NATIONAL RADIO NEWS

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GEORGE J. ROHRICH

In charge of N. R. I. Laboratory

George J. Rohrich . . .

GEORGE ROHRICH is one of Radio's real old-timers. He built his first Radio receiver and transmitter as far back as 1911 and in 1912 was issued **Amateur License Number 5.** His station was 3GB.

Rohrich was born at Baltimore in 1896. Elementary and high school training were received at Catonsville, Bethesda, and Rockville, Md., and Washington, D. C. At McKinley High School in Washington, his science teacher was J. E. Smith.

One night Rohrich invited Mr. Smith to inspect his "ham" outfit. So impressed was his teacher that George was employed as an Instructor when Mr. Smith started N. R. I. in 1914.

George is experienced in all manner of electrical equipment. He has been a maintenance man and electrical contractor. He served thirteen months, during the war, as Radio Instructor for the Army Signal Corps at Langres, France. He has been a ship operator and has served in the Radio Laboratory of the U. S. Bureau of Standards. In 1923 George became full time instructor in the resident classes and correspondence division of N. R. I. (Prior to that he had been acting as instructor in the evening resident classes.) When resident classes were discontinued he devoted his full time to correspondence training. He found time to continue his studies in Electrical Engineering at George Washington University.

The need of the Home Study student for practical work became apparent to Mr. Smith and Chief Dowie and George was assigned to the work of developing the practical units and writing the experimental work sheets. This is what keeps the "old timer" busy now at N. R. I. You can thank George Rohrich for your practical training.

A Tested Radio Service Club Plan

by D. L. Warner
Harvey, Ill.

MUCH has been said and written concerning the late depression and the return of prosperity. I say "late" depression because for certain far-sighted Radio-Men it is a thing of the past. Business lines are steadily showing an increase, and a little hard work will bring back a normal state in the various Radio branches. Particularly is this true of the Radio service.

There never was a better time to stage a campaign for new business than the present. Real effort should in a short time show a decided increase.

It is human nature for the buying public to flock to the place which offers an opportunity to buy for a little less than their neighbors. Give the average bargain-hunter a chance to buy at prices which are not open to the general public and he will in most cases gladly pay for the privilege.

A Dealer friend of mine in a neighboring town of about twenty-three thousand people recently decided to put on a campaign for memberships in a Benefit Sharing Radio Club and the results were so much better than expected that it should be of interest to everyone considering the formation of clubs of a like nature.

This organization already had two service men who were not kept busy. The campaign has furnished ample work for them and has also been the direct cause for a substantial increase in the profits derived from replacement parts.

The yearly subscription rates are six dollars, sold on the dollar down and a dollar a week plan, the first dollar going to the salesman as commission. Since the larger the membership the more successful the operation of the system, a crew of five experienced Rádio Salesmen were put out to make a house to house canvass of the town. The two service men were also called upon to put forth every effort to obtain subscribers when called out for inspection or repairs in the home. The entire personnel of the company became interested in collecting their share of these easily gotten commissions and succeeded in helping to raise the total. In a period of three weeks over a thousand members were signed up and new members are obtained each week. After two months, the Service and Parts departments have shown such a steady increase in receipts that the Service benches have been completely dressed up with new and up-to-date test equipment. Sales of new sets have also shown a decided increase over the previous six months record.

The outstanding clauses incorporated in the agreement between the Dealer and the individual Club member are as follows:

1. A Free Inspection service in the home at all times upon request. It was considered easier to care for a large number of people by giving these inspections only upon request, since, if periodic visits were to be made the two available men would not have been able to get through the list in any one period of time.

2. Benefits to members were to be distributed in the form of reduced prices on everything in the Radio Dept. Discounts of 10% allowed on replacements and tubes, and 25% on all Labor or Service charges.

3. The regular commission of one dollar is allowed each member for every new member he or she is able to sign up; the commission being allowed on the next bill for repairs of parts.

4. In the event that any member should wish to buy a new set during the period of the subscription, a reasonable allowance is made for the old set, and an additional discount of 5% is allowed from the Retail price of the desired new one.

This last inducement can easily be seen as the underlying reason for the increase in the Sales De-

(Continued on page 10)

My Own page

THIS AGE OF MACHINES

LET'S look back a number of years and visualize a big construction job. Here's what we'd see:

A structure of brick, concrete, and iron rising out of a chaos of trenches, lumber, mud, and all a veritable beehive of human activity. Sawing at big timbers were the carpenters; men mixing mortar for brick layers, masons, plasterers. Painters brushing on their color; huskies wielding pick and shovel in excavations. **Then came the machines.**

A steam shovel and two skilled men replace dozens of laborers. One man with a spray gun supplants many painters. One auto-truck driver will do the work of several teamsters; his truck even mixes the concrete on the way to the job. Ten carpenters find their sawing done by one man and a machine. The machine operators are skilled labor; the rest join the ranks of the unemployed.

As the over supply of unskilled labor increases, the pay they receive becomes less. What then is the secret of existence? It is training.

We've yet to see a machine which has brains. We've yet to see machinery which can service a Radio receiver; design an amplifier. The mechanical device is yet to be developed which can find a prospect and sell a Radio.

The pessimist will tell you this theory is wrong. "Look around," he will say, "and you'll find skilled as well as unskilled men out of work." True, but remember times are not normal. We are in a bad depression. But when times go back to normal—see who is the first to be hired. It will be the trained man.

ALUMNI YEAR BOOK POPULAR WITH MEMBERS

THE favorable comment resulting from the first issue of the Alumni Association Year Book far exceeded our expectations.

We knew the Association officers in charge of getting up this book were working hard to make it a success but we realized that it was their first attempt at such a job, and didn't expect such a fine piece of work.

But it turned out great. Only one officer of the Association was unable to contribute and the articles were timely and instructive.

We are indeed glad for any part the Institute personnel might have played in making this Alumni Year Book a success. More power to the Association; we hope they keep up the good work.

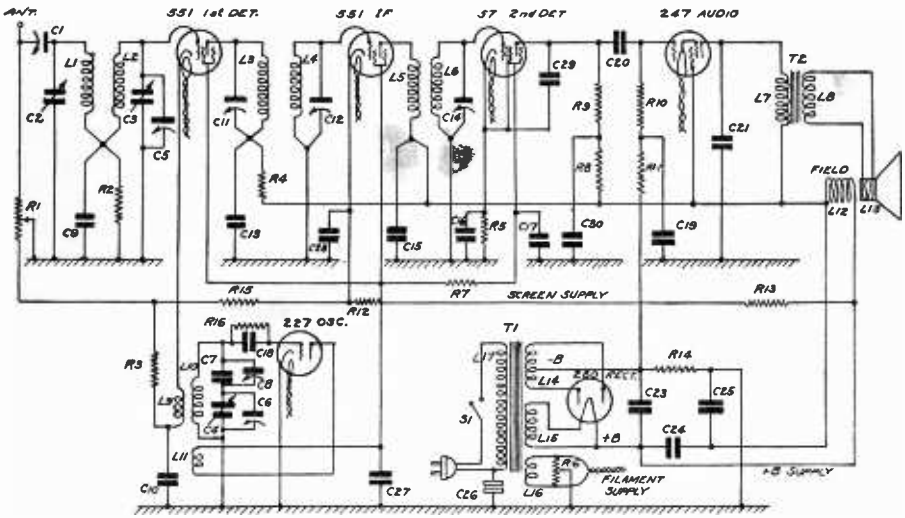
We say again as we have said before: "Students, keep working steadily toward your graduation when you will be eligible for membership in this fine organization." As Lucky Strike would say, "They are the cream of the crop."

J. E. Smith

President.

RADIO-TRICIAN SERVICE SHEET
REG. U.S. PAT. OFF.
COMPILED SOLELY FOR STUDENTS & GRADUATES

BOSCH MODELS 200-1-5-6-36-3



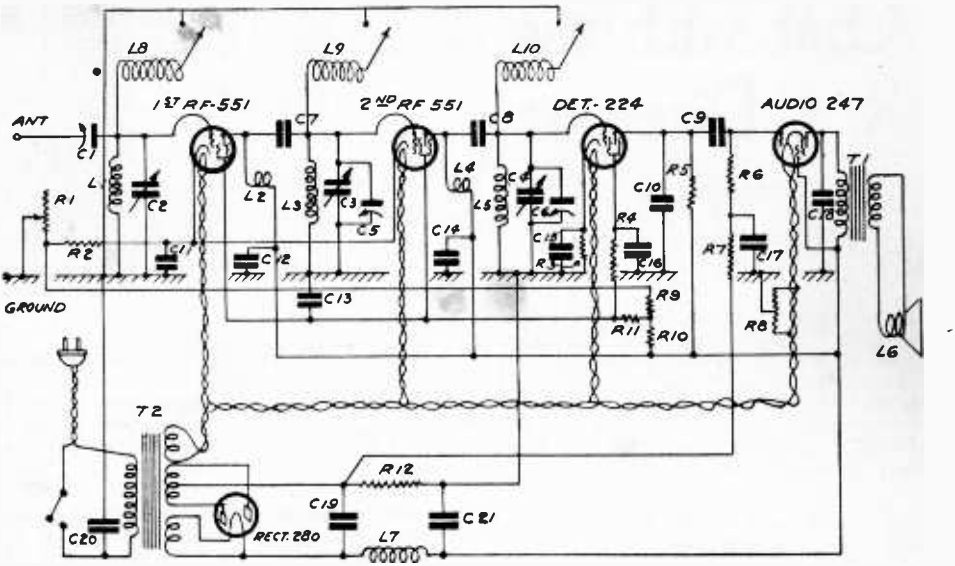
Schematic Diagram of Model 236 Receiver

ELECTRICAL VALUES

R1 - 10000 ohms	C1 - Trimmer	C17 - .25 mfd.
R2 - 1000 ohms	C2 - Tuning	C18 - .0001 mfd.
R3 - 5000 ohms	C3 - Tuning	C19 - .05 mfd.
R4 - 1000 ohms	C4 - Tuning	C20 - .01 mfd.
R5 - 25000 ohms	C5 - Alignment	C21 - .006 mfd.
R6 - Mid Tap	C6 - Alignment	C23 - 8. mfd.
R7 - .5 megohm	C7 - Alignment	C24 - .05 mfd.
R8 - .1 megohm	C8 - Alignment	C25 - 4. mfd.
R9 - .5 megohm	C9 - .05 mfd.	C26 - .01 mfd.
R10- .5 megohm	C10- .05 mfd.	C27 - 8. mfd
R11- .1 megohm	C11- Alignment	C28 - .02 mfd.
R12- 20000 ohms	C12- Alignment	C29 - .0001 mfd.
R13- 30000 ohms	C13- .05 mfd.	C30 - .01 mfd.
R14- 350 ohms	C14- Alignment	
R15- 300 ohms	C15- .05 mfd.	T1 - Power Trans.
R16- .1 megohm	C16- .5 mfd	T2 - Audio Trans.

STAGE	TUBE	PLATE	SCREEN	CATHODE	GRID	FIL.	PLATE MA
1st Det.	551	250	80	35	8	2.2	2
Osc.	227	75	--	* .1	* .1	2.2	8
I.F.	551	250	80	3	3	2.2	4
2nd Det.	224	60	*5	2	2	2.2	*.1
Audio	247	250	250	-	*3	2.2	32
Rect.	280					4.8	29

* These values will vary considerably with the type of test kit employed, due to the high resistance in the circuit.



Schematic Diagram of Model 200 Receiver

Models 205 and 206 use same hookup, without coils L8, L9 and L10.

ELECTRICAL VALUES

R1	= 10,000 ohms	R11	= 10,000 ohms	C9	= .006 mfd.	C19	= 8. mfd.
R2	= 200 ohms	R12	= 400 ohms	C10	= .0001 mfd.	C20	= .01 mfd.
R3	= 50,000 ohms	C1	= Trimmer	C11	= .05 mfd.	C21	= 4 mfd.
R4	= 2 megohms	C2	= Tuning	C12	= .05 mfd.	L1	= Ant. Coil
R5	= 1 megohm	C3	= Tuning	C13	= .25 mfd.	L2	= Primary
R6	= 500,000 ohms	C4	= Tuning	C14	= .01 mfd.	L3	= Secondary
R7	= 100,000 ohms	C5	= Alignment	C15	= 1. mfd.	L4	= Primary
R8	= Center Tap	C6	= Alignment	C16	= .25 mfd.	L5	= Secondary
R9	= 20,000 ohms	C7	= Coupling	C17	= .05 mfd.	L6	= Voice Coil
R10	= 15,000 ohms	C8	= Coupling	C18	= .01 mfd.	L7	= Field Coil

Note: Electrolytic filter condensers C19 and C21 are a single assembly. Condensers C11 to C18 inclusive are also a single assembly contained in the square can underneath the base plate.

STAGE	TUBE	FIL.	PLATE	SCREEN	CATHODE	GRID	PLATE MA
1st RF	551	2.3	250	90	2.5	3.0	4.5
2nd RF	551	2.3	250	90	2.5	3.0	4.5
Det.	224	2.3	*150	*20	3.0	1.5	.5
Audio	247	2.3	250	250	-	*16	32
Rect.	280	4.8		Plate current of each plate			20

The readings were made with the volume control in the full "on" position.

*These voltages are the correct values altho the average test kit will probably give much lower readings (as low as 1/10 of these values) due to the high resistance included in the detector plate and screen circuits, and the audio grid circuit.

RADIO-TRICIAN SERVICE SHEET
REG. U. S. PAT. OFF.
COMPILED SOLELY FOR STUDENTS & GRADUATES

WELLS-GARDINER SEVEN-TUBE SUPERHETERODYNE

(Series 10)

A MODULATED test oscillator and an output meter MUST be used when aligning this receiver to insure accurate alignment. It is important that the oscillator deliver a signal at exactly 175 K.C. in addition to frequencies in the broadcast band.

The adjustable condensers which tune the secondaries of the intermediate transformers are located under the hole in top of the shield where the grid lead to the tube is brought out. The condensers which tune the primaries are located under the small hole opposite. Make each adjustment in the order given below or the receiver may be thrown further out of alignment and it will then be a difficult task to align it properly. The receiver and test oscillator must be well grounded. All shields must be in place when making the adjustments.

INTERMEDIATE CIRCUITS

Tune the test oscillator to exactly 175 K.C. and connect its output to the grid of the first detector tube after removing the clip on the lead from the gang condenser. Adjust the primary and secondary of the first intermediate transformer for greatest volume. Follow the same procedure on the second intermediate transformer and then turn the receiver off. Disconnect one end of the speaker voice coil and connect the output meter across the secondary of the speaker coupling transformer. Short the oscillator tuning condenser (in the gang) by grounding the stator plates with a screw driver.

Turn the receiver on and adjust the output until the output meter shows a small or medium scale deflection. Adjust the primary of the first intermediate transformer for the greatest deflection on the output meter. Adjust the secondary in the same manner.

Follow the same procedure on the second intermediate transformer and then check the settings of all condensers to make certain the maximum output has been obtained. Remove the test oscillator coupling and replace the grid lead on the first detector, and also remove the screw driver shorting the oscillator tuning condenser.

GANG CONDENSERS

Couple the test oscillator output to the antenna, (white wire), on the receiver. Tune the oscillator to 1400 K.C. and carefully tune the receiver to the signal. A trimmer condenser is mounted over each condenser in the gang. The shield should not be removed. Adjust each trimmer condenser for maximum deflection on the output meter.

OSCILLATOR

Tune the test oscillator to 600 K.C. and tune the receiver to the signal. Then after turning the receiver off, disconnect the output meter and replace the voice coil lead which was disconnected.

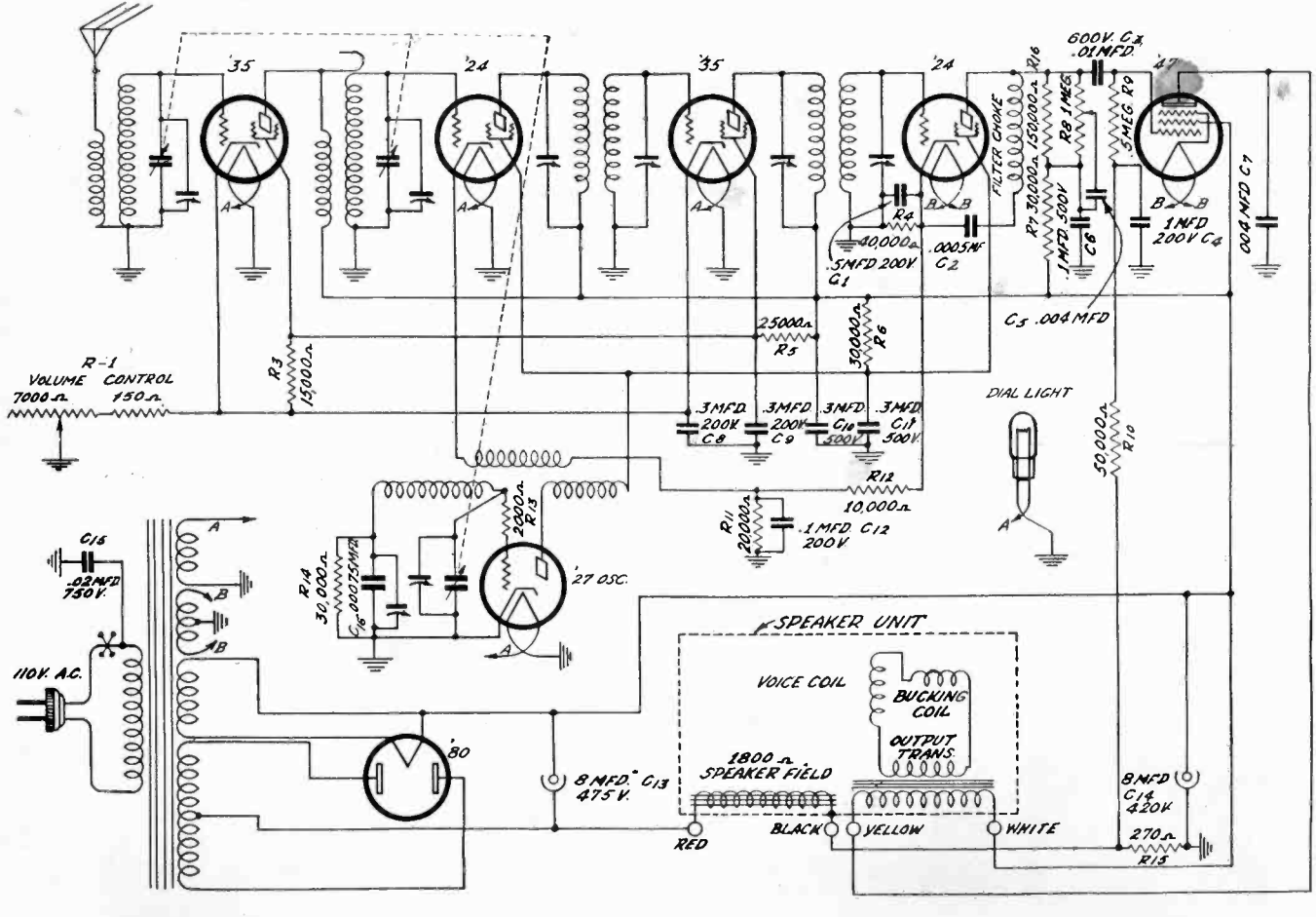
Turn the receiver on and rotate the adjusting screw on the 600 K.C. tracking condenser under the hole in top of the oscillator transformer shield. Rock the gang condenser back and forth across the signal at the same time and listen closely until the maximum volume is obtained. The tracking condenser is then properly adjusted and remains fixed thereafter.

Editor's Note: While the above instructions apply definitely to the Wells Gardiner Receiver, they can also be applied to practically any superheterodyne set.

CHANGES IN LATER CHASSIS

A yellow paint mark on the right rear corner of a chassis indicates the following change has been made:

The oscillator coil is mounted on a bracket, inside a rectangular shield, but the 600 K.C. tracking condenser is mounted separately, underneath the chassis and its adjustment screw will be found on the left front corner of the chassis base. The 2,000 ohm grid resistor (R13) and the .00075 mfd. condenser (C16) are not used. A 1,000 ohm cathode bias resistor will be found mounted between the oscillator cathode and ground.


'35
'24
'35
'24
'47
FILTER CHOKE
600V. C3 .01MFD.
R6 1MEG
.5MEG R9
R7 30,000Ω 150,000Ω R16
.1MFD 500V C6
1MFD 200V C4
.004 MFD C7
R4 40,000Ω
.5MFD 200V C1
.0005MF C2
C5 .004 MFD
25000Ω R5
30000Ω R6
R-1 VOLUME CONTROL 7000Ω 150Ω
R3 15000Ω
.3MFD 200V C8
.3MFD 200V C9
.3MFD C10 500V
.3MFD C11 500V
DIAL LIGHT
50,000Ω R10
R12 10,000Ω
R11 20000Ω
.1MFD 200V C12
2000Ω R13
R14 30,000Ω
C16 .00075MFD
'27 OSC.
C15 .02MFD 750V.
110V. A.C.
'80
8 MFD. C13 475 V.
SPEAKER UNIT
VOICE COIL
BUCKING COIL
OUTPUT TRANS.
1800Ω SPEAKER FIELD
RED
BLACK
YELLOW
WHITE
8MFD C14 420V
270Ω R15

N.R.I. ALUMNI News

INTERESTING WORK THIS AVIATION-RADIO

By
CHAS. STEINHOFF,
Omaha, Nebraska

IN 1930 I took the Civil Service examination for Airways Radio Operator, receiving an appointment the first of December of that year. After a short time at Cleveland, I was transferred to Omaha to fill a vacancy.

The Radio station here has a high power transmitter for broadcasting weather reports, etc., to the planes and for code work on intermediate frequencies. There is a high frequency telegraph transmitter on which most of the communication work is done. We have several receivers, chiefly a high frequency A.C. receiver and an intermediate receiver. Weather reports for different sectors are broadcast on a regular schedule four times an hour and special reports given at any time.

The Radio station, the teletype station, and a Radio range are at present in separate locations. The Radio station was moved close to the airport last year.

The Government has a network of Radio range stations on all main airways in the country. They send out beams or directional signals that are picked up by the receivers on the planes. Each station has an identifying signal and an "on-and-off course" signal to guide the plane. Here and at most other places the range is synchronized with the broadcast transmitters and operates on the same frequency. The range is shut off automatically during the regular broadcast of two minutes; so that the planes need not change setting on the receiver.

The teletype station has recently been moved from the Radio station at Bellevue to the new municipal building at the airport which is now on the other side of the city from the location at Bellevue. In the near future it is expected to operate both the Radio transmitter and the Radio range by remote control from the teletype station and all operators will be located at the airport.

The range transmitter is at present operated by remote control from the Radio station. We have four teletype or printing telegraph machines at the teletype station connected to the East, West, and South lines and a local line to the transport company from the Radio station. The East line is from Omaha to Chicago—the West line from Omaha to Cheyenne and the South line to Kansas City. I have an opportunity to work all of this apparatus and it certainly is interesting. My N. R. I. training has been a great help to me in this work.

Notice To Alumni Members:

All Alumni Members will receive with this issue of National Radio News a ballot form for nomination of Alumni Officers for the year 1933. Members are expected to fill out this blank and return it AT ONCE.

SPRAYBERRY'S NEW SET ANALYSER . . Cont'd from page 10

this measurement it is only necessary to set S1 to the proper range and depress the push-button of S14.

To make a negative grid voltage measurement, set S1 properly and depress push-buttons S2 and S14 simultaneously. The regular negative grid voltage will now be indicated on the voltmeter.

FILAMENT VOLTAGE

To measure filament voltage, turn switch S3 to "on," set S1 to correct range, set S10 to neutral, and depress the push-button of S13.

Control-grid voltage is always negative except in the case of a space-charge amplifier. To measure control-grid voltage, set S1 and depress S2 and S12 simultaneously. In the case of a space-charge tube, set S1 and depress S12.

Cathode voltage may be either positive or negative. In most cases it will be positive. To make this measurement, set S1 and turn S10 to F, then depress the push-button of S11. If the cathode is negative, depress S2 and S11 simultaneously.

Pentode screen-grid voltage is always positive. The measurement is made exactly as described for positive cathode voltage, with the exception that S1 is set to the 500-volt position.

Either pentode screen-grid current or regular plate-cathode current may be measured in connection with switch S7. It is only necessary to set S4 to the proper position and S10 to neutral, then depress the push-button of S7.

Screen-grid current is measured by setting S4 properly and turning S10 to neutral, then depressing the push-button of S9. As a rule, screen-grid current will be low in comparison to other currents to be measured. However, always use a high scale first to protect the meter against shorts.

RECTIFIER VOLTAGE

The voltage applied to the plates of an —80 rectifier will always be high. Therefore set S1 to the 1000-volt position. Set S10 to the neutral or off position. Set S3 to the "on" or a.c. position. Then depress the push-button of S16. The total a.c. voltage across both plates will now be indicated on the 1000-volt scale of the meter. This provides a good check on the high-voltage winding and enables you to tell if this winding is open.

Set S4 to the high position, and set S10 to neutral. Depress the push-button of S8 for one plate-current reading and the push-button of S9 for the other plate-current reading.

(To be concluded in next issue)

Nothing is easier than fault-finding; no talent, no self denial, no brains, no character are required to set up in the grumbling business.—Robert West.

INDEX

IN MEMORIAM

After an illness of just one week Alumni Association Member Charles Herman Erb, 51 Melrose Avenue, East Lansdowne, Pa., died of heart trouble. The Association mourns the loss of a valued member.

A Chat with the N. R. I. Director

E. R. HAAS
Vice President
and Director

Are You a WISHER Or a GETTER

FEW people think of themselves, "I am rich" or "I am poor." Many people say to themselves hundreds of times every year, "Oh, how I wish I had more money." "If only we had a better house." "I wish I had a new car." "If only we had better clothes, lived in a better neighborhood, had more money, what a wonderful time we could have."

You practically never hear anyone say, "I have everything I really need." The people who HAVE what they want are in the minority. Most people DON'T have what they want and are therefore HAVE NOTS.

What do you notice about the HAVE NOTS? Every last one of them is a WISHER. Does wishing get them what they want? Does wishing for a fine home, a nice car, a big salary, a good job, pleasant work and all the rest of the good things of life—GET THEM?

Absolutely NO!

How then do the WISHERS get out of the HAVE NOT class into the HAVE class? There is just one answer. They stop being mere wishers and become GETTERS. They go after what they want—stop being "hopers" and "wanters" and become go-getters.

Here is an amazing thing about human nature. Most people would rather be wishers than getters. They get a little weak pleasure out of thinking about the things they want—and it never even occurs to most of them to go after what they want and get it.

Any man who shows enough of the old "get up and get" spirit to undertake the N. R. I. Course proves that he is not a mere wisher. There is hope for him.

He cannot—must not—forget, however, that it is always easier to wish than to get. He must fight continually against the temptation to drift back into the life-long day dream of the WISHERS. He must spur himself every day to new efforts, new achievements—fresh steps along the road he has mapped out for himself.

Every lesson in the Course—every page, every paragraph—is a challenge to be a getter. Don't "wish" that you understood it better. Go over it again—and again if necessary—and get what is in it.

Resolve afresh to get every lesson in the Course, and get it more thoroughly than anything you have ever read or studied before. Resolve once more to master Radio, carve out a place for yourself in this growing field and —by virtue of being a getter instead of a wisher—become as quickly as possible one of those who COMMAND instead of wishing and who HAVE what they want.

The chief issue in the coming elections is who will be the next President. But, that's not all. The Democrats have control of The House of Representatives by a very slight margin; the Republicans have the Senate by an equally slim margin. As a great number of the states will elect or re-elect for these offices in November, there will be a battle for control.

There are rifts and splits in all directions over prohibition, unemployment, tariff, war debts, soldiers' bonus, farm relief, and governmental expenses.

The public waits at its loudspeakers for the campaigns and the elections. And an army of Radio men will be required to condition sets for these events. A harvest awaits the men with initiative to get after the work. Will you be with the harvesters?

SPRAYBERI
A NEW SET

PA

Frank Sprayberry, N. R. I. consultant on Radio S
which can be built by the serviceman at a cor
completion in this issue it will be concluded in
build the tester until you receive your Novemb
of great

DUE to numerous requests from N. R. I. students and graduates for a set analyzer that will test all modern tube circuits we have designed the one shown in fig. 1. With it the service man can analyze the circuits of such new tubes as the '14, '17, '29, '33, '34, '35, '37, '38, '39, '41, '42, '43, '44, '47, '51, '55, '56, '57, '58, '69, '82, '83, '93, '95, 841, 864 and the Wunderlich besides providing facilities for taking care of all older type tube circuits.

The analyzer about to be described was designed around the Weston rectifier type model 301 universal voltmeter. With this meter it is possible to measure both a.c. and d.c. voltage and d.c. current in several ranges, depending on the number of shunts used. The voltage range is extended by means of series multipliers. The low a.c. range also serves for making receiver output measurements. In fact, this one meter may be used to make all measurements on the modern receiver.

By the use of proper switches the meter is changed from circuit to circuit quickly, and within a few minutes the serviceman may determine if abnormal conditions are present in the circuits of the receiver under measurement; or in the tubes, as provision is made (S5 and S6) for testing the latter by changing the grid-bias by an amount equal to the C battery voltage.

MAY BE BUILT ON INSTALLMENT PLAN

If for reasons of economy the constructor wishes to cut down the constructional cost for original parts, he may do so and add the other parts later. For instance, the plate current switch (S8), the plate voltage switch (S15), the grid voltage switch (S14), the filament switch (S13), one UY type socket and one UX type socket may be included. All other parts may be left out until some future time, when more money is available. However, the cost of the complete set of parts is so low (with the usual servicemans discount),

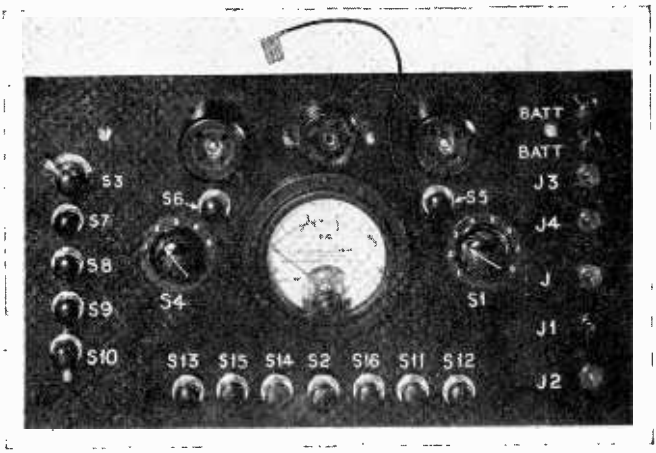


Figure 2—Arrangement of controls. Note. Cut shows two four-prong and one five-prong socket. It should show one each, four-prong, five-prong and six-prong sockets.

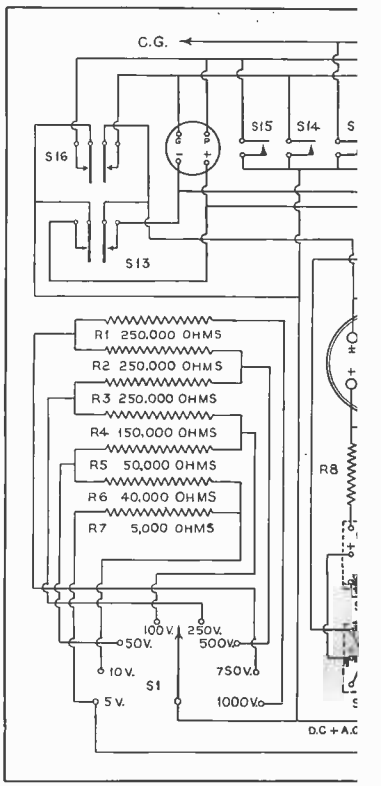


Figure 1—The Schematic Circuit

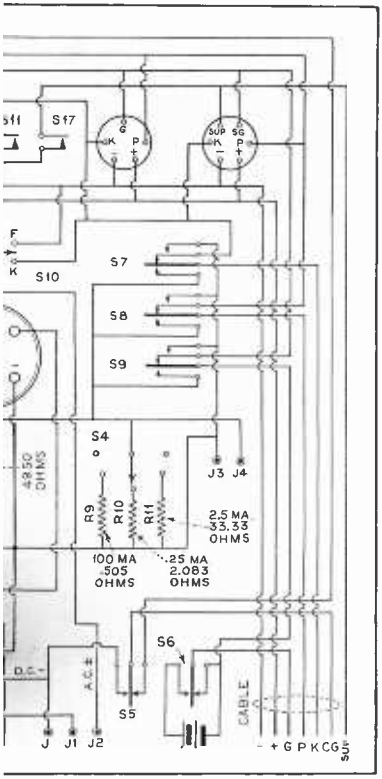
Y DESIGNS ANALYZER

[I

ing has developed a new a.c. and d.c. set analyzer atively low cost. As the article is too long for ember National Radio News. Do not attempt to lews as the information contained in it will be portance.

in comparison to similar manufactured testers, that the parts required are well within the reach of most servicemen.

Figure 1 shows the complete circuit in schematic form. The circuit is not at all difficult to wire after the various parts are mounted on the panel. Any one who is able to work from a schematic diagram can do the wiring.



ram of the Sprayberry Set Analyzer.

A panel may be chosen to fit available carrying cases, as no one size is essential as long as the electrical connections are correct. The writer chose a 7-inch by 12-inch panel, because that is a standard size and therefore less expensive than one of odd size. The carrying case specified in the list of parts is made to accommodate this panel, and provides a compartment for the test cable and plug.

The selection of the resistances to extend the range of the meter is of paramount importance. The accuracy of the entire tester depends on the accuracy of these resistances. Be sure, therefore, that you use precision resistors with an accuracy of at least 1 percent. The writer used I. R. C. resistors (made by the International Resistance Company, 2006 Chestnut Street, Philadelphia, Pa.) because they are easy to mount and have the proper accuracy.

Figures 2 and 3 show the panel appearance of both top nd bottom sides after all parts have been mounted.

Figure 1 should now be followed in wiring the analyzer, using No. 18 solid push-back wire having a good grade of insulation.

In starting the wiring it is suggested that the meter be wired first to switch S3. Then wire switches S7, S8, S9, S11, S12, S13, S14, S15, S16, S17, S10, S5, S6 and the jacks J, J1, J2, J3 and J4 in the order named. Finish any miscellaneous wiring to the sockets and switches. Next mount the resistance support and wire the resistances to switches S1 and

(Continued on page 10)

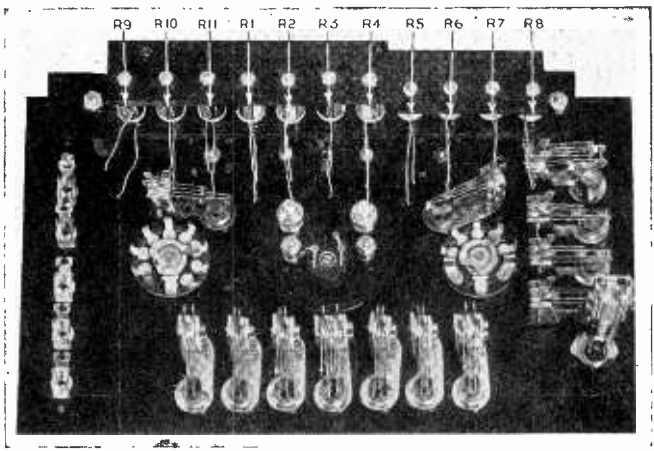


Figure 3—Back of panel with parts mounted and ready for wiring. S-17 is not shown. Mount it next to S-12.

A RADIO SERVICE CLUB PLAN . . . Cont'd from page 3

partment and many members quickly availed themselves of the opportunity to re-equip their respective receivers with complete sets of tested and matched tubes.

Requests for inspections come in at the rate of from twenty to thirty a day, and the contacts thus made enable the Service Men to pass on a number of good prospects to the members of the Sales Staff.

Careful consideration of the various inducements which can be made will show that a clientele of permanent customers can be obtained at very little expense, and the accumulated funds derived from this source can be turned into the capital account and used to very good advantage in the purchase of much needed test equipment, replenishment of the parts stock, or for any of the other matters requiring the use of some ready cash.

Too much cannot be said in favor of the plan as a business builder for the independent Service Man who wishes to enter into a business of his own, since the initial expense can be very small.

The use of salesmen while being slightly original in the formation of a membership list, is almost necessary, and many good men with experience in the selling of Radio equipment or electrical appliances can be obtained when it is seen as a quick and not too hard means of earning a sizeable salary.

SPRAYBERRY'S NEW SET ANALYZER . . . Cont'd from page 9

S4, including the 4950-ohm one between the meter and switch S3. Bore a hole between the sockets and bring out the control grid lead. Next wire the cable from test plug to the circuit.

All connections should be soldered, making sure that good contact is made at all joints.

Voltage measurements should always be made first with any set analyzer. The reason for this is there may be a short circuit in the circuit under test, causing excessive current flow. If by accident the milliameter is connected in series with the circuit, the excessive current may damage the meter.

A fairly satisfactory way to determine if the tube has shorted elements is to make voltage measurements first, with the tube out of socket of analyzer. Next insert the tube in socket and again make a voltage measurement. If the voltage reduces to zero, or nearly so, the tube has shorted elements and another one should be used in its place.

Insert the test plug in the receiver socket. set switch S1 to the 500-volt position and set switch S10 to the "F" or "K" position, depending on the type of tube being tested. (If the tube is of the direct heater type, such as the 26 or 45, set S10 to "F." If it is of the indirect heater type, such as the 27, 24 or 35, set S10 to "K.") Now depress the push-button of switch S15, and the plate voltage will be indicated on the meter if the receiver is turned on. Insert tube in tester socket. If about the same reading is obtained, the tube is not shorted. However, if the tube is in a resistance-coupled circuit, the voltage reduction may be quite large, as for instance from 200 down to perhaps 50 volts. The reason for this is that the meter draws little current, so that no appreciable voltage drop develops across the plate coupling resistor. However, as soon as the tube draws current voltage will rapidly reduce, and this is entirely a normal condition.

If the 500-volt scale does not give a readable value, drop to a lower scale by turning switch S1 to the left, using the scale which just exceeds the voltage to be measured.

(*When making current measurements switch* S10 *must be in the neutral position.*)

Set the switch to the highest position, or the first one to the right, set S10 to neutral and depress the push-button of S8. Always use the highest current range to start with; you can then drop back to lower scale by turning S4 to the right. When through making current measurements, always turn S4 all the way to the right, which is the "off" position. This will prevent any interaction between circuits should the wrong push-button be depressed at any time. The last contact to the right of S4 is the one milliampere position. It is to be used when measuring small values of current, as for instance, the current of a detector tube or the current of a screen-grid circuit. Never use this position where the current in the circuit is likely to exceed one milliampere.

Grid voltage may be either negative or positive, with respect to the grid. A polarity reversing switch, S2, has been provided in the circuit so as to take care of this condition. This switch is normally connected so that the meter will read positive with respect to the grid. In making screen-grid voltage measurements, switch S2 is not disturbed. To make

(Continued on page 14)