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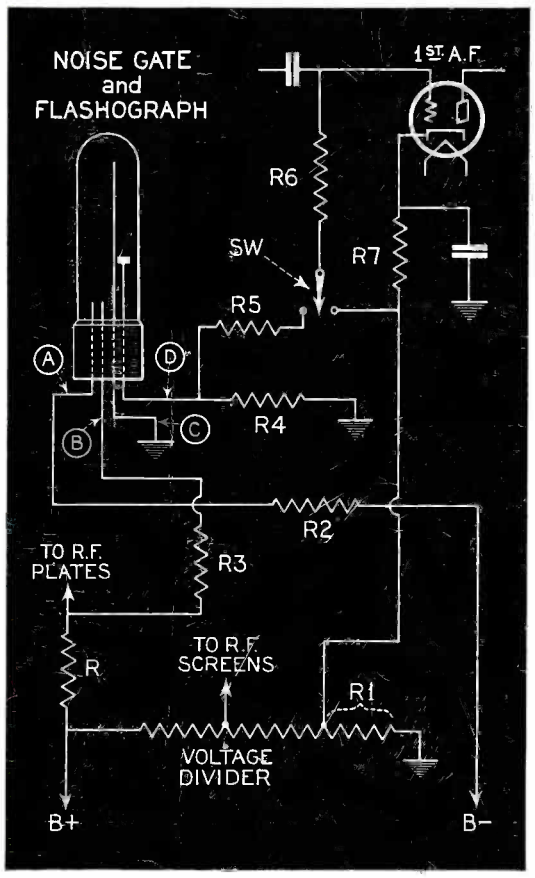

The Noise Gate

(See page 429)

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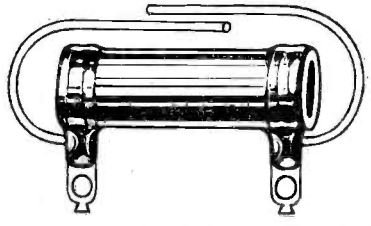

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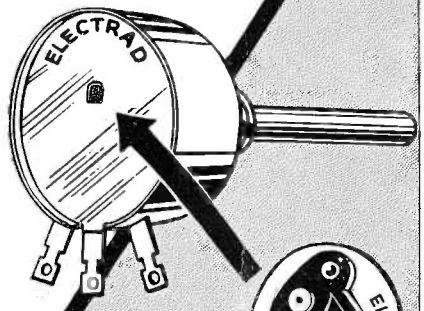

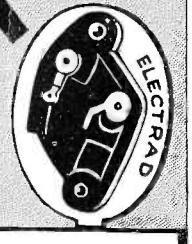

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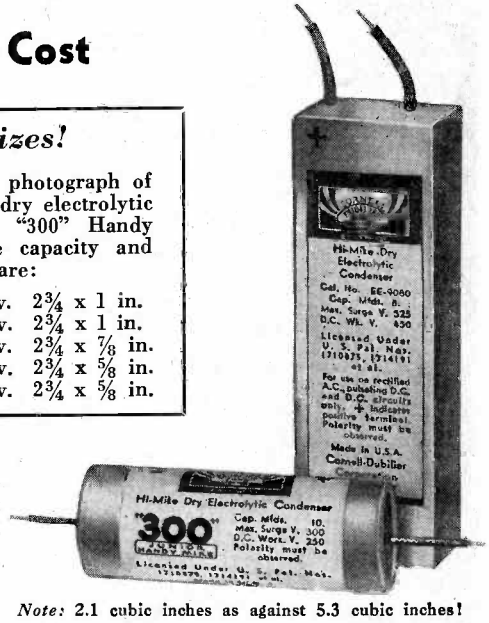
4 mfd.	300 max. surge v.	2¾ x ⅝	in.
10 mfd.	35 max. surge v.	2¾ x ⅝	in.



Note: 2.1 cubic inches as against 5.3 cubic inches!

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SERVICE

A Monthly Digest of Radio and Allied Maintenance

DECEMBER, 1933
Vol. 2, No. 12

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M. L. Muhleman

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Published Monthly by the
Bryan Davis Publishing Co., Inc.
19 East 47th Street
New York City

SANFORD R. COWAN
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Circulation Manager

Chicago Office—919 N. Michigan Ave.—L. F. McClure, Mgr.
Cleveland Office—10515 Wilbur Ave.—J. C. Munn, Mgr.
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Melbourne, Australia—McGill's Agency.

Entered as second-class matter June 14, 1932, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Subscription price $2.00 per year in the United States of America; 20 cents per copy. $3.00 per year in Canada and foreign countries; 35 cents per copy.

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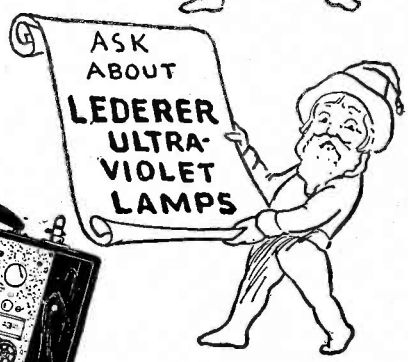

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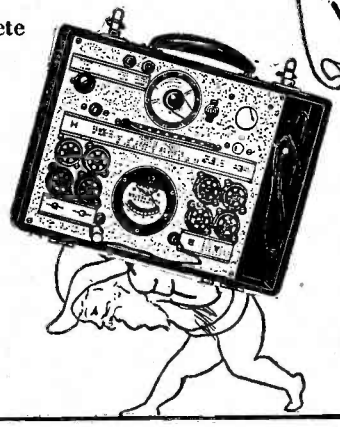

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THE ANTENNA...

NEW TUBE-PIN NUMBERING

WELL, it has happened. There is very little liklihood that the General Standards Committee of the RMA or that the members of the RMA, will veto the action taken by the RMA Committee on Vacuum Tubes to accept the new form of pin numbering for vacuum tubes. The new system will be effective June, 1934.

Before commenting upon the change, it might be well to present the highlights of the differences between the old and the new systems. With the exception of three- and four-pin tubes, all pins but the plate or anode (and even these in a few instances), have been changed. Looking down upon the top of the socket, the right-hand filament or heater terminal always was number 3 in the old system. The remaining filament or heater terminal was 4. The anode or plate of the tube was number 2 and the cathode, if one were used, was number 5. Of these four pins, number 2 of the plate pin is the only one to retain its numerical identity. Naturally where more than one anode is used in a tube, more than one pin must be allotted; hence two pin designations are used. However, number 2 is still one of these plate numbers.

Whereas in the old system, the lowest number, namely 1, could be the control grid, screen grid, one diode plate, one anode plate in a full wave rectifier, or grid number 2 in the 85 duplex-diode-triode, it is the one and same reference point in the new system; namely, the right-hand heater or filament terminal when looking down upon the top of the socket, This arrangement replaces the use of number 3 in the old system which was always the right-hand filament or heater terminal under the conditions stated before. Number 4 in the old system was the other filament or heater terminal in all cases. In the new system, the left-hand filament or heater terminal (previously designated as 3) now bears a number representative of the maximum number of pins on the tube base. Thus in a four-pin tube, the two heater or filament terminals are 1 and 4; in a five-pin tube, they are 1 and 5; in a six-pin tube, 1 and 6, and in a seven-pin tube they are 1 and 7.

As far as the use of reference points are concerned during service work, we can see very little advantage in the use of a number 1 instead of a number 3 for the same tube pin; that is, if the filament circuit is used as the reference point. Of course, number 1 more truthfully indicates a starting point than number 3, but this is purely a matter of preference for numbers.

The Service Man who in the past has become acquainted with the use of number 5 to designate the cathode, will experience some confusion with the new pin numbering because number 5 is not always the cathode.

Frankly, we see no major present advantage in the new form of tube-pin numbering. At the same time we do not see any disadvantage for the service group, unless—and we doubt that such is true—Service Men have been operating by utilizing the pin numbers specified upon various forms of technical tube literature. Since such numbers are not indicated upon the sockets used in the receivers and since they are not shown upon the schematic wiring diagrams, possible confusion may arise from numbers used to designate tube pins upon the sockets utilized in testing equipment. And even here the situation is not as bad as it may appear, for the man is working with a specific tester and it is far more important to correlate the elements from their position, rather than according to pin numbers. Naturally, if the man attempts to operate a tester which bears the old type of pin numbering and follows the new type of pin numbering, he will be checking across the wrong elements.

Habit is a very strong influence. Much water will flow over the dam after June, 1934, before Service Men will forget the old pin numbering. Infinitely far more confusion will result from the fact that the cathode terminal is not always to the immediate left of the left-hand filament or heater terminal.

At the same time, it may be necessary to recognize that some such change in pin numbering and allocation is necessary in order to prepare for future tubes. It is not a far-fetched thought to visualize two, three, and even four, tubes in one envelope, in which case, deviation from the old form of tube-pin numbering would be imperative. If this is true, then it is better to have whatever confusion may arise today, than to wait until the number of types of tubes are greatly augmented, and then make the change.

While talking about tubes, it might be well to comment that a certain amount of standardization irrespective of pin numbering should be used in tubes of like type. We are speaking about the wiring of the elements. Take for example the center tap upon the heaters of the 6Z5 and the 12A5. In the former it connects to one filament terminal. In the latter it joins the terminal to the immediate left of the left-hand heater terminal. Why?

• • •

RADIO receivers in taxicabs! That's a swell idea. New York City now has two chains so equipped. And from all reports, the radio-equipped cabs get the biggest play. In the meantime, independent cabs and smaller chains are equipping their cabs with radio receivers and displaying the "Radio Equipped" sign.

From the Service Man's angle this is grand. The idea will spread from Gothamtown to other towns, and finally into the smaller communities. Where there is a radio receiver, there will be required a Service Man. More than likely special arrangements have been made for service and installation. However, no one chain of radio-equipped cabs can function with but one service station. Such stations located in different parts of the town are required so as to obviate the necessity of driving a Brooklyn or Bronx taxi to some part of Manhattan for repair of the receiver. Since radio is the appeal, the receiver must be in working order. A town like New York can use at least 50 such service stations.

There are enough small taxi owners, who operate from one to a half-dozen taxis, to offer an opportunity for a wideawake Service Man or organization to sell auto-radio installations. If not the sale, then service arrangements. This type of work is not limited to New York. It is spreading over the nation. Taxi competition is keen as it is. The addition of auto radio makes it stiffer. Hence, an open-minded taxi owner will see the light when the sale is tackled from this angle.

Who will start selling auto radio to the buses?

John F. Rider.

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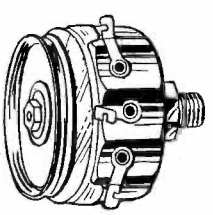
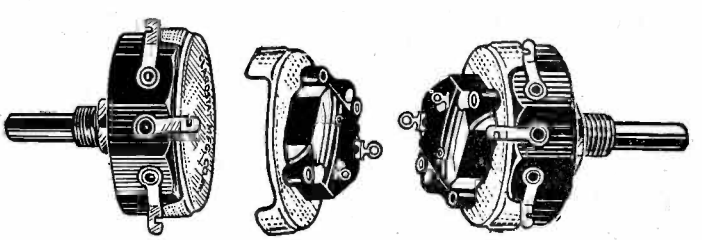


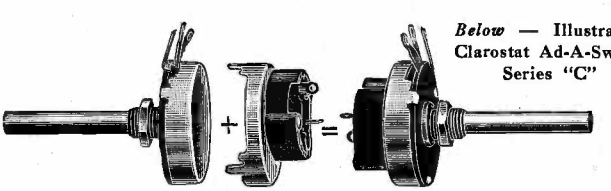
Left—Illustrating Clarostat "X" 123, replacement for Bosch 28, 29; Eveready 1, 2, 3

Below — Illustrating Clarostat Ad-A-Switch Series "W"

Clarostat Line Ballast Replacement for 27 makes — 81 models.



Below — Illustrating Clarostat Ad-A-Switch Series "C"



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CLAROSTAT

A MESSAGE

TO ALL OWNERS OF

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THE following will be of interest to every individual and every service organization who owns one, two, or all of the Rider Manuals—whether purchased direct from us, through one of our dealers, secured through a tube deal or in connection with other equipment.

New Eight-Page Booklet

WE have prepared an eight-page booklet containing "Special" data pertaining to the contents of Volumes I, II and III of the Perpetual Trouble Shooter's Manual. This information was not available when the Manuals were published. Consequently we are taking this means of conveying the data to you.

Contents of Booklet

This information is

1. *Electrical values missing from some of the diagrams shown in the three volumes and the single complete volume.*
2. *Socket layouts missing from some of the pages.*
3. *D-C resistance of transformers, field coils and other units.*
4. *Volume control values.*
5. *Color coding of units and leads.*
6. *Chasses names, changes, notes, etc.*

THIS is the first of a series of such periodic bulletins. Our reason for preparing and presenting this data in this manner is that we wish to make Rider's Manuals as comprehensive as possible and to avoid the spreading of data pertaining to any one receiver, between Manuals already issued and those to come. We are always seeking information concerning receivers so as to make the information concerning any one receiver as complete and detailed as possible.

WE are certain that you will find this and forthcoming bulletins of immense value. They will supply missing information. When writing for them, you must communicate with us direct and also advise where you purchased your Manuals.

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SERVICE

A Monthly Digest of Radio and Allied Maintenance

FOR DECEMBER, 1933

The Automatic Noise Gate

(SEE FRONT COVER)

ON page 112 of the March issue of SERVICE we made the timid prediction that some manufacturer would sooner or later make use of the excellent features of the "Noise Gate" developed by Mr. J. F. Dreyer, Jr. And sure enough—the new Fada "RW" group of receivers uses the combinations of "Flash-O-Graph" and "Noise Gate" as visual tuning indicator and inter-channel noise suppressor.

WHAT IT DOES

A glance at the diagram on the front cover will show that the new device is the usual type of gaseous discharge tube with an extra element. The elements A, B, and C are used to provide the light column which travels up along the element C. This is like a thermometer and provides amusement for the person tuning the set (they play "hot and cold"), but is placed in the circuit not for the purpose of fun but rather to give a true visual indication of the correctness of tuning.

Now we come to the fourth element, D, which is used only for inter-channel noise suppression. This element provides the desirable silence when tuning from one station to another, and without the use of any extra tubes for this function. Aside from the obvious advantage of obtaining this action in such a simple and economical manner, the arrangement has the further advantage that it releases the audio tube for amplification with a high degree of rapidity and therefore eliminates the possibility of distortion brought on by a lag in this automatic operation.

HOW IT WORKS

The tuning-indicator part of this tube operates from the plate current of the r-f, i-f tubes. As the plate current of the tubes decreases, the voltage between the elements B and C is increased. This increased voltage also increases the gaseous discharge, which thereupon travels up the element C. The height of the discharge is proportional to the increase in voltage and is also proportional to the current flow in the circuit of the r-f, i-f tubes.

Now for the fourth element, which provides the noise gate action. Referring to the diagram on the front cover—first of all, the grid of the 1st a-f tube is biased to the point where the plate current is practically cut off. This is accomplished by placing a positive voltage on the cathode of the tube and then returning the grid to ground through resistors R6, R5, and R4. The positive voltage on the cathode is the drop across the portion R1 on the voltage divider.

THE FOURTH ELEMENT

Now, the fourth element D has a portion of its length insulated by a glass sleeve and only a portion of the top is exposed to the discharge. As the gaseous discharge column rises along the element C it finally reaches the level of the exposed portion of the element D. This causes a second discharge between C and D which immediately develops a voltage across the resistor R-4 connected from the fourth element D to ground. Then, if the switch SW is in the left-hand position, the voltage developed in the circuit of element D is impressed on the grid of the 1st a-f tube. This voltage in effect reduces the high bias on the a-f tube grid and therefore "releases" it for amplification. In other words, when the light column reaches its high point—indicating a station signal—a voltage is immediately developed in the circuit of element D which releases the bias on the a-f tube and permits plate current to flow. The a-f tube then amplifies in the normal fashion. As soon as the light column drops below a certain point, the discharge between element C and D disappears (because the lower part of element D is insulated) and with it the voltage developed across resistor R-4. The a-f tube is then returned to the high-bias condition and will not amplify.

The noise-gate action may be cut out by throwing switch SW to the right-hand position. Then the bias on the grid of the 1st a-f tube is equal only to the drop in the cathode resistor R-7.

General Data . . .

Majestic 500 Chassis

The Majestic Chassis 500 is used in receiver Models 55, 59, 75, 195, 560, and 566, with speakers G-26-H and G-24-M. The G-24-M speaker is used in Models 75 and 560 only. This speaker has a field-coil resistance of 1000 ohms. The G-26-H speaker has a 980-ohm field coil.

The Circuit

The circuit of the 500 chassis is a good example of modern reflexing. The type of reflexing employed is not the same as the old systems wherein a single group of tube elements served two purposes. In modern reflexing, composite tubes are usually employed.

Getting down to the circuit of the 500, shown on this page, the tuned antenna circuit is fed into the duo-valve 6A7-S, which serves the double purpose of mixer and oscillator. The i-f output of this tube is fed through a double-tuned i-f transformer into the first intermediate frequency amplifier, which in this case is the pentode section of the 6F7-S tube. This section is in turn coupled through the second i-f transformer to the pentode section of the 6B7-S tube. The i-f output of this tube is then fed separately into the two diode plates of the same tube. One diode plate is used for the signal or audio channel, and the other for AVC. The use of separate diodes for these two purposes is an advantage because the audio diode is not negatively biased. The detected audio output of the "a-f" diode is then fed *back* to the triode section of the 6F7-S tube where it is amplified, finally driving the type 42 output tube.

Alignment

The receiver must be aligned with the volume control full on. Set wave-change switch in broadcast position and gang condenser in full mesh. Supply a 456-kc. signal to the 6A7 converter grid and align all the i-f tuning condensers for maximum sensitivity. When facing the rear of the chassis, the 1st i-f transformer is behind the gang condenser. This transformer has two adjustments made by turning both the screw and the nut. The 2nd i-f transformer is to the left of the 1st, and the 3rd just to the left of the 2nd. These two transformers have secondary trimmers only.

Now turn the gang condenser completely out of mesh. Set the dial to the calibration line for 4400 kc. and lock the dial to the condenser shaft. Then set the dial at 1500 kc., supply a 1500-kc. signal to the input of receiver and align the gang condenser trimmers (on side of condensers) for maximum output. (This adjustment is necessary only when replacing or recalibrating dial.)

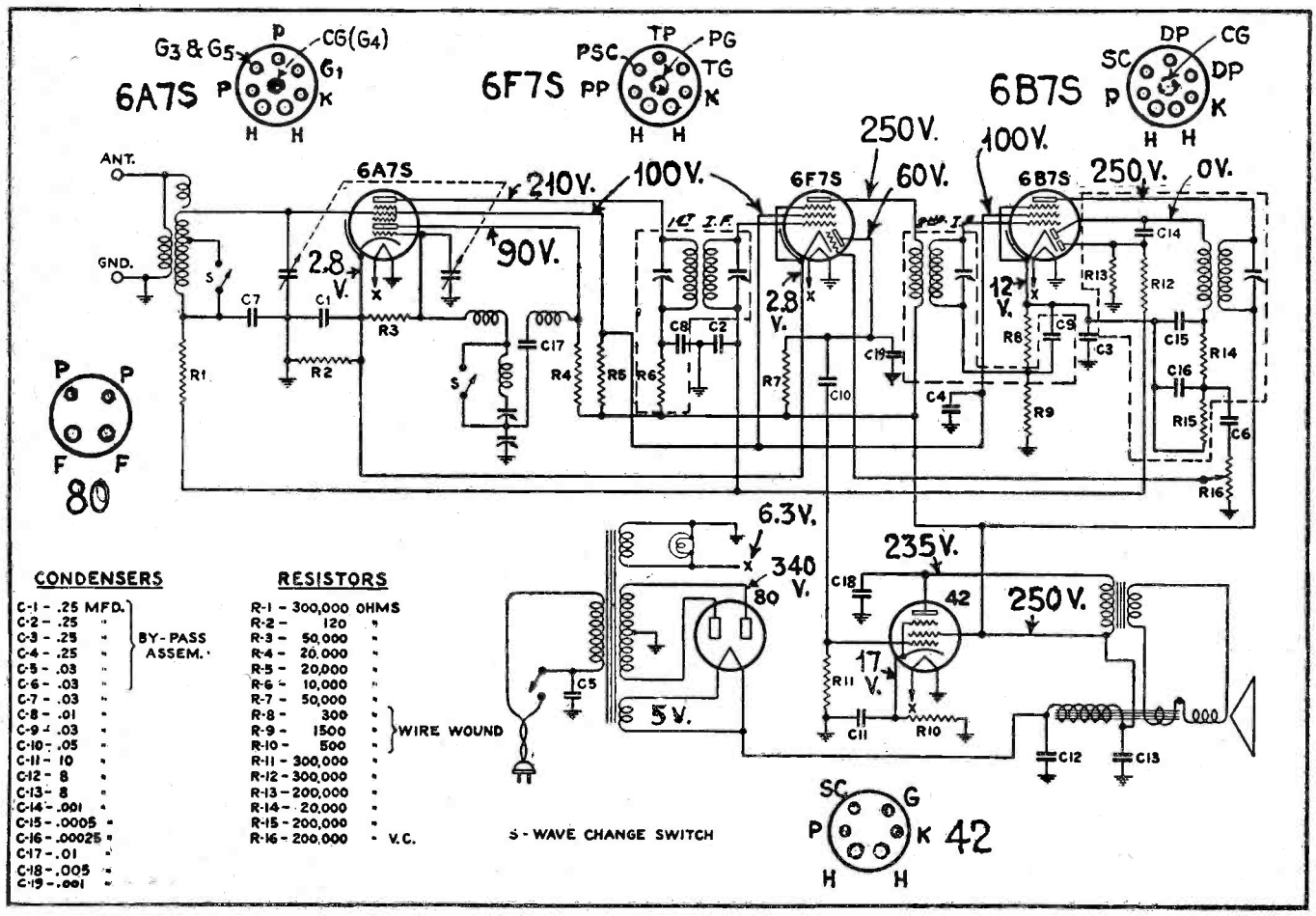
After this is completed, set the wave-change switch to the short-wave position, supply a 1500-kc. signal to the input as before and then tune the short-wave tracking condenser (rear of left side of chassis) and the gang condenser simultaneously for maximum output. For each adjustment of the tracking condenser there will be a different gang condenser setting which gives maximum output. The combination of gang setting and tracking condenser adjustment which gives maximum output, disregarding setting, is the correct adjustment.

Now return the wave-change switch to the broadcast position, supply a 600-kc. signal to the receiver input and adjust the broadcast tracking condenser (front left side of chassis) and the gang condenser simultaneously for maximum output. Adjustment should be made in the same manner as given above.

Power Transformer

The color code for the power transformer is as follows:

Primary.....Stranded yellow
Hi-voltage.....Stranded red
Hi-voltage C. T.....Stranded black
Heater.....Solid black
Rect. Fil.....Solid yellow



The Majestic 500, with "modern reflexing"

Voltage Readings

The voltages are given on the diagram, as well as socket connections. Voltages are based on a line of 115 volts. The reading of 60 volts on the a-f plate of the 6F7 cannot be read with the usual voltmeter due to the very high value of resistor R-7. For correct reading, use meter with a sensitivity of 600,000 ohms per volt.

•

RCA Victor 100 and 101

This 4-tube super employs an intermediate frequency of 460 kc. and covers the frequency ranges of 540 to 1500 kc. and 1600 to 3500 kc.

Note from the diagram that the power supply uses a type 1-V half-wave rectifier tube. This tube, as well as the rest of the tubes in the receiver, has a 6.3-volt heater. All heaters are connected in series and obtain their voltage from a tap on the high-voltage secondary winding of the power transformer. The lower end of this winding is grounded, as is one leg of the heater for the 6F7 tube. This completes the circuit. Since all heaters are in series, the tap on the power transformer is at a point slightly in excess of 25 volts above ground. A second tap is taken off this same winding to supply voltage to the dial lamp.

Wave Changing

The wave-change switch S-1 is in the antenna circuit. When thrown to the right, it shorts out a portion of the antenna coil winding and at the same time places another condenser, C-2, in series with the antenna. When thrown to the left, the complete coil is in use, and condenser C-2 is shorted. Switch S-2 is in the plate circuit of the power pentode and functions as the tone control by throwing in and out of circuit the condenser C-20.

The 6A7 tube functions as first detector and oscillator in the conventional manner. The 6F7 tube is used as the i-f amplifier and second detector. The upper plate and grid are used in the i-f stage and the lower plate and grid are used in the detector stage. In order to avoid confusion, the grids and plates for both the first and second detectors are marked "DG" and "DP" in the socket layouts accompanying the diagram.

Volume in this receiver is controlled by varying the bias on the grids of the 6A7 and 6F7 tubes by means of the variable resistor R-6 in series with the bias-limiting resistor R-7.

Line-Up Adjustments

The detector and oscillator line-up trimmer condensers are adjusted by setting both the dial and the external oscillator first at 1400 kc. and adjusting the tuning condenser trimmers for maximum output, then changing the oscillator frequency and dial setting to 600 kc. and adjusting the submounted trimmer condenser for maximum output.

The i-f adjustments are made by adjusting the two trimmers located on the first i-f transformer (near rear of chassis) for maximum output when a 460-kc. signal is connected between the control grid of the first detector and ground. Be sure and set the station selector at a point where no signal is being received when making the i-f adjustments.

All condenser, resistance and voltage values are given on the diagram. Voltage measurements are based on a line potential of 120 volts. Readings should be taken with volume control full on. The actual plate voltage of the second detector, which is 260 volts, cannot be read with an ordinary voltmeter, because of the high resistance in the plate circuit. The value given on the diagram is the average reading.

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Stewart-Warner Models

The Stewart-Warner Models Avon, Graham, Raphael, St. James and No. 5 Phonograph Combination contain the 900, 950 and R-100 chasses. Receiver models 50, 51, and 55 contain the Model 105 chassis. The Model 104 chassis is used in receiver models 504-A, R-44-A and R-40-A.

Of the late sets, the 501-A is the Metropolitan Midget and contains the 101-A chassis. The 501-C is also the Metropolitan Midget but contains the direct-current 101-C chassis. The Model 63 receiver contains the 106 chassis.

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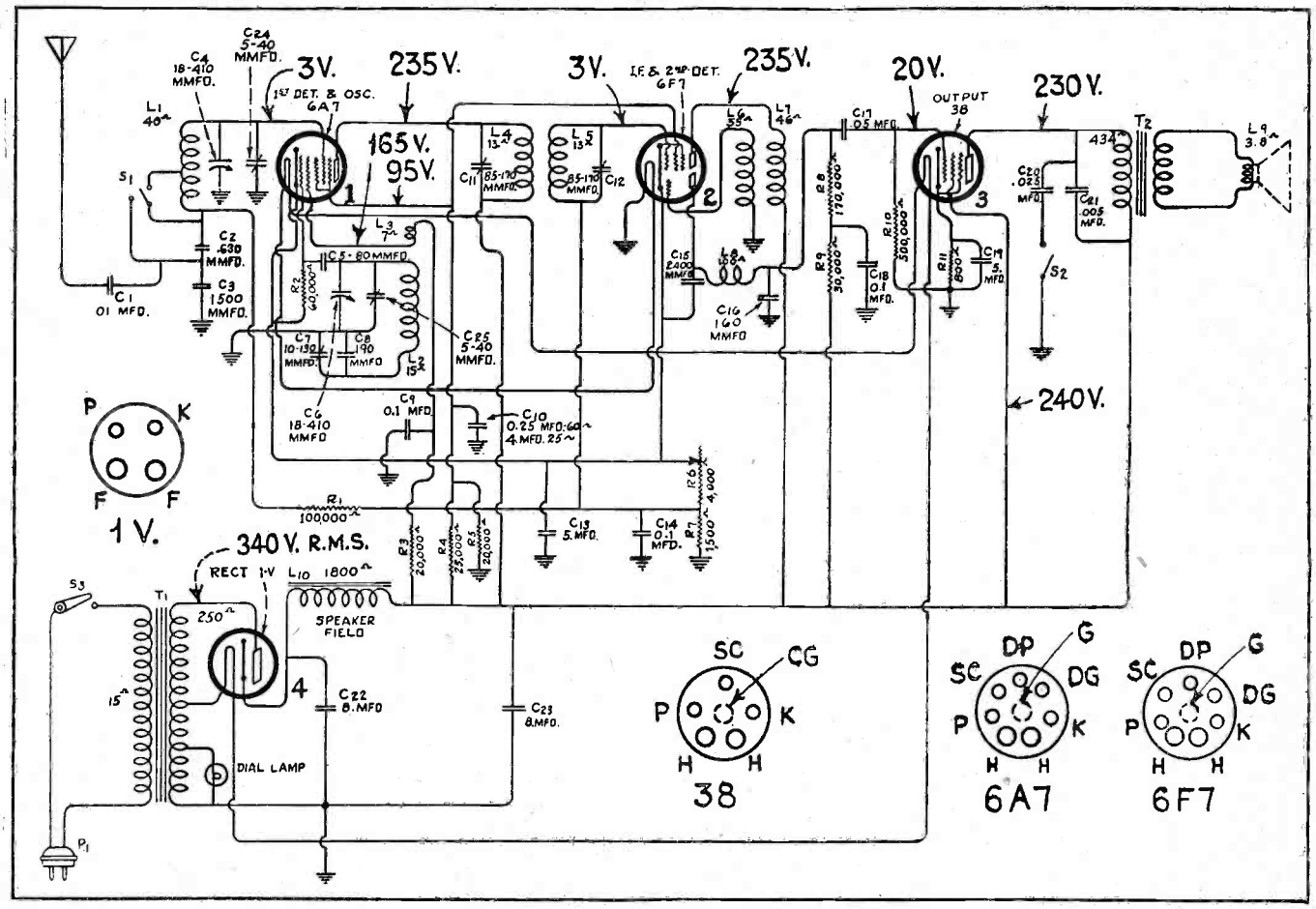

RCA Victor 100 and 101. Note tapped secondary of power transformer

Kadette Jr. Model F

There are two versions of the Model F. The diagram and values of parts for the first run receiver are given in Fig. 1. The diagram and values for the latest model are given in Fig. 2.

The Tubes

This receiver employs only two tubes. The first tube, which is a type 6F7, functions as r-f amplifier, detector and a-f amplifier. Referring to the diagram of Fig. 2, the cathode of the tube is shown in heavy lines. The first grid above the cathode is the control grid of the pentode portion of the tube. The next grid, with a positive voltage of 10, is the screen, and the uppermost grid is the suppressor, which is seen to connect to the cathode. The uppermost element is the plate of the pentode.

The signal is fed to the control grid in the usual manner. It is seen that this plate is coupled to the power tube through an r-f choke, and also to a tuned impedance through the condenser A-502-A. The r-f signal therefore takes the path to the tuned impedance and is impressed on the grid of the triode portion of the 6F7 tube. Note that there is a grid leak and condenser in the grid circuit.

Reflexing

The rectified signal appears in the plate circuit of the triode portion of the tube, this plate being the one shown at the bottom of the tube. We now have an a-f signal. This is fed back into the control grid of the pentode portion of the 6F7 through the .005-mfd coupling condenser A-339. The a-f again appears in the circuit of the uppermost plate, but now follows the path through the r-f choke and to the control grid of the power tube. It goes this way because the impedance of the condenser A-502-A is high at audio frequenices, while the impedance of the r-f choke is low.

Thus we see that the 6F7 tube is in a reflex circuit. The pentode portion is used first as an r-f amplifier and again as an a-f amplifier, while the triode portion of the tube functions only as a detector of the grid ieak and condenser type.

Rectifier-Power Pentode

Now let's get to the 12A7 tube. Note that it has two cathodes, two plates, and three grids. The 12-volt heater of this tube is in series with the 6.3-volt heater of the 6F7 and the two tubes are fed directly from the power line through the voltage-reducing resistor U-110 in the power-supply cord. Incidentally, due to the fact that this resistance extends the whole length of the cord, the cord itself should never be shortened, else the voltage will be increased on the tube heaters.

A glance at the 12A7 will indicate that it is a combination half-wave rectifier and pentode power tube. The lower cathode and lower plate make up the rectifier. The upper cathode, the three grids, and the upper plate, make up the power pentode. The pentode plate is coupled to the magnetic speaker.

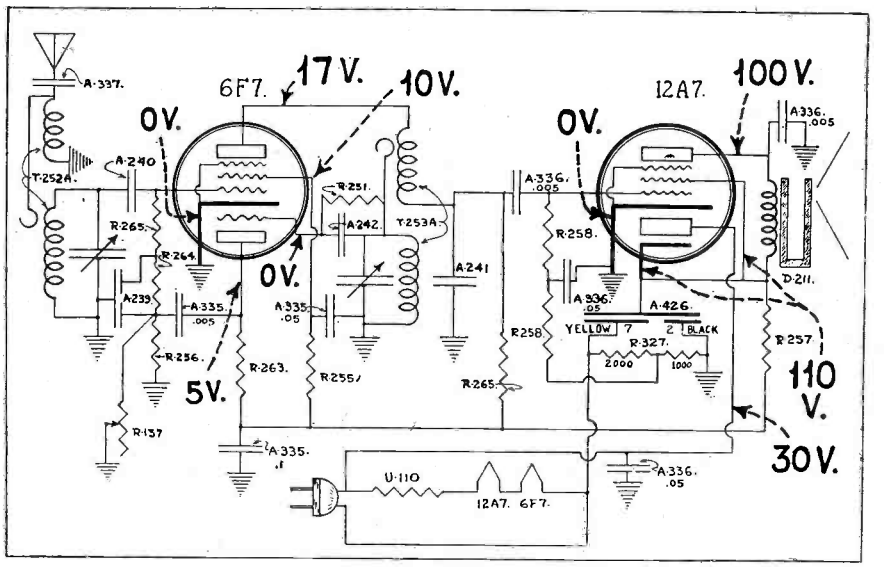

Fig. 1. Diagram of first Kadette Jr. Values are given in the table below. Color coding and connections of units are shown in Fig. 4 on the next page

Figure 1

A-239—Dual .00025mfd
A-240—.00025 mfd
A-241—.0001 mfd
A-242—.00025 mfd
A-335—See diagram
A-336—See diagram
A-337—.001 mfd
A-426—See diagram
R-137—2.5 meg vol.
R-251—0.5 meg
R-255—1.25 meg
R-256—2.0 meg
R-257—50,000 ohms
R-258—1.0 meg
R-263—3.0 megs
R-265—0.25 meg
R-327—2000-1000 ohm

Figure 2

A-242—.00025 mfd
A-243—.0005 mfd
A-337—.001 mfd
A-338—See diagram
A-339—See diagram
A-427—See diagram
A-502-A—18 mmfd
R-137—2.5 meg vol.
R-251—0.5 meg
R-255—1.25 meg
R-256—2.0 meg
R-258—1.0 meg
R-263—3.0 meg
R-265—0.25 meg
R-328—3000-1600 ohm

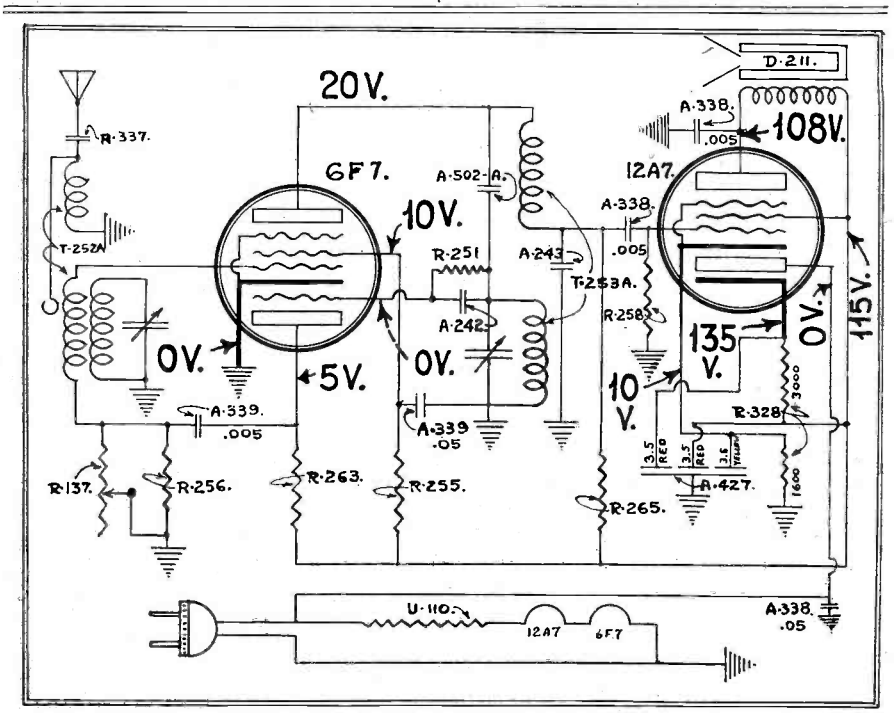

Fig. 2. Diagram of the second Kadette Jr. Values are given in the table above. Color coding and connections of units are shown in Fig. 5 on the next page

Philco Model 44

This chassis is also used in the Philco Model 504 Radio-Phonograph combination. (See note elsewhere in this issue).

The receiver has a four-point wave-band switch which covers the following ranges: (1) 520 kc. to 1500 kc. (2) 1.5 mc. to 4.0 mc. (3) 4.0 mc. to 11.0 mc. (4) 11.0 mc. to 23.0 mc.

Separate Filters

The speaker field is used as the filter choke in the power supply lead feeding high voltage for all the tubes with the exception of the type 6A7 detector-oscillator. A separate filter choke and filter condenser are used in this lead. The output of this filter is connected to a voltage divider made up of resistors (31), (32), and (33).

There is another voltage divider in the main supply circuit. This is made up of resistors (52) and (53). The tapped resistor (58) supplies the bias for the 42 pentode and the triode section of the type 75 second detector, AVC and first a-f tube. AVC is placed on the first detector and the two i-f tubes.

The tone control is in the output circuit of the pentode. The acoustically-compensated volume control is in the grid circuit of the triode part of the type 75 tube.

Voltage Data

All values are given on the diagram. Voltage readings must not be taken with a plug-in adapter, but rather with test prods. All readings should be taken with volume control full on, the station selector set at 520 kc. and the wave-band switch knob all the way to the left.

The i-f transformers should be peaked at 460 kc. When facing the *rear* of the chassis, the adjusting screw for the primary of the 1st i-f transformer is reached through the left hole (on the right hand side of chassis), and the secondary adjuster through the right hole. The adjusting screw for the wave trap (explained later) is reached through a hole on the left side of the chassis.

When facing the *front* of the chassis, the i-f transformer nearest the front on the left side is the 3rd i-f transformer. The one directly behind it is the 2nd i-f transformer. On both these transformers the screw is the primary adjustment and the nut the secondary adjustment.

Wave-Trap Adjustment

To adjust the wave trap, connect the output of the signal generator to the antenna and ground of receiver. Set wave-band switch to the broadcast range (Range 1) and the station selector at the low-frequency end (520 kc.). Now with the signal generator working on 460 kc., adjust the wave-trap condenser (3) to give *minimum* response to a 460-kc. signal. The position of the wave-trap adjusting screw has already been given.

Other Adjustments

Adjustment of the dial frequencies should not be undertaken with the usual form of signal generator. A crystal-controlled or electron-coupled signal generator is essential for making the high-frequency adjustments as it is necessary to rely on harmonics of the oscillator for readings and any slight discrepancy will make adjustments useless.

Under no circumstances adjust the trimmers on the two rear units of the gang condenser. When facing the front of the chassis, the trimmer on the first variable condenser is for the oscillator range 4, the next for oscillator range 3, the third for antenna range 1 and the last for antenna range 4. It is the latter two which should not be disturbed.

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Majestic 460 Chassis

The 460 chassis is used in receiver models 461 and 463, both of which use speaker G-24-C.

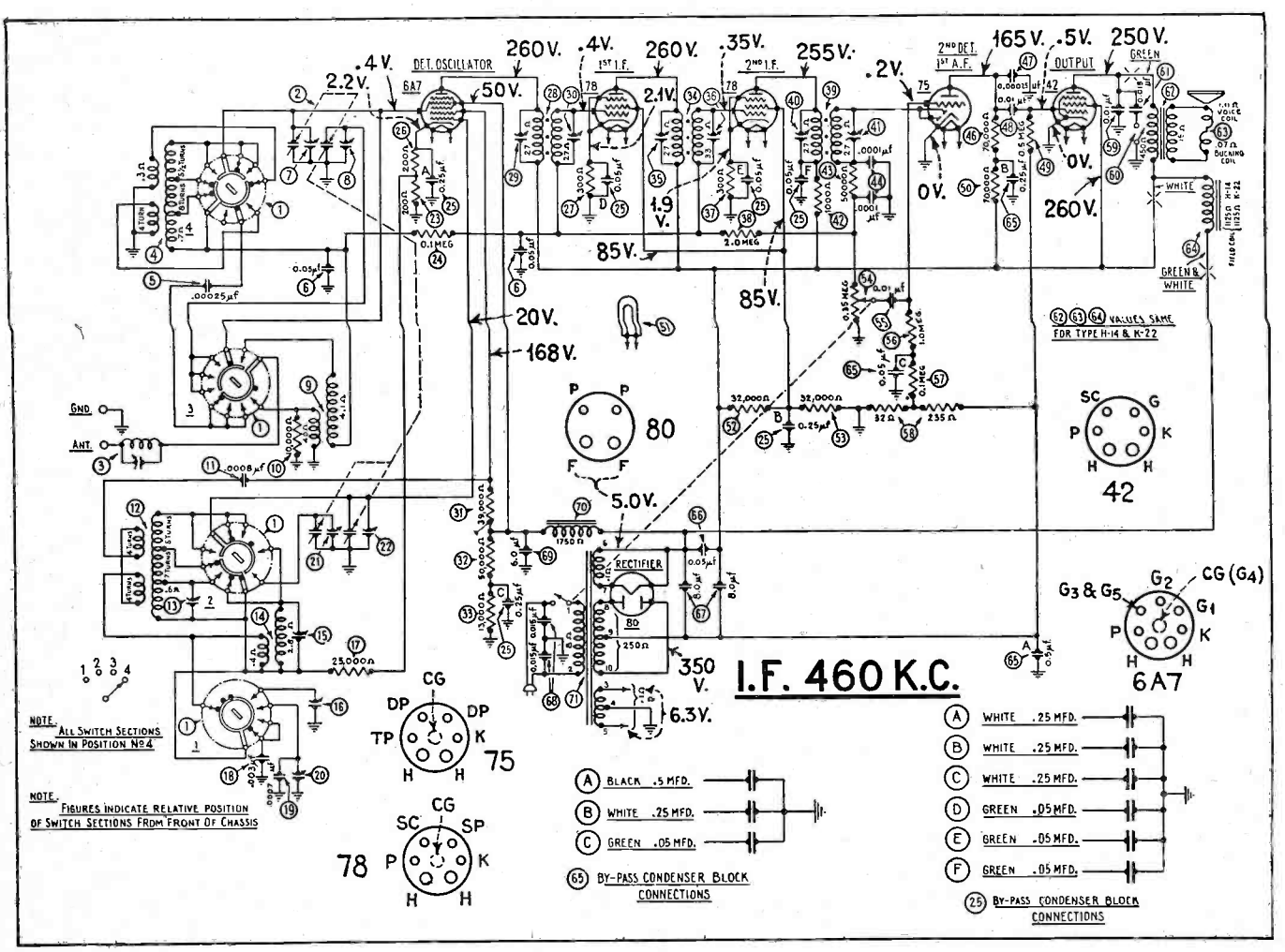

Diagram of the Philco Model 44 All-Wave receiver. Wave change switches progressively short out portions of the coils

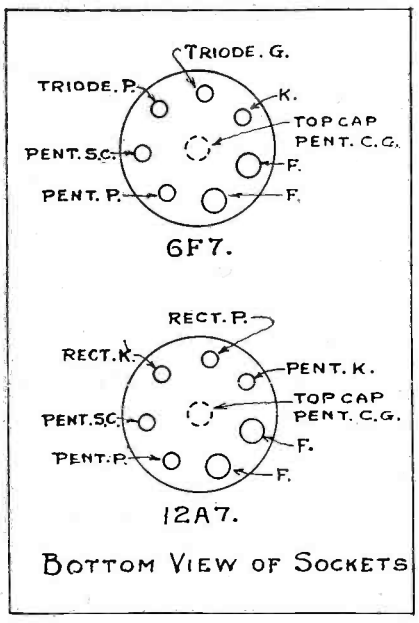

Fig. 3. Socket connections for the Kadette Jr. tubes

Speaker Adjustment

It should be possible to center the speaker armature by turning the adjustment screw which is just above the volume control. If through rough handling or long wear the speaker is sufficiently out of adjustment so that the adjustment screw will no longer center the armature within the coil, it may be necessary to resolder the driving pin. To do this, first loosen the adjusting screw and then resolder the pin to the armature at the same time pushing the armature toward the cone.

If a wire or condenser touches the back of the cone this will result in a rattle. It is also possible for a tube to touch the cone if pushed out of its normal position. If a screw is dropped into the chassis when removing the cabinet it may adhere to the back of the cone due to the pull of the permanent magnet.

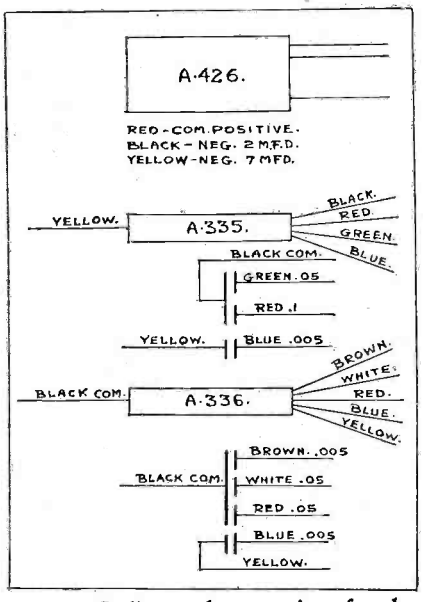

Fig. 4. Coding and connections for the circuit of Fig. 1

Balancing and Aligning

The trimmers on the variable condensers may be adjusted by ear. However, it is always best to use a signal generator.

If a signal generator is to be used for alignment, it should be coupled to the antenna wire on the receiver and an output meter connected from the 12A7 pentode plate to chassis. This may consist of an 0-5 or 0-10 volt a-c meter with an 0.1-mfd condenser inserted in one lead.

It will be noted that there are three trimmer screws on each section of the variable condenser. Adjust the condenser so that the leading edge of the condenser rotor is at the middle of the first split stator section. The dial reading for this setting is about 25. Tune the oscillator to this frequency, which is approximately 1000 kc., and then adjust the two diagonally opposite trimmer screws for maximum output. Then in succession change the condenser setting to center of 2nd and 3rd sections, rebalancing in the same manner for maximum output, not retrimming

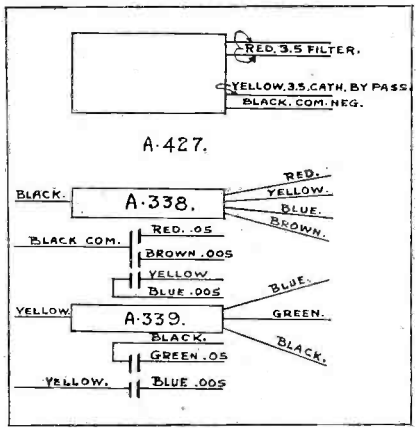

Fig. 5. Coding and connections for the circuit shown in Fig. 2

preceding split plates. Then re-seal with wax.

Voltage Readings

The voltage readings are given on the diagrams. They are based on a line voltage of 115. A variation of 5 volts in the line voltage will show a variation of approximately 4 percent in set voltages. All readings should be taken between tube elements and chassis.

Model Determination

It is comparatively easy to determine which circuit is used in the receiver at hand. The circuit of Fig. 1 has the filter in the negative leg and that of Fig. 2 in the positive leg. These are resistance-capacity filters. The easiest way to check, however, is as follows: The metal-covered resistance above the 12A7 socket has 3 lugs when the circuit of Fig. 1 is used, and 4 lugs when the circuit of Fig. 2 is being used.

Values and Connections

The socket connections for the 6F7 and 12A7 tubes are shown in Fig. 3. The color coding and connections from the combination units for the circuit of Fig. 1 are shown in Fig. 4. The same data for the circuit of Fig. 2 is given in Fig. 5.

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Automatic Bias Control

With the exception of Class B operated power tubes, a single or double output stage has the tube(s) biased to the middle of the straight portion of its characteristic and therefore consumes at all times the same amount of plate current required for full power output.

In a-c or d-c receivers there is no objection to this system, but in battery-operated receivers where economy is an essential item, some method (aside from Class B) which would reduce the "B" battery drain would be quite an advantage.

A system has been worked out in England which accomplishes just this. It is done by side-tracking a portion of the a-f output from the power tube(s), rectifying it with an extra tube or oxide rectifier, and applying the resultant voltage to bias the output tube(s).

Bucking Bias Voltage

In actual operation, the power tube(s) is given a high initial bias—possibly twice the normal bias—so that the plate-current drain is very low for no-signal conditions. When a signal voltage is impressed on the input of the power tube, a part of the resultant a-f in the output is used to offset the high initial bias. Since the rectified bias is proportional to the strength of the signal, the actual bias on the power tube is altered by the signal, the bias being high when there is no signal and normal under conditions of maximum signal.

The effect is much the same as Class B, but the results of course are different, as the power tube(s) still operates Class A. No doubt some distortion results from the use of this system.

Some of the noise-suppression circuits used in this country are similar in operation.

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Fada I-F Peaks

The i-f peaks for the late Fada receivers are as follows:

Model NA	265 kc.
Model NE	265 kc.
Model RA	175 kc
Model RC	175 kc
Model RE	175 kc
Model RG	175 kc
Model RN	470 kc
Model RP	175 kc
Model RS	470 kc
Model RU	265 kc.
Model RV	175 kc
Model RW	265 kc.

Models RP and RV are auto-radio receivers.

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Sentinel I-F Peaks

The new Sentinel 5-tube battery-operated superheterodyne receiver employs an intermediate frequency of 465 kc.

The 6-tube all-electric automobile superheterodyne operates at an intermediate frequency of 265 kc.

RCA Victor Model 330

This is a combination radio and phonograph with a number of new features. The frequency range is 540 to 1,500 kc and 1,400 to 2,800 kc, the waveband change being accomplished by the usual type of tandem switch; in this case the switch shorts out portions of the secondaries of the antenna and r-f transformers (but not the oscillator coil) and at the same time throws trimmer condensers in shunt with the main tuning and oscillator condensers. These trimmers, mounted on the range switch, are used for lining up the circuits on the 1,400 to 2,800-kc band. It should be noted that when the range switch is in the high-frequency position, small coupling condensers (C-1 and C-8) are put into circuit to provide capacity coupling in addition to inductive coupling. These condensers are used only on the high-frequency band.

Radio-Phonograph Switch

A type 55 tube is used as second detector, AVC and a-f. The volume control (R-12) is in the grid circuit of the triode section of the 55. The control-grid lead is shielded and connects to the Radio-Phonograph switch. When this switch is in the left position the phonograph pickup is out of circuit. When the switch is in the right position the common cathode circuit of the 58 r-f tube and 58 i-f tube is opened, the grid of the 55 is connected to the output of the pickup, and the choke L-14 short-circuited.

The triode section of the 55 tube is resistance coupled to a 56 tube. This circuit includes the high-frequency compensator choke coil, L-14, just referred to, which is used only when the set is employed for radio reception. The 56 tube is employed as a driver for the type 53 double Class B tube in the output. The undistorted output is 5 watts.

A link is provided in the filter circuit (L-18, C-41) connected across the plates of the 53. Opening this link increases the high-frequency range of the phonograph approximately 2,000 cycles. The link is accessible by removing the filter unit from the cabinet.

Compensated Volume Control

The phonograph pickup is of the low-impedance type and is matched to the circuit by transformer T-4. The output of this transformer works into the volume control which is of the acoustically-compensated type. This provides an increase in the bass frequencies as the volume is decreased, thereby providing a comparatively uniform frequency response at all volumes.

The voltages given in the diagram are based on a line voltage of 120, and should be measured with volume control set at maximum.

The i-f transformers are tuned to 175 kc. They are located at the rear of the chassis, the first i-f transformer being to the left (facing rear) and the second i-f transformer just to the right of the first. The primary adjusting condenser on the first i-f is to the left, the secondary condenser to the right. The second i-f transformer has a primary adjusting condenser only, the secondary being untuned.

In peaking the i-f transformers, short-circuit the antenna and ground leads and tune the receiver so that no signal is heard. Set the volume control at maximum and connect a ground to the chassis.

Connect the oscillator output between the first detector control grid and chassis ground. Connect the output meter across the voice coil of the speaker and adjust the oscillator output so that with the receiver volume control at maximum, a slight deflection is obtained in the output meter.

Then adjust the primary of the second, and the secondary and primary of the first i-f transformers for maximum deflection. Go over the adjustments a second time, as there is a slight interlocking of adjustments.

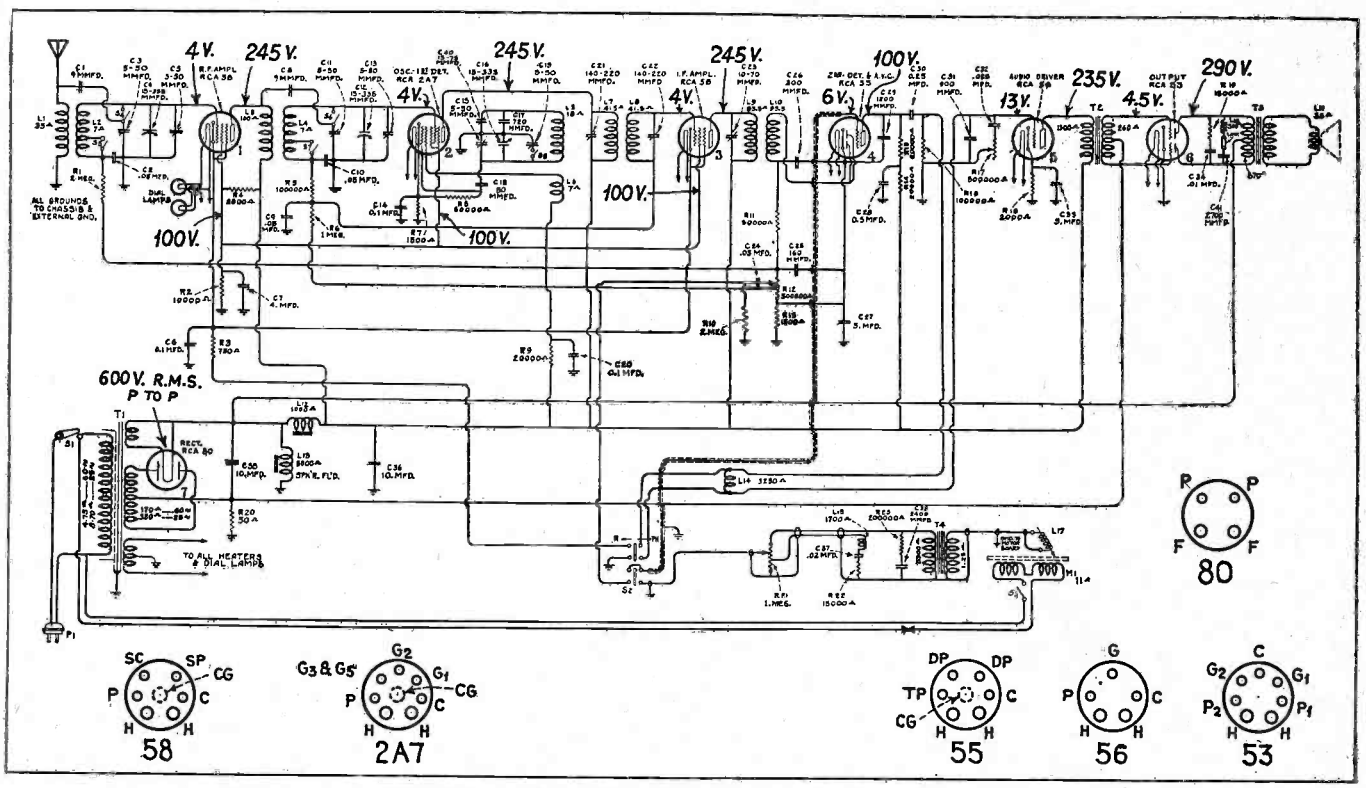
For r-f and oscillator adjustments, the three-gang variable condenser adjusting condensers, as well as the 600-kc trimmer condenser, are adjusted from the chassis. Facing the front of chassis, the first variable condenser in the gang is the r-f, the second the detector, and the rear one the oscillator. The 600-kc adjusting screw is located just back of the oscillator which is the second back from the front of the chassis on the right side.

The R-F Adjustments

For these adjustments, use a modulated oscillator giving a signal at 600, 1,400 and 2,400 kc. Connect the output of the oscillator to the antenna and ground leads of the receiver. Then with output meter connected as before and volume control at maximum, check the tuning dial. The indicator should be at the last scale division.

Then set dial at 140 and oscillator at 1,400 kc and adjust oscillator output so that only a slight deflection is had in output meter. Continue by aligning all three of the trimmers on the gang condenser.

Next set oscillator at 600 kc and tune for



Circuit of the RCA Victor Model 330, with phonograph. See pickup data on next page

maximum deflection on output meter. Then adjust the 600-kc series condenser for maximum deflection. Rock the gang condenser back and forth while making this adjustment as the gang-condenser and oscillator series condenser adjustments interlock.

Now change frequency of oscillator to 1,400 kc, tune set to 1,400 kc and repeat the former r-f adjustments.

Then shift the oscillator to 2,400 kc, the range switch to the clockwise position and the dial to 120. The three line-up condensers located right on the range switch should then be adjusted for maximum output.

When making both the r-f and i-f adjustments, the important point to remember is that the receiver volume control must be at its maximum position and the minimum input signal necessary from the oscillator must be used.

●

RCA Victor Pickup Adjustments

The following data refers to the servicing of the magnetic pickup used in the RCA Victor 330 and 331 receivers. The data referring to the replacement of the magnet coil and pivot rubbers also applies to the magnetic pickup used in RCA Victor receivers 310 and RE-40-P.

Generally speaking, both types of pickups referred to above consist essentially of a chromium steel magnet, two thin pole pieces, a mechanism support and bracket, a coil, and an armature that is damped by means of an anchored damping block.

Magnet Coil and Pivot Rubbers

In order to replace a defective coil or hardened pivot rubbers, it is necessary to proceed as follows:

(1) Remove the pickup cover by removing the center holding screw and needle screw.

(2) Remove the pickup magnet and the magnet clamp by pulling them forward.

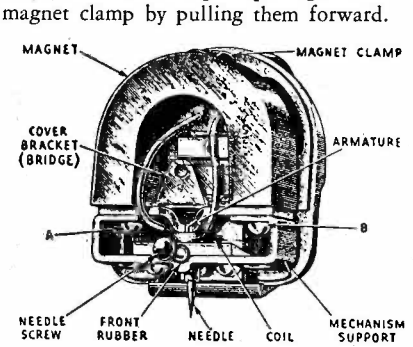


Fig. 1. The parts composing the pickup are marked. Adjustments are made at "A" and "B"

(3) Unsolder the coil leads and remove the mechanism assembly from the back plate by releasing the two mounting screws and the damping block clamping screw.

(4) Remove screws A and B, Fig. 1, and then remove the mechanism assembly from the pole pieces.

(5) The coil or the front pivot rubber may now be removed and replaced. If it is desired to replace the rear pivot rubber, then the end of the armature soldered to the mechanism support must be unsoldered, being careful not to use too much heat as damage to the damping block may result.

Remagnetizing

(6) The mechanism should now be reassembled, except for the magnet, which must be magnetized. After being magnetized, the mechanism—with the pole pieces upward—should be placed so that the magnet may be slid from the magnetizer onto the pole

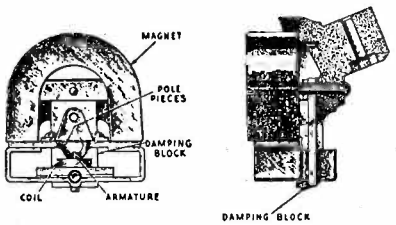


Fig. 2. Showing location of damping block and armature

pieces without breaking physical contact. After placing the pole pieces on the magnet, the entire assembly should be remagnetized thoroughly, being careful not to change the polarity.

(7) After reassembling to the mechanism, the entire assembly should be fastened to the back plate by means of screws provided, making sure the damping block is securely clamped. At the same time, the metal dust cover must be placed in position.

(8) After remagnetizing, it is necessary to correctly center the armature. This may be done quite accurately by feeling its play after the needle is inserted. A little practice will quickly show which way an adjustment is necessary to have the armature centered properly. The adjustment is made by loosening screws A and B, Fig. 1, and sliding the mechanism slightly in relation to the pole pieces.

(9) The cover may now be replaced over the entire assembly, and the pickup returned to the tone arm.

In reassembling, it may be desirable to check the armature air gap by means of a small feeler gauge. This air gap should be 9 mils on each side of the armature. However, a little practice with the needle in place will quickly disclose whether or not the armature is centered.

Replacing the Damping Block

If it is desired to replace the damping block, it may be done as follows:

(1) Disassemble the pickup as described above and remove the armature entirely by unsoldering it at its joint with the mechanism support.

(2) Remove the damping block from the armature and clean the bushing for holding the damping block with emery paper.

(3) Insert the armature through the new block so that it occupies the same position as that of the old. Also ascertain that the block is in correct vertical alignment with the armature. It will be noted that the hole in the damping block is somewhat smaller than the diameter of the armature. This is done so that a snug fit will be obtained.

(4) After properly locating the damping block, a soldering iron should be applied to the armature so that the block will melt slightly at its point of contact with the armature. The iron should be applied long enough to slightly melt the block and cause a small bulge on both sides, but should not be applied long enough to cause any bubbling. The pickup should then be reassembled as previously described.

Only rosin core solder should be used for any soldering in conjunction with the pickup. However, if great care to wipe clean and use as small amount as possible is exercised, paste or liquid flux may be used for soldering the end of the spring.

●

Philco Phono-Radios

The Philco Radio-Phonograph Model 504 uses the Philco chassis Model 44 (in this issue). The Radio-Phonograph Model 505 uses chassis Model 60 (See page 392, November SERVICE).

The same type electric pickup is used in both models. This is a high-impedance unit, having an impedance of 10,000 ohms at 1000 cycles and a d-c resistance of 700 ohms. This pickup also has a bucking coil, which has a d-c resistance of 230 ohms. Should this bucking coil be disconnected, be sure to reconnect it properly as the direction of the current flow in this coil is very important.

●

Stewart-Warner Speaker Adjustment

Many of the 5-inch dynamic speakers, Models 215 and 217, used with chassis Models 110, 111, and 115, did not have the field plate soldered to the field coil housing bracket. Consequently it is impossible to repair these speakers since there is no way of properly centering the field plate when reassembling or adjusting the speaker.

Stewart-Warner has made up a special centering ring which will take care of lining up the field plate so as to obtain a uniform air gap in which the voice coil can move without rubbing.

Use of Tool

This centering ring tool (T-79888) is used as follows: After the speaker has been disassembled, place the centering ring, which is tapered on the outside, as far into the hole in the field plate as it will go, and then insert the pole piece into the hole in the centering ring. The plate and housing should now be bolted together temporarily, using the same bolts that will later hold the diaphragm shell in place. With a heavy soldering iron solder the field plate to the housing at each end and remove the centering ring and bolts. The diaphragm and shell assembly can now be dropped in place and bolted down. The voice coil can easily be centered by eye, so no special centering gauge will be required for this purpose.

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Clarion Models and I-F Peaks

The following Clarion Models employ an intermediate frequency of 465 kc.—Models 420, 422, 423, 425, 440 and 450. The models 340, 360 and 480 are peaked at 175 kc.

Majestic 800 Chassis

The Majestic 800 Chassis is used in receiver Models 85, 86, and 998 with speaker G-22-L. The field coil of this speaker has a resistance of 970 ohms.

The Circuit

The circuit is seen to consist of a 58 in a stage of r-f, a 2A7-S as combination mixer-oscillator, another 58 in a stage of i-f peaked at 175 kc., and two separate type 4-S tubes connected to a split secondary, the upper tube functioning as the automatic volume control and the lower tube as second detector with its output feeding the grid of a type 56 a-f tube employed as a driver for the type 53 double Class B tube.

It will be noted that AVC is placed on the r-f and i-f tubes, and also the mixer section of the 2A7 tube. It will also be noted that a slight negative bias is placed on the grids of the 53 tube, this bias being supplied by the drop across resistor R-3.

Alignment

Align the receiver with volume control full on. Supply a 175-kc. signal to the grid of the 2A7 mixer and adjust the three i-f aligning condensers for maximum sensitivity. Supply a weak signal just strong enough to give a reading on the output meter. When facing the rear of the chassis, the 1st i-f transformer is just to the left of the type 58 i-f tube and the second i-f transformer just to the right of this same tube.

Now, with the gang condenser completely out of mesh, supply a 1730-kc. signal to the receiver input and align the three gang-condenser trimmers for maximum sensitivity. These trimmers are located on top of the gang condensers.

Emerson Models and Chasses

There are two versions of the Emerson Universal Compact 5-tube superheterodyne receiver. The first chassis employs a type 78 mixer-oscillator, 78 i-f, 77 second detector, 43 power tube and 25Z5 rectifier. This chassis is used in receiver Models 30-AW, 33-AW, 250-AW, 321-AW, and 350-AW.

The second chassis uses the same tube complement with the exception of the mixer-oscillator which is a type 6A7. This chassis is used in receiver Models 30-LW, 33-LW, 250-LW, 321-LW, and 350-LW.

The first group of models listed above with the suffix "AW" are combination broadcast and short-wave sets. The second group, with the suffix "LW" are combination broadcast and long-wave receivers—the latter range being from 1000 to 2000 meters.

Other Models

The Emerson Universal 6-tube superheterodyne chassis is used in Models 40 and 375. The tubes used are: three 78's, 6B7, 43, and 25Z5.

The Emerson Universal Compact Model V4 is also the Model 420. The Model L-755 is also the 55-L. Model M-AC-7 is used in Models M-755 and 50-M. The Model S-755 is also the 55-S.

•

Silvertone 2A3-H Power Tubes

The Silvertone receivers Models 1721, 1722 and 1732, employ type 2A3-H (or 2A3) tubes in push-pull in the output. Hum which cannot be eliminated with the hum-balancing adjustment is due to poorly matched tubes. Try others until a combination is found which permits a hum balance. The plate currents of the tubes must be very nearly equal in order to obtain this balance.

Examination of the output tubes sometimes discloses particles of white-hot carbon on the grid or plate. Hum balance cannot be obtained with such tubes and they should be replaced.

Some trouble has been experienced with power transformers burning up. In almost all instances this is due to an inter-element short in the 2A3 or 2A3-H tubes. These tubes are very much more prone to such trouble because of the very close spacing of their elements.

•

Stewart-Warner 111 and 115 Voltages

In the Stewart-Warner Models 111 and 115 universal receivers, voltage readings should be taken from the frame of the variable gang condenser to the various tube elements. In these models the chassis frame is not connected to any part of the circuit except through a condenser.

Voltage readings taken with set analyzers may be different because they generally measure voltages from cathode to the other tube elements.

•

Sparton Model 410 A.C.

A common fault is no plate voltage on the 183 output tubes. This is due to a shorted 1-mfd condenser in this circuit.

J. M. Osenton,
Grayson, Ky.

•

RCA Victor I-F Peaks

An intermediate frequency of 175 kc. is used in all the late RCA Victor receivers with the exception of the Models 100 and 101 which use a peak of 460 kc.

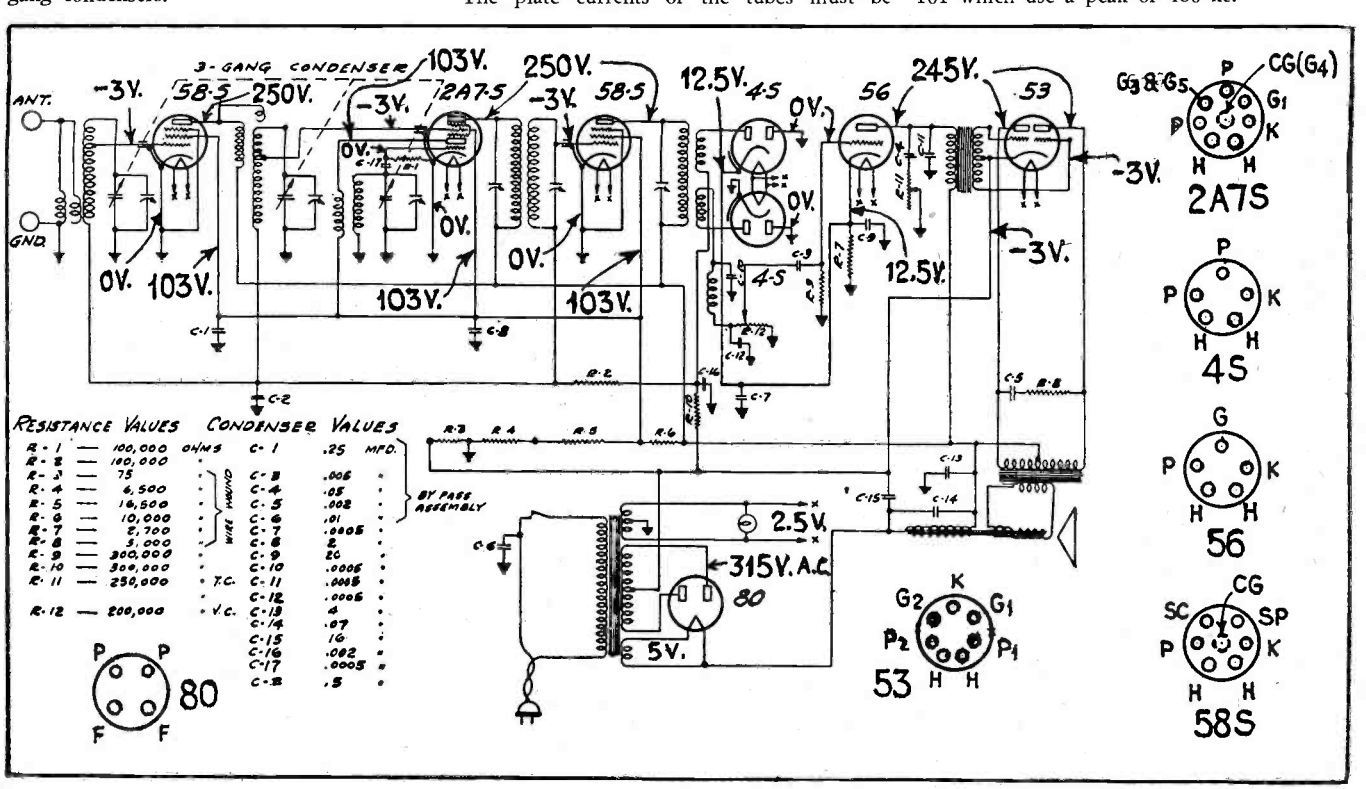

Diagram of the Majestic Model 800 Chassis. Class B is used in the output

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Auto-Radio . . .

Emerson Model 678

The Model 678 superheterodyne is designed for automobile and motorboat use where a 6-volt storage battery is installed. The total battery drain to the receiver is 4.8 amperes.

The Power Unit

The field coil of the dynamic speaker has a d-c resistance of 6 ohms and is energized directly from the storage battery. The "B" power unit employs a full-wave synchronous rectifier of the vibrator type—no tube being used. This double-vibrator unit functions simultaneously as an inverter and rectifier and supplies a steady d-c to the filter which is made up of a single choke and two filter condensers. All leads to the set include r-f chokes for the purpose of eliminating ignition noise, vibrator hash, etc.

The Circuit

The first tube in the receiver, the type 78, functions as an r-f amplifier, automatic sensitivity control and automatic fidelity control. The second tube, the 6A7, functions as mixer and oscillator. The 172.5-kc output from this tube is fed into the double-tuned i-f transformer the secondary of which is in circuit with the control grid of the pentode section of the 6B7 tube. The output from the plate of the 6B7 is fed into the tuned primary winding of the second i-f transformer. The secondary winding of this transformer is untuned and is in the diode circuit of the 6B7. The rectified signal voltage appears across the 200,000-ohm load resistance which leads to the arm of the 200,000-ohm volume control potentiometer. The a-f voltage in this circuit is *fed back* to the control grid of the pentode section of the 6B7 and is amplified. In other words, the pentode section of the 6B7 is reflexed—being used for both i-f and a-f amplification.

The resultant amplified a-f signal appearing in the plate circuit of the 6B7 is fed into an auto-transformer. This voltage then appears on the grids of the two type 41 pentodes connected in push-pull.

Automatic Controls

Returning to the circuit of the 6B7 tube, a portion of the rectified a-f voltage appearing in the diode circuit is impressed on the control grids of the r-f and mixer tubes through the one-megohm resistor connected to the point between the 200,000-ohm load resistor and the lower end of the secondary winding of the second i-f transformer. This provides the automatic volume control. The suppressor grid of the type 78 r-f tube is also connected into this AVC circuit. An increase of voltage on this suppressor grid tends to alter the plate impedance of the tube, and in the case of a strong local signal the selectivity of the circuit is reduced somewhat so that the signal channel is widened. This permits quality reception on local stations.

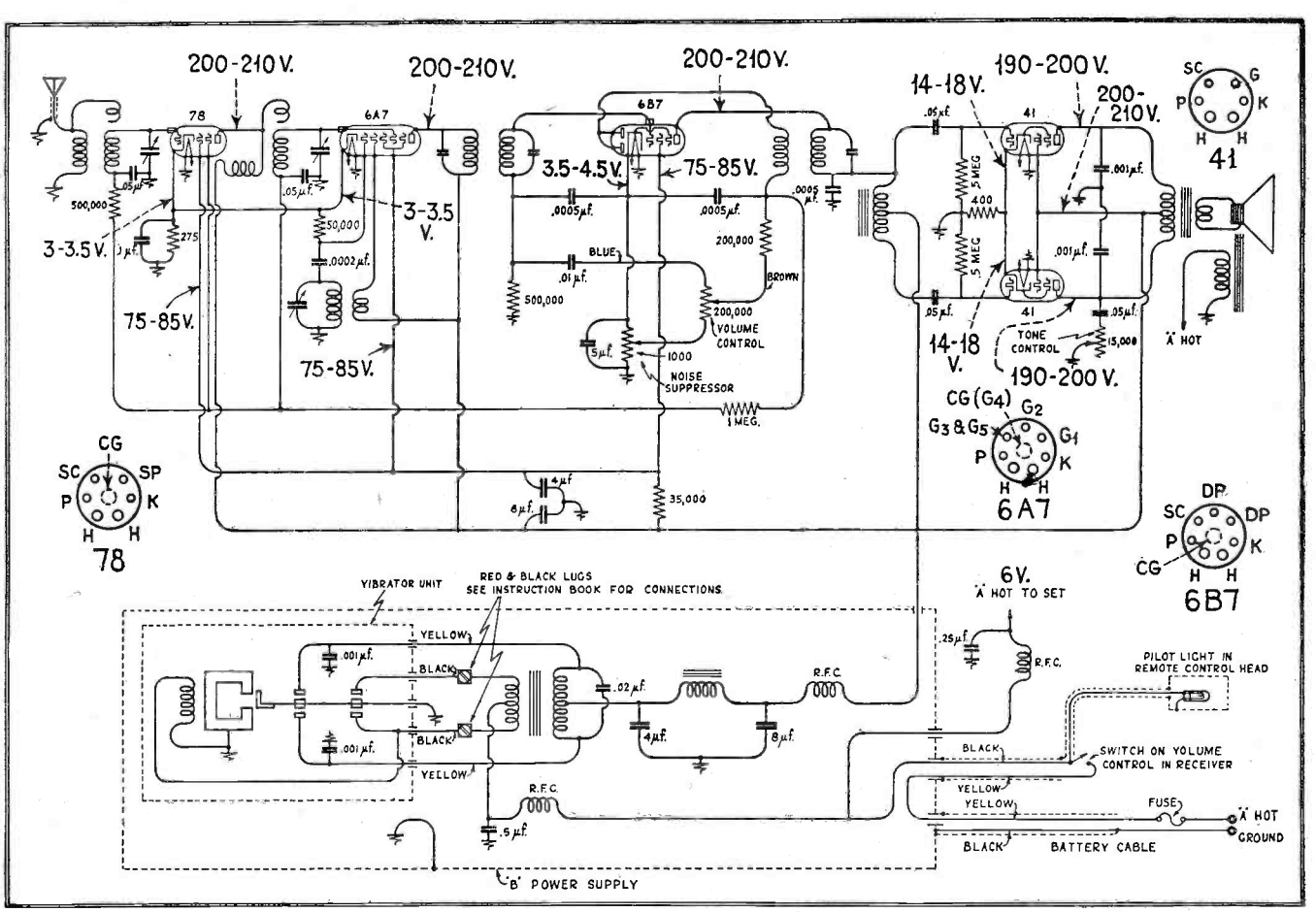
When the suppressor-grid voltage is reduced, the plate impedance of the tube rises and the tuned circuit is automatically stiffened. That is, the selectivity is increased. This permits the reception of distant or weak signals without interference from adjacent channels.

This sensitivity and fidelity control is automatic because it is governed entirely by the AVC voltage which in turn depends on the strength of the incoming signal.

Noise and Tone Control

The noise-suppressor adjustor is in the cathode circuit of the 6B7. This resistor places a high bias on the control grid of the pentode, and until a portion of this bias voltage can be overcome by the a-f signal voltage appearing in the volume control circuit, the 6B7 does not amplify. As soon as a signal is tuned in, the resultant a-f voltage in the diode output releases the 6B7. The point of release may be adjusted by the moving arm on the cathode resistance.

The manual tone control is in the plate circuit of the push-pull amplifier and is made



The Emerson 678, with automatic sensitivity and fidelity control

up of a fixed condenser and variable resistance.

Adjustments

If the interference or interchannel noise level is considered too high (this may be determined best by tuning an average station at a setting of average volume, then detuning the dial slightly without touching the volume control setting, so that no signal is received), turn the noise suppressor clockwise just enough to suppress noise satisfactorily. Turning beyond this point may desensitize the receiver to weak signals although not affecting stronger stations.

The tone control is set for full register reproduction. This is recommended for closed cars and for vocal programs. Turning the control clockwise brings up the low tones and is recommended for open cars and musical programs. Incidentally, in this position, static and other noises are decreased greatly. Do not turn clockwise more than necessary as definition of speech may be lost due to the attenuation of higher tones by the car interior.

Values and Alignment

The voltages given in the diagram were taken with the storage battery fully charged. The readings should be taken with no signal being received and a high-resistance voltmeter. The reading across the speaker field is 6 volts.

The i-f transformers should be peaked at 172.5 kc. Connect the output of the oscillator to the grid cap of the 6A7 and ground. Ground the antenna and turn the tuning dial so that no station is received. Set volume control full on, then adjust the i-f transformer trimmers for maximum output, using a weak oscillator signal.

The sensitivity of this receiver is high. Therefore, when lining up the r-f, use an oscillator with good attentuation and connect it to the receiver through a dummy antenna. (See page 386, November Service). Set oscillator to a frequency between 1350 and 1450 kc and adjust trimmers for maximum output.

Airline No. 62 Series

The Airline No. 62 (Montgomery Ward) is an early receiver—released during 1932. In servicing one of these sets, check up on the antenna trimmer, the adjustment screw of which can be reached by removing the small metal plate on one end of the chassis box. When adjusting, use a weak signal and with volume control about three-fourths on. Select some station at the high-frequency end of the dial. Adjust trimmer for maximum output.

The Circuit

The circuit consists of an antenna stage, a 39 tube in the r-f stage, a 36 as first detector and oscillator, a 39 in the i-f stage, a 37 used as diode detector with plate and grid tied together, a 39 as first a-f amplifier, and a 38 pentode in the power stage.

The intermediate frequency is 262 kc. The diode current creates a drop across resistor R-4, which is used as an additional bias voltage on the r-f, i-f and first a-f tubes, giving automatic volume control action. The full control voltage is supplied to the r-f tube, two-thirds to the i-f tube, and one-third to the first a-f tube. The manual volume control, R-14, varies the diode audio voltage applied to the grid of the first a-f tube.

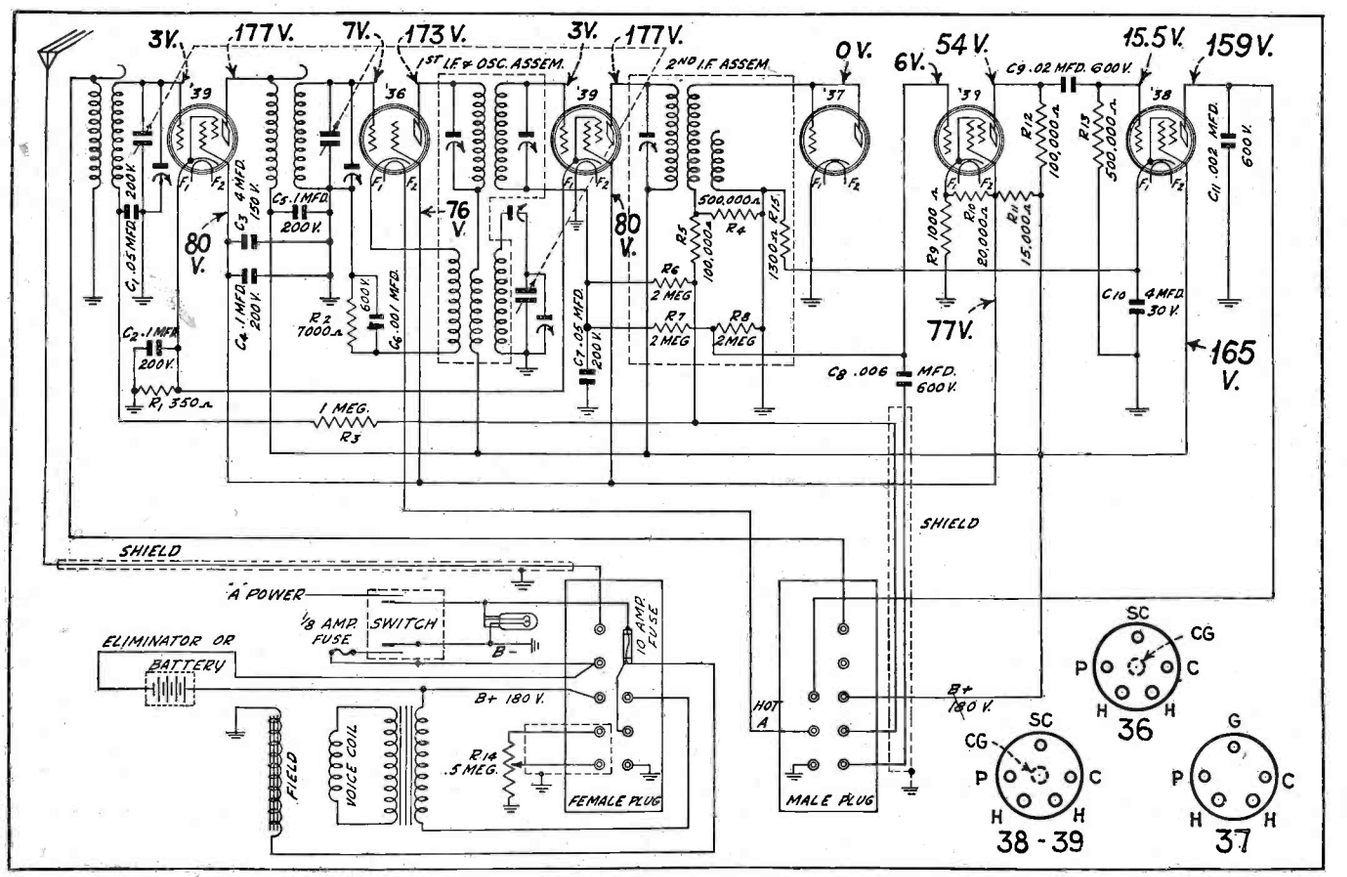
Voltage Readings

In respect to the voltage readings given in the diagram, all bias voltages should be read between cathode and ground. The bias of 7 volts on the grid of the first detector tube will vary with dial setting.

Do not check the "A" and "B" voltages at the multi-point socket on the cable head, as the pilot light may be burned out when the switch is turned off. This is due to the high inductance of the dynamic speaker field, which will increase the voltage at the break of the circuit. Also, when the cable head and multi-point socket is taken off, the connections between the chassis and power unit are open so that readings are not made under load conditions.

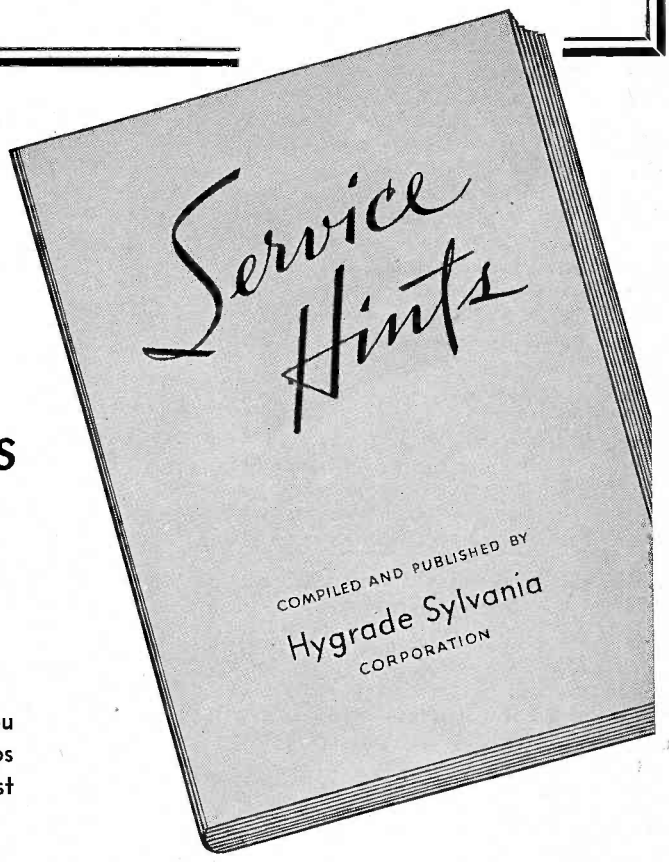
G.E. Model A-90

The G.E. Model A-90 is the same as the RCA Victor M-30. These are auto receivers.



The Montgomery-Ward Airline 62 Series. Note AVC system

FREE HANDBOOK OF SERVICING SHORT-CUTS



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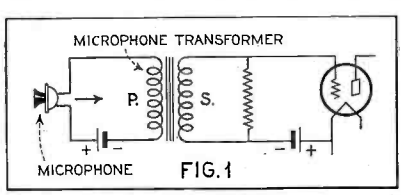
IMPROVING THE MICROPHONE CIRCUIT

By Charles Felstead*

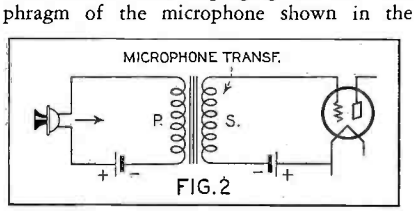
INPUT transformers in public-address systems and radio-broadcast speech amplifiers, particularly those employed for coupling low-impedance transmission lines to the grid circuits of vacuum tubes, frequently are designed so that they require "loading" on the high-impedance side in order to function satisfactorily. This is especially true of microphone coupling transformers; and it is because of this requirement that the secondaries of such transformers are often shunted by fixed resistances, as depicted in Fig. 1. If a high-resistance potentiometer



Microphone circuit with secondary of transformer loaded

were used at this point in the amplifier circuit, it would take the place of the fixed resistance and serve the same purpose with the additional advantage of functioning also as a volume control; but frequently it is more desirable to locate the volume control elsewhere in the circuit or to employ some other method of controlling the gain of the amplifier.

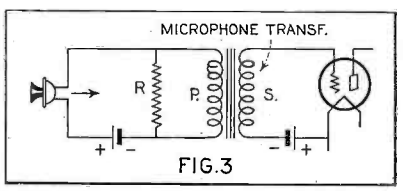
A sound wave impinging on the diaphragm of the microphone shown in the



An unloaded condition such as shown causes distortion due to phase shift

illustration will cause a variation in the current in the microphone circuit; and that will induce a corresponding voltage variation across the secondary of the microphone transformer. If a shunting resistance is employed, the voltage drop across it will cause a current flow which will provide the necessary load on the secondary; but if the resistance is missing (Fig. 2) there will be practically no load on the secondary, as the grid-filament circuit of a vacuum tube is customarily assumed to pass no current. Actually, however, there is a slight current flow within this circuit due to the grid-filament charging current; although it is not great

* Sound Engineer, Universal Pictures Corp.



Circuit with the resistance load in the primary circuit

enough to present an appreciable load to the transformer.

Impedance Mis-Match

The result of this condition is that instead of presenting an impedance of 200 ohms to the microphone, the primary impedance of an unloaded microphone transformer often is as high as 1,000 ohms. Since the microphone has an impedance of 200 ohms, the mis-match that occurs is serious enough to cause an inefficient transfer of energy and a definite amount of phase shift with its accompanying distortion of speech.

An alternative method of overcoming this difficulty is to provide a resistive load for the microphone itself and then "bridge" the microphone transformer across the load, as illustrated in Fig. 3. The resistance R must match the impedance of the microphone. With this arrangement, the loss of energy is still rather high but phase distortion is minimized. It is always possible to counteract energy loss in a circuit by the addition of amplification; but it is almost impossible to correct for loss of tonal quality. This form of bridging input should be employed only when the input impedance of the unloaded microphone transformer is of the order of 1,000 ohms or higher.

Matching Mike Impedance

Where the input impedance of the unloaded microphone transformer is below 1,000 ohms but higher than the microphone impedance, a matched input is the most satisfactory. The circuit of Fig. 3 that was employed for the bridging input is also employed for the matched input. But in this case, the value of the resistance R must be so chosen that the total impedance presented by the parallel connection of R and the primary of the transformer matches the impedance of the microphone.

The value of R may be calculated for any individual case by the formula

$$R = \frac{Z_1 Z_2}{Z_2 - Z_1},$$

where R is the shunt resistance, Z_1 is the microphone impedance, and Z_2 is the input impedance of the unloaded microphone transformer. The values must all be in ohms. R should be a non-inductive resistance that will remain relatively constant in value under load. Perfect impedance matching results when the correct value of R is employed.

•

Motorboating in Push-Pull Amplifiers

Push-pull amplifiers frequently start motorboating when one tube is removed or when one tube loses sufficient emission to materially reduce its gain. Such a condition indicates instability and in some cases sufficient regeneration to cause noticeable distortion. Such regeneration is frequently caused by the common impedance of the biasing resistor or resistors and may be remedied by better filtering.

Fig. 4 shows in schematic form the two most common push-pull circuits. In either circuit the by-pass condensers may be quite

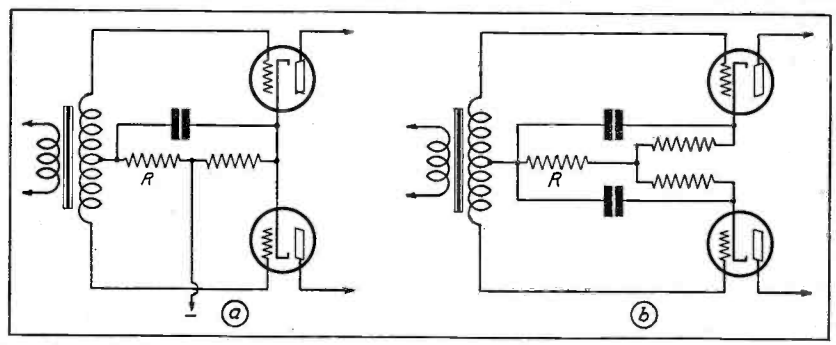


Fig. 4. The filter resistance, R, in either circuit, will tend to eliminate motorboating with fairly low values of bypass capacity

low in impedance at 100 cycles but they have 100 times greater impedance at 1 cycle and at very low frequencies may be totally ineffective. Thus, a condenser of 1.0 mfd. has an impedance of about 1,700 ohms at 100 cycles, about 17,000 ohms at 10 cycles, and 170,000 ohms at 1 cycle. Since the bias resistor is common to both plate and grid circuits, oscillation can easily result when the amplification of one tube is much greater than the other.

Fig. 4 also illustrates easy ways of curing the trouble. In Fig. 4 (a) a grid filter R is used which has a very high resistance—100,000 to 500,000 ohms—and the by-pass condenser or condensers connected from the high potential side of this resistor to the cathode circuit, as shown. In Fig. 4 (b) the two by-pass condensers are connected in parallel between the cathodes and a high resistance,

(*Continued on page* 453)

ON THE JOB . . .

Preserving Audio Transformers

Audio transformers seem to have a high mortality in this neck of the woods. (Georgia. Climatic conditions.—Ed.). Noting after a period of years that failures are due to the electrolytic action of minute stray direct current flowing away from the primary coil at some particular point along the winding, it was decided to block the direct current out of the winding. (It is invariably the primary winding that is short lived).

Fig. 1 shows a conventional arrangement that was tried. While it will greatly improve the low note response, by virtue of increasing the primary inductance under working conditions, it does not seem to lengthen much the life of the transformer for the reason that it does not eliminate the possibility of stray leakage.

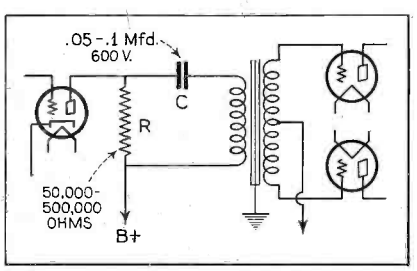


Fig. 1. The primary is not completely isolated from the high voltage

Fig. 2 shows a circuit that does protect the primary and the writer has not experienced a single transformer failure where this connection was used. The winding is completely isolated from the "B" voltage. This circuit, too, improves the low note response of small audio transformers due to the reason mentioned above and also because the circuit can be resonated by the proper selection of blocking capacity.

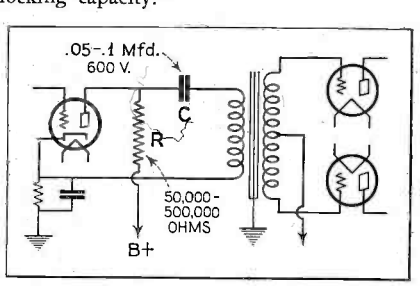


Fig. 2. The primary is now completely isolated, as return goes to cathode

It has been found that a good audio transformer can be used to follow a screen-grid detector when this connection is used, and that the gain is considerably more in this case than with any sort of impedance or resistance connection. This is doubtless due to the fact that the primary inductance is greatly increased by the removal of the direct plate current from the winding.

In some cases it is necessary to increase the voltage applied to compensate for the increased drop in the plate resistor used. The value of the plate resistor will vary from 50,000 ohms to 500,000 ohms according to tube types and applied voltages, but no difficulty should be experienced as the proper value is the same as would be used if the stage were resistance coupled.

J. D. BLITCH,
Statesboro, Ga.

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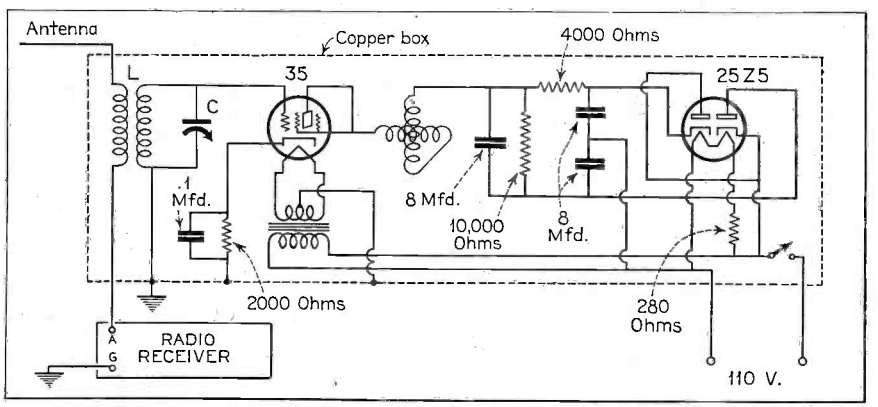

Fig. 3. Complete diagram of the regenerative wave trap

Regenerative Wave Trap

With the new sets as selective as they are, it isn't often that one requires a wave trap. However, even selective receivers which are near a powerful broadcast station, are not always capable of cutting out the interference. In such a case, or in the case of a receiver owner interested in distance reception, a good wave trap is often essential to clear up desired channels of local interference.

Experience has indicated that the usual form of wave trap, even if well-constructed and well-shielded, will not do the job required of it. However, a regenerative wave trap will do the job.

Referring to the diagram of Fig. 3, the unit simply consists of a regenerative amplifier connected across the secondary of a regular wave trap. A four-element tube, with screen and plate connected, or a three-element tube with large grid swing, may be used. A variometer connected in the plate circuit of the tube may be adjusted to give any degree of regeneration required to produce the necessary sharpness. A straight feedback circuit could of course be used, if desired. The power-supply employs 25Z5 rectifier in a voltage-doubler circuit and a resistance-capacity filter network. Any type of power unit, or "B" batteries, could be used, of course. The whole unit is mounted in a copper box so that it is well shielded.

The transformer L and variable condenser C should have the proper values to cover the same wavelength band as the receiver so that it will be possible to bring the trap into resonance with any desired channel. Thus, L may be a good antenna transformer such as used in broadcast receivers. The primary winding should preferably have approximately 15 turns of wire, layer- or bunch-wound. For high selectivity, space this winding ⅛-inch from the secondary.

To operate, the trap is adjusted to resonance with the undesired station. The regeneration is then increased and the trap circuit re-tuned. This process is continued until the undesired carrier has been eliminated from the receiver. The best results will be had when the regenerative trap is just below the point of oscillation. Once adjusted in this manner, the particular channel selected will be free of interference.

C. F. SMITH.

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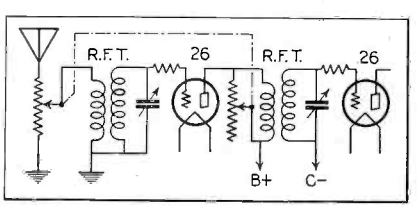
New Control for Old Kolsters

Here is a little trick which may help the boys along.

The volume controls for the old Kolster electric sets are wearing out very fast now and new ones are hard to obtain. Here is a way out. Take any dual volume control



with both tracks of 10,000 ohms or more, connect one side in the antenna circuit much like the Majestic 70, and use the other side for a shunt across the plate winding of the 1st r-f tube. This is shown in the accompanying diagram.

Both controls must be used as the shielding is poor in this set and one side will not be sufficient for the control of volume on locals.

K. R. STAPLETON,
2200 Lincoln St.,
Topeka, Kansas.

•

Airline Model 326-W

After these sets have been in operation for four or five months the two wires running from the high voltage winding of the power transformer to the plates of the 80 rectifier short because of poor insulation. They should be replaced by wires with good rubber insulation.

J. M. OSENTON.

HIGHLIGHTS . . .

Dead, But Safe

A young lady who had purchased a Philco 54-C universal receiver for her husband, spent a whole day in secret ramblings from friend to Service Man and Service Man to friend seeking much needed assistance in reviving it from its state of complete silence.

As the day wore on, the young lady became frantic, as the next day was her husband's birthday and she had no desire to hand him a radio with no more life than a dead fish.

As chance would have it, a friend of a friend (you know how it is) met the young lady with the set under one arm and the aerial wire dragging along the earth as she hastened around in all directions seeking aid.

The set was forthwith led to an a-c outlet, and sure enough, it was dead. Not even a glow from the tubes—and at this observation by the friend of a friend, the young lady explained that following closely the instructions, another friend had taken off the back cover to determine if all tubes were tight in their sockets. But this enterprising male did not continue with the instructions as laid down and replace the back cover. With the result that for a whole day the set had been inoperative merely because the back cover was off—for there is a nice little spring safety switch which opens the line circuit as soon as the back is removed.

Dead, but safe. It's fun to be fooled, but it's more fun to know!

•

500,000 Watts—BAM!

WLW has been granted permission to fool around with half a million watts after one o'clock in the morning. What will this do to selectivity? Heh, heh!

Looks as though 500,000 watts is the coming thing for most of the big boys—in which case we would say that receivers will consist of a diode feeding a power tube!

With sufficient power barging in from a local wave, it would appear that receivers will be self-tuning through impulse-excitation (forced oscillation to you). Sounds like a new invention—and we'll bet you one buck, six bits that something comes of it. But it may not be something good. . . .

•

Wide Range

There is much ado these days about wide range sound reproduction. Lots of engineers are also trying their hands at wide-range recording. We know of one engineer (?) who had a hand in the design of a marvelous array of equipment for this purpose. The frequency characteristic of the amplifier was as flat as a pancake and covered everything from a mere thud up to 20,000 cycles (maybe). Everything (most everything) was the berries, only the engineer selected an old type cutting head with a cutoff around 4,000 cycles!

The moral is: you can't shove a whole piano through a dumbwaiter shaft.

New Alden Catalogue

The Alden Products Company, 715 Center St., Brockton, Mass., has brought out a new 16-page catalogue listing and detailing their complete line of adapters, short-wave coils, plugs, sockets, etc. There is also included data on the winding of coil forms for covering the short-wave bands in common use, a complete socket layout chart with table giving filament voltages, and adapter charts for set analyzers and tube checkers.

A copy of the catalogue may be obtained free by writing to the manufacturer.

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United Reproducer Servicing

The assets of the United Reproducers Corporation, former manufacturers of the *Courier, Peerless* and *Kylectron* receivers, have been purchased by the Kylectron Radio Corporation, a subsidiary of the Gray Electric Co. This includes the Factory Service Division, the testing equipment, replacement parts, etc.

Correspondence and shipments pertaining to service should be addressed to Kylectron Division, The Gray Electric Co., Springfield, Ohio.

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S.A. on N.U. Sticker

Is the heading a sticker? We'll intimate. "S.A." stands for sex appeal, but "N.U." doesn't stand for nude . . . it's National Union Radio Corporation.

They have released an advertising sticker for use on automobile and show windows which is supposed to put to shame the well-known Jantzen bathing beauty.

The sticker, beautifully reproduced in brilliant four-color process printing bears the simple phrase "Radio Vitality National Union" and features as the center of interest a National Union radio tube (oh, yea?) with the semi-nude figure of a beautiful woman in a vivacious pose. We suppose she represents the bare facts of N.U. tubes.

Sounds like a good Xmas number. Dealers and Service Men had better get in touch with N.U. Customers will want 'em. Ye scribe would like to have just one. How about it, somebody?

•

Tester Modernization

Mr. Jack Grand, Sun Radio Co., 227 Fulton St., New York, N. Y., has worked up a special diagram for the modernization of the Weston 547 Set Analyzer, which requires but a few additional parts.

The Analyzer, when completed, will test a-c and d-c volts, d-c mils, 3 ranges of ohms, and 3 ranges of output and capacity. Point-to-point testing by use of either ohms or volts is conveniently arranged. All 4, 5, 6 and 7 prong, large and small base, tubes can be tested.

The circuit is also applicable to the Jewell 408 and 409, if one is willing to discard one meter; and to the Weston 565, as well as the 400 Series of Supreme Diagnometers, if the oscillator and tube checker features are discarded.

The blue prints and instructions are available to the Dealer and the Service Man desiring to make these changes. A rewiring service is also offered.

•

"Drops of Solder"

The client has the right to be interested in your methods of diagnosis on *his* radio, so if he gets in your way, don't use your elbows.

•

Consider the questions of your client carefully, and do not offend him by your answer . . . *he may have built a set or two.*

•

The most convincing guarantee of a tube replacement is a dated label, with test data and your personal signature, attached to the glass.

•

A few drops of good furniture polish, mixed with a little elbow grease, makes the radio sound better, after the repair has been made.

M. K. BARBER,
Fort Ethan Allen,
Vermont.

Radio Taxis

New York City now has Radio Taxis. But they play only for customers. When the meter flag is shoved down, the passenger can tune the set to his favorite station and thus close his ears to the noise of the city.

When the ride is up the jig is up. The poor driver can't enjoy the programs—unless he wants to take himself for a ride, and pay for it!

•

Bringing Testers Up To Date

Most models of tube testers made by leading manufacturers can be modernized to test all the latest types of tubes. A simplified process of rewiring the tester is said to have been developed which also allows for future new tube types.

The Electrical Instrument Service Corporation of Dayton, Ohio, is engaged in this work. A descriptive bulletin on the modernizing service for each leading type of tester can be obtained by writing them.

•

Sylvania Tube Base Chart

The Hygrade Sylvania Corp., Emporium, Pa., have had printed a special tube base chart to be hung on the wall of the service shop, which depicts the elements and prong connections for all types of tubes. The elements and prongs are shown as viewed looking into each tube from the top. Two tables are included in this wall chart, one listing the base arrangements by tube types, and the other the tube types by base arrangements.

The chart may be obtained by writing to the tube manufacturer direct.

The "huffs" and "puffs" of vibration, excessive heat and overloads mean nothing to a Centralab resistor, safely housed in its protective ceramic cover (an integral part of the resistor itself).

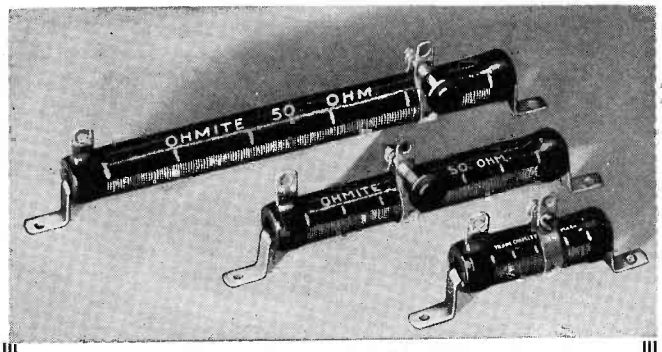
No wonder CENTRALAB Resistors defy abuses that would make the average resistor fail to function.

"Who's Afraid OF THE BIG BAD WOLF"

Your jobber has the new 1934 Volume Control Guide. Ask for it!

Centralabs

Central Radio Laboratories
Milwaukee, Wis.



OHMITE RESISTORS
WILL MAKE MONEY FOR YOU!

Ohmite "DIVIDOHM" Semi-variable Resistors are making money for service men everywhere. There is no need to pay high prices for special voltage dividers. Just select the DIVIDOHM having the proper total resistance and wattage rating—set the adjustable lugs (as many as needed) by means of the patented Percentage-of-Resistance Scale—insert the mounting brackets and install the unit in the set without any fuss or bother. You then have a vitreous enameled resistor with complete protection against both electrical and mechanical injury.

See OHMITE Catalog Number 9 for list of over 100 different DIVIDOHMS; also many other resistors and rheostats. Use the coupon!

OHMITE
MANUFACTURING COMPANY
637 N. Albany Avenue Chicago, Ill.

Please send me a copy of your eight-page Resistor and Rheostat Catalog No. 9.

NAME .....
ADDRESS .....
CITY..... STATE.....
JOBBER'S NAME.....

A New Service That Brings More Profit to the Serviceman

NEW LIST PRICE
GENERAL PARTS CATALOG

Profit is what you are in business for . . . and profit is what you get when dealing with Wholesale Radio Service Company.

We have always extended lowest wholesale prices to Servicemen and Dealers because we have realized that they *must* make a profit to remain in business. Now, in addition to the many special services extended to our customers, we are bringing out a LIST PRICE GENERAL PARTS CATALOG!

In this Special Consumer Catalog are listed the retail prices on thousands of replacement parts. Now you can *protect* the profit to which you are entitled on all replacement parts when estimating a job. The prices listed are the prices your customer pays.

BUY WHERE YOU ARE INSURED A PROFIT!

HERE ARE 4 BIG BARGAINS

POWER TRANSFORMER

Finest quality. Flush mounting type. For 5-6 Tube Sets. Three or four 2½ V. Heater tubes, one 2½ V. Power Tube and one 280 or 282 Rectifier, No. C1492..... **$1.55**

For 7-8 Tube Sets Four or Five 2½ V. Heater Tubes, Two 2½ V. Power Tubes and one 280 or 282 Rectifier, No. C1507..... **$1.95**

JEFFERSON MICROPHONE
2-Button Transformer

For double button microphone. A turn ratio of 1 to 45. Impedance ratio, 1 to 2000.

No. C1929 SPECIAL **$1.45**

Dry Electrolytic Condensers
INVERTED CAN

No.		
D2714	Capacity 4	44c
D2715	Capacity 8	49c
D2716	Capacity 4-8	95c
D2717	Capacity 10	75c

CARDBOARD

D2718	Capacity 2	29c
D2719	Capacity 4	32c
D2720	Capacity 6	42c
D2721	Capacity 8	43c

Audio and Push-pull Input Transformer

An especially well made, fully shielded transformer with an excellent frequency response. Two types—straight audio and push-pull input

C1912—Push-pull Input. YOUR COST..... **69c**
C1914—Straight Audio YOUR COST..... **39c**

WHOLESALE RADIO SERVICE CO.,
100 Sixth Avenue, Dept. S-123,
New York, N. Y.
Please send me your new list price catalog.

Name.....
Address.....
City.....State.....

WHOLESALE RADIO SERVICE CO. INC.
100 Sixth Avenue, New York, N.Y.
New Branch
219 Central Avenue, Newark, N.J.

ASSOCIATION NEWS . . .

A.R.S.M.A. Meetings

The Akron Radio Service Men's Association plans to have some leading technical speakers on some of their future programs. Tentative arrangements have been made to extend invitations to the Cleveland section of the I.R.S.M., the Akron chapter of the A.I.E.E., the radio and electrical enginerring students of Akron University, Case School of Applied Science (Cleveland), and others interested in demonstrations and speeches on radio and electrical subjects.

This association has enjoyed a steady growth and now has 35 members, representing probably 35 percent of the radio establishments in that vicinity. Meetings are held every Monday night.

The A.R.S.M.A. has also started a library of the service manuals of each and every manufacturer of radio equipment, and is enjoying some real co-operation in this respect. Manufacturers who desire to have their service manuals in the library should address the Librarian, Mr. H. Hauenstein, 1021 North Main Street, Akron, Ohio. Manufacturers who have representatives in the Ohio territory who might wish to speak before the association group should communicate with the Secretary, Mr. Gahagan, same address as above.

This association is also purchasing collectively such equipment for the use of its members which would ordinarily not be within their reach.

•

New York I.R.S.M. Meeting

The New York Section of the Institute of Radio Service Men report that meetings will be held as usual Monday evening of January 8th and 22nd, at 8:00 P.M. Both meetings will be held in the Pennsylvania Hotel.

Brooklyn Division

The Brooklyn Division of the New York Section is at present negotiating for a meeting place in downtown Brooklyn where meetings, to be announced later, will be held during January.

All of these meetings will be preceded by a Service Forum where your particularly tough service problems can be ironed out.

Write to the Secretary of the New York Section, Mr. Forrest B. Arnold, 303 Vanderbilt Ave., Brooklyn, N. Y., for further details.

•

I.R.S.M. Chicago Lecture

Mr. Cole of the General Transformer Corporation, gave a talk at the meeting held by the I.R.S.M. in Chicago on December 18th. The subject of the talk centered upon a new type of multi-tap universal power transformer designed principally for replacement in early models of receivers.

ATTENTION—SECRETARIES

THE success of the "Association News" department, and the possibility of its assisting and publicising your association, is entirely dependent on the willingness of each service association to cooperate with us. This department was created for the purpose of informing all Service Men of the formation of new associations, dates of meetings, what each group is doing to better conditions, notifications of special lectures, etc. This is just the sort of information we want from you, each month if possible.

Take the matter up at your next meeting, and arrange to send us material regularly. It should reach us by the fifth of the month to make the issue.—THE EDITORS.

N.A.R.T. (Oregon)

The Northwest Association of Radio Technicians is a local organization embracing Portland, Oregon; Vancouver, Washington, and the suburbs of these cities.

The object of the association (quoting from the constitution) is to advance the radio service profession, to uphold its dignity, to exalt its standards, to extend its sphere of usefulness, and to promote public confidence in the radio technician. The organization endeavors to promote cooperation and good fellowship among its members, and technical papers or technical motion pictures are presented at each meeting.

The association was formed May 12th, 1933, and at present has a membership of 66 radio technicians.

At the last two meetings oscillograph tone tests were run on the different methods of audio amplification. In future meetings the actions of various detectors used in present-day radios will be illustrated by means of the oscillograph.

Any radio Service Man is welcome at the meetings, held every two weeks. Detailed information may be obtained from the Secretary, Mr. Earl Grulke, 232 N. Monroe St., Portland, Oregon.

•

Lippman Co. Conducts Service School

Aaron Lippman Company of Newark, N. J., has cooperated with the National Union Radio Corporation and the Newark Section of the Institute of Radio Service Men in organizing an advanced study course for professional radio Service Men.

A series of thirteen meetings will be held at the Robert Treat Hotel every Tuesday evening from 8:00 to 9:00 P.M. The course involves a study of the theory behind each part of a radio receiver with illustrations of practical application of the theory.

Fifty-one Service Men gathered at the first meeting to hear instructor Walter A. Cobb discuss the theory and application of resistances. Mr. Cobb is also an instructor at the Bloomfield Vocational School.

350 Attend Altoona Meeting

Hollenback Radio Service of Altoona, Pa., with the assistance of representatives from Ohio Carbon Co., National Union Radio Corp., and Burgess Battery Co., staged a demonstration and entertainment on November 13th which drew attendance from a radius of eighty miles around the city of Altoona.

The meeting which opened with manufacturers' demonstrations in the afternoon was terminated by a dinner, entertainment and dancing in the evening.

The party was unique in that dry sales-talks were eliminated. It was basically a "Thank You Party" for business done in the past year and was made brilliant by the sparkling entertainment provided by singers, dancers, and a number of radio artists from Station WFBG.

Walter Hollenback, of Hollenback Radio Service, acted as Toastmaster, Hi Cohn of Ohio Carbon was master of Ceremonies, while John Olson of Burgess Battery Co. and M. F. Taylor, National Union Radio Corporation District Manager, acted as Assistant Hosts.

•

R.S.M.A. (Ind.)

The Radio Service Men's Association of Fort Wayne, Indiana, was formed October 4, 1933. They have already held four meetings (every other Wednesday night) and boast a membership of twenty-five Service Men.

This association is doing quite a bit of newspaper advertising and have great plans for the future. They agree with Mr. Whitner of the R.S.M.A. of Evansville, Indiana (See October SERVICE), that associations should be kept above the level of a labor union in the interest of the profession.

Address all communications to the Secretary, Mr. Herbert G. Tipton, 1305 Home Ave., Fort Wayne, Ind.

•

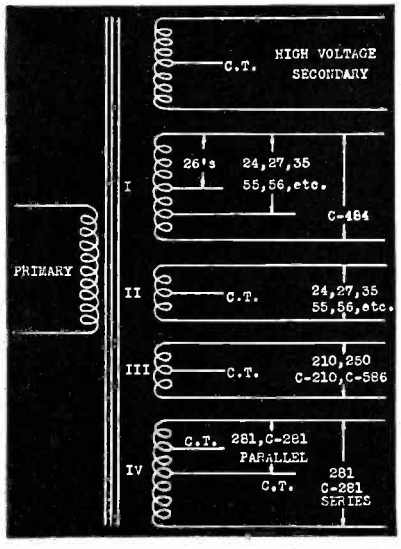
I.R.S.M. Washington Representative

The Institute of Radio Service Men has retained Allen Bennett Forsberg, formerly connected with the office of the National Recovery Administration in an executive and advisory capacity, as its Washington representative before the Administrator in matters relative to the code of fair competition for the radio service industry. Mr. Forsberg is an economist of high standing, and has served on the faculty of midwestern universities. He is thoroughly familiar with the details involved in the presentation and advancement of codes of fair competition as well as the requirements of the Administrator. His valued assistance will, no doubt, expedite the final approval of a code to govern the activities of the service branch of the radio industry.

THE MANUFACTURERS . . .

New "General" Multi-Tap Transformer

In order to meet the requirements of all radio receivers, the General Transformer Corp., 502 Throop St., Chicago, Ill., have made an addition to their family of transformers, in the form of a Multi-Tap job for



replacement in receivers using such tubes as the '81 half-wave rectifier and 210 amplifier tubes. This transformer also will supply such tubes as the C-484 and C-586 which have 3-volt filaments, as well as the C-210 and one or more '81's in either series or parallel.

•

Brand Spaghetti

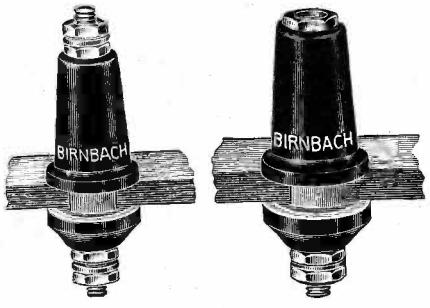
William Brand & Co., 268 Fourth Ave., New York, N. Y., have a spaghetti known as Turbo Oil Tubing which is impregnated inside and outside. This is a high grade tubing and is particularly applicable to high-voltage wiring in receivers, and for use in special test equipment such as set testers and ohmmeters.

Another type—Turbo Saturated Sleeving—has an extremely high voltage breakdown resistance. Sold in rolls of 300 feet.

•

Birnbach Standoff Insulators

Birnbach Radio Co., Inc., 145 Hudson St., New York, N. Y., has brought out a new type standoff insulator of unique design



for construction of receiving, transmitting, and test apparatus where a maximum ruggedness and insulation must be had—such as short-wave equipment.

These standoffs may be mounted on metal panels as they require only one hole for mounting to make possible connections on the bottom of the subpanel, thereby eliminating unsecured wiring.

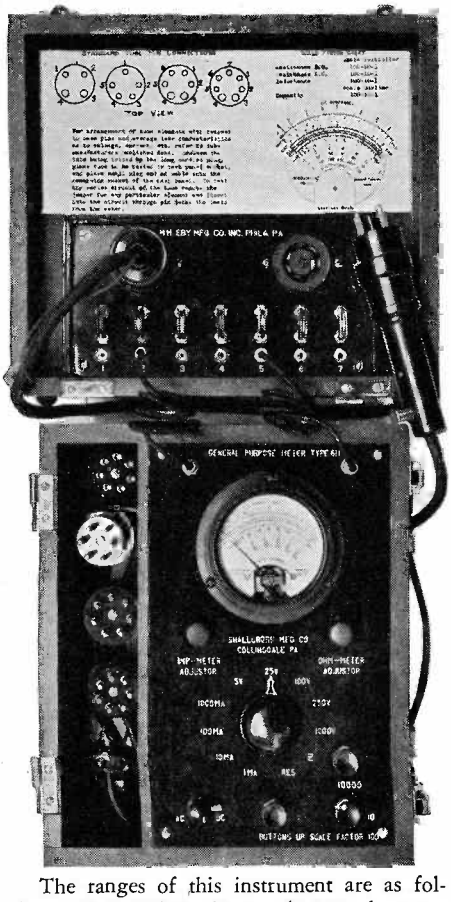
The body is made from a good grade of porcelain and is thoroughly glazed with the smooth finish necessary for high-frequency work.

They are supplied in several sizes ranging from 5/8" to 1¼" high, and complete with nickle plated brass hardware. The 7/8" and 1¼" sizes are supplied with jacks, making these insulators desirable for plug-in coils, chokes, and all types of high-voltage apparatus.

•

Shallcross No. 611 Analyzer

Shallcross Manufacturing Co., 700 Macdade Boulevard, Collingdale, Pa., has introduced their new No. 611 Universal Tester and Radio Set Analyzer.



The ranges of this instrument are as follows: D-C Voltage Range (1,000 ohms per volt):—5-25-100-250-1,000 volts. D-C Current Range:—1-10-100-1,000 milliamperes. A-C Voltage Range (1,000 ohms per volt):—5-25-100-250-1,000 volts. Resistance (D-C):—0.5-5,000,000 ohms. Resistance (A.C):—25-3,000,000 ohms. Capacity:—.001-10 mfd. Inductance:—100-10,000 henrys.

The No. 611 Universal Tester can be used for regular point-to-point testing, but for those who prefer the type of analyzer employing adapters, a special unit may be added for this purpose.

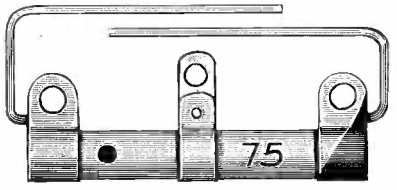
The No. 611 Tester is sold complete, or in kit form for those who wish to build their own.

•

Ohmite Center-Tapped Resistors

Ohmite Manufacturing Company, 636 N. Albany Ave., Chicago, has just placed on the market a line of center-tapped, low-wattage radio resistors.

These units are of the same construction as the Wirewatt resistors with the exception of the center terminal lug. In the construc-



tion of these units the resistance wire is wound over a porcelain core and covered with a special insulating material. Tinned lugs and tinned wire leads on the end terminals are used for connecting the units. Resistors are color-coded and are also marked in numerals.

The center-tapped Wirewatts are made in the following resistance values: 10, 20, 25, 50, 75, 100 and 200 ohms. They are rated at one watt for the entire unit, or one-half watt for each section.

•

Pioneer 32-Volt Genemotors

The Pioneer Gen-E-Motor Corp., 1160 Chatham Court, Chicago, Ill., has just announced a new Genemotor which provides 180 volts d-c from a 32-volt input.

Two models are available. One is complete with filter and intermediate voltage taps, which may be connected to any battery-operated receiver and thereby eliminate the "B" batteries. The other model is supplied stripped of filter and intermediate voltage taps to meet the needs of set manufacturers.

•

Eastern Coil Mike Stands

The Eastern Coil Company, manufacturers of quartz crystal holders for the past three years, has expanded its line and is now manufacturing in addition to the above a line of microphone stands.

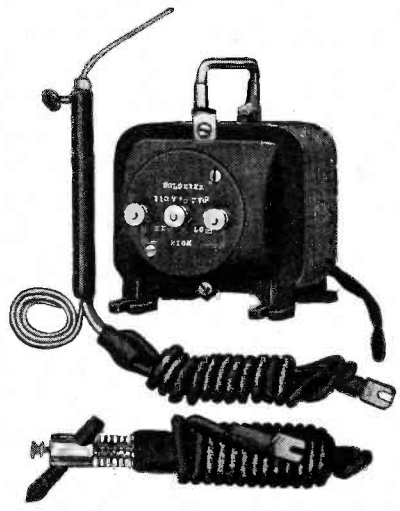
Instead of concentrating on a single type of floor stand, three floor types have been developed to take care of price requirements.

An innovation is a cable clamp which allows external use of the mike wire, holds it neatly to the side of the stand, prevents injury to the wire and allows instant adjustment. Two of these clamps are meant to be used with each stand.

Catalogue sheet describing the complete line may be had by writing to Eastern Coil Company, 56 Christopher Ave., Brooklyn, N. Y.

King Solderers

King Solderers, manufactured by the Electric Heat Control Company, 9115 Inman Ave., Cleveland, Ohio, are practical for general use in radio and electrical work. They



use a step-down transformer and there is no waiting to heat, or waste of current when not in use and no copper tip to tin or corrode. Heat applied directly at the joint assures a positive contact at all times.

•

New Supreme Diagnometer

Supreme has announced a new Diagnometer, known as the Master Series. This instrument is capable of testing all tubes, including the newest types, without adapters—on a meter dial which is colored for accurate "Bad," "Doubtful" and "Good" transconductance classifications, and is adjustable to varying power supply potentials. Tubes can also be tested from the sockets of operative radios.

All necessary readings are made on the meter dials, without the need of charts. The meters provide all the usual a-c. and d-c. current and voltage readings, as well as resistance and capacity readings.

The Master Series Diagnometer includes an a-c., d-c. stabilized and completely shielded 100 per cent modulated oscillator with variable attenuator. Maximum tuning accuracy is assured at eleven fundamental frequency settings ranging from 130 to 1875 kc., and covering the 20, 40 and 80 meter short-wave bands.

•

"Bivocal" Mike

The lapel microphone, boon of portable and special-events broadcasts, has found another improvement. Whenever a speaker turned his head, even if ever so slightly, some of his words were lost.

Now along comes Universal Microphone Company with *two* lapel mikes corded together with a special line. One of the mikes goes on each lapel.

No matter how the speaker or announcer turns or twists his head, the microphone arrangement maintains a constant volume.

Shure Condenser Microphone

Shure Brothers Co., 215 West Huron St., Chicago, announce a new condenser microphone designated as Model 40A. The response is said to be from 40 to 10,000 cycles.

The head amplifier uses two special dome-top, non-microphonic type 30 tubes. A special output transformer, with terminals appearing in the tube chamber, makes it possible to change the output impedance from 200 to 50 ohms according to circuit requirements. The output level is minus 30 db.

The tubes in the condenser microphone may be supplied from batteries or from the Shure Model 41A Power Supply for Condenser Microphones. This unit supplies a rectified and filtered current for both filament and plate needs.

•

Universal Three-Channel Mixer

The Universal Microphone Co., Inglewood, Calif., have a new three-channel mixer for three microphones, or two microphones and a low-impedance pick-up.

The mixing is done with a constant-impedance attenuating pad so that frequency response is maintained uniform throughout the scale.

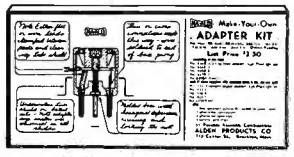
This device, while normally supplied with constant impedance attenuating pad, can also be furnished equipped with the usual L or U pads at a lower cost.

The unit comes in a black metal case with carrying handle and weighs about 10 pounds.

•

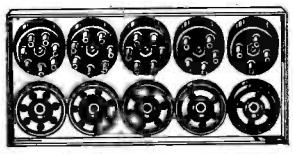
Na-Ald "Make-Your-Own" Adapters

With so many new tubes and circuits it is necessary to have many adapters for analyzing, tube checking, testing and experimental purposes, especially for use with out-of-date equipment. Since there are five different prong arrangements on the modern tubes, the number of adapter circuit arrangements becomes very great. To simplify the situation,

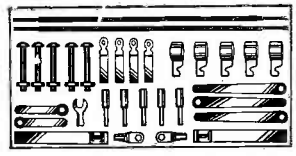


the Alden Products Company, 715 Center Street, Brockton, Mass., has introduced their new "Make-Your-Own" adapter parts.

In assembling the adapter, the required circuits are soldered to the convenient solder terminals of the socket section and brought



down through the hollow prongs of the plug section soldering the wires to the ends of the prongs in the usual manner. A 6-32 screw and nut supplied with the adapter holds the socket and plug sections securely together. The nut fits into a recess in the base of the plug section so that a neat flush bottom results. A very important feature is the very small size, making it possible for the use of these adapters in the closely shielded sockets. Twin adapters, or adapters with leads brought out are conveniently made by securing the leads between the top and bottom parts by means of the center screw. These leads are properly located to clear the closely shielded sockets used on the new sets.



These adapters are available singly or in kits of five top and five bottom sections, making any combination possible. The numbers of the 4, 5, 6, medium 7 and small 7 socket top sections are 422, 423, 426, 427 and 427A respectively, and the numbers of the bases with the corresponding 4, 5, 6, medium 7 and small 7 prongs are 934B, 935B, 936B, 937B and 937AB.

•

CURE FOR MOTORBOATING

(*Continued from page* 444)

R, inserted in the common grid lead. Resistance or very high capacity (i.e., 8 to 20 mfd.) is about the only thing that is really effective at the very low frequencies at which motorboating occurs.

This method is not a cure-all since it occasionally happens that motorboating is due to other causes, even being due in some cases to the action of the detector or AVC tube or both, when the amplifier is a part of a receiver, and in some cases to the regulation of the power supply unit as well. However, the method outlined will be found effective in a large number of cases in which motorboating is confined to the push-pull amplifier.

The reason motorboating is confined to one side of the push-pull amplifier is generally due to the fact that this side has higher gain than the other. This may be due to the use of a tapped transformer in which one side of the secondary is wound directly over the other. In such cases the inner winding will have more inductance and less resistance than the outer winding and as a result will be more efficient, and consequently more likely to cause oscillation.

High resistance should not be inserted in the grid circuits of high power tubes, such as the 50 type, since if the tube is subject to grid emission and normally draws a small grid current, a high resistance in the grid circuit will effectively reduce the grid bias and may in certain cases cause the tube to overheat. It is a perfectly safe procedure, however, with small power tubes since grid emission is either non-existent or so small as to be unimportant.

INDEX TO ADVERTISERS

RIDER NOW OFFERS

a "3-in-1" MANUAL!

(CONTAINING VOLUMES I, II and III)

and other Manuals and Manual Equipment.

In keeping with the trend and with the desire to fulfill the insistent demands of the radio service industry, we have expanded our line of Manuals and Manual equipment so that you can suit your individual requirements.

Rider's Manuals—individual or combination—represent the highest order of accuracy, completeness and up-to-the-minute detail in radio-service information covering American commercial receivers. These are the Manuals which have been used, sold, and endorsed by the leading tube manufacturers, instrument manufacturers and set manufacturers. These manufacturers with extensive engineering organizations have critically examined Rider's Manuals and their choice of these Manuals is absolute evidence of superiority.

Companies like E. T. Cunningham, Inc., National Union Radio Corp., RCA Radiotron Co., Raytheon Products Corp., Weston Electrical Instrument Co., Hickok, Supreme, Readrite, Fada, Wurlitzer, Stromberg-Carlson, etc., have used, sold, and endorsed Rider's Manuals exclusively. . . . You can do no better than to follow their example and recommendations.

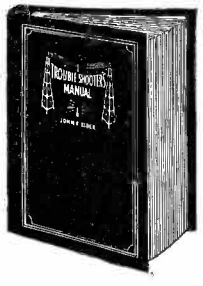
You now can secure Rider's "Perpetual Trouble Shooter's Manual," Volumes I, II and III under one cover—and if you so desire, also Rider's "Specialized Auto Radio Manual" under the same cover. This compilation of service data is the greatest in the world, totaling more than 3,300 pages; each page 8½ x 11 inches and printed letter press from engravings.

Realizing that Rider's Manuals are constantly used and oftentimes taken right to the job, we now offer binders with or without carrying handles, thus providing for portable use.

INDIVIDUAL MANUALS

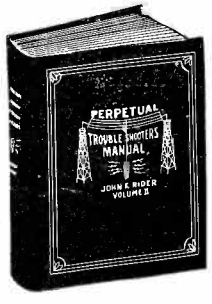
Volume I
(Individual)

1000 pages. Covers the period between 1919 and 1931. Price $7.50.



Volume II
(Individual)

800 pages. Covers the period between 1931 and 1932 with some earlier data. Price $6.50.



Volume III
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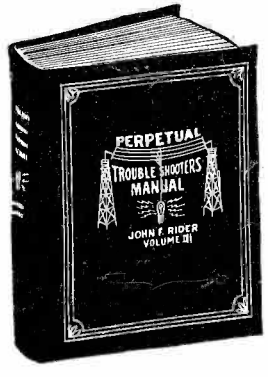

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