, flexible, and economical. You, too, can start cashing in. Write now and get details of Bell's full line. Then you'll be ready to start.



Model P.A. 3-C

A popular P.A. System, remarkably low priced. Powerful enough for the majority of needs and built for layman operation. 15 watt output, twin heavy-duty speakers, high fidelity crystal microphone.

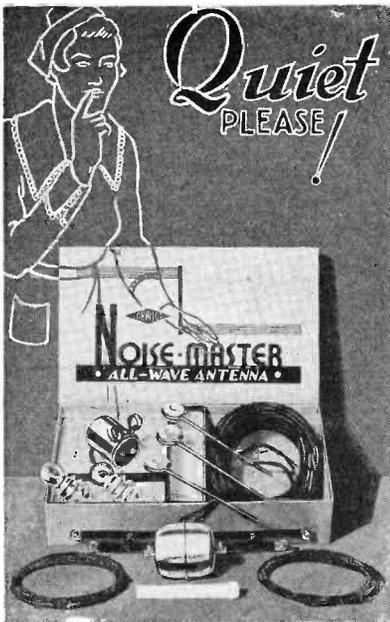
With two separately controlled input channels, recordings and voice can be run simultaneously. Two compact, light Keratol covered carrying cases. Total weight, 74 lbs.

And for you, Mr. Jobber!

We have a real proposition in a few select open territories. With the increasing demand for P.A. systems, plus our efficient equipment and promotional help, we can show you the way to substantial profits. Let's discuss it.



BELL SOUND SYSTEMS Inc.
61-62 East Goodale St.
COLUMBUS, OHIO



Quiet PLEASE!

"NOISE-MASTER"

Makes every receiving set a BETTER set

Electrically AUTOMATIC in operation

LIST PRICE \$6.75

Also available with special transformers for European broadcast bands . . . list \$7.00

Eliminates static on both broadcast and shortwave bands.



QUIET is what the set-owner craves, and here's the way to give 'em what they want. This A.A.K. licensed product, designed and engineered with typical CORWICO thoroughness, needs no manual operation after a qualified service-man has adjusted it. It eliminates noise and improves reception EVERYWHERE. Use it on your next installation!

Write for descriptive literature on this and other CORWICO units.

Cornish Wire Co., Inc.

30 Church Street

New York City

DESIGNED FOR

Speedy and Efficient

SERVICE WORK



Point-to-Point Tester Model 720-A. Dealer Net Price . . . \$15.00

With this Point-to-Point Tester defects can be localized without removing chassis from cabinet. Speeds up radio service repair work, measures resistance. Capacity and continuity, checks voltages of tube circuit.

Model 730-A Point-to-Point Tester same as Model 720-A except has Triplett Model 223 D.C. Voltmeter. Dealer Net Price . . . \$18.60

See them at your Jobbers. Write for Complete details.

Readrite manufactures all types of testers used for servicing Radio Sets, including Set Testers, Tube Testers, Resistance, Continuity and Capacity Testers, Point-to-Point Testers and inexpensive Indicating Meters.

MAIL THIS COUPON

READRITE METER WORKS
12-17 College Drive, Bluffton, Ohio

Please rush details on Model 720-A

730-A Send Catalogue

Name

Address

City State

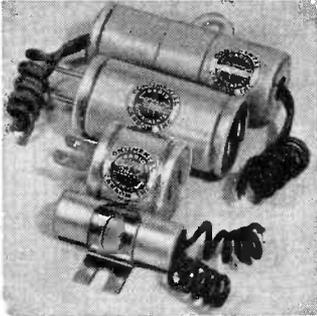


MANUFACTURERS—continued

CONTINENTAL "FILTERCANS"

Man-made static reduction is the object of seven new types of supply line filter devices developed by Continental Carbon, Inc., 13900 Lorain Ave., Cleveland, Ohio.

Filters designated for use with small motors, heater pads, vibrators and neon



transformers are of the type which prevents radiation of high-frequency impulses on the supply lines. Two designs are specifically for use between a radio receiver and a power line and are of the convenient plug-in type which can be quickly connected and demonstrated. For oil-burner motors and noise-producing devices with grounded frames, two filters are provided with mounting straps to be attached directly to the apparatus. Five of the seven filters employ combination network of inductances and condensers. The filters are rated to carry 5 amperes, a-c or d-c.

The principle of the filters is to prevent radiation of interference by capacity or capacity and inductance and to block line noise from entering a receiver by diverting extraneous signals to ground or shunting the r-f component to the grounded side of the line.

The word "filter" and the first three letters of the firm name have been combined into the word "Fitercon," as the general designation for the new noise-reduction devices.

SOLAR "LITTLE GIANTS" ADD DUAL TYPE TO POPULAR LINE

The service trade is now familiar with the virtues of "little giants", the ultra-compact midget dry electrolytics introduced by Solar Mfg. Corp., 599 Broadway, New York City, some months ago. Reduced to a startlingly small size, so that for equal capacity and voltage ratings, they need only about half the space required by other so-called "midgets," "little giants" have earned a high rating with the servicing fraternity.

Solar, accordingly, and in answer to a definite demand, now announces "little giants" of the dual type. This series affords the same space-saving economy, and offers lower cost than buying two singles, with increased convenience through flange mounting. They are made with separate sections and with leads from each section, so connections may be arranged to fit any circuit layout. Four new types are available. Capacities of 4+4 mfd, 250 volts surge peak; 8+8 mfd, 250 volts surge

peak; 4+4 mfd, 525 volts surge peak, and 8+8 mfd, 525 volts surge peak.

Service organizations are invited to write to Solar at the above address for complete information and samples.

AMPLIVOX AURITON

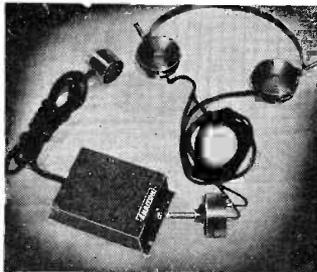
A simple, practical device for diverting signals from the loudspeaker to earphones has been designed by the Amplivox Labs., 227 Fulton St., New York.

It is called the Auriton. Its outstanding features are first, that it automatically silences the speaker when the phones are plugged into the circuit; second, that incorporated in the device is a circuit for using the full amplification of the receiver for listening. This permits using the device to operate a speaker on the porch, in bedrooms, etc.

The circuit is not unbalanced in any way; nor is any damage possible to the receiver.

The practical advantages are that it permits the listener to hear programs at all times without interfering with other members of the family, in complete "privacy". Auriton is especially helpful to the hard-of-hearing.

A 5-foot cable permits placing the device at the fingertips of the user, yet is not in the way. The Auriton avoids the



necessity of rewiring the receiver for an earphone jack.

Available in several models so that it can be used with either single audio power tube or with audio power tubes in push-pull.

Complete information available in new Bulletin O.

"PRECISION" ELECTRONOMETER TUBE ANALYZER

The Precision Apparatus Corporation introduces the Series 500 Electronometer, said to embody many advanced circuit features to fill the need of tube analyzing in an extremely accurate, complete and speedy manner.

The following is a condensed list of the outstanding features employed:

1. Tests over 300 tube types including all types of glass, metal, metal glass and glass octal base tube series.
2. Hot cathode leakage test.
3. Hot neon inter-electrode short test between any elements.
4. Tubes tested under properly rated loads so that damage to the tube will not occur by drawing excessive emission from the filament.
5. Sufficient current is delivered by the power tubes to show up poor cathode structure under heavy load conditions.
6. Complete free point tube analysis provides for extreme flexibility for future

tube releases without the necessity of rewiring.

7. Gives individual tests for each section of

- (a) full-wave rectifier tubes
- (b) double-triode tubes
- (c) triode-diode tubes
- (d) pentode-diode tubes
- (e) duo-diode tubes
- (f) pentode-triode tubes
- (g) frequency-converter tubes.

8. Line voltage checked directly on the meter.

9. Center tapped filament tubes 6Z5, 12A5 and 12Z5 can be checked for shorts.

10. Large 4-inch square meter with a three colored English reading scale plate.

11. Neon condenser leakage test.

12. Easy to operate.

The No. 500 Electronometer can be obtained in three types: portable, counter and panel type.

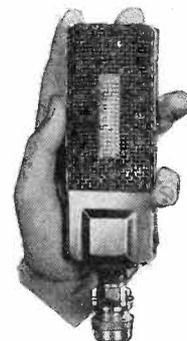
Circular matter giving complete information may be obtained by writing to Precision Apparatus Corporation, 821 E. New York Ave., Brooklyn, N. Y.

BRUNO VELOCITY MIKES

Two types of velocity microphones for direct connections to the grids of vacuum tubes are announced by William Bruno, President of Bruno Laboratories, 22 West 22nd St., New York City. One of the types has an output impedance of 100,000 ohms, suitable for connection to a vacuum tube as used in the customary pre-amplifier, and the other has an output impedance of 5000 ohms, for circuits using special tubes with relatively low input impedance, or conventional tubes with special grid loading.

There are two models for each type. One model is flat to one decibel from 50 cycles to 12,000 cycles, and the other to two decibels from 60 cycles to 10,000 cycles. An engineering circular is obtainable from the manufacturer.

The high impedance velocity microphones dispense with the need of a coupling transformer, since usually such microphones would have impedances of 200 or



500 ohms, impractical for direct connection to a tube grid circuit because of the loss suffered through mismatch.

"The new high impedance type velocity microphones," said Mr. Bruno, "increases the gain and also reduces the hum."

A complete list of various constructions and designs are available by writing Bruno Laboratories.

ELECTRO-VOICE

HUM-FREE VELOCITY MICROPHONES



Among the many exclusive features that are found in this new Velocity microphone series, elimination of hum pick-up is an important one. The intelligent application of basic engineering principles does the job with extraordinary efficiency. The High Impedance type, for example, can be operated within eighteen inches of the power transformer and the 200 ohm type, even closer. This has never before been possible with any other Velocity microphone in the medium price class and is just another reason that your ELECTRO-VOICE will be a joy to own and use.

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SUPREME 310 FOUNDATION METER KIT

The new, specially designed Supreme 5 inch meter is fan shape and incorporates 26% longer scales and larger figures. Combined with the parts kit, it provides 2 D.C. current ranges (0/5/125 mils.), 4 A.C. voltage ranges (0/5/125/500/1250 volts), 4 D.C. voltage ranges (0/5/125/500/1250 volts), 4 output voltage ranges (0/5/125/500/1250 volts), and 3 ohmmeter ranges (0/2,000/20,000/2,000,000 ohms). A complete circuit diagram is also included.

Complete 310 Meter Rectifier and Resistor Kit
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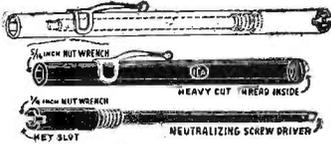
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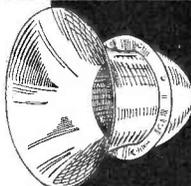
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WRITE FOR ILLUSTRATED BULLETIN S.

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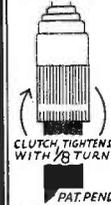
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WRITE FOR BULLETIN H.

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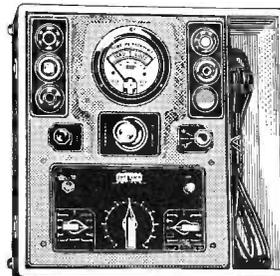
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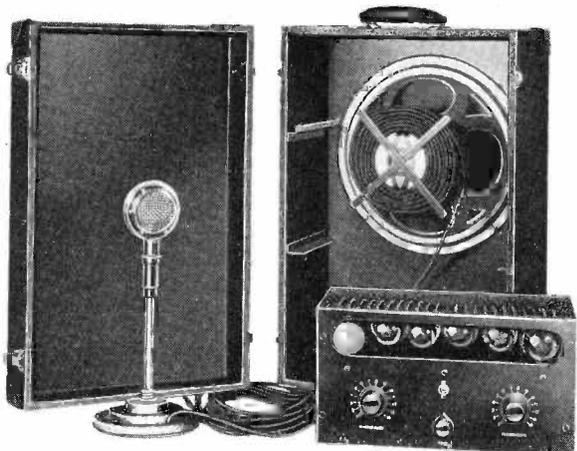
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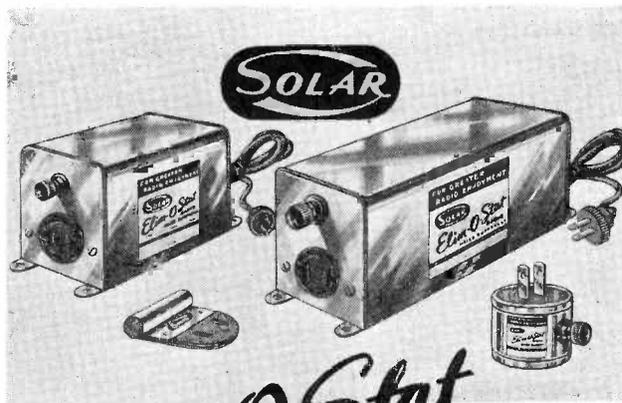
Webster-Chicago engineers are continually bringing out sound units of advanced design. Two other recent ones include a Class A 15-Watt Amplifier with 4-Position Electronic Mixer and a High-Gain 17-Watt Amplifier.

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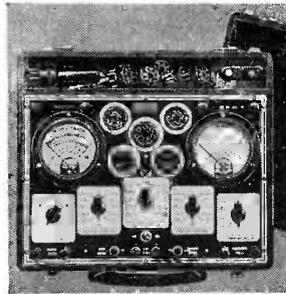


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"K.H." in Electronics says about

MODERN RADIO SERVICING

by ALFRED A. GHIRARDI

"THERE WAS A TIME when practically anyone could service a radio receiver. If it didn't 'play' you whacked the detector tube and if a bong came out of the loud speaker you felt sure the audio amplifier was not in trouble. Then you took the antenna wire and put it successively on the grid of the detector, the first and second r-f tubes until you had found which was the dead stage.

This was before Trube, Ballantine, Wheeler, Jarvis, Travis et al., including those at Camden got busy with perfectly good radios and put a.v.c., inter-carrier noise suppression, diode detection, variable-mu tubes and other tricks into everybody's set. Furthermore they were unsatisfied with a straightforward (from the standpoint of service) t.r.f. job and made nearly everyone own a much more complicated superhet. Then someone got the all-wave idea, and now they are to have wide-band receivers.

The result is that practically no one can service a radio nowadays without expensive tools, vast patience and intuition, and a rather complete knowledge of these more modern receivers.

Mr. Ghirardi, whose 'Radio Physics Course' is well known, has assembled a tremendous book of dope for servicemen. In its 1300 pages he has described servicing equipment, told how to make much of it, what makes

radio wheels go round and what makes them stop and how to start them running again. It is up to the minute with a chapter on high-fidelity receivers (anticipating the day when such will be a bit more plentiful than now), much material on cathode ray tubes, 100 pages in a chapter on aligning superheterodynes, data on testing and repairing components, how to diagnose and remedy troubles in automobile sets.

This reviewer spent the better part of a day looking over this book. He now understands why servicemen often feel like darning a chief engineer to try to service one of his own creations. And while this reviewer does not offer to take on practically anybody's radio which has something wrong with it, he does feel that within the pages of this huge book there is all that a service man needs to know to tackle the worst of today's receivers.

As a companion to the text there is a smaller volume by the same author with the aid of B. M. Freed. It is called 'Radio Field Service Data' and it gives the i.f.'s of 2700 models of receivers, grid bias resistor chart, wiring diagrams of automobile ignition systems, trouble symptoms and remedies of over 750 receiver models, etc.

With these two books it seems possible that one of the engineers mentioned above could go out and make a living at servicing."—K. H.

Nov. 1935.

MODERN RADIO SERVICING

1300 pages. 706 illus.
723 Review Questions. \$4.

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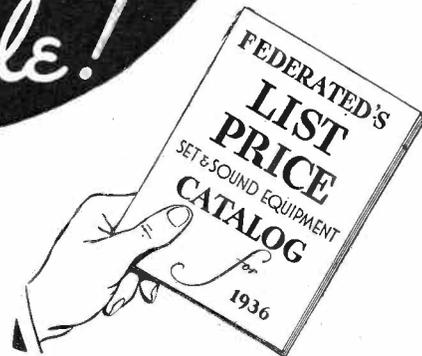
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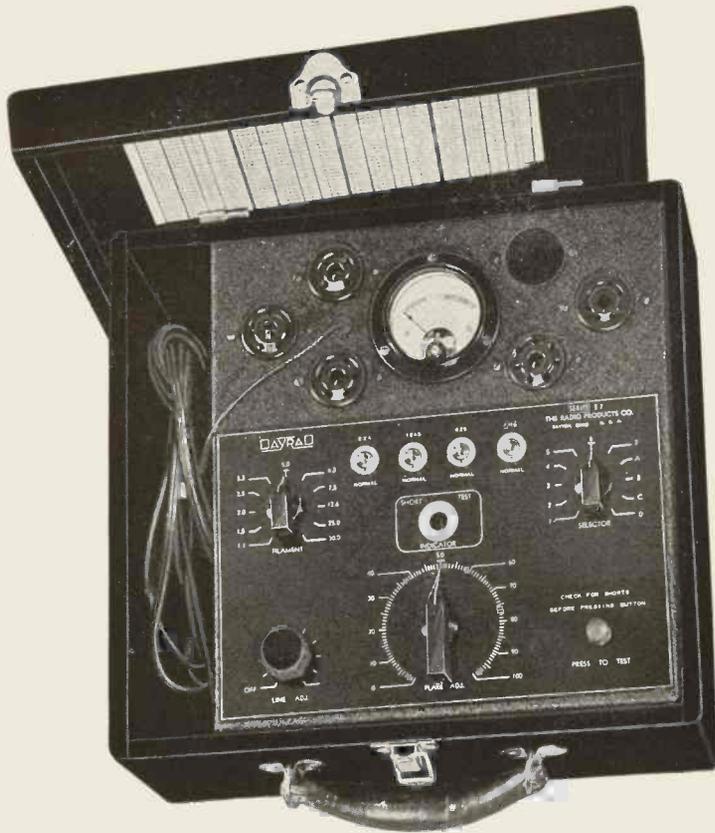
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