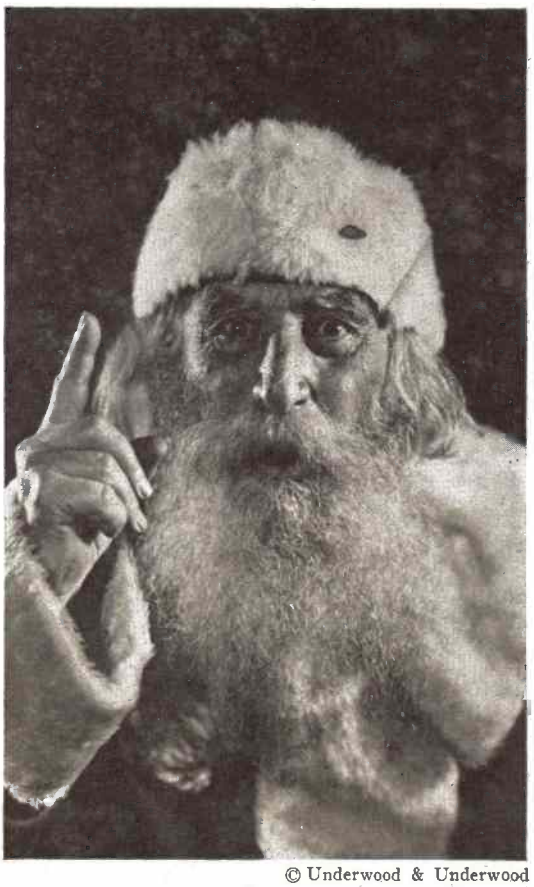
SERVICE

A MONTHLY DIGEST OF

RADIO

AND ALLIED MAINTENANCE



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MERRY XMAS!

I'll bring 'em—you service 'em

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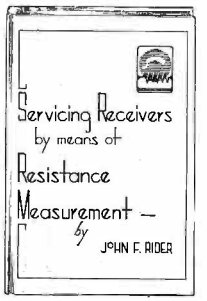
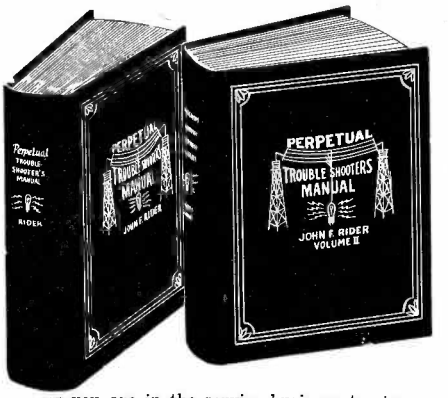
DECEMBER
1932

BOOKS EVERY SERVICE MAN SHOULD HAVE



Do you know how all receivers irrespective of how complex the circuit may be—can be serviced in the same manner? Do you know how to break down the most complex receiver circuit so that it can be tested throughout with an ohmmeter? Get this book and become acquainted with the most modern—yet simplest method of servicing. Price $1.00 postpaid. 203 pages. Type set.



If you are in the service business to stay and make a profit—you must have Rider's "Perpetual Trouble Shooter's Manuals," Volumes I and II. These two volumes are as essential to you as your set tester, analyzer, diagnometer or ohmmeter. The wiring diagrams—voltage data—electrical values, etc., enable you to use your test equipment most advantageously.

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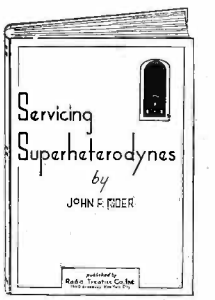

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ANNOUNCEMENT . . . RADIO QUESTIONS AND ANSWERS. Volumes I and II are off the press and are being mailed to our dealers. For the first time in the history of the radio industry, a question and answer volume really gives the answers to the problems which you have, and each answer is given in full detail.

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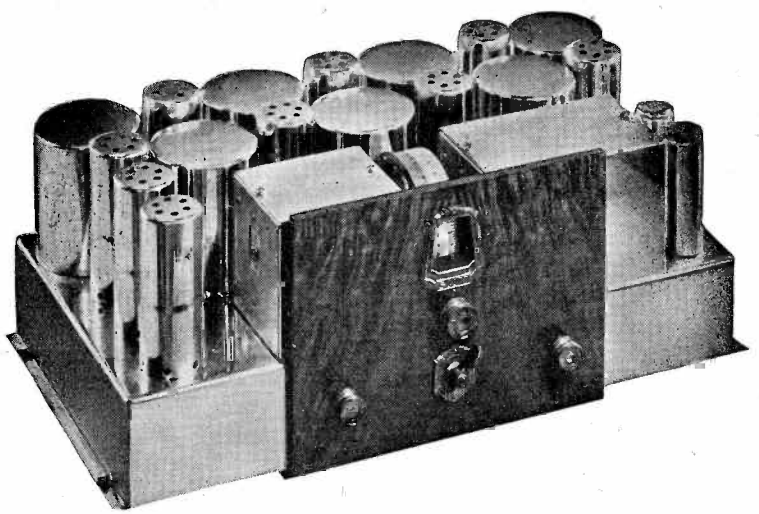

Are You familiar with these Features of the mighty New

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WAVELENGTH RANGE: 15 to 550 Meters—no plug-in or tapped coils.

TRUE ONE DIAL: No trimmers used on any wavelength.

DISTANCE RANGE: Guaranteed to receive foreign stations 10,000 miles or more away, with full loud speaker volume, at all seasons.

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SENSITIVITY: .6 microvolts per meter at 600 KC—.012 microvolts per meter at 1400 KC.

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FULL AUTOMATIC VOLUME CONTROL—12 TUBES, complete A. C. operation.

SEND FOR INTERESTING TECHNICAL BROCHURE

We will be glad to furnish you with complete technical details of the SCOTT ALL-WAVE DELUXE on request. Curves showing results of tests conducted in independent research laboratories included, as well as full explanation of the ways in which this unusual receiver is able to accomplish its sensational performance. Send for it NOW!

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When your customers ask you, "What kind of a radio receiver do you use yourself?" they expect you to name the *best* . . . and they accept your answer as expert judgment.

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It is the result of years of planning, experiment, experience and study by master engineers. It is built by highly skilled workers trained in Scott precision methods. Every part used in its construction is selected from highest-grade, specially specified designs and materials. Throughout its construction it is submitted to a series of gruelling tests on delicate laboratory apparatus costing a fortune, and available in but few radio factories.

Study its condensed technical specifications . . . ponder over its sensational "round-the-world-reception guarantee" . . . realize that its tone perfection is unrivalled . . . think what it means that every part is warranted for five years of service.

Can you—as an expert whose reputation rests on the exactness of your technical knowledge—afford not to know all about the SCOTT ALL-WAVE DELUXE?

After you know about it, it's up to you whether or not you choose it as your personal receiver. Because we are confident in the results of your judgment we make no attempt here to sell you . . . we believe that its own merit will do a better selling job with experts than any arguments in words.

But we do ask you to mail in this coupon—TODAY—so that you may know ALL the facts.

MAIL THIS----------

E. H. Scott Radio Laboratories, Inc.
4450 Ravenswood Ave., Dep't. S-122, Chicago, Ill.

So that I may know ALL the facts—and from them form my own expert opinion—please send me detailed information about the new 15-550 Meter SCOTT ALL-WAVE DELUXE, including full Technical Information, Laboratory Curves, Performance Proofs, etc. This is not to obligate me in any way.

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SERVICE

A Monthly Digest of Radio and Allied Maintenance

DECEMBER, 1932
Vol. 1, No. 11

EDITOR
John F. Rider

MANAGING EDITOR
M. L. Muhleman

Editorial Contents

Advertising Director

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1440 Broadway, N. Y. City
Telephone: CHickering 4-4542

Published monthly by

John F. Rider Publications, Inc.
1440 BROADWAY
NEW YORK, N. Y.

Officers

JOHN F. RIDER, President and Treasurer
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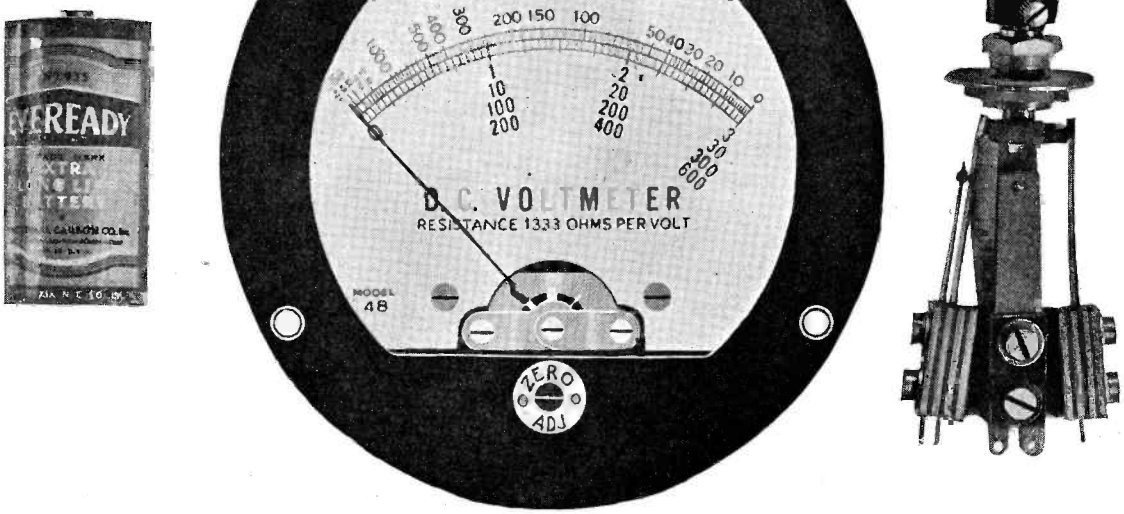
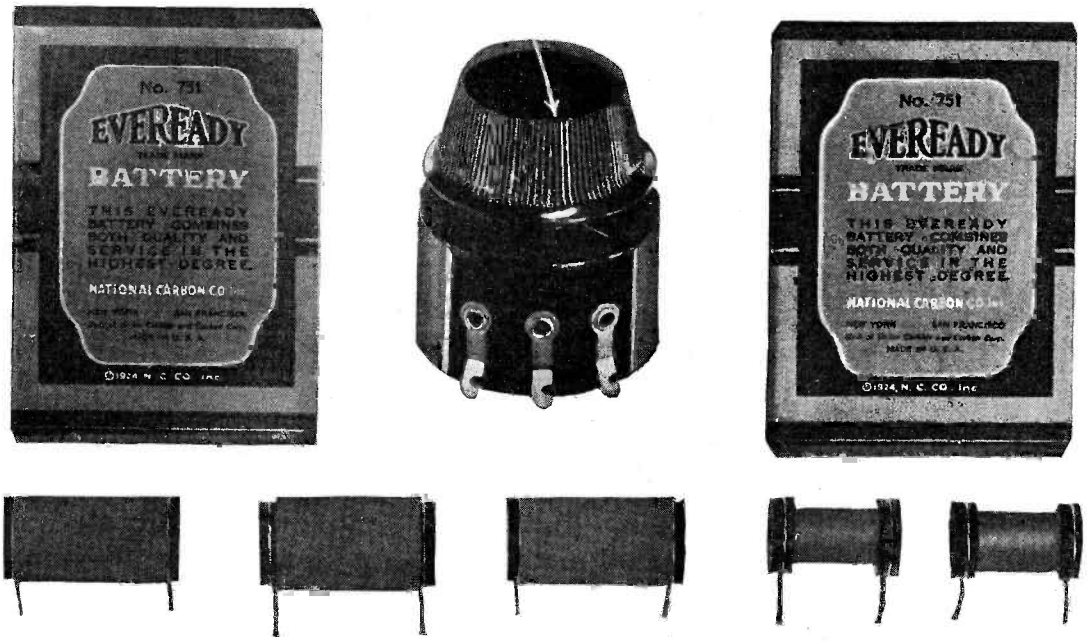
Entered as second-class matter June 14, 1932, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Subscription price $1.00 per year in the United States of America; 15 cents per copy. $2.00 per year in Canada and foreign countries; 25 cents per copy.

Build This Low Priced Volt-Ohm-Meter





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This low priced, accurate Volt-Ohm-Meter is pre-calibrated. You don't have to worry about calibration—we did this for you. Large size meter—3½-inch body diameter, 4¼-inch flange; bakelite case.

Every part used in this instrument is as accurate as the parts used in our complete testing systems. All the parts can be mounted and wired in an hour. The kit includes all parts illustrated, including Voltage Adjuster to calibrate meter to batteries. Accurate wire-wound resistors and batteries. Instrument is 1333 ohms per volt resistance.

Measures all values of resistance most frequently used in receivers, from 1 to 1,000,000 ohms. Voltage values from 0 to 600 volts D. C. in four ranges. A knife-edge pointer assures ease and accuracy of reading.

Complete Instructions and Simple Wiring Diagram With Each Kit

List price $30.00. Net to dealers and Service Men $18.00.

HICKOK Model 4855—AO—Wired and Mounted

This is the above kit wired complete and mounted in a case ready for use.

List price $39.00. Net to Dealers and Service Men $23.40.

HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 DuPont Avenue — **Cleveland, Ohio**

THE ANTENNA...

THE HANDWRITING ON THE WALL

THE handwriting is on the wall for some of the service organizations who are carrying on somewhat shady tactics in the service field. There is much more than a bad taste left in the mouth of the customer. Not only do shady service tactics reflect upon the service industry, but they go back much further than that; the influence is felt also by the dealer, and even the manufacturer of the receiver is placed in a bad light. All the owner of a radio receiver can see after having paid a fat and juicy price for what normally should have been an average service charge is that the entire radio industry is a racket—that all its branches and its personnel are racketeers.

The time is not far distant when large metropolitan centers will take concerted action to prevent occurrences of the following nature. One instance which was brought to our attention was the failure of an r-f. bypass condenser in a certain receiver. The customer was told that the entire power pack was damaged and he was charged a fee in excess of $20.00 . . . quite a juicy price for a single r-f. bypass unit!

Another instance called for the replacement of a filament control resistor. The customer was told that all three tubes controlled by that resistor were damaged and that the entire filter system in this d-c. receiver required replacement. This job cost the customer in excess of $30.00.

A third case called for the replacement of an output transformer. The customer was told that the complete speaker was damaged and that a new one was required. The estimated cost was around $30.00. Fortunately for this individual it seemed too high and the final repair, when given into the hands of another Service Man, cost him about $6.00. There is no doubt of the fact that such type of service is profitable —for a while at least, but it cannot last. You can't bunk people forever.

It appears as if the service industry is confronted by two obstacles. On one side we have the man who cuts service charges and on the other side is the man who takes advantage of the customer by exacting exorbitant charges. The latter type will eventually exterminate himself because the *modus operandi* will become public knowledge after a while. From the information we can gain, related information is being prepared for the Better Business Bureaus in the various cities where such tactics are known to exist.

The former class will eventually "service itself out of the field" because it is impossible to run a service business unless a legitimate charge is made. It is just not in the cards.

• • •

WE are coming to the end of one year and the start of another. At the moment we have no resolutions to make. Instead we see every reason for commenting upon the greatly increased cordiality existing between the radio receiver manufacturing industry and the radio service industry. 1932 witnessed certain definite actions on both sides. No one year up to the last showed as much recognition of the importance of the Service Technician as was manifest by the manufacturers comprising the whole radio group during 1932. We are inclined to believe that the peak has not been reached—that much greater co-operation will become evident as 1933 rolls along.

In this connection, there has developed, despite the general chaotic state of organization in the service field, an improved morale. Although times have been bad, and are not as yet of rosy hue, the mental stand has improved. There seems to be a better understanding of what is to be achieved and how to go about reaching this goal. The service industry still has a hard row to hoe, but it is not as wide or as deep as in the past.

• • •

THERE'S been a merger. The past twenty months have seen the absorption of a certain branch of the short-wave field by the broadcast field. In other words, the modern broadcast receiver is extending its receiving activities into the short-wave field. More and more of the broadcast receivers sold to the general radio public are combination short- and broadcast-band receiving systems. Because this condition is at hand and because of every likelihood of still greater activity in this direction, the "General Data" section of this magazine has absorbed the "Short Waves" section.

Recognizing the difficulties of splitting a combination receiver into two parts and showing the broadcast part in "General Data" and the short-wave part in "Short Waves," the editors have felt that it would be best to show such receivers as complete units in but one part of SERVICE. This is done in this issue and will be continued in subsequent issues. The makeup of the contents page will continue as heretofore; namely, we shall carry a listing of data normally belonging in the short-wave field, under the caption of Short Waves.

No doubt you have noticed that there has been an increase in the number of pages contained in the magazine. Ever since the October issue, we have been running forty pages inclusive of the covers. This number of pages shall be continued and we are planning to again increase the number of pages sometime in the near future.

• • •

HERE are some facts which may be of interest. Our editorial in the November issue asked that the service industry make an effort to revive listener interest. A recent investigation carried out in New York City, during the prime hours of the evening, between 8 P.M. and 8:30 P.M., showed that on one night only 4 out of 18 receiver owners had their receivers in operation. On another night, 6 out of 20 were on the air and on the third night only 4 out of 19 were on the air. It seems as if 25 per cent of the receiver owners are not sufficiently interested in radio to listen to programs.

• • •

Merry Christmas to you all and Best Greetings for 1933

John F. Rider.

NATIONAL UNION meets the service man MORE THAN HALF WAY!

Oscillator and Output Meter

The only way to service super hets properly! Absolute necessity for modern servicing. Free with small purchase of National Union Tubes and small deposit.

The Readrite Tube Tester

Here's a valuable tester! Easily carried, convenient. Illuminated dial! Free with small purchase of tubes and small deposit.

Two Service Manuals

Here are two instructive, valuable service manuals written by John F. Rider, well known radio scientist and lecturer.

Volume 1 has over 2,000 diagrams on voltage, electrical values, color coding, etc.

Volume 2 has over 700 pages of valuable information. Point-to-point resistance data furnished for the first time enables operation of continuity, capacity, and resistance tester above at the right. Either one or both of these manuals free with small purchase of tubes.

No other manufacturer of radio tubes offers more to help the service man and the dealer.

Radio men everywhere are telling us what National Union means to them. All appreciate that National Union helps the service man to help himself.

And the reason why National Union does all this for service men and dealers is because National Union understands and does something about the service man's problems—

FIRST . . . National Union sells him only High-Quality Tubes.

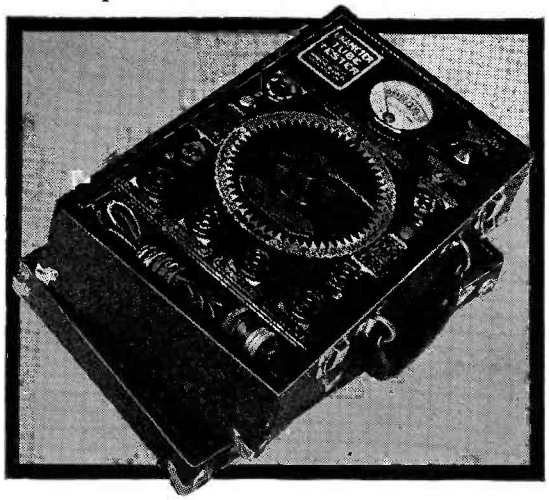
SECOND . . . National Union offers him FREE the finest, most efficient shop equipment.

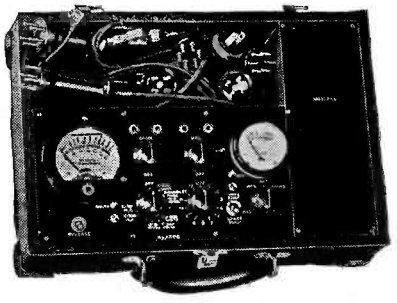
THIRD . . . National Union gives the latest and correct data on all radio equipment.

FOURTH . . . National Union assures him a real profit . . . because there is *no price cutting.*

Just look at all the valuable free equipment in this advertisement. And then ask yourself what tube manufacturer does more for service men.

Decide today to tie up with National Union for profit. Decide what equipment you want . . . and mail coupon below!





Readrite Resistance Tester

The new Readrite continuity, capacity, and resistance tester. No more chassis pulling! With the new Readrite Tester you can make every test—continuity, capacity, and resistance . . . without taking the set apart!

Operates easily, efficiently. And that means you can service more sets better and quicker than ever. Yours free with small purchase of National Union Tubes and small deposit.

NEW! UNAMETER!

Latest Type Tube Tester

At the left is the new, sensational Unameter. Tests more than fifty types of tubes.

This Unameter Tester is very easy to operate. Turn the selector, then place tube in the socket, and watch the reading on the meter in English.

It is a compact, easily carried, sturdy meter. An aluminum chassis, with all panels made of bakelite. And attractively finished in gold, red and black. This Unameter is undoubtedly one of the finest pieces of radio equipment ever offered to service men. So don't miss this opportunity. It is yours free with moderate purchase of tubes and a small deposit.

FREE! Tube Base Layout Chart compiled by John F. Rider. No obligation. Write for one!

•

ASK YOUR JOBBER'S SALESMAN

NATIONAL UNION RADIO CORPORATION
400 MADISON AVENUE · NEW YORK CITY

Dear Sirs: I am checking the equipment in which I am interested: S 12-32

READRITE TUBE TESTER ☐ OSCILLATOR AND OUTPUT METER ☐ VOL. I ☐ VOL. II ☐
RESISTANCE TESTER ☐ UNAMETER ☐

NAME_____

ADDRESS_____ CITY_____ STATE_____

"NO, FELLERS, THERE AIN'T NO SANTA CLAUS"

BUSINESS RECOVERY GETS UNDER WAY AFTER THE WORLD REALIZES THAT THE SOFT JOB HAS BEEN REPLACED BY THE SOLID JOB OF SELLING

WITH Old Man 1932 about to make his exit, the big election over, and people still saying: "Aren't conditions terrible", we can thank our stars for many things—

We've all had to work harder. As a result better products have been made, we've learned a great deal about selling, values have taken on a new significance. The soft job is gone and we're hardened to the new task of getting along in the world.

So-o-o-o! (as Ed Wynn would say)—we are wishing you a

MERRY CHRISTMAS

by assuring you of a still more progressive

OHIOHM *program for 1933*

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An Analysis of the Tube Adapter Situation

By JOHN F. RIDER

THE development of adapters for use in connection with the testing of the modern crop of vacuum tubes presents a very interesting field of study. There is no doubt about the fact that these adapters have made possible the continued use of testers of various kinds developed during the past few years. At the same time, they have not interfered with the sale of new testing units for the simple reason that there are existent two groups of men affiliated with the service industry. One group represents those men who would use adapters so as to modernize their test equipment, recognizing of course that the use of adapters cannot help but increase the time required for a test. The other group consists of the men who at all times desire the latest

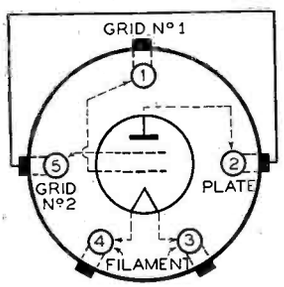


FIG. 1.

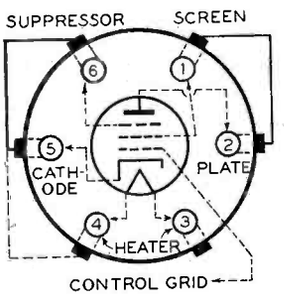


FIG. 2.

Fig. 1. The '46 tube connected as a Class A amplifier when tested as an ordinary triode. Fig. 2. The '57 arranged for testing an ordinary five-prong triode or with the cathode joined to one heater can be tested as an ordinary four-prong tube

equipment and place their speed of operation above all else, because they appreciate the fact that accuracy when combined with speed means a financial saving.

However, one cannot overlook the fact that there appears no limit to tube developments and while the present crop of tubes seem to have reached their zenith, no one knows when still newer tubes will be announced, so that the use of adapters is ordained to be quite plentiful irrespective of the type of test equipment at hand.

After a critical examination of the adapter situation, we cannot help but have the impression that something more than just adapters is required. This something more is definite information allied with the application of the adapters. Such a conclusion is reached after an examination of the various set testers produced some time back and for which these adapters are suitable. An examination of these units shows that they provide for tests upon four- and five-prong tubes, which includes the normal four-prong triode, five-prong triode and even five-prong screen-grid tube. Furthermore, certain standards of comparison are available when tubes are tested in these checkers. We further know that the very latest tube checkers afford standards of comparison whereby one can judge if the meter indication designates a good, poor or bad tube.

What the service industry needs to be able to fully apply adapters is some basis of comparison: i.e., meter readings interpreted in tube condition. This information is required for several reasons. First, the actual test methods employed in the modern testers are not identical to those obtained when an adapter is inserted into an old tube checker, because all tube-checker circuits are not identical. Second, the dissimilarity between operating voltages applied to the tubes makes impossible any one standard of comparison, because what may apply to one tester does not apply to another.

An examination of some of the checkers produced during the last two or three years shows quite an elaborate range of filament voltages, from 1.1 to as high as 7.5 volts. In other cases, just two or three voltages are available. Plate voltages may range from 50 to 250 volts, depending upon the design of the checker. When we are called upon to employ adapters in connection with the recently developed tubes, we are confronted with the problem of correctly utilizing a tube which has a filament voltage of 2.0 volts, 2.5 volts, 3.3 volts, 5.0 volts, 6.3 volts, 7.5 volts, 15 volts and even 30 volts.

In many instances it is possible to check a 6.3-volt tube in a 6.3-volt socket which is provided in some older tube checkers. On the other hand, some of these checkers do not provide this voltage so that it is necessary to utilize the 7.5-volt test socket and to employ filament control resistors in the adapter. Now, the tubes normally arranged for 7.5-volt filament supply are the four-prong triodes, so that it becomes necessary to check 6.3-volt pentodes or other type screen-grid tubes rated at the same filament or heater voltage, as ordinary triodes. This calls for the interconnection of some of the elements, as for example the joining of the suppressor to the cathode and the cathode to one heater and the screen-grid to the plate. While definite information

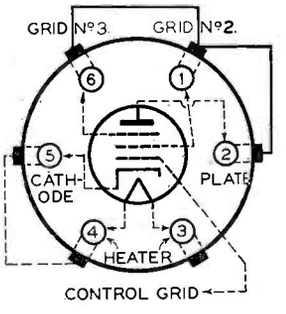


FIG. 3.

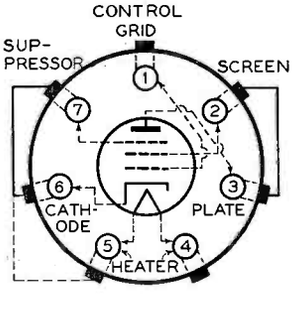


FIG. 4.

Fig. 3. The '89 type tube arranged for test as a screen-grid tube, five-prong triode or even four-prong triode, depending upon the type of adapter employed. Fig. 4 is that of the seven-prong tube suitable for test as a '27 or even as a four-prong triode, depending upon the type of adapter used

is available concerning the testing of the four-prong triode and the six-prong r-f. pentode in the socket specifically provided for that purpose, it becomes quite a problem to establish what is good and what is bad when such a six-prong tube is tested in a four-prong socket.

Of course, we recognize that some of the earlier checkers make provision for the 6.3-volt filament and that suitable test data is available, but we are definitely lacking test data relative to the test of a six-prong r-f. pentode as an ordinary triode.

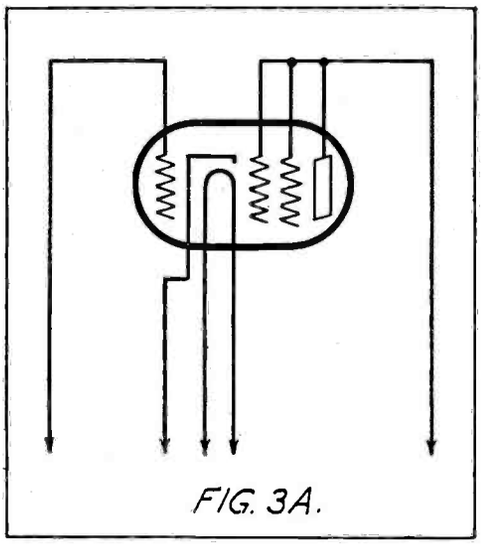


FIG. 3A.

This illustrates the equivalent diagram of the tube circuit with the links shown in Fig. 3

It is not very correct to employ the test data applying to the test of this tube in a modern tester because the test operating voltages to be found in the present-day tester do not coincide with the operating voltage applied in some of the earlier testers. It is also significant to note that the actual test circuits are not the same in all cases so that this condition augments the number of variables present during the test.

It occurs to us that in view of the fact that all of the older testers incorporate a 7.5-volt filament for the testing of four-prong triodes, whereas some of them do not provide a 6.3-volt filament source, it might be best to establish the condition that all such tubes should be tested as four-prong triodes and used in the 7.5-volt socket. Naturally, information would be desired concerning meter indications representing tube condition.

Another item of significance is that relating to the discrepancy in applied plate voltages. Definite information is required concerning tube checker meter indications over definite voltage ranges. If this information is not available, how can one determine the condition of the tube?

Still another requirement which appears in connection with the use of adapters for tube checkers is the need for short checking circuits. It is, of course, true that some of the tube checkers have short testing circuits, but even this part of the tester must be advanced to take care of the new tubes. Those tube checkers which do not have short testing sockets as a part of the equipment require adapters for the purpose. An examination of some of the tube diagrams shown herewith illustrates this point.

Fig. 1 is an example of the '46 tube which is tested as a Class A triode. Grid number 2 is joined to the plate. The application of an adapter is by no means complicated but it is quite important to determine if grid number 2 is actually shorted to the plate. While such an external connection is permissible for testing, it would not be permissible for operation of the tube as a Class B amplifier.

Fig. 2 illustrates a '57 type tube which is connected for test as a five-prong, screen-grid tube. The dotted line between the cathode and one heater shows the possible connection so that this tube can be tested as a four-prong, screen-grid tube. Once again, such shorting links are satisfactory during the test, but it is necessary to determine the existence of internal shorts of this nature, because if they were allowed to exist, the tube would be unfit for use. Thus the test would not show the defect existing unless a short test was made.

Fig. 3 illustrates the links employed to adapt the '89 tube for testing as either a four-prong, screen-grid tube or as a five-prong, screen-grid tube, such as the '24. Of course, there is nothing to prevent the use of a 6—4 adapter whereby this tube can be used as an ordinary triode, but once more we require information relative to the correct condition to be indicated when a tube is tested in this fashion and we require a short circuit test to show the existence of internal shorts between the elements shown externally shorted. Fig. 3-A illustrates the equivalent connections shown upon the socket or what would be the connections when this six-prong tube was allied with a 6—5 adapter for tube checking.

Fig. 4 shows a seven-prong tube connected for test in an ordinary five-prong socket, such as the '27. This assumes that the link between the cathode and the heater is open. The equivalent adapter connections are shown in Fig. 4-A.

What we have said in these two pages does not present the entire picture. There is much more to be said and it will be printed in subsequent issues. At any rate, one of the necessities, at least in connection with tube testing, is information relating to the actual tests. As far as we can see, a definite gain is to be derived by standardization of tube checking adapters, so that all possible new tubes are tested in the minimum number of sockets upon the tube checker. We realize that only a few of the older checkers provide the required 15 and 30 volts needed in some cases. Just how this will be ironed out with these testers remains a problem, but a solution is not beyond comprehension.

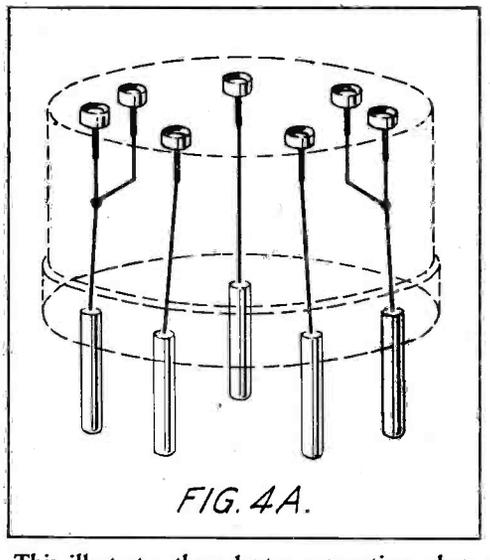


FIG. 4A.

This illustrates the adapter connection when the seven-pin tube is arranged for test as a '27

General Data . . .

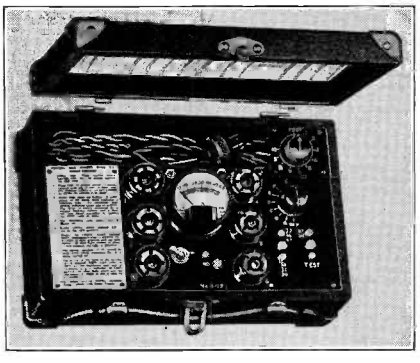
REVIEW OF TUBE TESTERS

Readrite No. 407 Counter Tube and Short Tester

The Readrite No. 407 Tester is the same as the No. 406 except that the latter has no short tester. The instrument is a-c. operated and provides filament voltages from 1.5 volts up to and including 7.5 volts. Voltage for the tube elements is taken direct from the line.

The meter used is of the polarized vane type and has a scale with 60 divisions. The meter is protected by a current-limiting resistor and a fuse, the fuse being accessible by pulling the meter from its jacks.

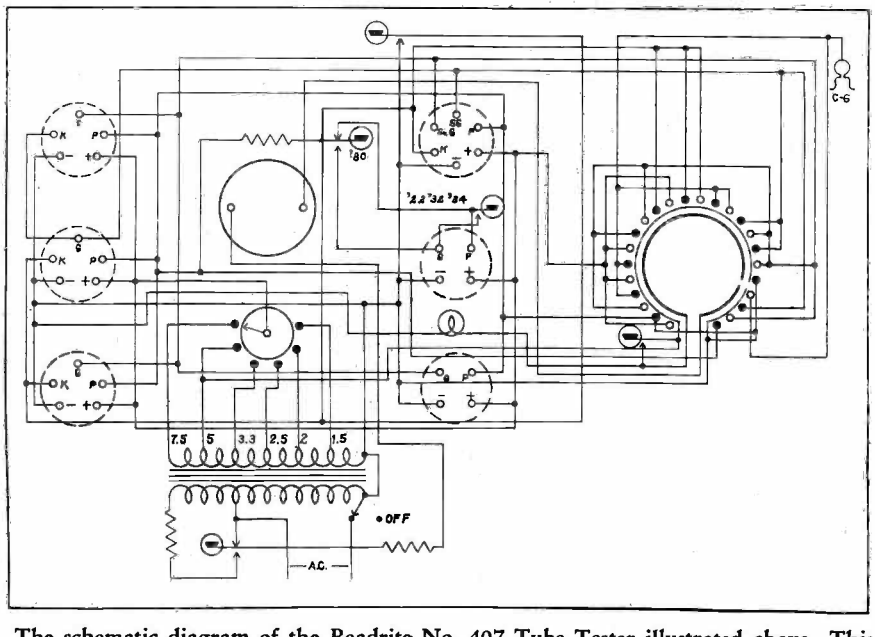
Six sockets are provided for the various types of tubes, and the standard tests are based on the relative change of plate current. All rectifier tubes are tested the same way, a means being provided to obtain the relative readings on each plate of a full-wave rectifier.



Front panel view of Readrite No. 407 Tube and Short Tester. The rotary switch to the right provides short tests

In addition to the general tube testing, there is a short test switch of the rotary type which, with the aid of a pilot light mounted in the meter, will indicate a shorted condition in any type tube. As the switch is rotated it progressively feels out each element, and if there is a short the pilot light will glow.

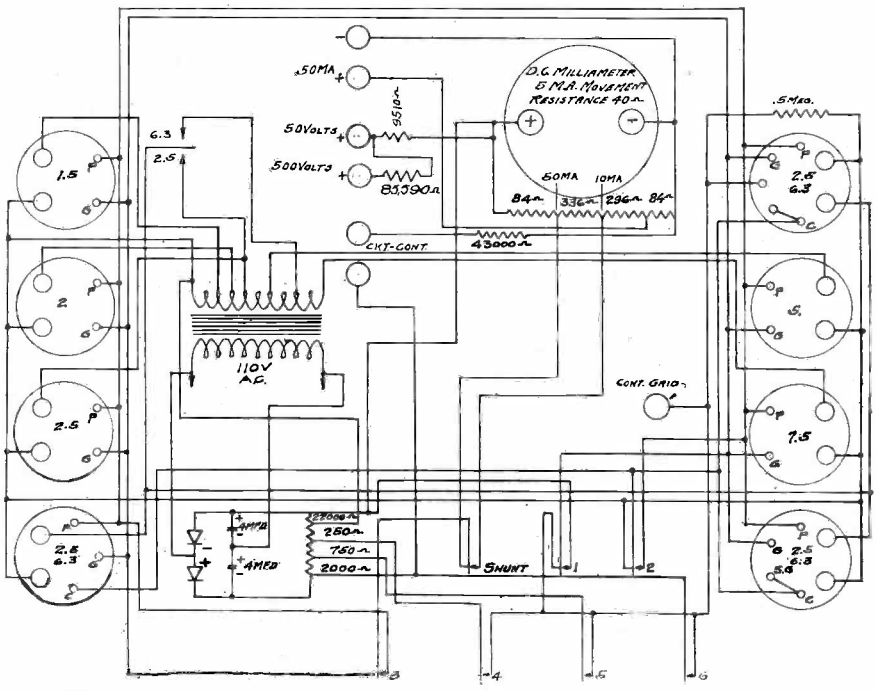
Though the instrument is referred to as a counter tester, its portability is indicated by the accompanying illustration.



The schematic diagram of the Readrite No. 407 Tube Tester illustrated above. This shows the connections for the special rotary switch which provides short tests

Franklin D-33 and H-33 Tube Checkers

The Model D-33 Tube Checker, shown in the accompanying illustration, is identical to the H-33, except that the latter has a panel along the side of the case, carrying jacks for the purpose of making resistance, capacity and continuity tests. The accompanying schematic diagram is that of the H-33, showing the jack arrangement. The two bottom jacks are for circuit continuity.



Above: Schematic diagram of the Franklin H-33 Tube Checker. Note that provisions are made for resistance and continuity testing. Below: Panel view of the Franklin D-33 Tube Checker

When it comes to tube checking, both instruments are the same, so we shall confine ourselves to a description of the H-33. This unit, it will be seen, has eight sockets mounted on the sides of the panel. These will accommodate all type tubes, including the new 6- and 7-prong tubes. The 7-prong socket will handle tubes with a filament or heater voltage of either 2.5 or 6.3, so that any new tubes which may be an-

nounced can be checked without the use of an adapter or any change in the circuit structure of the instrument.

A Model 572 Weston Jewell combination meter is used. This meter has ranges of 0 to 500 volts, and two milliampere ranges of 0 to 10 and 0 to 50.

The control grid connection for tubes having this element terminating at the top, is brought out to an insulated tip jack, which is on the panel just to the right of the meter. To the left of the meter is a toggle switch which places either 2.5 volts or 6.3 volts on the heater prongs of any of the sockets marked with both these values. The circuit diagram will indicate that there are three sockets so marked.

The high-voltage circuit contains a copper-oxide rectifier, so that the tubes are energized with direct current. A resistance network is used in order that each type of tube may be tested with the proper voltages, as governed by the characteristics of the tube.

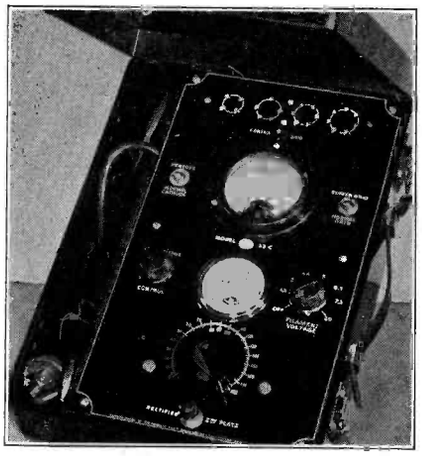
Tubes short-circuited are indicated without any possible injury to the checker.

In addition to checking tubes, the Model H-33 instrument permits continuity and point-to-point tests on receivers. Voltage taps are provided for this purpose; also for the testing of condensers, and resistors up to 2,000,000 ohms. A resistance conversion chart is provided for this purpose.

●

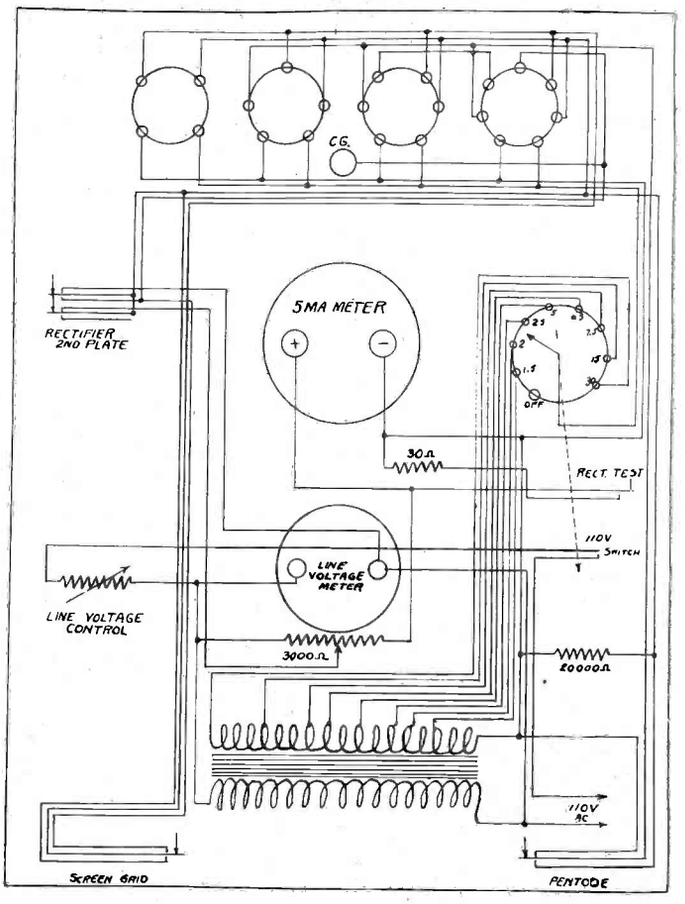
Franklin Model 33-C English Reading Tube Checker

This checker has a single set of sockets for all types of tubes so far introduced, a single scale meter the readings upon which indicate directly by reference to a chart the exact condition of the tube, and a smaller meter, with a line voltage control knob to its left (see accompanying illustration) for indicating line voltage.



The Franklin Model 33-C English Reading Tube Checker, which uses a single scale meter for all tests. The tube sockets are at the rear

The tubes are tested under operating conditions by superimposing the desired amount of signal voltage on the proper d-c. bias, thereby preventing the tube from operating on an improper portion of its characteristic curve. Tests are made by setting the 3,000-ohm potentiometer in the center of the panel



Here is the complete schematic diagram of the Franklin English Reading Tube Checker. The 3000-ohm variable resistance just below the line-voltage meter operates in conjunction with the knob and scale on the front panel of the instrument. There is a particular adjustment for each type of tube

to the proper position as stated on the instruction sheet and setting the filament voltage control knob to the proper marking.

It will be noted from the accompanying circuit diagram of the Model 33-C that two toggle switches are provided to permit screen grid and pentode tests. Also a rotary switch for permitting the necessary high-current test on a rectifier tube.

Note also that the line switch is on the same shaft as the filament voltage selector switch. Since it is necessary to bring the selector switch back to zero to break the line voltage, it is not possible to leave it at what might be an excessively high filament or heater voltage for some particular tube inserted for test.

●

L & L Model E-33 Tube Tester

The Model E-33 will test all of the new type tubes, including the 85 and 89, the ER49, the TS57, and also the Sparton and Kellogg new and old types.

The various push-button switches on the panel of the instrument provide the means of making special tests. These are: short test, grid change test, oscillation test and total filament emission test.

To the right of the filament voltage selector switch on the panel there is a small knob to take care of voltage regulation. This will take care of a line variation of 90 to 130 volts. This is a 5,000-ohm variable resistance in series with the meter circuit.

A small pilot light on the panel indicates a short in a tube. The circuit and switching arrangement is such that eighteen short combinations can be tested.

The switch SW-2 in the schematic diagram is for grid test. This switch permits a change from high to low readings on the meter when the button is pushed down.

This instrument is also adaptable for oscillation test. The coupled coils used in conjunction with this arrangement will be seen in the schematic diagram just to the left of

The L&L Model E-33 Tube Tester. This instrument also contains an oscillating circuit which can be used for other purposes aside from tube testing

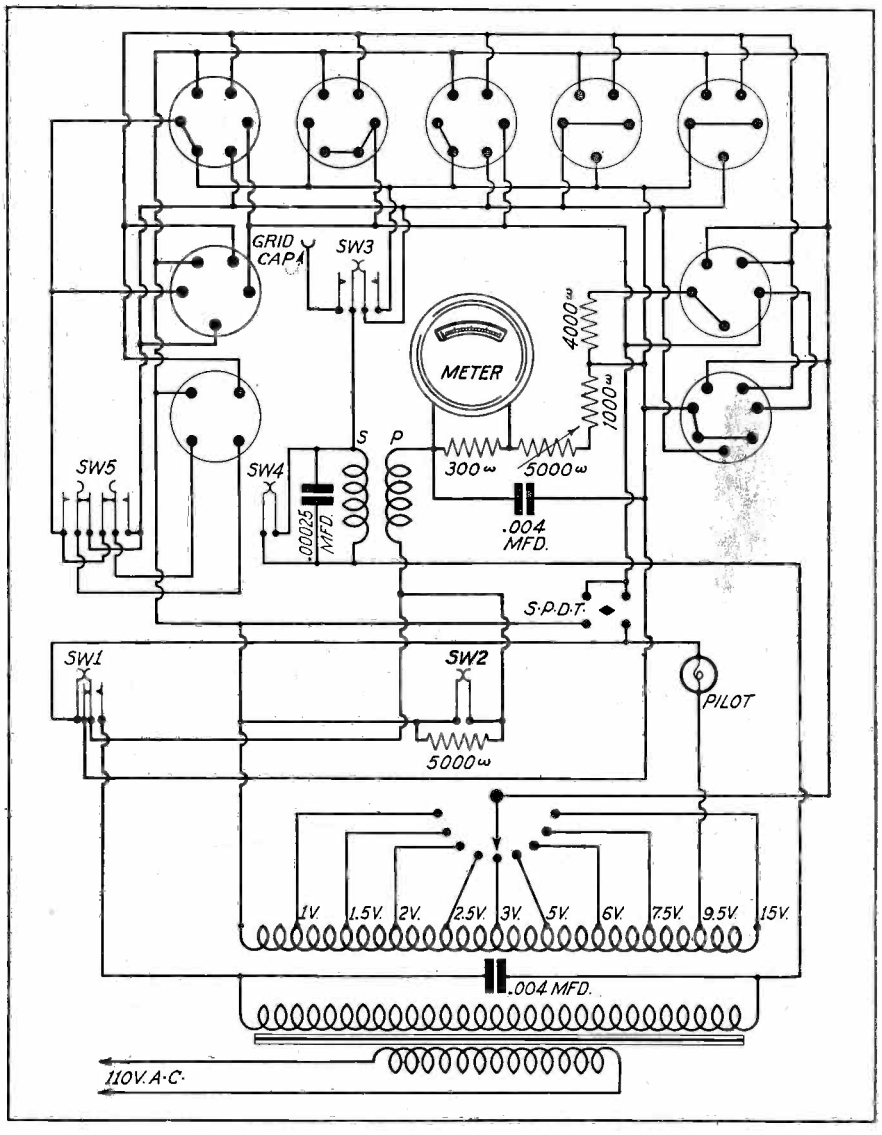
the meter. Since any of the usual tubes placed in the sockets for test can be made to oscillate, it is possible to use the unit as an oscillator for other purposes.

It will be noted that there are nine sockets in all and that they are so connected that the tubes are tested as triodes, though through the use of switch SW-3 the screen grids may be tested. A means is also provided for testing both plates of a full-wave rectifier of either the regular type or mercury-vapor type. This is accomplished by switch SW-5.

Confidence English-Reading Tube Tester

The Apparatus Design Company "Confidence" Automatic English-Reading Tube Tester uses a single meter with the ordinary scale divided into two sections: BAD and GOOD. The large rotary pointer is set to the tube type number on the circular scale and a reading is then obtained automatically on the meter.

Above: The Confidence English-Reading Tube Tester. The large scale carries the type numbers of the different tubes which can be tested. Five blank spaces are left for new tube numbers

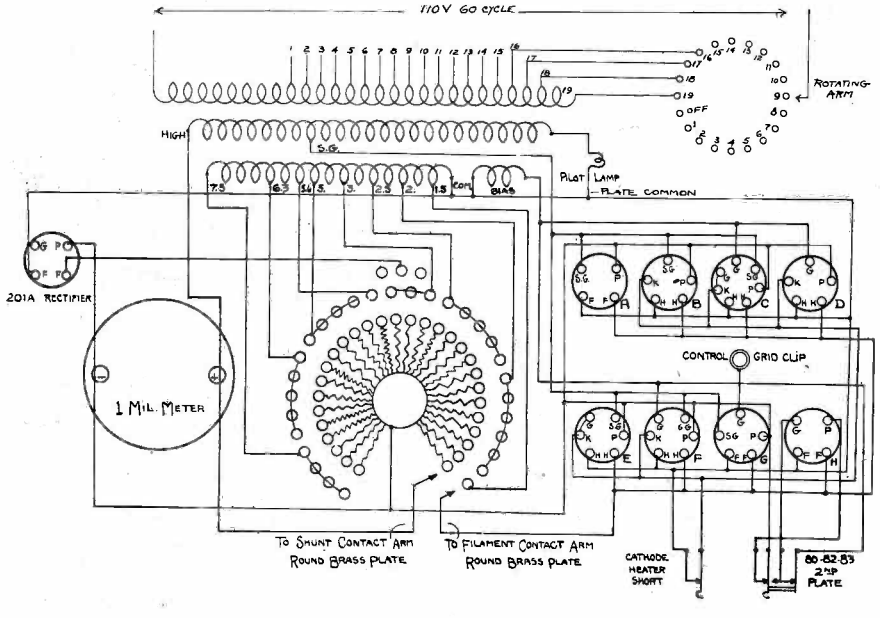


Below: The schematic diagram of the Confidence English-Reading Tube Tester. Note that tube filament voltages are altered automatically

Above: The schematic diagram of the L&L E-33 Tube Tester. S and P are the oscillator coils

A special transformer with multiple secondaries is so designed that automatic cutoff of plate current takes place which allows the tube under test to flatten its plate current curve against a fixed bias, giving a test conforming to both plate current and mutual conductance.

Relationship between transformer current limits, hot resistance of the protective pilot lamp, and the multiple meter shunts gives automatic protection to the meter. Since the pilot lamp is located in the plate return circuit, as shown in the accompanying diagram, it will light and give visual evidence of any short circuit: plate to grid, cathode, filament, or suppressor grid; also from screen grid to any of these elements. Short circuits from cathode to heater are indicated on the meter by pressing a button which opens the normal cathode-heater connection.



Supreme Model 62 Tube Testing Power Unit

The Model 62 is essentially a Model 40 Tube Tester without the meter, though the Model 62 has a few new features.

It may be used with any d-c. voltmeter, or any set tester or analyzer, by merely connecting the meter to the pin jacks provided on the panel.

The accompanying diagram of the Model 62 is a worm's eye view, that is, the wiring and the location and positioning of switches, socket prongs, etc., are as they would appear

A view of the Supreme Model 62 Tube Testing Power Unit which may be used with any meter or analyzer

from beneath the panel. The sockets permit the testing of any type tubes, including the new 6- and 7-prong tubes. The transformer at the left in the diagram provides the various filament voltages required, from 1.5 volts up to and including 30 volts. As indicated by the diagram, the correct filament voltage is selected by the rotary switch.

Another secondary winding provides 10 volts for the leakage test, and 78.5 and 135 volts for plate and screen voltages for different type tubes (note that the sockets have jumpers so that tubes are tested as triodes).

A "grid shift" test for all amplifiers is provided with a biasing arrangement automatically determined by the plate current load of the tube under test, so that the controlling grid biasing potential may be observed on the external meter.

The unit also incorporates a gas test, a cathode-heater short test for heater type tubes, and a means of testing both plates of full-wave rectifiers.

•

Weston-Jewell Model 676 Tube Seller

The Model 676 Tube Seller is practically the same as the recent Model 677; the latter is equipped with a greater number of active sockets for testing the new types of tubes.

The schematic diagram of this tube tester (which is the same diagram used for the Model 677) is shown on the opposite page. The line-voltage meter is a Weston Model 517 a-c. voltmeter, while the large testing meter has a large colored multi-arc scale which clearly indicates the limits for each type of tube.

The circuit permits each tube to be tested with rated values of a-c. on the filament or heater and with peak values of a-c. equal to the rated d-c. values of voltage supplied to all grids and plates. Test results are proportional to mutual conductance.

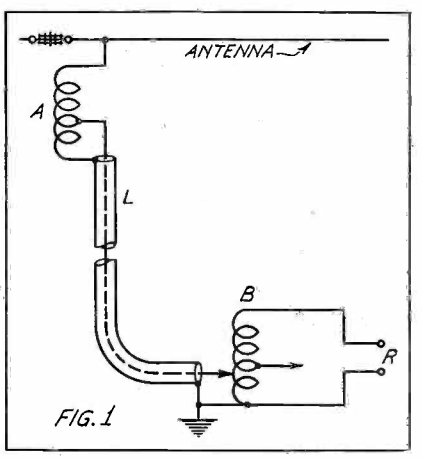
Spare sockets for four, five, six and seven prong tubes are provided with color-coded wires attached, ready to connect to the numbered terminal board whenever new tubes become available.

Controls are provided for zero adjustment and line-voltage adjustment. Special push-buttons are included for making tests on rectifier tubes, and for short tests.

Heater and filament voltages ranging from 1.5 volts to 35 volts are available, these particular taps being connected directly to the filament or heater terminals on the respective tube sockets.

More on Receiving Antenna Practice

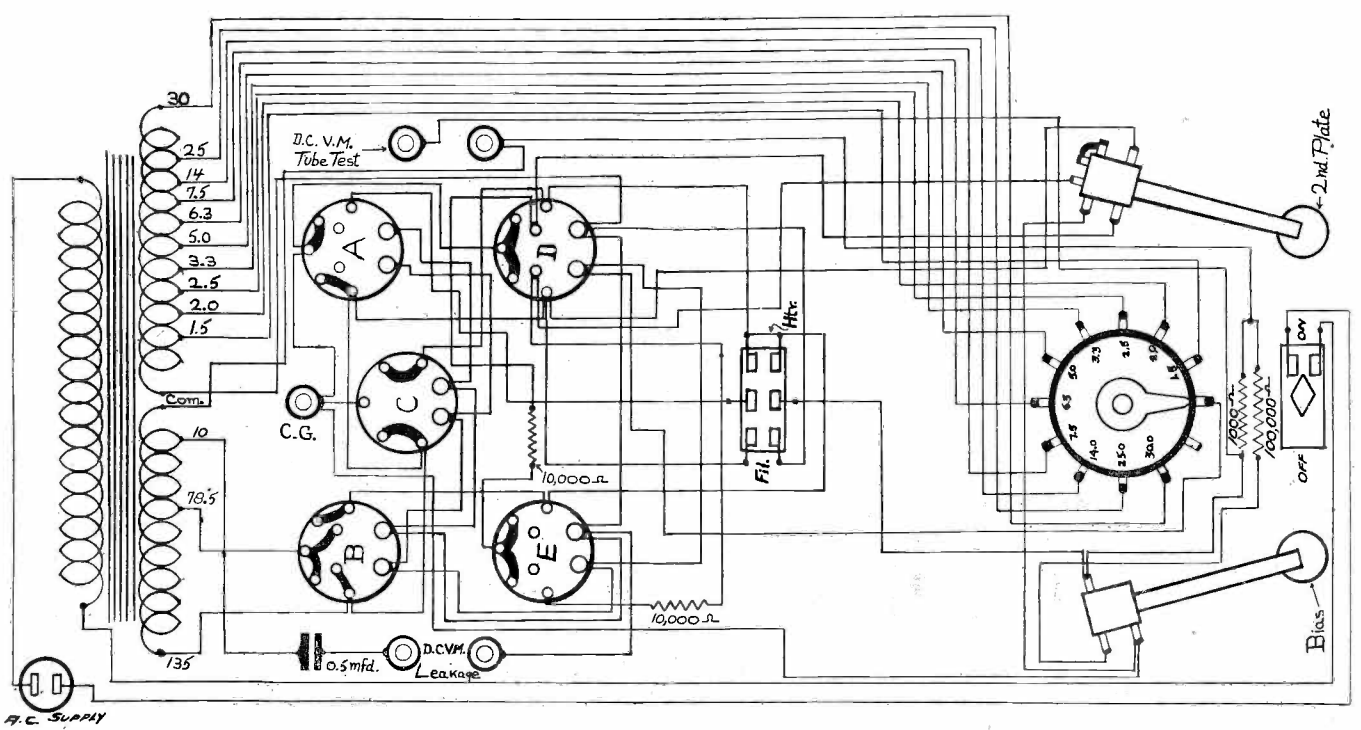
On page 314 of the November issue of SERVICE there appeared an extensive article on the general subject of receiving antennas, with special emphasis given to present noise-reducing systems. In this article it was stated that ". . . the lead-in, or vertical portion of the antenna is in general the member responsible for most of the induced voltage." We went on to say, "If this is the case, it is obviously wrong to extend the shielded lead-



An installation diagram of the AKA-former noise-reducing antenna system. L is the shielded wire downlead

in all the way up to the horizontal flat top, or to place an antenna transformer of the type used with noise-reducing aerial systems, directly at the flat top."

The above statements most certainly apply to all noise-reducing systems which do not use a transformer between the flat top and the shielded lead-in, and also to many other



Complete schematic diagram of the Supreme Model 62 Tube Testing Power Unit. Filament or heater voltages from 1.5 to 30 are obtained by altering the position of the rotary switch. Note that the tube sockets are connected so that the tubes are tested as triodes

systems using transformers and a shielded transmission line. However, there is a wide difference in design existing between various noise-reducing systems, and the article referred to above failed to take into consideration one system in particular which, if anything, suffers by the use of a vertical or sloped lead-in only partly shielded.

The design of this system, and the numerous reasons for adhering strictly to one form of installation, should be of particular interest.

The arrangement referred to is known as the AKAformer system, which was developed by Amy, Aceves & King, Inc., and which is distributed by this company and their licensees.

A diagram of the system is shown in Fig 1. at the flat top of the antenna. From it the The antenna transformer A is located directly shielded downlead "L" is fastened and connects directly to the lower transformer "B," which is located at the radio set "R."

Now, the transformer "A" is enclosed in a metal shield and this shield becomes a part of the antenna. Having a fairly large surface it contributes to the capacity of the antenna system by an amount equal to the addition of approximately 10 feet of wire to the flat top. The surface likewise provides a signal pickup area, said area being effective in relation to waves with a vertical or bent front.

In this system, the lead-in is not a transmission line in the true sense of the word. The sheath of the downlead cable is a conductor and is just as effective as an open downlead, in so far as carrying to ground the antenna current after it has passed through the primary of the transformer "A." The potential gradient is very steep between the antenna and the downlead "L" because the impedance of transformer "A" is relatively high with respect to broadcast frequencies, while the impedance of the downlead is very low in comparison with the transformer and the antenna impedance. (As a matter of fact, the inductance of the downlead is negligible and the downlead may be considered as having only a round-trip resistance of 3 ohms.) Hence, the sheath of the downlead is very nearly the ground potential throughout its length. This being so, any electric field in its vicinity can induce but very small potential differences along the downlead.

The effective height of the antenna is negligibly affected when a high-impedance circuit is attached to it.

If in a matching-transformer shielded downlead installation, the sheath is grounded both at the top and at the bottom it is difficult to forecast the results, as a very large loop circuit is formed with the other ground returned, and it may be possible that the signal voltage delivered to the receiver may be diminished or increased according to the orientation of the loop circuits. In practice, this procedure has never been recommended.

There is a small effect of parallel resonance in the middle of the broadcast band between the effective inductance of the transformers and the capacities of the cable and antenna. The relatively damped circuit makes this resonance very flat, but in itself raises the effective impedance of the matching-transformer system as viewed from the primary side of the antenna transformer "A." This effect helps to increase the effective height of the antenna to the value that it would have with an infinite impedance downlead.

In brief, it may be restated that a shielded downlead system of the nature described, does not appreciably reduce the effective height of any flat top antenna, owing to the high effective impedance of the antenna transformer. If this transformer were removed, it could readily be shown that the effective height of the antenna would be reduced considerably and its voltage pickup impaired by continuing the shielded downlead up to the flat top of the antenna, because the potential at the junction between the vertical and horizontal wires would not be far from ground.

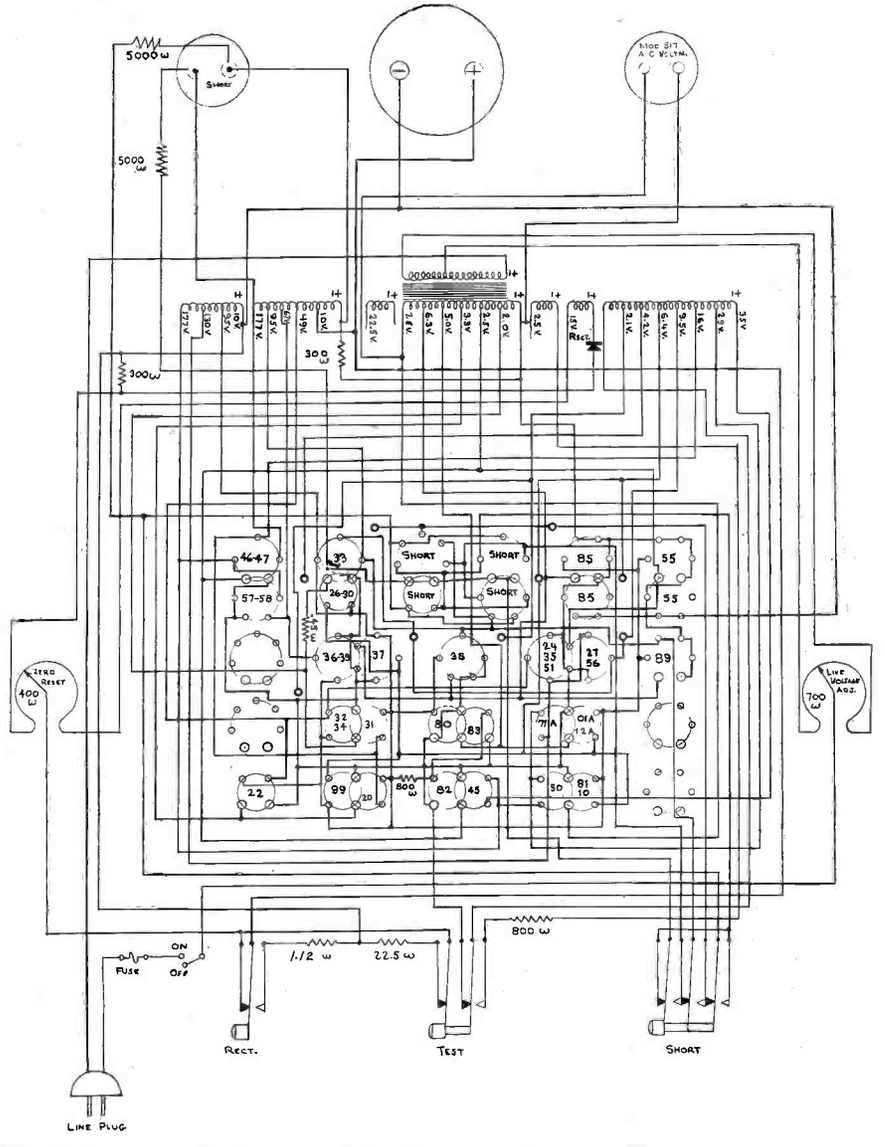
In closing, it is interesting to note that a greater gain is often obtained with these systems because of the more exacting impedance match between the antenna and the receiver input.

Mr. Millen's S. W. Book

A rather comprehensive booklet on short waves in general and details of the new National Company short-wave receivers, has been brought out by Mr. Millen, who needs no introduction. We are of the understanding that copies of this booklet can be obtained free of charge upon application. A copy is well worth having.

The forepart of the booklet covers in detail, and in simple language, those points one should understand about short waves, such as their characteristics, relationship of wavelength to frequency, the low down on "kilos" and "megas," and the various short-wave band allocations.

The back part of the booklet covers such matters as zero beat, inter-circuit coupling elimination, volume control, and a good-sized dissertation on installation and operation which includes data on aerials and transposed leadins. There is also some good dope on trouble shooting.



This is the schematic diagram of the Weston-Jewell Model 676 Tube Seller. The diagram of the Model 677 is identical, except that some of the extra sockets shown are wired in for use. The short indicator in this instrument is a neon lamp

Atwater-Kent Models 612 and 812

These new models are both superheterodynes with silent tuning, automatic volume control, push-push Class B output amplifiers and twin speakers. From the diagrams below it will be seen that these models employ two each of the new type 83 mercury-vapor rectifiers. One rectifier supplies the radio-frequency portion of the receiver and the other supplies the necessary voltages for the push-push and driver stages only.

Neon Tube Tuning Indicators

The illumination within the usual type of neon tube tuning indicator climbs during tuning until maximum indication is reached when tuned to accurate resonance.

Time and again complaints are voiced that the edge of the illumination is not very sharp. In other words, a slight corona effect appears at the edge of the glow. This does not indicate a defect.

•

A-K. Model 84

The early Model 84 Atwater-Kent receivers have a red-green resistor of 3,000 ohms which is in series with a choke biasing the first detector.

S. P. Pusey.

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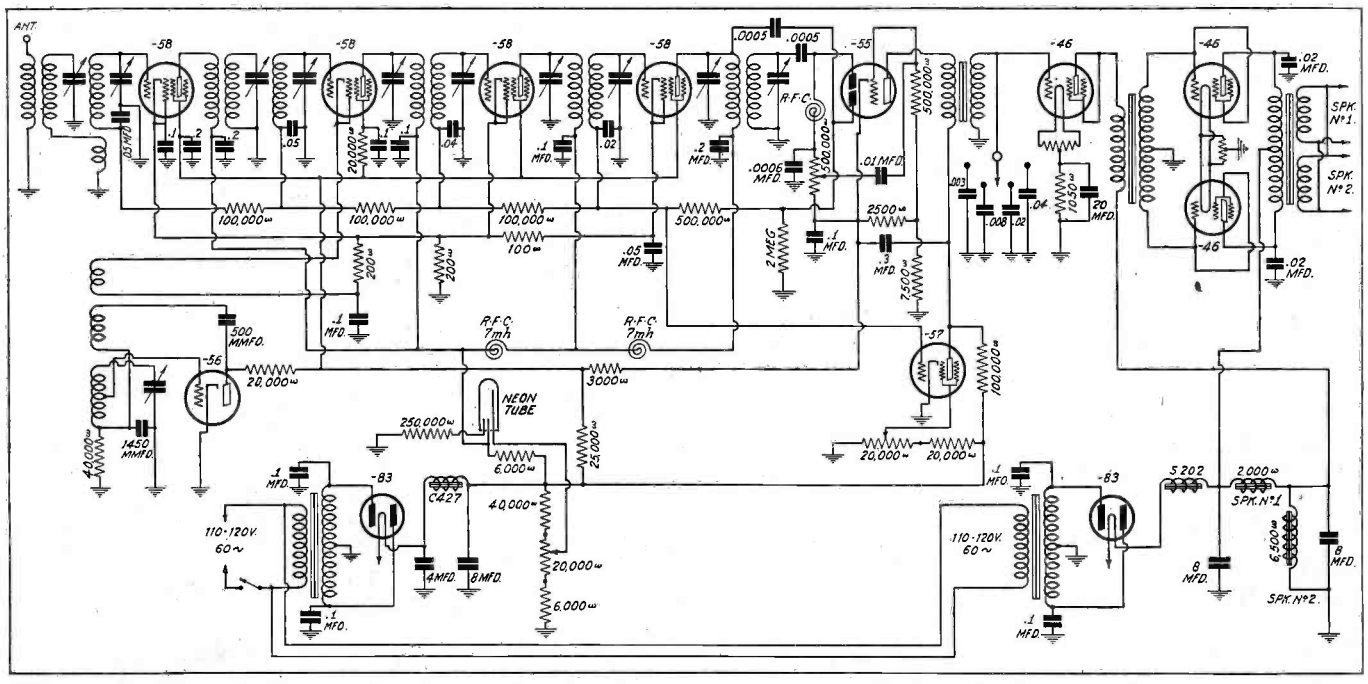
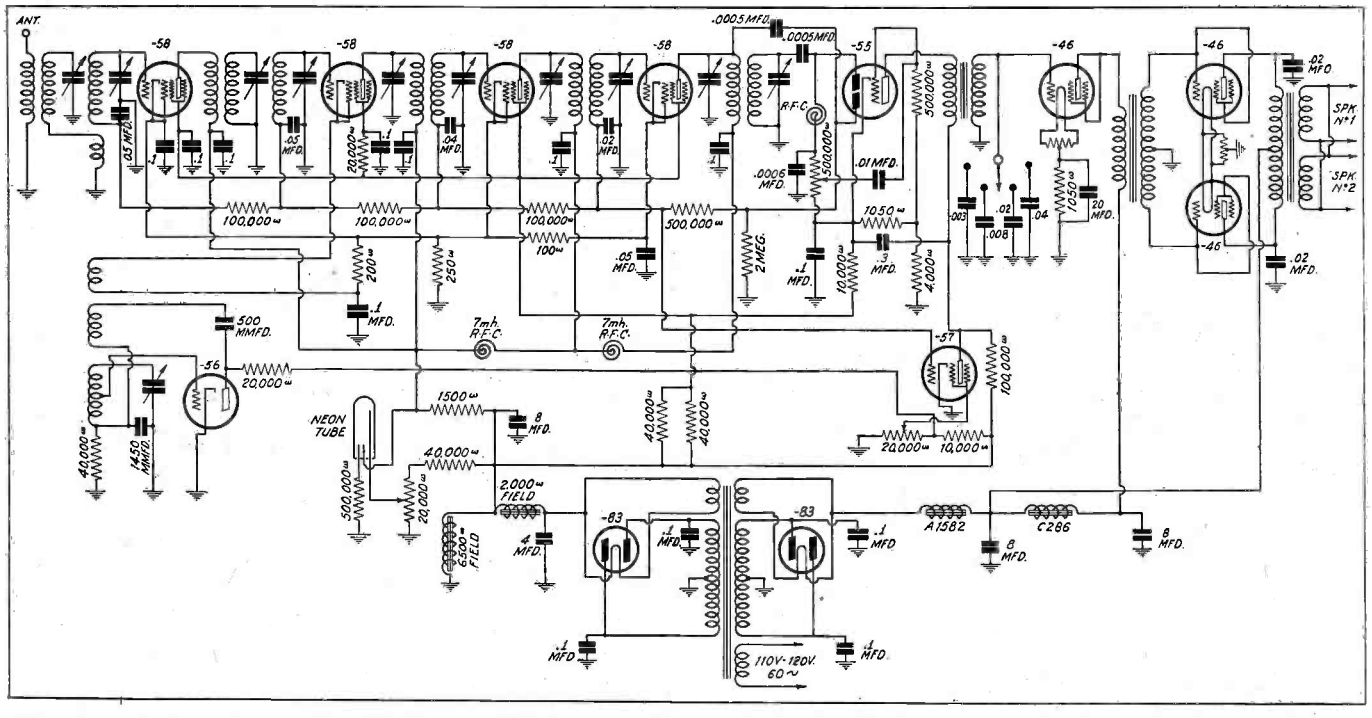
Majestic 20 Shorted Condenser

In the Model 20 Majestic the 0.1-mfd. condenser in the i-f. transformer often shorts. To replace the transformer is expensive and



The complete schematic diagram of the Atwater-Kent Model 812 superheterodyne, including all resistance and capacity values. The first tube is an r-f. amplifier, second tube is first detector, the next two are i-f. amplifiers and the fifth tube a type 55 duo-diode AVC second detector. The type 57 tube just below the type 55 provides the silent tuning feature of the set



The diagram of the Atwater-Kent Model 612. This is practically the same as the Model 812, with different values for some of the units and slight circuit alterations. For example, in the Model 812 the two speaker field coils obtain their exciting current from the same rectifier that supplies the audio amplifier, while in this model just the reverse holds true

to melt the condenser out of the case takes a lot of time.

A method I have been using a long time is to cut a small hole about ¼-inch in diameter in that side of the i-f. transformer facing the front of the set. The hole should be one inch from the bottom of the transformer and ¾-inch from the front, just under the trimmer condenser. At this point through the hole you will find a bare wire from one end of the 0.1 mfd.-condenser to ground. Cut this wire, then take end plate off chassis, scrape insulation off red wire and from this point connect a 0.1-mfd., 400-volt tubular condenser to ground. This takes only about ten minutes time to accomplish and is practical.

L. J. McGee.

•

Fada Model 55 (RG Chassis)

The Fada Model 55 is a five-tube superheterodyne using the new "50" series tubes and the Fada 10-M dynamic speaker. The intermediate frequency employed is 175 kc.

If it is necessary to remove the chassis from the cabinet, the tuning and volume control knobs will have to be removed from their shafts, and the five speaker leads disconnected. After screws are removed from the bottom of the cabinet, the chassis will slide out.

ADJUSTMENTS

To accurately adjust the various trimmer condensers, it is necessary to use a shielded signal generator capable of giving a modulated carrier frequency which can be accurately attenuated at 175 kc., 600 kc., and 1400 kc.

The receiver volume control should be turned to its maximum position and the signal output of the receiver controlled by the attenuator of the signal generator.

For test purposes on chassis removed from the cabinet it will be necessary to place a grounded metal shield between the second detector and i-f. tubes. The shield should project about one inch above the tops of the tubes—the same as the shield which is mounted on the speaker frame.

Shifting of control grid wires after adjustments have been made will throw the receiver out of alignment. It is therefore necessary to press these wires close to the tube shields before attempting any adjustments.

The three i-f. condensers are located in the rear and top of the chassis itself, and should be adjusted as follows:

Disconnect the outside antenna system from the receiver and connect a lead from the output of the signal generator to the control grid of the detector-oscillator tube. Do not disconnect the control-grid cap from the tube, nor remove the tube shield. Connect the ground (slate) lead of the receiver to the ground post of the signal generator. Connect a 250-mmfd. condenser in series with the lead wire of the signal generator.

Place an output meter across the secondary of the receiver output transformer (which is mounted on the speaker).

Now place the signal generator in operation and adjust the frequency output to 175 kc. Regulate the attenuator control so that the output meter is low enough to insure accuracy in adjusting the i-f. condensers of the receiver.

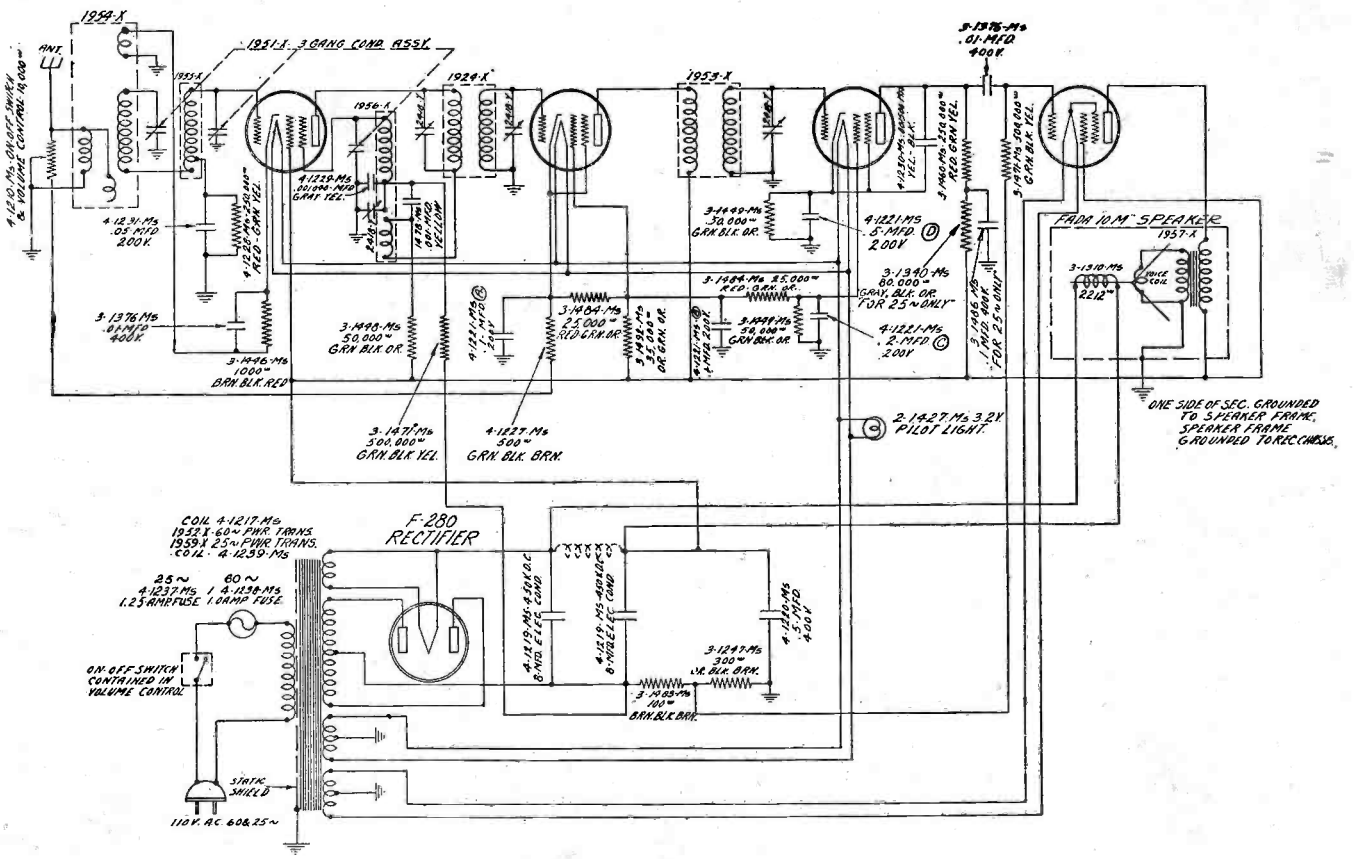
With the aid of a No. 4 socket wrench adjust the three i-f. condensers to resonance as indicated by the greatest swing of the needle on the output meter.

The compensators for the tuning condenser gang are located at the top of their respective tuning condensers and can be adjusted by the aid of a screw driver. To adjust, remove the lead wire which is connected to both the control grid of the detector-oscillator tube and also to the output system of the signal generator.

Now connect the antenna (red) wire of the receiver to the output system of the signal generator. The ground (slate) wire of the receiver is to remain connected to the ground post of the signal generator.

Adjust the carrier frequency output of the signal generator to 1400 kc. and set the tuning dial of the receiver to approximately 15. Starting with the compensator nearest the front of the receiver, adjust each compensator in turn for maximum signal output as indicated on the output meter. Do not disturb the setting of the gang condenser during these operations. Leave the volume control on full and regulate the signal output of the attenuator control of the signal generator.

The oscillator series condenser can be adjusted through the hole in the top of the chassis to the left of the speaker looking from the back. In this case adjust the carrier fre-



Circuit diagram of the Fada Model 55 (RG Chassis), with values. The intermediate frequency is 175 kc. Units (A), (B), (C) and (D) are contained in the same can

quency of the signal generator to 600 kc. and pick up the signal at about 84 on the receiver tuning dial. With the No. 4 socket wrench adjust the condenser for maximum reading in output meter. To insure perfect adjustment it is necessary to "rock" the ganged condenser back and forth in order to follow the maximum signal output.

After the oscillator series condenser is properly adjusted, turn the tuning dial of the receiver to approximately 15 and adjust the signal generator to 1400 kc.; then repeat adjustment of all variable condenser compensators as heretofore outlined.

●

Stromberg-Carlson No. 645 D-C.

The No. 645 is a direct-current receiver built into a console, with a dynamic speaker (No. 25) with a voice-coil impedance of 13 ohms. It will be noted that three stages of r-f. are employed and three stages of audio, the first two being resistance coupled and feeding into a pair of '45s in push-pull.

A series filament circuit is employed, and the current from the d-c. line is fed through a radio-frequency line filter as well as the usual filter circuit. It is interesting to observe that this receiver was supplied with shielded lead-in wire to prevent man-made interference —this in 1930.

It should be noted that the volume control is of the dual type, one portion being a 20,000-ohm variable resistor shunted across the antenna coil and the other portion a 2,000-ohm variable resistor which controls the grid bias on the first two r-f. tubes. The third r-f. tube has a constant bias which is supplied by the drop in voltage across a 1500-ohm fixed resistor. The bias (9 volts) for the detector tube is supplied by a "C" battery housed in a container in the receiver chassis. The same "C" battery provides the bias for the audio tubes.

The line voltage is reduced to approximately 20 volts (when the "HI-LO" switch is set properly) for supplying the heaters and filaments by the voltage drop in the large resistors and (in parallel with the resistors) the dynamic speaker field winding.

Since the '45 tubes draw only 1.5 amperes normally, while the '24 and '27 tubes require 1.75 amperes, a Mazda No. 31 pilot lamp is shunted around the two '45 filaments. It thus serves the triple purpose of illuminating the tuning dial, indicating that current is turned on and preventing over-voltage to the '45 filaments. The Mazda No. 31 is rated at 0.30 ampere at 6.2 volts.

The voltage readings as given in the accompanying table were taken with a double-range (50-250 volts) voltmeter having a resistance of 1000 ohms per volt. For all voltages over 20 volts the higher range should be used. The voltages are only approximate and correspond to a line voltage of 120 volts on the "HI" position of the "HI-LO" switch, or 110 volts on the "LO" position.

STROMBERG-CARLSON NO. 645 VOLTAGES

Tube	*Fil.*	*Plate*	*Grid*	*Screen*	*"B"*	*"C"*
1st R-F.	2.4	105	(Variable)	60		
2nd R-F.	2.4	105	(Variable)	60		
3rd R-F.	2.4	105	1.5	60		
Det.	2.4	22	9.0		110	9.0
1st A-F.	2.4	80	1.0		110	9.0
2nd A-F.	2.4	80	1.0		110	9.0
Each '45	5.5	100	7.0		110	9.0

Note: Total "B" voltage is 110. Speaker field voltage is 90.

Philco "Shadow Tuning" as Indicator

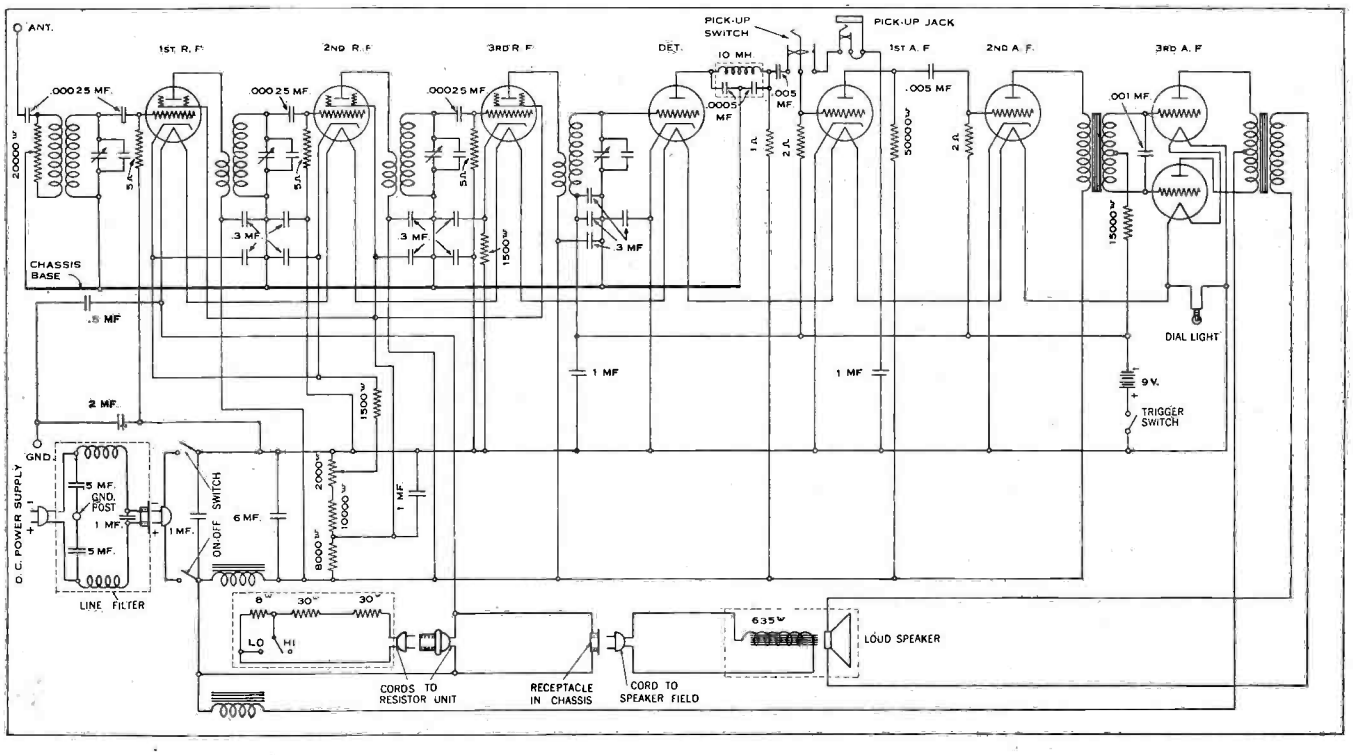
The "shadow tuning" on Philco sets can be used as an indicator when adjusting the antenna, high-frequency and low-frequency condensers. The "shadow tuning" operates on the carrier of a station, and unlike an output meter, it is independent of any variations produced by voice or music. Thus, if a station of known frequency is tuned in at or near 1400 kc., the high-frequency and antenna condensers can be adjusted for minimum shadow width when the dial reading is set at the correct station frequency. The same adjustment can be made on the low-frequency condensers by tuning in a station near the low-frequency end of the dial.

●

Eliminating Radio Beacon Interference in Philco Model 70 and 90

On some of the earlier Model 70 and 90 sets, difficulty has been experienced with interference from airport radio beacon stations, transmitting at or near 260 kc. Last year when these models were being sold, the interference was not present, but during the past year several new beacon stations have been installed.

The Stromberg-Carlson No. 645 D-C. receiver. Note that a radio-frequency line filter is used



The interference can be readily eliminated by readjusting the i-f. compensating condensers at 250 or 270 kc., instead of 260 kc.

If the Philco 095 oscillator is used for this readjustment, it can be recalibrated at 250 kc. by tuning in a reliable broadcast station signal at 750 kc. (third harmonic of 250 kc.) or 1000 kc. (fourth harmonic); substituting the oscillator for the aerial and readjusting the 260-kc. compensating condenser of the oscillator until the signal is heard and the output meter reads maximum.

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Brunswick Models "D", and 17, 24 and 25

The Brunswick Model A.V.C. "D" chassis schematic diagram is shown in Fig. 1. This chassis is used in Brunswick receivers Nos. 11, 12, 16, 18 and 33 having chassis serial numbers higher than 25,000.

This superheterodyne receiver has a power consumption of 85 watts. The speaker field is 7 watts, series connected, with a 135-volt drop at 52 ma.

The socket voltage data is included in the diagram.

The complete schematic diagram of the Brunswick chassis used in Models 17, 24, and 25 is shown in Fig. 2. As will be noted, these models use the "turret condenser" gang. The numbers in circles indicate the speaker terminals.

Replacement part numbers are given in both diagrams. These parts can be obtained from Brunswick Engineers, Inc., 619 West 54th St., New York, N. Y.

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Delco 2- and 32-Volt Receivers

In the Delco 2-volt and 32-volt receivers (see Delco 32-volt receiver diagram on page 270, October SERVICE) the three r-f. transformers appear as single units in the diagrams. These are not single units in practice, however. The primaries are choke coils and have green and white leads enclosed in spaghetti. The green leads connect to the B+ 140-volt connecting strip. The white leads connect to the respective plate terminals of the tube sockets.

The r-f. choke in the detector stage plate circuit has a maroon and white lead. These two types of chokes are not interchangeable, although in appearance they are absolutely alike to the eye.

Harry W. Krug.

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Clarion Image Frequencies

In the article on the Clarion Model AC-240 receiver, appearing on page 317 of the November issue of SERVICE, we stated under the subhead "Possible Faults" that an "image frequency" signal 980 kc. lower than the signal tuned in may be impressed on the first detector. This should have read 980 kc. *higher* than the signal tuned in.

If you are in possession of service manuals on the Clarion Models 240, 241 or 300, turn to those sections relative to image frequency and change the reading from "lower" to "higher" for your own reference purposes.

The reason for this change becomes immediately evident when it is considered that the intermediate frequency employed in all three models is 490 kc. and the "high" side of the oscillator frequency is employed for the beat.

•

Detecting Oscillating Circuits

The plate current flowing in a tube which is oscillating will indicate the condition. If the grid circuit employs a grid leak and condenser, the plate current during oscillation will be less than during the non-oscillatory state. If the oscillator tube does not employ a grid leak and condenser, the plate current will be more than during the non-oscillatory state.

An idea of whether or not a tube is oscillating can be had by touching the control-grid terminal upon the socket when the tube is in the socket. Generally this will tend to stop oscillation in the circuit and the tube plate current will indicate the non-oscillatory state. This is true in connection with all triode type oscillators, such as the '71, '27, etc. It is not applicable to the dynatron or screen-grid type of oscillator however.

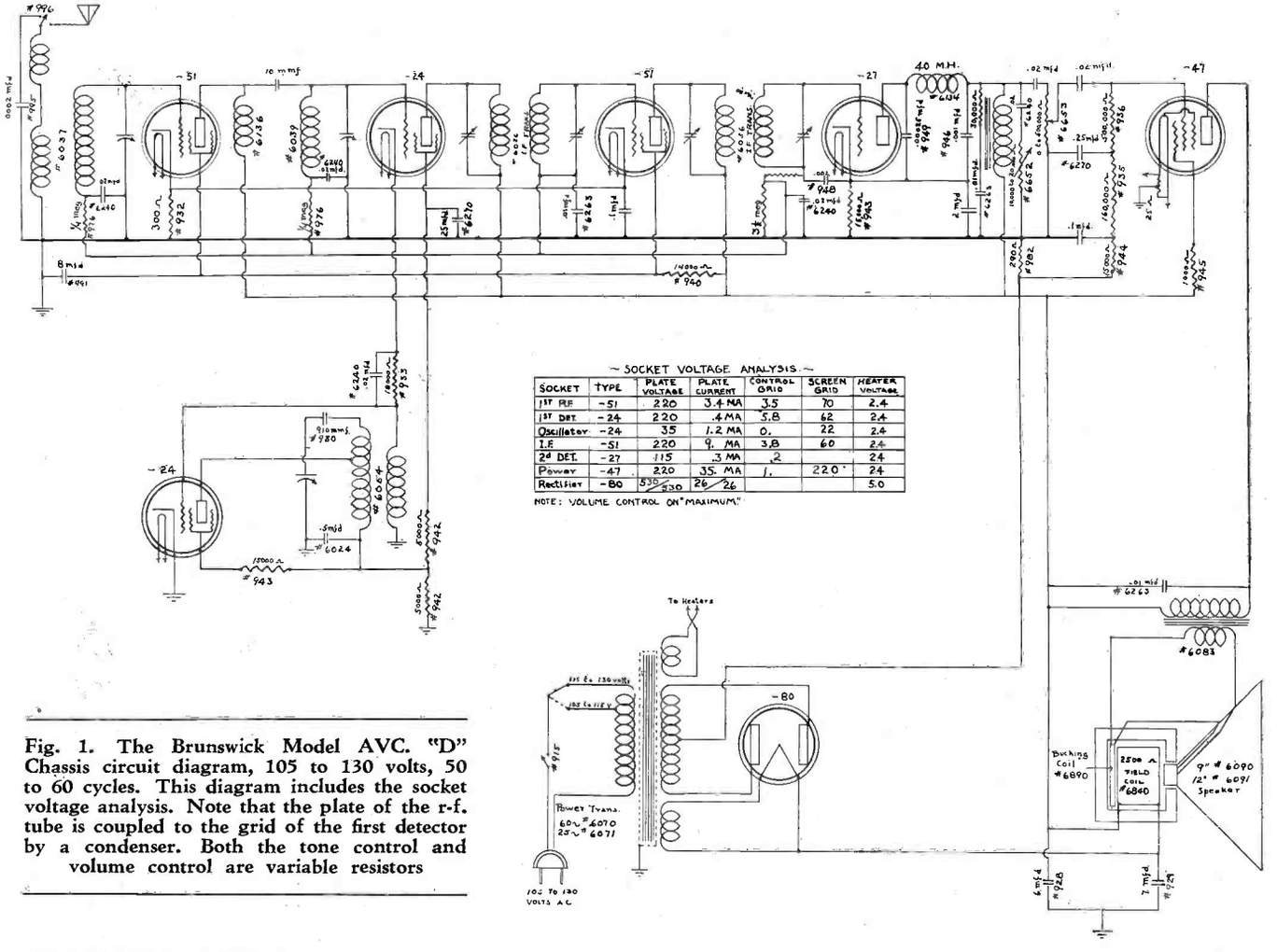


Fig. 1. The Brunswick Model AVC. "D" Chassis circuit diagram, 105 to 130 volts, 50 to 60 cycles. This diagram includes the socket voltage analysis. Note that the plate of the r-f. tube is coupled to the grid of the first detector by a condenser. Both the tone control and volume control are variable resistors

540 kc. on Philco Models

A number of changes have been made in the Models 52, 71, 91, and 47 to extend the low-frequency receiving range, making these models capable of receiving the new 540-kc. frequency assignment of the Canadian station in Windsor. The Model 52 receives down to 540 kc. and the Models 71, 91, and 47 go down to 520 kc., although at the present time there are no assignments lower than 540 kc. All Models 37 and 80's shipped from the factory have been designed for reception down to 540 kc.

The circuit changes involve new r-f. coils, new tuning condenser assembly, and new dial assembly. The following table lists all of the part number changes.

On all models which are designed for the lower frequency reception the code number has been changed from 121 or 221 to 123 or 223. These numbers appear on the inspection and serial number tag attached to the packing cases.

Part Changed	MODELS							
	52 540 kc.		71 520 kc.		91 520 kc.		47 520 kc.	
	Old Part No.	*New Part No.*	*Old Part No.*	*New Part No.*	*Old Part No.*	*New Part No.*	*Old Part No.*	*New Part No.*
Antenna Coil	03880	05726	04339	05988	04317	04984	04339	05988
Tuning Cond.	03890	05829	04733	05986	04790	05982	05098	06144
Det. Trans.	03881	05727	04185	05989	04409	05985	05093	06146
Osc. Coil	03882	05728	04186	05987	04408	05983	04186	05987
Dial Assembly	04031	05811	04832	05992	04832	05992	04832	05992

●

Output Meters

Do you have an output meter specifically designed for that purpose? If not, you can use a thermo-couple meter across the secondary of the output transformer or a low-range a-c. meter across the output transformer secondary—yes, even a crystal detector in series with a 0-5 d-c. milliammeter across the output transformer secondary.

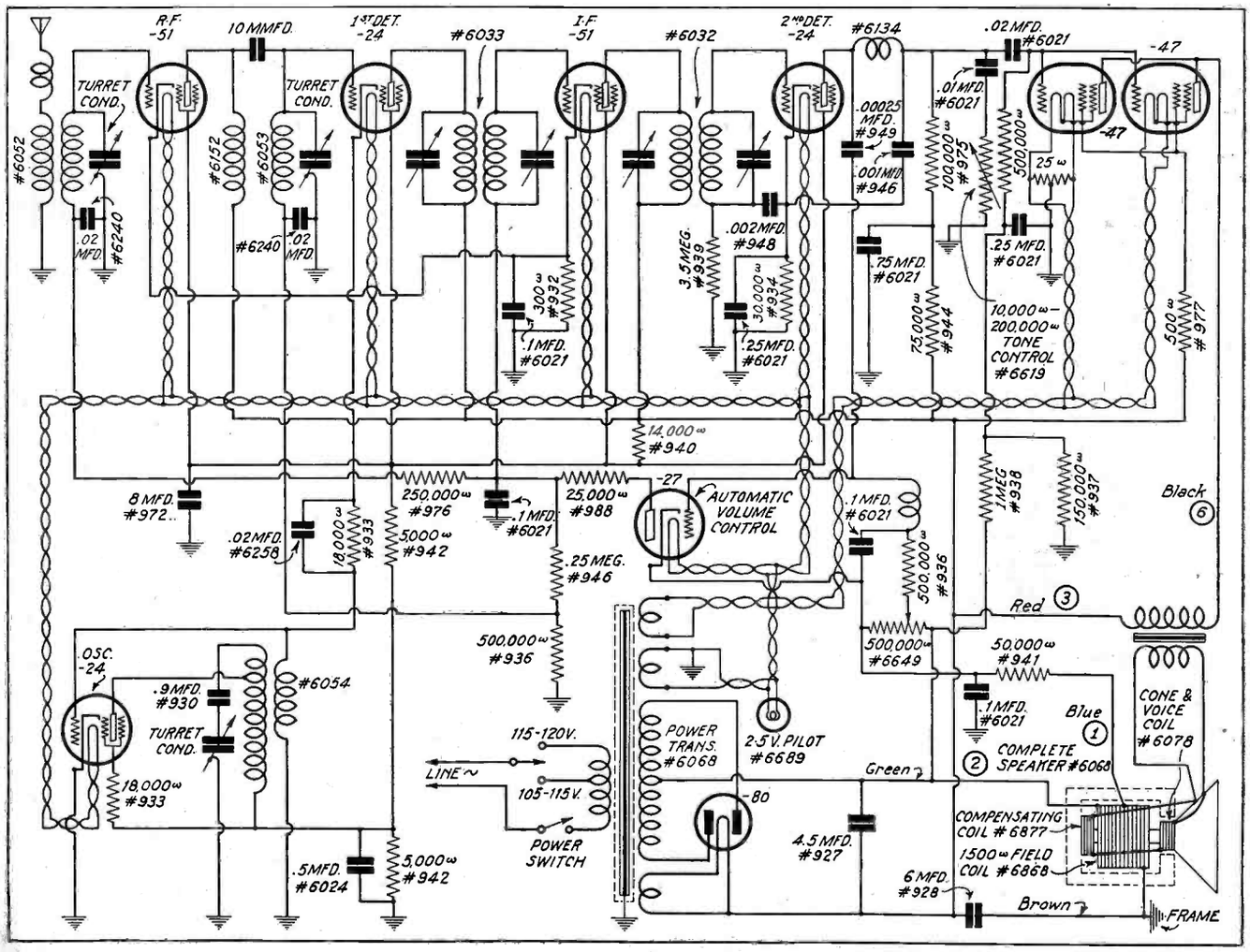
●

Condenser Replacement

When a section of a condenser bank is to be replaced, it is not necessary, if not convenient, to remove the defective section from the bank. Disconnect the defective section and locate the replacement unit in the most advantageous place, if one is available. As a general rule, because of the small amount of space available in a receiver, it will be necessary to remove the defective section and to place the replacement unit in its place.

Solid dielectric condensers can be used to replace electrolytic condensers, either as permanent or temporary measures, providing that the voltage rating of the replacement condenser conforms with the requirements of the circuit wherein it is to be used. If electrolytic filter condensers are being replaced, 500-volt d-c. voltage rating solid dielectric condensers will be satisfactory.

Fig. 2. Circuit diagram of the Brunswick receivers 17, 24 and 25, described on page 356



SERVICE ANNUAL INDEX

February, 1932 — December, 1932

I. R. S. M. CONVENTION!

You fellows who have been undecided about going to this Convention had better make up your minds to attend . . . it's going to be good. Remember—January 9th to January 11th, at the Sherman Hotel in Chicago. All Service Men, whether they are members of the Institute or not, are invited to attend any part or all of the three-day meeting.

The registration desk at the Convention will open at 10 A. M. on January 9th and the technical sessions will start at 1:30 P. M., continuing through with a recess for dinner until late in the evening.

Following is a listing of the speakers who will appear on the program. The official title of the paper had not been determined at the time of writing this report in certain instances, which accounts for the general nature of the subject assigned.

JOHN F. RIDER *(Service Activities During the Coming Year)*. Paper to be delivered during evening session, Monday, January 9th.

J. C. HOOVER, President of Hoover Laboratories, Inc., Detroit, designer of instrument for testing radio receivers using static method. Paper to precede Rider paper in Monday evening session.

J. N. GOLTEN, Service Manager, Stewart-Warner Corp. (*Necessity for Education in Radio Servicing*).

H. W. KADELL, Engineering Department, Eveready Raytheon Company. (*Tubes*. Exact phase of subject to be determined.)

TOBE DEUTSCHMANN, President, Tobe Deutschmann Corp. (*Problems Involved in Installation of Noise Reducing Antenna Systems.*)

WALTER JONES, Commercial Engineer, Hygrade Sylvania Corp. (*Manufacturing Practices that Determine Performance of Vacuum Tubes in the Field.*)

W. W. GARSTANG, Vice President in Charge of Engineering, Electronics Laboratories, Inc. (*The Use of Electrolytic Condensers in Radio Circuits.*)

E. W. BUTLER, Engineering Department, RCA-Radiotron Company, and E. T. Cunningham, Inc. (*Tubes.*)

ARTHUR G. MOHAUPT, President, Radio Training Association. (*Noise Suppressor Circuits—Quiet Automatic Volume Control.*)

E. N. RAULAND, The Rauland Corporation. (*Public Address Systems and the Service Man.*)

A. J. McMASTERS, G-M Laboratories, Inc. (*Photoelectric Devices, a Source of Revenue for the Service Man.*)

M. NORDENGREN, Service Manager, Grigsby-Grunow Company. (*Relationship of Satisfactory Service to Repeat Set Sales.*)

B. S. TURNER, Engineer, Chicago Telephone Supply Company. (*Tone Controls and Tone Compensation.*)

F. J. O'GRADY, L. O. GORDER, RCA Institutes, Inc. (Subject to be selected.)

A. H. BRUNING, Carter Genemotor Corporation. (*Power Devices for Radio Sets to Operate from 32-Volt Farm Lighting Systems.*)

DANA PIERCE, President, Underwriters' Laboratories. (*The Workings of the Underwriters' Laboratories.*)

LEE ROBINSON, Editor, Radio Merchant. (*Merchandising Sets and Service.*)

McMURDO SILVER, President, McMurdo Silver, Inc. (*Merchandising Custom Built Radio.*)

While the meetings of the Convention are open to all Service Men, the Institute is taking a precautionary measure to prevent the riff-raff with which the service field is infested from attending by setting a registration fee of $1.00 for the entire session. The Institute has found that the self-styled Service Men fail to recognize the value of anything for their benefit if there is a charge connected with it. It is thought that in this way the Convention will be attended by sincere and bona-fide Service Men exclusively.

Reduced railroad fares on the fare and one-half certificate plan will be in effect for the Convention. Those attending the Convention are notified to request a validation certificate from their local ticket agent when they purchase tickets to Chicago, which certificates are to be turned in at the convention registration desk for validation.

Public Address . . .

Phonograph Motor Vibration

Phonograph motors of the universal type, induction type and synchronous type may cause serious vibration if they are not mounted properly, or if the mounting supports have not been correctly adjusted.

Vibration may be of two kinds: direct vibration, which is due to the design of the motor and is transmitted directly to the air as mechanical noise, and indirect vibration, which is caused by the revolving armature and is transmitted to the board upon which the motor and turntable are mounted.

Most phonograph motors give little trouble in the way of direct noises. However, many of them transmit considerable vibration to the turntable, the mounting board and to the cabinet if they are mounted in one.

The opinion seems to be in many cases that such vibrations may be eliminated by providing a well-floated mounting, consisting of springs or thick rubber washers. These forms of mountings are of no avail if their natural periods happen to be the same as the natural period of the motor vibration. In such cases the springs or rubber washers make very efficient conductors of the vibration, passing it on to the mounting board which in turn transmits the vibration to the cabinet. The result may be a distinct rumble in the loudspeaker.

The manufacturers of the motors have in most cases taken great pains to correctly design the mounting system so that vibration may be completely eliminated. The difficulty lies mostly in the installation, when the springs are not given the correct amount of tension or rubber washers are left comparatively loose.

The cure of the trouble does not lie in a loosening of the bolts of the mounting system, which would increase the amount of "floating," but rather a tightening of the bolts so that the springs or rubber washers may absorb the vibration rather than transmit it.

If you run into a difficulty of this sort, try tightening the bolts a bit at a time until a point is reached where vibration ceases. Care should also be taken in tightening these bolts that the motor remains on an even keel and is not thrown off level. The position of the turntable shaft will determine this. Placing a carpenter's level on the turntable will not necessarily provide the correct keel, as the turntable itself may not be running true, and the idea is to get the motor itself level.

Even after these adjustments have been made, vibration may be present to a certain degree. The board upon which the motor is mounted may act as a very good sounding board. It should be made of some "non-resonant" material, but in any event, such vibration as may appear from this source can be damped out to some degree and at the same time confined to the board itself, by "insulating" the board from the cabinet in which it is mounted with slabs of rubber about an inch thick. Rubber pads of this type are sold in the Woolworth stores and no doubt other stores carry them also.

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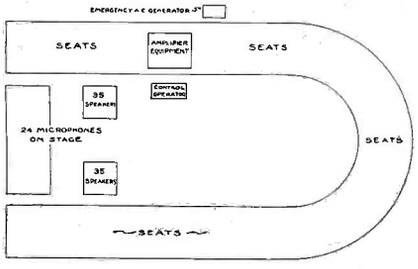
Feeding 125,000

At the recent Chicagoland Music Festival in Soldier's Field, seventy speakers pumped music and voice to an audience of 125,000. A 400-watt Webster amplifier was used to do the job, and the results were highly successful.

The manner of layout is interesting, as indicated by the accompanying sketch of the outdoor amphitheatre. Seventy speakers were installed just forward of the stage in two banks of 35 each. Both horn and cone speakers were used, to bring out both high and low frequencies. Twenty-four microphones were installed on and around the stage, and as many as ten were used simultaneously in picking up the program.



Placement details of the public-address equipment used in Soldier's Field Stadium, Chicago, to provide a sufficient volume level for 125,000 people

The amplifier system was placed in a room under the stadium seats, and the microphone mixing panel near the front of the platform where the operator could view the proceedings and communicate by private telephone line to the amplifier operator.

In all, there were seven stages of amplification between the microphones and the speakers. The power stage heretofore mentioned used four 203A tubes.

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Record Markings

Victor electrically cut records—and we presume it is also true of other makes—carry amplitude markings in the blank space on either side of the seal. Thus, on the left side may be the number 2 and on the right side the number 3. Or the markings may be 1—1 or any other combination.

However, the point is that the markings represent the upper and lower limits of the volume or amplitude as recorded. Just what units of amplitude these numbers may represent, we do not know, but the number 1 indicates that the recording is loud, and numbers 2, 3 and so on indicate corresponding units of less volume. Thus, if a record is marked 1—1, the entire recording is loud, while if the numbers are 1—3, you may assume that portions of the record are loud and other portions relatively less in amplitude.

These markings are convenient when one wishes to make tests and desires a record with a certain degree of volume.

•

Dynamic Unit Ratings

How much power can be safely pumped into these large dynamic speaker units designed for public-address work? This is a question which can only be answered with figures covering averages.

Most of the large units use voice coils wound with No. 37 enamel-covered wire. This wire can carry just so much current and no more. Therefore, in the usual case, 60 watts would be the limit of endurance. At this point the wire will fuse or, just as bad, the enamel will burn off the wire and the coil will collapse.

Most of the good dynamic speaker units can handle peaks approaching or equaling 60 watts without giving up the ghost, but the average level should not exceed 20 watts for each unit used, unless the manufacturer definitely states that a greater level can be handled with safety.

It is obvious that if the amplifier has an output of, say, 50 watts of power straight from the shoulder, it would not be safe to use anything less than three speaker units. These units, then, would be connected up to meet the impedance requirements of the usual line-to-speaker transformers (see page 239, September SERVICE for multi-speaker coupling connections).

It should be kept in mind that an increase of power output from the amplifier from, say, 20 to 40 watts is equivalent to only about 3 db., which means that the increase in amplitude is just perceptible to the human ear.

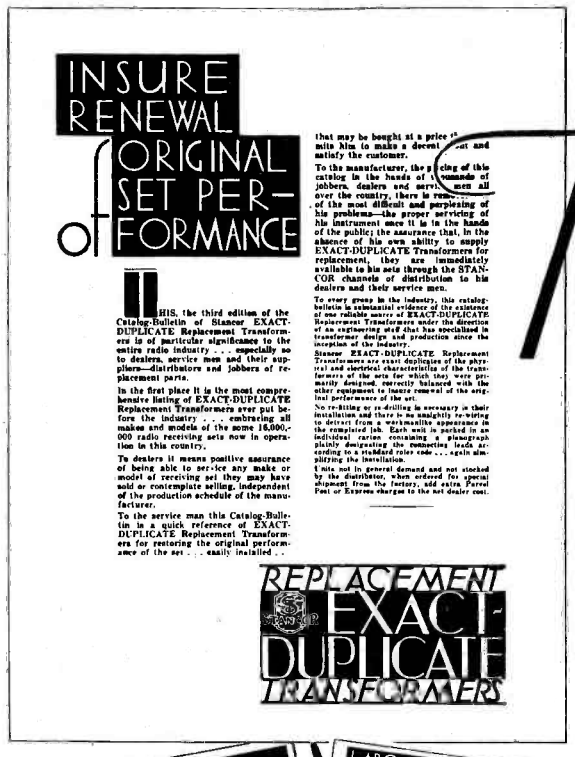
Now, in the event that we have an amplifier with a 40-watt output it would be necessary under most conditions to use two dynamic units. These may both be coupled to the same horn, in which case the total volume will appear the same as if but a single unit were used. The power, of course, divides equally between the two units. In such cases, it may be advisable to use the units with separate horns, in which case a better coverage could be obtained than would be possible with two units on a single horn.

There appears to be very few cases where the two-unit horn is of advantage. Of course, if a wide area is not to be covered, there is no particular reason for increasing expense by using two horns.

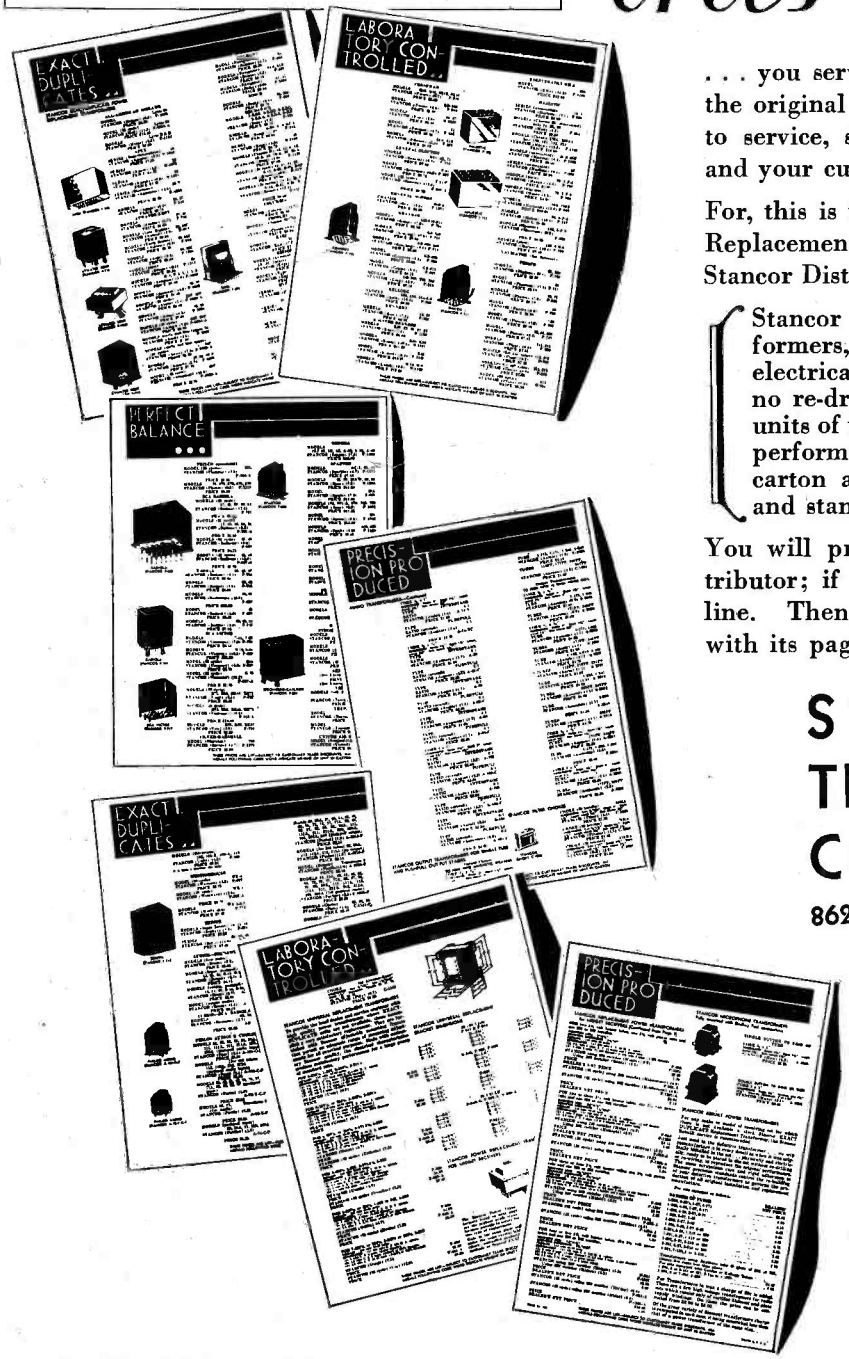
In most cases, the area to be "fed" is of sufficient dimensions to warrant the use of two horns placed in the same plane, but set at different angles so that the projection of sound more nearly fills the entire area; just as we use two floodlights set at angles to light a comparatively wide area of space.

There is no set rule for the setting of two horns. Too much depends on the design of the horns, the acoustic power output and the acoustic characteristics of the space to be covered. Walk around the place and determine if there are any dead spots. If there are, a change in the angle of one or both horns may bring these spots to life.

This brings up the matter of echoes and phase relation, both of which may cause dead spots. Echoes are due to the reflection of sound waves and can be eliminated by the proper placement of sound-absorbing material. Phase relation can be altered by changing the projection angles of the speakers, as heretofore explained.



Through the pages of this BOOK



. . . you service men will find your job of maintaining the original performance of the sets you are called on to service, simplified—made more satisfactory to you and your customer—and infinitely more profitable.

For, this is the new catalog of Stancor Exact-Duplicate Replacement Transformers, distributed by authorized Stancor Distributors all over the country.

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You will probably receive your copy from your distributor; if you do not, use the coupon or drop us a line. Then, keep it handy. Once you are acquainted with its pages you wouldn't think of being without it.

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Auto-Radio . . .

Transmission Lines

How about transmission lines in auto-radio receivers? A great deal of attention has been focused upon the use of shielded lead-ins and transformer-coupled aerial receiver systems. If it can be effectively employed in an outdoor installation it should be at least as effectively applied, if not more so, to auto radio systems.

There is no doubt about the fact that direct pickup by the receiver proper and the battery cables has been minimized to a very great extent. Most of the noise pickup subsequent to a good installation can be attributed to pickup by the aerial. If so, the modern method of coupling aerial to receivers in the home would find a ready market in the car.

If anything, it would certainly eliminate the present bugbear of troubles due to conduction of noise interference along the lighting wires and the car chassis, which then is picked up by the aerial. How about it, some of you auto-radio receiver manufacturers?

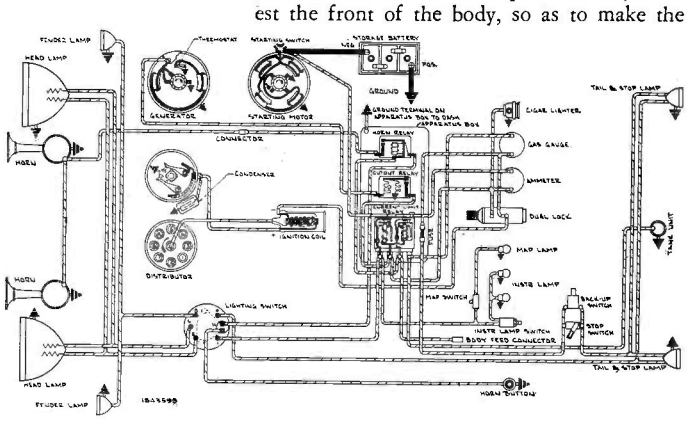
•

Outside Car Aerial

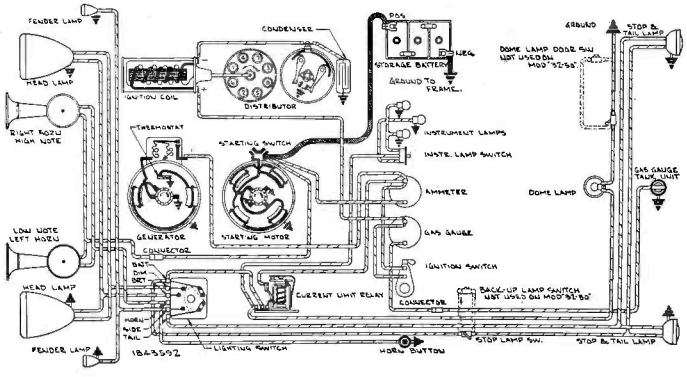
The following suggestion relative to aerials to be applied to cars which are now equipped at the factory comes from the U. S. Radio and Television Company. "Secure about 50 feet of tinfoil covered tape about ¼-inch wide. (There are various kinds of tape aerials which can be purchased upon the market. Ed.) Also a roll of 1-inch adhesive tape and a two-ounce bottle of waterproofing top dressing.

To make the installation clean the car top thoroughly, removing all moisture and dirt. Now drill a hole in the top of the car, nearest the front of the body, so as to make the lead-in connection to the receiver most convenient. Starting with the point where the lead-in hole was drilled lay the aerial tape on the car top, working around the edge of the top in the form of a rectangular spiral. Place the tape about six inches from the edge of the top so as to be that distant from the metal frame. Solder the lead-in wire to the lug on the aerial tape. Next cover the aerial tape with the adhesive tape. Place two small lengths lengthwise and two lengths crosswise over the soldered connection and the hole in the roof. Now go over the adhesive tape with the top dressing. Use at least two coats of this waterproofing dressing. (If necessary a small piece of waterproof canvas can be stretched across the soldered connection and the hole and glued to the roof with waterproof glue. Atop this paint two coats of the waterproof dressing. This will make the job free of possible leakage of water through the hole in the roof. Ed.)

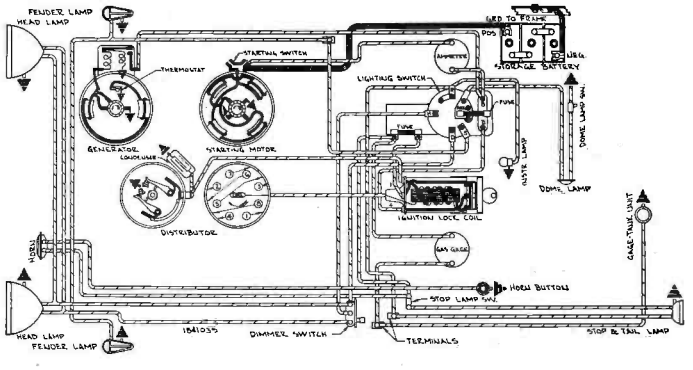
If the car has a wire mesh under the top lining and this mesh is grounded, it will be necessary to unground the mesh. (The outside aerial affords greater pickup as indicated by experiment. Ed.)



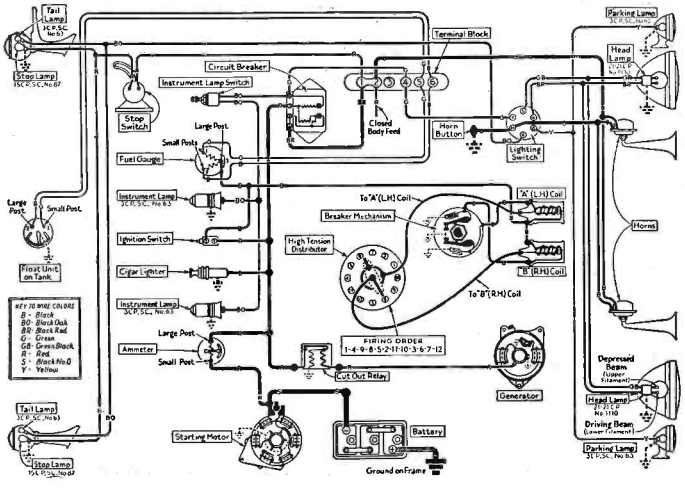
LA SALLE
Ignition diagram for 1932, 8-cylinder cars. Distributor contact opening; .018"-.024". The rotation of the distributor is counter-clockwise, viewing drive end



BUICK
Ignition diagram for 1932, 8-cylinder cars. Distributor contact opening; .018"-.024". The rotation of distributor is clockwise, viewing drive end



OAKLAND
Ignition diagram for 1931, Model 301, 8-cylinder cars. Distributor contact opening; .015"-.020". Rotation of distributor is clockwise, viewing top



CADILLAC
Ignition diagram for 1931, Model 370 "V-12" cars. Distributor contact opening; .018"-.024". Rotation of distributor is clockwise, viewing top

•

Far Fetched—But Sometimes Necessary

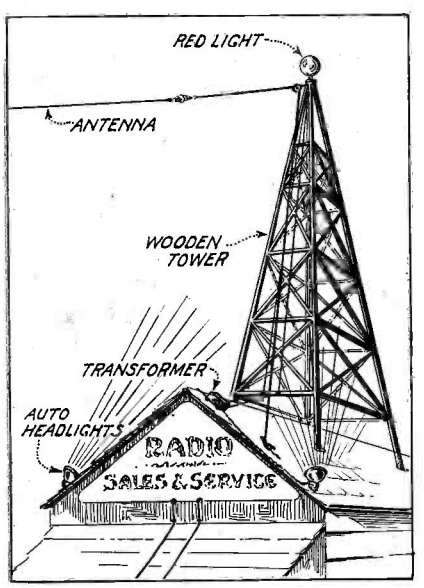
A shield around the complete distributor head. Close copper screen or chicken mesh—grounded right to the metal which supports the distributor head or the nearest metallic and grounded surface.

ON THE JOB . . .

FIRST PRIZE
PUTTING OVER YOUR BUSINESS
By W. F. Bloom

Situated in a small town, and operating a "one-man" service business, I found myself confronted with the problem of finding a way to establish my shop as the foremost one in the county. True, I could carry on a local advertising campaign to make the public "service conscious" but the cost was prohibitive. After turning over several ideas in my mind, I decided to use the following plan.

My shop is located at my home, and the aerial I was using was run between the house and a barn located at the rear. With the aid of a couple of friends, I constructed a tower of 7/8-inch wood, using the conventional triangular bracing. It was about 18 feet high and five feet square at the base.



As a means of attracting attention and gaining prestige, a tower of this type is very effective. Besides, it is very cheap to build, as attested by Mr. Bloom

After it was finished, we gave the whole mast a coat of aluminum paint and mounted it atop the barn roof, bolting the base of the "tower" to the roof framework.

I arranged a pully at the top so that the aerial can be raised and lowered at will from the ground.

At the extreme top of my tower I mounted a socket for a 40-watt bulb and covered this with a red lantern globe. At opposite corners of the tower, and about 10 feet therefrom, I arranged two "Model T" Ford headlamps and these were focused so that about three feet at the top of the tower was left in comparative darkness.

These "floodlights" are run from a discarded Majestic transformer which was rewound to supply 6.5 volts. On the gable of the barn which faces the street I painted my service sign and lighted this also with auto bulbs.

The comment created in and about town in the last week has more than repaid me for my efforts. The local newspaper has given me a very fine write-up on the tower which in itself has done a great deal to boost my business.

The material used for the tower was cypress and was obtained at the lumber yard at a cost of one cent per foot. About 290 feet were used. One pint of aluminum paint was required, at 90 cents a pint. All together, only about $7.00 was required for the complete job.

Of course, all Service Men cannot construct a tower of this sort, but there are many who can, and they will find it a great business booster. Those who cannot erect towers may well use some effective system of floodlights directed upon a sign placed in a prominent position.

•

SECOND PRIZE
A TUBE SELLING SYSTEM
By Romuald Bernard

Good business demands that one keep a careful check on merchandise and data relative to the possibility of repeat sales. In the radio servicing business this matter is of particular importance in connection with the handling of tubes, and I have worked out a ledger system which has both *saved* money and *made* money for me.

Procure a good size ledger and divide each page into columns with the following headings: Quantity; Type of Tube; Jobber's Name; Date Received; Date Sold; Customer's Name and Address. Now, in each of these columns write in a progressive series of numbers, starting with the number one and writing in as many numbers as possible.

When tubes are received from the jobber, the type of tube, jobber's name, and date received are entered in the ledger. The tubes are listed separately, each being written in opposite a number. The number corresponding to each tube is then written on a sticker, which may also have a little advertisement printed on it, and the sticker placed on the proper tube.

Eventually, when a tube is sold, its number is checked against the corresponding one in the ledger, and the name and address of the person who purchased the tube entered along with the other data in the ledger.

This system of individual tube entry in a ledger has a number of advantages. In the first place, you are always able in this manner to move your stock without keeping some tubes on hand too long by not knowing when they came into your possession. Second, when a customer brings in a tube for replacement, you will be able to check the length of time that particular tube has been in use. Third, the names and addresses of all your customers are at hand and make the best sort of mailing list. Fourth, you can determine from the ledger which types of tubes you sell in the largest quantities, which last the longest, and to some degree what types of receivers, as to age, are being used in your community. This data serves to determine the quantity and types of tubes you should reorder at periods.

Lastly, the data in the ledger tells at a glance when Mr. Jones or Mr. Smith will be calling for more tubes—or, in the event that, say, Mr. Jones does not see fit to replace tubes as often as he should, your ledger will tell you that he is at least a prospective customer for a new set of them. Thus, aside from other things, the ledger provides an excellent selling point.

•

THIRD PRIZE
A TEMPORARY AUDIO REPAIR
By Chris North

Here is a little stunt I have been using lately as a temporary repair of an audio transformer until such time as I could obtain a replacement unit. The main advantage of the stunt, of course, is that the customer may continue to use his receiver until the replacement unit arrives.

I suppose a lot of you Service Men have been using this idea right along, but I never tried it until I was caught without a push-pull input transformer for a Philco 96-A. In this particular receiver the primary of the transformer was open, so I connected a 100,000-ohm resistor from the plate of the '27 audio tube to B+, as shown in Fig. 1, and then connected a coupling condenser from the plate of the same tube to the grid connection on one of the '45 power tubes, leaving the secondary connected as usual.

Of course, there was some loss of volume, but the big point was that the customer wanted to listen to one of the football games and there I was with no transformer. Well, he heard his football game and is assured that I know my business.

It is apparent that the same idea can be applied in most any receiver wherever a primary or secondary winding blows, with the exception that a higher value resistor would be used to temporarily replace an open secondary.

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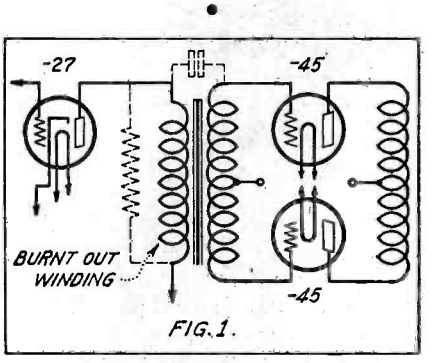


Here is a simple little stunt for temporarily repairing an audio circuit when the primary of the transformer opens. A resistor and coupling condenser keeps the set going until a transformer can be obtained

Essential to MODERN RADIO!

DON'T just repair—*modernize* and *improve* the set. Wouldn't that build confidence and recommendations?

Service men are doing it in five minutes—and earning *$1.85 extra* on each service call.

You know that less than one hour of high line voltage will overload tubes, resistances and condensers—causing crackling noises and burnouts.

AMPERITE will stand guard day and night against all voltage fluctuations.

AMPERITE Corporation
561 BROADWAY, NEW YORK

AMPERITE
VOLTAGE CONTROL

Send $1.40 to Dept. S-12 for sample, sales helps and exclusive territory proposition.

SERVICE FOR YOU

COMPLETE RADIO SUPPLIES AT LOWEST WHOLESALE PRICES

You pride yourself on the kind of service you give your trade . . . we pride ourselves on the service we give you. You can rely upon us to make it possible for you to give prompt, reliable service on replacement parts, tubes, batteries, the latest sound systems, and any electrical supplies.

You can feel that our immense stock of the latest and finest in radio supplies stands back of you. You can promise immediate delivery and we will see that you get it. You can know that anything we send you will be quality goods at the very lowest wholesale prices. We pass on to you the advantage of our immense buying organization.

Write today for our 1933 catalog crowded with bargains

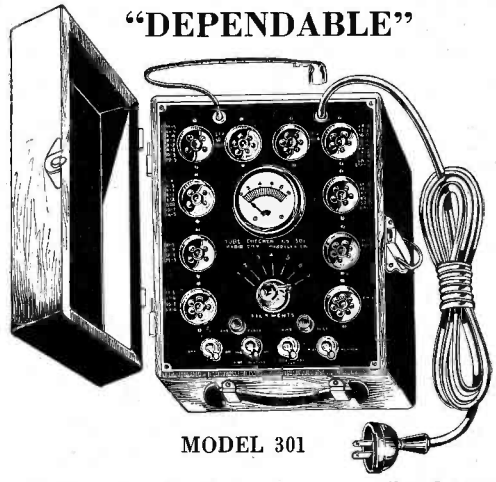
ALLIED RADIO CORPORATION
831 W. Jackson Blvd. - Chicago

TEST ALL THE NEW TUBES with "RADIO CITY" Products

"DEPENDABLE"

$14.50
Net to Dealer or Serviceman

List Price $27.50



MODEL 301

The most remarkable value for the money ever offered in a modern and efficient tube checker. Tests all of the new 6- and 7-prong tubes as well as the older 4- and 5-prong types without adapters. Line voltage adjustment 105-115-125 volts. Filament and heater voltage of 1.5-2.0-2.5-3.3-5.0-6.3-7.5 are available at each and every one of the ten sockets on the panel.

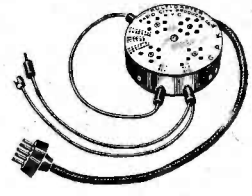
Grid shift test—short and gas test with pilot light indication—2nd plate test for rectifiers. Extremely simple to operate. Special design gives clear easily read indications for all tubes. Beautiful lithographed panel—rugged, positive contact switches.

Handsome leatherette case with deluxe handle. Removable hinged cover for counter or portable use. Belden indestructible type rubber cord and plug. You'll be proud to carry this checker on any job.

MULTIDAPTER

Model 203— **$2.75**
Net to Dealer or Serviceman

List Price $4.50



Multidapter allows you to use all the new tubes in old, obsolete test equipment. More than 50 different types of tubes can be tested with the Multidapter.

It is a perpetual type of adapter; provision is made for testing all new tubes that might be brought out in the future in either 4-, 5-, 6- or 7-prong types.

Combines many adapters in one which makes it economical and saves cost of future adapters. Just one adapter to carry around and use. You can not afford to be without a Multidapter.

Model 204—Universal type with cord and plug, $2.95 net.

Illustrated above. List Price $5.00.

RADIO CITY METERS

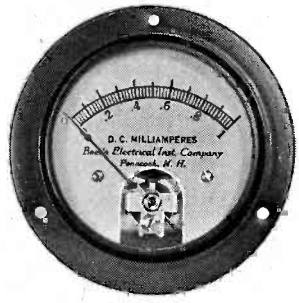
Accuracy Guaranteed Within 2%

A new line of moving coil D'Arsonval type, 3¼-inch, milliammeters, voltmeters, ammeters, etc. Astoundingly low prices for high-grade instruments.

Typical list prices—0-1 milliammeter $6.00

1,000 ohms per volt—0-150 voltmeter $7.00

30% Discount to Dealers and Servicemen.



RADIO CITY PRODUCTS CO.
48 WEST BROADWAY NEW YORK, N. Y.

HIGHLIGHTS . . .

"So Big"

We are justly proud of our progress since February, at which time the first issue of SERVICE entered the mails. At that time the total paid circulation was 1,800. Today there are 8,500 Service Men reading this little sparkle.

It might interest you to know that copies of SERVICE go to such far-away places as England, Germany, Norway, France, Spain, Italy, South America, New Zealand, Australia, China, Egypt, Hawaii, Philippine Islands, and even Iceland (*Yo-hoo, Iceland, how is servicing up there?*)

The amount of paper used in the first issue could have been carried in a suitcase. Today we use 3,140 pounds of the same stuff (which you can't carry) and it takes 50 pounds of ink to make this paper intelligible.

If you took all the sheets of paper and stretched them end to end . . . well, never mind that.

And we are still growing—thanks to you, and *you,* and YOU.

•

Continental Resistor Data

The Continental Carbon Company, of Cleveland, Ohio, has had its service engineering department prepare a book on resistor replacement data for over 900 popular receivers. Much valuable general resistor servicing data is also included.

An entirely new method of listing resistor data was used in compiling the book, and it is said that the method makes the listings more compact and simplified. Both resistance and wattage rating are given for each unit.

•

"You're on the Air"

Full to the brim with campaign speeches after weeks of listening to them in silence, the man on the street finally had a chance to say his word just before election when station WABC devised its own inquiring radio reporter and had him tour the sidewalks of New York asking passers-by to tell about their political views.

The Interviewer was Ted Husing, who, like a fish on the end of a line, was attached to 75 feet of wire which a couple of engineers reeled out or in as he strayed through the crowds. One end of the wire terminated in the buttonhole of his topcoat where was pinned one of these tiny W. E. lapel mikes which, no bigger than a half dollar if you've never seen one, picked up both Husing's questions and the replies of those he engaged in conversation. At its other end, the wire connected with portable amplifiers in a sedan parked at the curb and from there led to regular telephone circuits used in broadcasting.

•

Flash-Back

A few nights ago we walked through the winding streets of the little suburban village where we once lived. It was a cold night and our face was stiff from the snap of the air.

Lights had sprung up in the houses and they looked very warm and cheery inside. Here and there was an attic light aglow, and we wondered if some youngster was deep in the mystery of radio in one of those attics.

As we trudged along through the bite of the evening air, much older, not quite so buoyant and exuberant as in the years past, we remembered the attic in the old house where we had our bench covered with the radio trappings that so mystified our visitors. Bell wire coils wound on mailing tubes, "Navy Type" headphones, variable condensers immersed in castor oil to increase their capacity—and glory of glories, a DeForest Audion.

The attic was freezing in the winter, until we got the old oil stove working. Just enough light from that old stove to lend enchantment to the whole room. Just enough heat to keep the fingers from getting stiff.

Our breath was steam that collected on the old, green, hard rubber panel where the Audion was mounted. The old bulb glowed but didn't work so well until she was warmed up. We'd light a match and gently caress her sides with the flame, and the first thing you'd know, old NAH would blast the cans. Yes sir, blast the cans when old Sheba got warmed up.

Then we'd work out from NAH and search the cold air of the evening for DX . . . until the "A" battery started giving out. Then to bed with a head full of plans for a better station.

These days we fall asleep listening to Europe on the short waves. The tubes we use have no personality. There isn't an old Sheba amongst them. And they don't need a bit of warming up with a kindly match flame.

Well, we trudge along, much older, with the old loves gone. Tomorrow is another day.

•

Dubilier Condenser Catalog

The 1933 Edition of the Dubilier Condenser Catalog is now off the press. A copy may be obtained upon application to the Company.

A lot of space is given over to electrolytic condensers, covering units for all classes of service, ranging from fractions of a microfarad to thousands of microfarads, and from 25 to 5,000 volts. Tabular data and descriptive and dimensional cuts are included to assist the user of condensers.

•

A New Kind of Service

The officials of Mercury Radio Service, 522 18th Street, Oakland, California, are fast-moving fellows. They have inaugurated a unique service in their centralized *radio service for manufacturers only.* They maintain a large service staff, including two graduate electrical engineers, and specialize in the installation and service of public-address and amplified music equipment. They are provided with automobile transportation and the latest in testing equipment, and from what they say, evidently manage to cover a sizable portion, if not all, of the Pacific Coast. And that's some coverage.

Mr. Rider suggested in one of his recent editorials that Service Men attempt to tie up with the manufacturers of public-address equipment. And now, here is a concrete example of an organization doing just this thing right under our nose, so to speak.

Mercury Radio Service appears to be in a swell position to do a swell job for any manufacturer who is interested in satisfied customers and more business. We hope to see more of this as time passes.

•

He Played with Watches

Mr. J. C. Sampson, of Sampson Industries, Inc., has sent us a letter from an erstwhile watch taker-aparter who wants some service information. The letter reads:

Dear Sir:

I have a radio set which I have taken apart. I would like to put it together again but I haven't the right idea. Will you kindly send me a free booklet?

At the bottom of the letter is a nice little drawing of the set with three circles marked thus: "Amplier," "Detector," "Konpentrol." Do any of you fellows know what set this may be? We have a hunch it is one of those early Victorian armchair jobs made in Tasmania in the year 1652.

What we are wondering is if this fellow's watch keeps time. After taking it apart (which he *must* have done) we bet he didn't have the right idea and sent for a free booklet.

•

The Mystery Solved

Why did the electric clock stop each week at 9:30 A. M.? Because each week at that time the maid of the house pulled the plug and used the vacuum cleaner from that outlet. After completing the job of cleaning she would again plug in the clock, which was not a self-starter.

Silly, isn't it?

•

Good to the Last . . .

Last month we stated that Maxwell House Coffee cans made swell shields for short-wave plug-in coils. Now we get a letter from one of the fellows who used a pair of 'em for this purpose, and he says that he not only hears Java on the set but can also smell it . . .

•

"Standard" to "Optional"

In the November issue we stated that Majestics had become standard equipment for the new Fords. It's not so, we are told. The equipment is optional.

All Ford cars will have knock out plates so that when a receiver is to be installed in a car it will only be necessary to remove the plates.

THE FORUM . . .

The Other Side

Editor SERVICE:

We note with interest a letter on the Forum page of the November issue of SERVICE. This letter is termed "The Right Idea," but it is the same old story, which is: One man's meat is another man's poison.

As far as theory goes, "The Right Idea" is fine business, but if many Service Men should try this there would be plenty of set owners who would take a course in servicing or hire a Service Man by the year or by the month.

Let's take for an example one of this year's "Two-Bit Sets," which are so low in list price that the dealer isn't even allowed his regular discount to try to break even on the trade-in racket that he has to eat and like it. We'll say, for instance, that the set was to retail for $20, but the customer had a junk set that some dealer had offered him $20 for towards the purchase of a $150 set. The customer sees your set for $20 and he, having a $20 set, comes over to do business in a big way. We'll omit the rest of this because I think all dealers have been through this before . . . but, anyway, we ended up by allowing the customer four or five dollars (about the dealer's discount) for his old set so he would still think that we had been born in the United States.

Well, to make a long story short, let's suppose that a power transformer got sick and died before we could get to it with our testing equipment (which costs more to keep in date than an American automobile) and as like as not the transformer decided to take a few of the resistors along with it to keep it company. We arrive on the scene with our test set, take a few tests and tell the customer the sad news that it will cost close to ten bucks to make his set sing for him again. The customer takes a good look at your head to see if you look anything like the photos that they hang up in Post Offices with a nice reward on them and sees that he isn't in luck, so he puts his pet bulldog on you . . . and wait—don't forget your meters in the hundred-yard dash (the ones that put you in the red for the next five or ten years).

We hope that no one reads this letter who can't take a grain of salt with it, but we had to do the same thing with Mr. Rhine's note as far as our business is concerned. Most of the people will not pay for the sort of test he advocates, so the best thing we can do is to do as our public wishes us to.

I think that most Service Men will agree that theory such as Mr. Rhine states doesn't work so hot in every man's town. However, we agree that if one can make this plan work it would do wonders for the service game. (We tried this plan once ourselves, but we could never get away with it.)

I think that the Editors of SERVICE should view both sides of such service questions without calling our type "irresponsible" (we took this with a grain of salt also).

There is no doubt that many Service Men could make the sets he works on a good deal better, but did you ever hear of a garage man making a Packard out of a Ford for his health?

We have to service a set according to the amount the set costs, and last but not least, the amount the customer can stand, or the name service doesn't mean service to us.

I think that the Editors of SERVICE will agree that one has to make his business fit his customers and no set standard is going to work for every customer. One has to service as the customer wants it and that is the only plan that really works out in the long run.

HERB CORBETT,
Manager, Radio Service,
A. R. Corbett & Son,
Amboy, Minn.

(First of all, let us thank you for taking the time to write us your views of this particular matter. We are forced to admit that the situation is much as you paint it, though we have been advised of a number of cases where the practices as advocated by Mr. Rhine have worked out to perfection. After all, the whole matter boils down to the question as to whether a man can afford to reject any service jobs at all. The whole situation is distasteful to say the least, and that holds for most business at the present time. Mr. Rhine has what might be termed a "choice clientele" and therefore does not find it necessary to take on "distress" jobs. How many other Service Men could do the same, we do not know—and we are not suggesting that a man who is incapable of assuming this form of independence is a poor worker or business man. The whole matter hinges too much on local conditions and situations.

If we had any sure and positive answer to the question, you may rest assured that we would shout it from the housetops. As it is, we do not believe there is a satisfactory answer. Therefore, it is necessary that each man carry on as best he can, and in the manner most profitable to him, until the business horizon clears somewhat, at which time he should be able to tighten up a bit on a public that has gone haywire with cheap radio sets.

We fear you have misunderstood our meaning of "irresponsible." It is quite possible that you have never run into one of the breed of so-called service men who have no true understanding of the technical side of radio and are hardly more capable of repairing a radio than the owner of a set . . . or the breed who deliberately give the service profession a bad name in their quest for unearned profits. A Service Man is entitled to a good profit, but he has no right to charge five dollars (not including the service charge) for a shot resistor the retail cost of which is thirty cents or so. Yet we receive regularly complaints of this sort from legitimate Service Men who are striving to make an honest living.—The Editors.)

Eliminate the Fixer

Editor, SERVICE:

May I take this opportunity to express my thorough interest in SERVICE? It is indeed timely and an "up-to-the-minute Service Man's publication."

The "Antenna" editorial for October, relative to servicing as a profession, hits the nail on the head squarely. The field is entirely too filled with the handy tradesmen, and the future holds no prospect as a livelihood for Service Men unless the mechanics and technicalities of radio become more complicated.

The manufacturers have by this time learned the value of well-trained and experienced Service Men, and the majority cooperate with him to the fullest extent. It is only natural that the progress of radio cannot be halted, and new ideas in design have made servicing more difficult for the man who is just a "fixer."

Some mention was made in a previous issue relative to a general index. This idea is in keeping with our I. R. E. *Proceedings* and believe that some provision would be a very handy reference file.

A. H. SCHWENKER,
Schenectady, N. Y.

(A general index appears in this issue of SERVICE, *as originally planned. Binders, for those who may wish to keep the issues in the form of an index file, can now be obtained.—Editor.)*

●

The Salary Question

Editor, SERVICE:

At present you seem to be the only man who tries to help the Service Man. Numerous times articles on service charges have appeared, but up to now no question seems to have been raised as to the salaries of Service Men.

Since Walthall's left the picture I have been working on and off. Now I am in business for myself. Why? Because there isn't a decent salary being paid by anyone! Of course, you know all these things, but can't something be done about them?

A decent man, who knows his business, cannot get what he is worth. Is it fair? No! I believe there should be a motion brought up to all who are concerned, to get together some way or other. But on the other hand, the fellow who does earn his $35 per week is afraid to say anything for fear he will lose his job to someone who will work for less.

WERNER MILLER,
EMPIRE RADIO LABORATORIES,
Passaic, N. J.

●

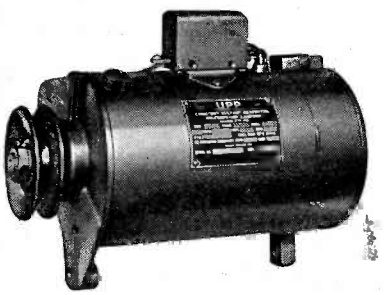
(We appreciate the situation and certainly wish something could be done about it immediately. However, with business conditions as they are, we feel that any effort at present would prove fruitless. The time will come when the irresponsible element will be eliminated from this field and we may then hope for a betterment of conditions.—Editor.)

THE MANUFACTURERS . . .

Upp Auto-Radio Generator

Ability to produce constant voltage at variable speeds is one of the outstanding features claimed of the Upp combination d-c. and a-c. generator, for automobile radio and sound equipment operation, now being manufactured by the Whitaker-Upp Company, Kansas City, Mo.

This generator mounts under the hood, is driven by the car engine, and produces both 6 volts d-c. and 110 volts a-c.



Both a d-c. and a-c. armature are wound on the same shaft. The d-c. end of the generator is of the shunt type, and when running at 1,000 R.P.M. is so designed that it will generate 6 to 8 volts for charging the car storage battery. The a-c. end is of the armature type, and when running over 1,000 R.P.M. will produce 110 volts a-c. and hold the voltage constant.

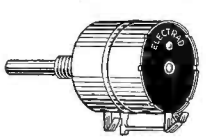
This combination generator makes it possible to operate a 110-volt a-c. radio in an automobile.

A 60-watt model for auto radio and a 300-watt model for portable sound equipment are now in production.

•

Electrad L Pad Attenuator

Approximately constant impedance can be obtained by using a dual control consisting of a series and a shunt resistor. With this arrangement, the impedance looking from the source to the sink is always constant.



The Electrad L Pad Attenuator is designed for this particular desirability, and may be obtained to work in connection with lines of the following impedances: 15, 200, 500, 3,000 and 5,000 ohms.

•

Clarostat Replacement Line Ballasts

There have been numerous cases where Service Men have attempted to "replace" line ballasts by shunting the ballast with some resistance wire, in which case line-voltage control ceases. Much of this practice has been due to the inability of the Service Man to obtain the correct types of line ballasts for the various receivers using them. This situation has now been cleared up insofar as Clarostat Line Ballasts are concerned, by the publication of a Line Ballast Replacement Chart.

Any one wishing a copy of this chart may obtain one free of charge from the Clarostat Manufacturing Company, 285 North 6th Street, Brooklyn, N. Y.

•

Ohmite "Determ-Ohm"

The Ohmite Manufacturing Company have brought out a new type of resistance box called the "Determ-Ohm," so named because its chief purpose is to determine radio replacement resistor values.

By manipulating four direct-reading dials, it is possible to obtain actual resistances ranging from 100 ohms up to 1 megohm, in 100-ohm steps. It is stated that the guaranteed resistance tolerance is plus or minus 5 percent.

The resistance units used in this box are of the wire-wound, coated type.

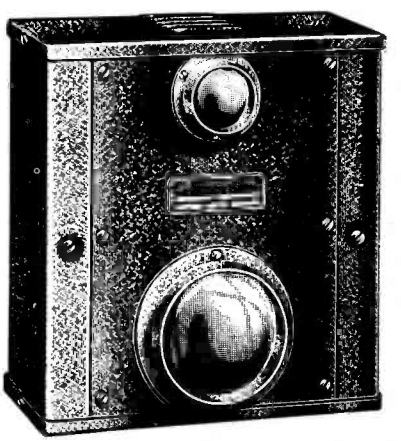
The "Determ-Ohm" has many uses, the chief one from a Service Man's viewpoint being the ability to determine the values of replacement resistors. In many cases it is

found that the resistor in a receiver has been completely destroyed, and that it is impossible to read the value of the unit or measure it. In such a case, the "Determ-Ohm" is connected in place of the defective resistor and the radio set turned on. The dials on the "Determ-Ohm" should be set at the maximum resistance before the set is operated and then the resistance is gradually reduced until the set functions properly. Then, a glance at the dials shows the proper replacement resistor value.

Other uses for the "Determ-Ohm" include the increasing of voltmeter ranges, as resistance bridges, as ohmmeters, as milliammeter resistances, etc.

G-M Foto-Switch

G-M Laboratories, Inc., 1731 Belmont Avenue, Chicago, announce a new photo-electric relay device, known as the No. 1252-LL Foto-Switch.



In most devices of this sort the light source is a separate unit. In this device the source of light is included in the case with the photoelectric relay, as will be seen from the accompanying illustration.

The manner in which it operates is quite simple. The light beam is focused on to any suitable mirror, and the angle of the mirror is adjusted so that the beam of light is reflected back on to the photo-cell lens at the bottom of the case.

The complete device consists of the light source, a photoelectric cell, an amplifier tube, transformer and magnetic relay.

The magnetic relay is capable of operating at speeds as high as 300 to 600 light interruptions per minute, and will control a non-inductive load of 2 amperes at 110 volts a-c. Two pairs of contacts are provided, i.e., one make and one break.

The No. 1252-LL Foto-Switch is designed to operate on 110 volts a-c. No extra attachments are necessary.

•

I. C. A. Adapters

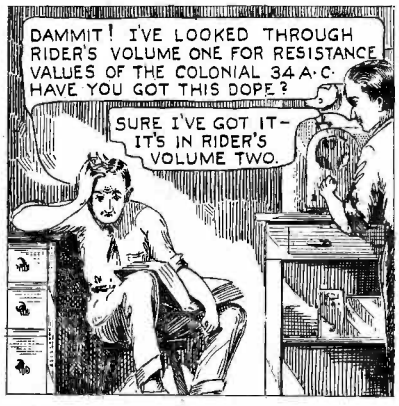
The Insuline Corporation of America have brought out a complete line of adapters for tube testers and set analyzers, and include types for handling the following tubes: 57, 58, PZH, Wunderlich, Duo-Diode, 41, 42, 43, 46, 82, and others.

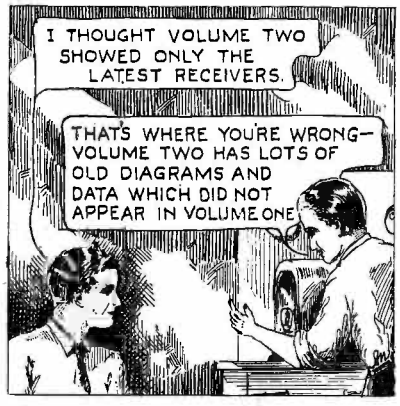
•

New Flechtheim Electrolytics

A. M. Flechtheim & Co., 136 Liberty Street, New York, N. Y., announce the addition of a complete line of dry electrolytic condensers rated at 500 volts d-c. peak in the inverted upright and cardboard containers. Their new electrolytic catalog No. 25A listing a wide range of capacities will be sent to anyone upon request.

THIS IS NO JOKE!...A True Story





SERVICE DATA ON 1927-1928-1929-1930-1931 SETS

(Shown in Volume II—Not appearing in Volume I)

Advance Electric	Echophone	Sears Roebuck
Atwater Kent	Erla	Silver-Marshall
American Bosch	Fada	Sparks Withington
Bremer Tully	General Electric	Steinite
Brunswick	General Motors	Stewart Warner
Bulova	Grigsby Grunow	Stromberg Carlson
Cable-Nelson	Howard Radio	Sentinel
Capehart	Kennedy	U. S. Radio & Television
Colonial	Montgomery Ward	Ware Mfg. Co.
Columbia	Ozarka	Wextark Radio
Crosley	Philco	Zenith

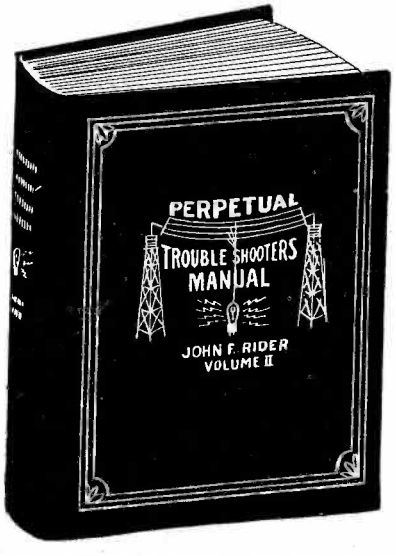
Service data on these and many others are found in Volume II

The above receivers are now coming into your shop for service. Being interested in the finest and most practical Manual available, you are eventually going to buy Volume II.

DON'T WAIT—until you are "stuck" on a job without the correct diagram and service data. The time you waste trying to service ONE job without a diagram will cost you MORE than the entire cost of the Manual.

VOLUME II

760 pages, two-tone blue cover, stamped in silver. Stiff cover allows the Manual to stand on end in your service library and protects the pages permanently. No duplication with Volume I. List price $5.00.



VOLUME II

contains old sets as well as new sets; power packs, eliminators, auto - radio sets, chassis layouts, voltage data, electrical values, color coding, alignment data, trimmer locations, socket layouts, peak frequencies, wiring diagrams and resistance data.

SEE VOLUME II AT ONE OF THE DEALERS LISTED ON THE SECOND COVER OF THIS MAGAZINE

If there is no dealer near you, write to us

RADIO TREATISE COMPANY, INC.

1440 Broadway **New York, N. Y.**

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of SERVICE—A Monthly Digest of Radio and Allied Maintenance published monthly at New York, N. Y., for Oct. 1, 1932.

STATE OF NEW YORK } ss.
COUNTY OF NEW YORK }

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared Robert N. Mann, who, having been duly sworn to law, deposes and says that he is the Business Manager of SERVICE—A Monthly Digest of Radio and Allied Maintenance, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, John F. Rider Publications, Inc., 1440 Broadway, New York, N. Y.; Editor, John F. Rider, 1440 Broadway, New York, N. Y.; Managing Editor, M. L. Muhleman, 1440 Broadway, New York, N. Y.; Business Manager, Robert N. Mann, 1440 Broadway, New York, N. Y.

2. That the owners are: John F. Rider Publications, Inc., 1440 Broadway, New York, N. Y.; John F. Rider, 1440 Broadway, New York, N. Y.; Florence Rider, 1501 Undercliff Ave., Bronx, N. Y.; M. L. Muhleman, 1440 Broadway, New York, N. Y.; Robert N. Mann, 1440 Broadway, New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

ROBERT N. MANN,
Business Manager.

Sworn to and subscribed before me this 26th day of September, 1932. [SEAL] JOSEPH NEUMAN.

(My commission expires March 30, 1934).

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R. M. Hyatt, Radio News, pp 398, January, 1933

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IRC Christmas Gift to the Serviceman...

THE other day I was looking over the circuit diagram of one of these modern radio sets which do everything but put the cat out for you at night. This receiver uses twenty-seven resistors in its circuit structure.

Now, some of the new receivers may use more, and some a lesser number. That's not the point, of course. The increasing use of resistors in modern radio circuits got me to thinking about the future, and what the Service Man should look out for.

In the old days, we used resistors for grid leaks and as voltage dividers or reducers. That was about the limit, unless the set used resistance-coupled amplification. Today, it is seldom that we see a resistor used as a grid leak, and voltage dividers have inclined to give way to more expansive networks of voltage-reducing and bleeder resistors. We have, in addition to these, bias resistors, resistors composing filter networks, decoupling resistors—which serve much the same function as the more expensive r-f chokes of yesteryear—and last but certainly not least, this new group of resistors used for the successful operation of automatic volume control circuits, noise-suppression circuits of one kind or another—these automatic circuits that silence the radio between stations—and also some of these frequency-compensation networks.

Well, what got me to thinking was that in the old days a resistor was pretty much a resistor, and didn't make such a whale of a difference if the value was off considerably. Why, in those days, with a general lack of precision of operation of both vacuum tubes and the circuits in which the tubes were used, it didn't matter an awful lot just what value of resistor you *did* use. A fellow could get by with most any value within reason.

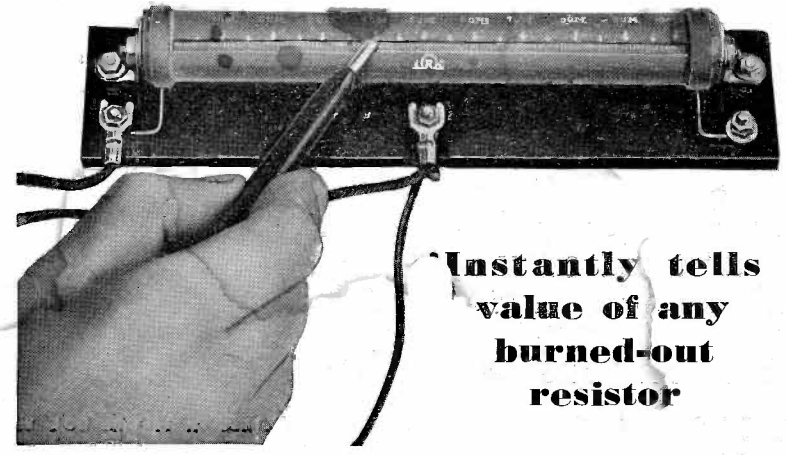
But now it's a different story. In many radio receivers, tubes are being operated within very narrow limits—practically trigger action in some cases, and if the value of the resistor or resistors in the circuits of that tube are not precise . . . well, the set just *can't* operate satisfactorily. This is particularly true in such cases where the voltage drop through a resistor is used to control the plate current flow, or the grid bias, on other tubes. Man—those resistors *have* to be right!

So, I thought to myself that we boys will have to pay more attention to resistors in the future, if we want to give good service.

Service Sam

The New I. R. C. RESISTOR INDICATOR

VEST POCKET SIZE

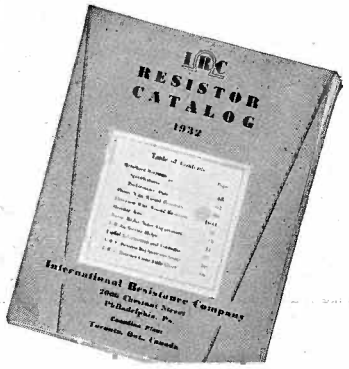


Instantly tells value of any burned-out resistor

HERE'S a new service help that will save you many a bad half hour. A quick practical method of testing the value of any resistor.

I.R.C. engineers have come to your assistance with this new device—a Resistor Indicator. It indicates the exact value of the damaged unit. Small—slips into your vest pocket. Packed in a neat little box. Complete instructions on its use goes with it.

This valuable Indicator is given *Free* with order for new I.R.C. Combination Resistor Kit No. 6. Write at once for data on how to get it. A postal card will bring full information — also Catalog showing complete I.R.C. line.



INTERNATIONAL
RESISTANCE COMPANY
2006 Chestnut Street, Philadelphia, Pa
76 Wellington St., West, Toronto
Ontario, Canada

Metallized also Power Wire Wound, Precision Wire Wound and Motor Radio Suppressors.

RESISTORS

EXACT DUPLICATE CONDENSERS For REPLACEMENT Service

CONDENSERS BY POTTER

A COMPLETE replaceme service of Duplica Condensers fo practically all radio sets has been offered by The Potter Company for years.

Specifications on hand for over 9000 condensers. *Partial List shown herewith.*

ATWATER-KENT
Models: 37, 40, 42, 46, 52, 38, 39, 55, 35.

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BALKEIT
All Models.

BELMONT
All Models.

BOSCH
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NORTH CHICAGO, ILLINOIS