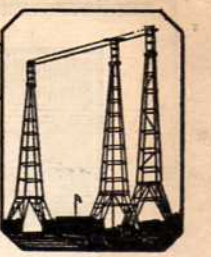
NATIONAL RADIO NEWS



FROM N.R.I. TRAINING HEADQUARTERS

VOL. 3—NO. 5 WASHINGTON, D. C. DECEMBER, 1930

That Happiness and Prosperity
May Be Yours
This Christmas
and All Through the
New Year
Is the Wish of Everyone
at the
National Radio Institute

J. E. Smith, President

J. E. SMITH

The PRESIDENT'S PAGE

THE Times Square Television installation of the National Broadcasting Company has been completed. The Columbia Broadcasting System has requested authority from the Federal Radio Commission to erect one in connection with its New York studios.

Television

For the present, neither chain will use Television for commercial purposes, but lots of experimenting will be done with these stations.

The interest of these two large broadcasting organizations in Television certainly speaks well for the ultimate future of this branch of the Radio industry.

GENERALLY improved business conditions are indicated by an increasing demand for radio advertising, according to William S. Paley, president of the Columbia Broadcasting System. In an interview Mr. Paley said:

Broadcasting

"The business of broadcasting is in a healthy condition. New contracts have been signed by a number of leading manufacturers for advertising time on the nation-wide network of the Columbia System and we have had many renewals, indicating industry generally expects to return to normal. Today we are carrying a greater volume of business than ever before and inquiries indicate a steady future growth.

"We regard this as indicative that business has found Radio broadcasting a powerful aid even in times of depression and as evidence that the leading manufacturers have confidence in the buying power of the public to the extent that they are spending millions of dollars to advertise their products by Radio.

"The Columbia Broadcasting System looks forward to the biggest year in its history."

"DURING the first four days of the world series baseball games I made $61.20," writes a student in Pennsylvania. Another one says: "The Sharkey-Schmelling prize fight cleared me over $100 fixing up sets so the owners wouldn't miss anything." The wise Radio man—whether he is operating a large store or doing Radio work in his spare time, will keep his eye on big events and profit by them.

Big Events and Profits

Nearly everything of interest in the sporting world—football, baseball, races, prize fights, is broadcast. Big political speeches, election returns—all are of interest to the public, otherwise they wouldn't be put on the air.

Keep a calendar of these events. The newspapers will give you the dates well in advance and give you time enough to solicit old customers and new ones. Sell them on the idea of service for their sets so they'll be ready for the big events.

TWENTY-FOUR municipalities and two States have been licensed by the Federal Radio Commission to operate police Radio stations for the broadcasting of orders to squad cars and outlying stations. Twenty other cities have been issued Federal permits for the construction of such stations.

Police Radio

Chain Broadcasting Now Possible on One Wavelength

By MARTIN CODEL

(Special to National Radio News)

Chain broadcasting has reached the point where one wavelength is sufficient to carry a network program to the entire country.

The first definite statement that such synchronization has been achieved came from M. H. Aylesworth, president of the National Broadcasting Company, in a conference here with the Federal Radio Commission. Mr. Aylesworth made it clear, however, that various factors, technical, economic and political, enter into the proposition and no revolution will be wrought in broadcasting immediately or within the next few years.

"I am gratified to inform you," Mr. Aylesworth told the commission, "that synchronization in the field of Radio broadcasting is now out of the laboratory. Experiments and tests which we have been conducting have definitely demonstrated that, from a technical standpoint at least, it is now possible to operate two or more stations on the same radio frequency without distortion."

By special arrangement National Radio News will from time to time publish articles by Mr. Martin Codel, famous for his Radio writings in leading newspapers.

We know you'll like Mr Codel's articles. They are of interest to all Radio-Tricians because they discuss matters of great importance to the Radio Industry. You'll hear more from Martin Codel later.

The tests consisted of linking high powered transmitters at Schenectady and Pittsburgh by telephone and control wires and operating them simultaneously with WEAF, New York key of the N. B. C., on the wave length of WEAF. All broadcast the same program originating at WEAF. These tests, carried out under the guiding genius of C. W. Horn, general engineer of the N. B. C., have been entirely successful, Mr. Aylesworth reported.

Such synchronization has been the goal of Radio engineers almost since the beginning of congestion on broadcast wave lengths. At present the occupation of one channel by two or more stations almost inevitably means interference somewhere between them if they operate with substantial powers or if they are geographically near one another.

With synchronization accomplished, the next logical step is the establishment of chains of stations, probably owned and operated by the chain organizations themselves, to carry the same program on the same wavelength. These stations may be a few high powered ones strategically placed throughout the country, or they may be a multitude of booster stations so placed that their "signals" will cover the country. Most likely they will be owned by the chain organizations themselves, giving the latter complete 24-hour outlets for their national programs.

Far from spelling the end of chain programs from the independently owned stations which now dominate the spectrum, the scheme will probably mean the establishment of additional chain services to the independently owned stations. They would have all the time they wanted for their programs of local origin and according to Mr. Aylesworth, they could then supplement their local offerings with such chain programs as they choose. Particularly would all national news event broadcasts be made available to them, for the chain has no intention of dropping its affiliations with independent stations, he declared.

There are distinct limitations upon the immediate possibilities of synchronized network broadcasting. First, the cost of erecting the booster stations and linking them by telephone wires to keep them in phase and to carry the programs would amount, it is conservatively estimated, to well over $35,000,000. Secondly, a sweeping reorganization of broadcasting, involving a considerable realloca-

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National Radio News

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NATIONAL RADIO INSTITUTE

Washington, D. C. December, 1930

E. R. HAAS
Vice President and Director

The Story of a Sale

A Radio-Trician drove his car up to a gasoline filling station. The Radio he had just installed in it was giving the world series baseball game—play by play.

"What's the score?" asked a salesman who had also pulled up for gas.

"Two to one; Philadelphia leading," was the reply.

"I haven't heard a complete game during the series," continued the salesman. "Guess I'll take tomorrow afternoon off and tune in."

"Why do that?" questioned the Radio-Trician—"Why lose a half day from work—miss seeing your customers on time—lose business and break up your schedule? Why not put a Radio in your own car, then you can have programs wherever you go?"

The salesman thought this was a good idea. He made long, lonesome trips. His customers had Radios. When he arrived they talked about the happenings of the day. He had to get his information second hand.

The result of sixteen minutes conversation was a sale and installation of an automobile Radio by the Radio-Trician. He writes, "Mr. Smith, tell the boys that salesmen are good prospects for Auto Radios. Since that day in October—I've sold nine sets to travelling men and there sure is a nice profit in those Auto Radios."

A Success Plan

The program of a successful man contains four important factors: Ambition —a Goal—Preparation—Optimism.

Jim Blank says: "I wish I had a good job like Joe Brown,"—then spends his evenings playing pool. That's not ambition—even though he thinks it is.

Brown didn't get that good job by "wishing." His was a very different procedure.

Brown wanted a good job. He planned for it and worked out his ideas. First he decided definitely what he wanted to do—established a goal for himself. He knew he would have to work for what he got, but his Ambition carried him through. Brown didn't "trust to luck." He didn't just "wish" for things to happen.

Then he considered what he must know to attain his goal. He **prepared** himself —studied—realized that work and study would be big factors in his success.

Last of all he was Optimistic. He thought success—talked success. Did he let the failure of others discourage him? No—! Why should he? Those failures merely lacked ambition—had no aim in life—didn't prepare properly—didn't believe in themselves.

Did the successes of others make him envious? Absolutely not—! They just acted as an incentive to spur him on to his own success.

Brown's good job isn't the top of the ladder for him. He didn't quit preparing when he got that job. He's working for the job above now. There are always success ladders for men of Brown's type and Brown will keep on climbing.

Jim Blank will continue to play pool and "WISH" he had a good job. Well, maybe his relatives will take care of him when he is too old to do odd jobs for a living.

Radio on Up-Grade

Statistics from the United States Government are very optimistic for Radio. The United States Department of Labor reports that forty-four Radio manufacturers employed 32,103 workers in August, which is an increase of 25% over the employment by these companies during July. Their pay rolls increased over an equal period 31.2%. The pay roll percentage increase as compared to the increase in the number of men employed, would also indicate that salaries are advancing.

RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

CLARION RECEIVERS, MODELS NOS. AC-51, AC-52 AND AC-55

These receivers use the same chassis, the only difference being in the cabinet design.

With reference to the diagram you will find that the circuit employs 3 screen grid 224 tubes, a 227 power detector and a 227 first audio resistance coupled, as well as two 245's in the push-pull amplifier. The conventional 280 tube is used as a rectifier.

When the receiver is first turned on the voltage regulator should be watched. If it becomes red hot a short circuited rectifier tube or a defect in the power pack causes it. The switch should be turned off and the short circuit or abnormal condition overcome. The speaker plug should be in place while the receiver is on. If the speaker plug is out of place, and the switch turned on the filter condensers will be overloaded. Three chokes are used in the filter circuit of the power pack including the field coil of the dynamic speaker. Ordinarily only two chokes are employed in A.C. receivers.

If oscillations occur look for an open screen grid by-pass condenser, an open plate by-pass condenser, an open grid bias resistor, poor contact between the variable condenser canopy and chassis, poor contact between Radio frequency unit chassis and the main chassis, open circuit of grounding strap between Radio frequency choke and main choke, poor contact between variable condenser frame and rotors through the tension spring clips or by open circuit of the ground strap between condenser frame and chassis. Chassis base plate loosely attached to chassis; poor ground connection, a high resistance connection in series with a by-pass condenser, tube shields not secure and high line voltage.

New receivers have the trimmer condensers on stages 1, 2 and 4 almost all the way in, that is, having almost maximum capacity. Trimmer condenser on stage No. 3 will be found adjusted about half way out. It is suggested that you leave the trimmers as found unless it is definitely ascertained that they are out of adjustment.

If it is found that the trimmer condensers must be reset, tune in a broadcast signal of about 1400 K.C. or use a modulated oscillator for a signal.

Starting with the detector stage (toward rear of chassis) turn the trimmer condenser in and out with an insulated wrench until maximum signal is heard. Be sure to have the tube shields and grid caps in place. Next adjust the trimmer condenser of the 3rd Radio frequency stage, repeating this operation through the 2nd and 1st Radio frequency stages successively. From here on do not touch the trimmers. Re-tune the receiver to 1000 kilocycles. Starting with the detector stage, bend the split rotor plate of the condenser in or out for maximum signal. Repeat this operation on the 3rd, 2nd and 1st Radio frequency stages in turn. Tune to 550 kilocycles, and reset the split rotor plate if necessary.

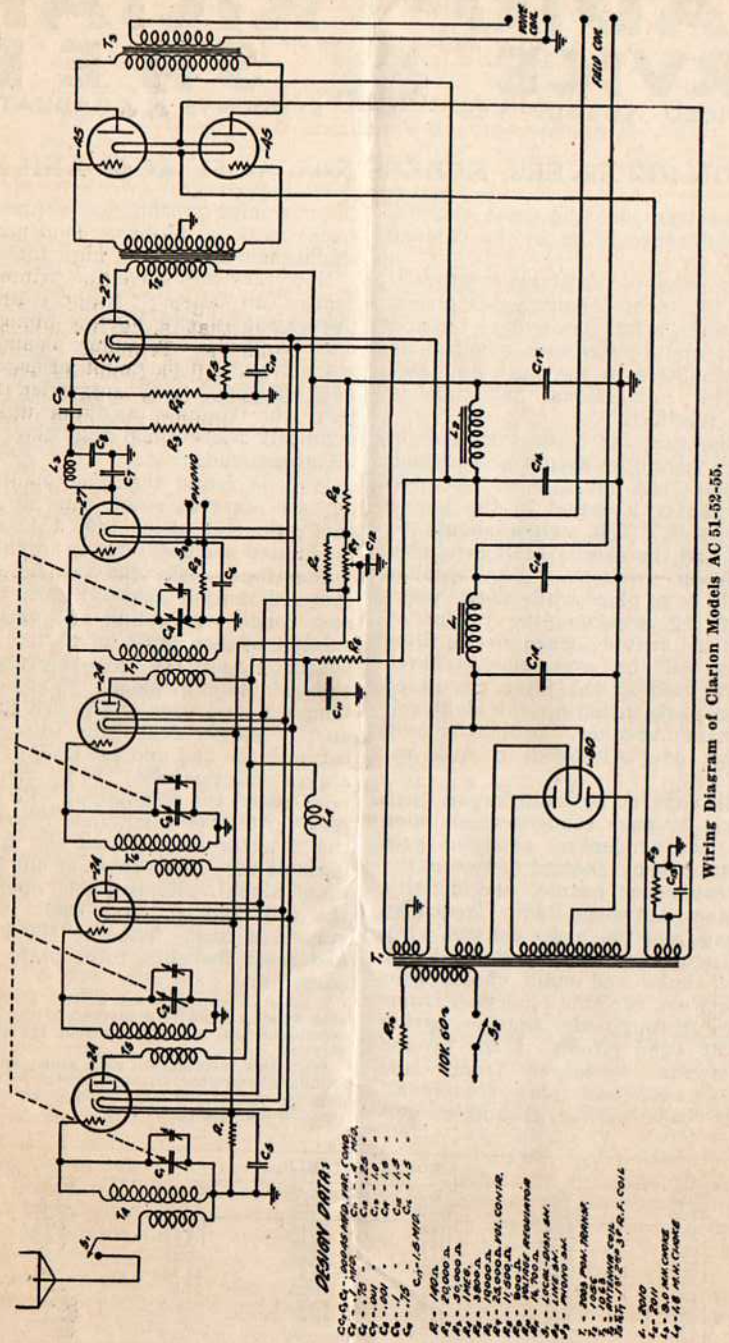
A table accompanies this article, giving the voltages which should be measured at the tube socket terminals with a line voltage of 105 and 60 cycle current.

With this information as a guide and following standard practices on such receivers you will be able to correct any trouble that may develop in the Clarion receivers.

VOLTAGE TABLE

Tube Order	Tube Type	A Volts	B Volts	Cont. Grid Volts	Cathode Volts	Plate M.A.	Screen Volts
1	224	2.09	146	2.43	2.43	2.72	87.5
2	224	2.09	151	2.43	2.43	2.55	85.5
3	224	2.09	151	2.43	2.43	2.72	87.5
4	227	2.09	134	12.2	13.15	.58	——
5	227	2.14	170	1.22	13.6	3.31	——
6	245	2.14	195	37.5	——	20.4	——
7	245	2.14	195	37.5	——	23.4	——
8	280	4.51	——	——	——	35.	——

Line Voltage 105 60 cycle. Volume Control Position Full



Wiring Diagram of Clarion Models AC 51-52-55.

Radio Opportunity Fields—III

MANUFACTURING

By P. J. MURRAY, Manager
Employment and Vocational Departments

The third of a series of articles by Mr. Murray on opportunities in various Radio Fields. "Ship Operating" and "Broadcasting" were published in July and September, 1930, National Radio News respectively. Other articles by Mr. Murray will follow.—Watch for them.—Editor.

Former Federal Radio Commissioner, O. H. Caldwell, estimates that Radio and its allied industries will this year reach the high mark of $1,150,000,000. One of the outstanding features is that every bit of Radio apparatus sold, which goes to make up this enormous figure, must first be manufactured. What a field of opportunity for the trained Radio man.

To most people Radio manufacturing means only the assembly of Radio receiving sets.

When one considers the manufacture of Radio receivers as representative of the manufacturing branch of the Radio Industry, they are in reality only touching the surface. There is much more than this to Radio manufacturing.

I'll admit that Radio receiving set manufacturing is the greatest single factor in the tremendous industry. The annual sales of Radio receiving sets has been estimated at 3,500,000. This represents a business of $405,000,000. But there are many other things to consider when we are studying Radio manufacturing as a whole.

For instance, the Radio tube business contributes $217,000,000 a year to the gross volume of Radio business. $150,000,000 a year may be attributed to talking motion picture equipment, and at the rate this branch of the industry is growing it would not surprise me to see the figure double in a very short time. And all this material must be converted from the raw into products ready for the ultimate user. It is therefore a part of Radio manufacturing.

Stewart Warner's Chicago factory where hundreds of Radio men have their opportunities.

As I have written before, I try to fit N. R. I. graduates into jobs to which they are best suited. This gives a man a better opportunity to grow, to climb the ladder of success—to work up to the bigger jobs. It all means more money to the man. The manufacturing branch of the Radio Industry gives me a fine chance to do this very thing. It is large; it has many different angles from which I can work.

The nature of the work of manufacturing Radio apparatus is such that trained men are required from the time

(Please turn to page 14)

A part of the great Atwater Kent Plant in Philadelphia where over three million Radio sets have been manufactured.

There Isn't any Santa Claus

By S. M. ARMSTRONG
Student Service Director

Some fellows seem just to be discovering that truth. For years "their stockings hung by the fireside" and were filled more or less regularly with Radio Business. They were having a wonderful time.

People knew little or nothing about Radio; any tinpanny noise was considered "good reception." Anyone with a pair of pliers and a wise look could service a Radio.

Then something happened.

The door-bell mechanics who once fixed Radios are bewildered. They ask each other: "Where has the Radio Business gone?"

Well, where has the Radio Business gone?

The plain truth is that the Radio Business hasn't gone anywhere. It's right here. Always has been. Always will be.

But it's operating on an entirely new and different principle. The door-bell mechanic will go back to fixing door-bells unless he learns Radio. The day of the "guess method" of Radio Servicing is gone. Mr. Public won't tolerate make-shift, hay wire work on his expensive Radio. He demands real reception now and is willing to pay for it.

The untrained Radio man who sits around now and expects big Radio Business to come his way is doomed to disappointment—and lots of it.

No—there's no Santa Claus. No one gives anything away nowadays. But the trained Radio man, who goes after the business, sees the closest approach to the Merry old Fellow. He sees dollars rolling in and that's what counts.

You have your services or your Radios to sell. There is always someone, some place who wants to buy—and can buy—what you have to sell. Go out after him. Find him—tell him—sell him. And you'll enjoy it more than if there were a Santa Claus.

Don't worry if a set warms up while operating. The generation of heat within the receiver will frequently be found of benefit in drying operating parts during wet or humid weather.

Fluctuating Line Voltage

Much has been said and written regarding fluctuating line voltage as it affects the operation and life of tubes and radio sets. Until now, however, the available data has been largely limited to a few local instances, leading to the conclusion that line voltage fluctuation is relatively rare and, therefore, purely a local and even individual matter.

A survey of the power systems throughout the country discloses that fluctuating line voltage is widespread and commonplace. According to the findings of Electrical World, there are wide line voltage variations in every State. The fluctuations are as great as 30% of the rated power house voltage or three times greater than the 5% plus or minus specified by tube manufacturers in guaranteeing the operation and full service life of their products. Such variations are detrimental to the proper operation of power packs in the usual socket-power radio sets.

According to the engineers of the Amperite Corporation, the actual delivered voltage may vary as high as 30% in addition to the reported line voltage variation, due to local conditions. Thus the power company may report 110 volts on its line, and yet the voltage at the socket or receptacle operating a radio set may be down around 100 volts or less, due to severe loads on the house wiring. In other words, the voltage on the line is only the starting point in line voltage fluctuations. There is no practical method today of regulating the socket voltage itself, due to the many factors involved in fluctuating loads line voltages, but there is a simple means of regulating the voltage applied to the radio set itself, in the form of self-adjusting line controls inserted in the primary circuit of the radio set, either as a built-in feature or as an attachment.

WANTED

The Instruction Department has need of wiring diagrams and service information on the Silvertone, Gilfillan and Tyrman 50 receivers.

Chief Instructor Dowie requests that anyone having service information or wiring diagrams of these receivers mail them in. They will be promptly returned as soon as copies are made. Please address the material to **The Editor, National Radio News.**

COURTESY

Courtesy is one of the keynotes to the Success of the Radio Service man.

The Service man is often the only contact between his employer aud the customer, after the sale is made. Therefore, upon the manner in which the Service man conducts himself, frequently depends the customer's attitude toward the Dealer.

The customer's goodwill is valuable to the Dealer. A satisfied customer is his best form of advertising. He wants his customer pleased—satisfied, so that new business will result.

You may sometimes feel that the customer is unreasonable and this may be entirely true. But go as far as you possibly can to please him. Suppose you do have to give him a little extra service to satisfy him. Suppose it is a little inconvenient. If you please him, your employer may sell him again—or his friends through his recommendation. That gives a chance to get back with interest, any excess he has cost you in handling him. But if he is not satisfied your company will never sell him again and will not get a chance to get back anything.

Large companies have been built on the slogan "The customer is always right." There may be a few cases where this will not work out but it is a good general plan.

Once having established this rule of giving the customer all you can for his money—give it cheerfully—pleasantly—otherwise it is just as well if you don't give it at all. A little courtesy often saves a lot of service.

Graduate Reports on European Radio Conditions

Just as we go to press with this issue a very interesting article is received from Graduate Heinz A. Mueller, of Chicago.

Graduate Mueller is visiting Europe for several months and is making a survey of Radio conditions there.

Although too late for publication in this issue, the News will print Mr. Mueller's full report in the January number. We know you'll find his comparisons of European and American Radio of great interest.

CHAIN BROADCASTING NOW POSSIBLE ON ONE WAVELENGTH

(Continued from page 3)

tion of present wave length assignments would be necessitated.

Since the wave length selected for the synchronized operation of the multiplicity of stations would become a "local channel" in every part of the country, and since the Commission requires a 50-kilocycle separation between stations operating in the immediate vicinity of one another, the actual channel width required for synchronization in the present state of the radio art would be 100 kilocycles.

In other words, if the WEAF channel of 660 kilocycles were immediately impressed into use for a nation-wide chain of stations, no other stations could operate between 610 and 710 kilocycles. On the other hand, receivers design is improving so rapidly, particularly with the superheterodyne coming into more widespread use, that it may be possible to maintain a closer separation and thus not require such a wide path for the synchronized broadcasting.

At any rate, the N. B. C. president and his chief engineer did not promise the millennium in national broadcasting. They simply pointed out that an ideal was within grasp, and they told the commission that they would not be surprised to see it take ten years or more for the accomplishment of that ideal. Nor will they, they asserted, keep their technical advance to themselves. If and when Congress and the commission decide that the system should be placed in operation, it will be made available also to others in the chain broadcasting field.

In essence, the newly discovered means of placing a multitude of stations carrying the same program on the same channels means the establishment of new national programs services as distinguished from those that are purely local or regional. The American radio audience stands to benefit whenever it is done.

If Green has a dollar and Black has a dollar, and they exchange dollars, each still has only one dollar.

But if they each have an idea and they exchange them, they'll each have two ideas.

Let's all exchange ideas. Tell the other fellows how you handle certain jobs—little tricks in servicing and getting spare time work. It will mean more money to everyone.

NEWS of the RADIO WORLD

BLACK-AND-WHITE TELEVISION PICTURES

RADIO television has been cured of its pink eye, according to statements and demonstrations made by the engineers of the DeForest Radio Company. Instead of pink-and-black pictures, which have been held objectionable from the standpoint of entertainment value, the latest DeForest television development is a new type of gas-filled, highly responsive white light source which provides black-and-white pictures on the screen.

Not only are the black-and-white pictures more realistic, but, due to the greater contrast between shadows and highlights, far better detail is obtained than in the pink pictures. The increased detail is immediately apparent when working with the same signals and apparatus.

CHANGE TO DYNAMICS

Dynamic speakers are being installed in the monitor rooms of WABC to augment the magnetic type speaker formerly used. Although engineers declare that the cone type speaker gives more faithful reproduction, it is said that the dynamic speaker gives control men a truer approximation of how programs are coming in on the average receiver, since a majority of the more modern receivers employ dynamic speakers.

158,000 WATTS

Word has been received from Chelmsford, England, that the British Marconi Company is completing tests from that point, of a new transmitter built for the Polish Broadcasting Company. This transmitter, when installed just outside of Warsaw, will be the highest powered broadcasting station in regular operation in the world.

The new Polish Station is rated at 158,000 watts. The two masts for this station will be 600 feet high and 750 feet apart, the tallest in all Europe.

NORWAY REVAMPING RADIO

Norway is reorganizing its entire broadcasting system of forty-three main and "booster" stations, the Government having decided to take over all existing stations to provide a state service. Programs, however, will be provided by private companies under contract.

SCHOOL OF THE AIR

Several hundred thousand school children are now keeping "radio scrap books" of items clipped from the newspapers referring to programs of the American School of the Air, officials of the school report.

These programs are broadcast from fifty stations of the Columbia network and are heard in 20,000 schools throughout the United States, the Grigsby-Grunow Company having supplied radio sets to the schools as part of a free educational service. It is estimated that the total number of children who listen in on these programs exceeds 6,000,000.

The scrap books are a permanent record of the radio course, and in many cases are used as text books for class room tests.

SHORT WAVE STATION IN VATICAN

Radio has found another use. It will now be the means of conveying messages from the Vatican, home of Pope Pius, XI, to people of the Catholic faith all over the world.

ARGENTINE RADIO IMPROVES

According to the Department of Commerce one of the reasons for increased Radio apparatus sales in Argentina is found in the somewhat better quality of Radio broadcasting. The broadcasters have had considerable cooperation from the large Radio distributors in Buenos Aires.

NEW STATIONS FOR PHILIPPINES

It was announced recently that twenty new Radio stations will be established within the near future by the Bureau of Posts. Materials for the construction of these new stations are supposed to have already been ordered in the United States. The apparatus will cost about $3,500 for each station. They will be established at isolated points on the Islands where the people have no means of communication.

ATWATER KENT EQUIPMENT

One and one-third million square feet of floor space, eight miles of chain and belt conveyors, 1800 miles of electric wiring, 1250 electric motors, a total of 4,095 connected motor horsepower, boilers seven stories high—these represent some of the equipment of the Atwater Kent 32-acre radio plant in Philadelphia.

RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

EDISON RECEIVERS R-6 AND R-7

This circuit is different from most of the modern A.C. circuits with reference to the detector stage. This tube, a 227, is used as a Diode tube acting as both detector and automatic volume control. We are not concerned in this article with the theory of the circuit but the practical side of servicing.

A pre-selector or band pass filter circuit precedes the R.F. stage. Three screen grid 224 tubes are used as R.F. amplifiers. Two 227 tubes are used in the first two stages of A.F. amplification which are resistance coupled. Two 245 tubes are in the push-pull circuit feeding a dynamic speaker.

Refer to the circuit diagram and you will see that each part value is given, making replacements an easy matter. A voltage table is given herewith and the servicing of this receiver centers around this voltage table with reference to the circuit diagram.

No filiment voltage on the R.F. tubes indicates open filament lead to socket, open filament winding of power transformer L33, shorted filament winding of power transformer L33, open primary winding of power transformer L34, open circuit in either connecting cable or six prong connector.

No control grid voltage indicates no plate voltage, open grid circuit, open winding secondary of R.F. coils L6, L9, L12, open R.F. grid isolating resistor R2, R15, open automatic volume control resistor R-10 or R-11, shorted R.F. bias by-pass condenser, C24, C20, shorted screen grid by-pass condenser C25, C21.

No screen grid voltage indicates open screen grid isolating resistor R25, R22, shorted audio frequency by-pass condenser C23, "A" choke grounded or open L26, "B" choke grounded L17, shorted filter condenser section C51, C52, grounded or open filament winding of power transformer L28, open or short circuit in either connecting cable or six prong connector.

No plate voltage indicates open plate lead, open cathode lead, grounded R.F. plate lead, open R.F. plate isolating resistor R20, R13, or R5, shorted R.F. plate by-pass condenser C22 or C14, open primary winding L7, L8, L10, L11, L13, open or grounded choke L26, L17, shorted filter condenser C50 or C52, filament winding of power transformer grounded L28, open Radio-phone switch contacts S6, open or short circuit in either connecting cable or six prong connector.

No plate current indicates no filament voltage; no plate voltage, no screen grid voltage, referring to paragraphs above for further details.

No filament detector voltage indicates open filament lead to socket, open and shorted filament winding of power transformer L33, open primary of power transformer L34, open in either connecting cable or six prong connector. No detector plate current or plate voltage will be measured except possibly when a strong signal is being received. Under these conditions a grid voltage of 8 to 10 volts may be measured and is the voltage of the rectified signal.

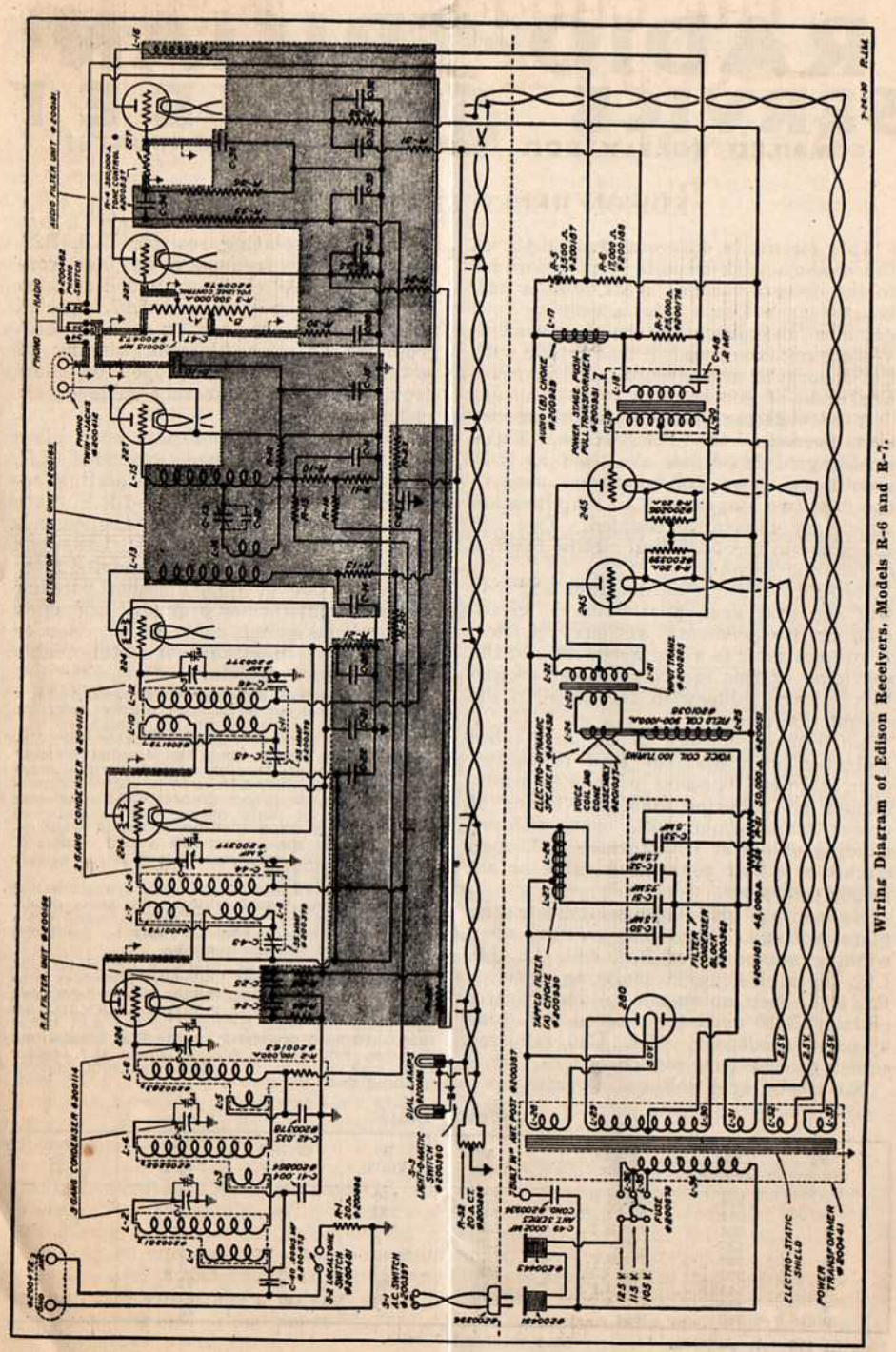
No filament voltage on the audio frequency and rectifier sockets would indicate the same conditions outlined for the R.F. and detector tubes except that these conditions apply to the audio frequency and rectifier sockets.

The same is true in regard to the plate, grid and cathode circuits of the audio frequency amplifiers. The R.F. and detector stages have been treated in detail and by referring to the diagram and using the same methods for the A.F. stages that have been described for the R.F. stages, and detector, you will be able to locate any trouble that may develop in Edison receivers, models R-6 and R-7.

VOLTAGE TABLE

Tube No.	Tube Type	Stage in Set	A Volts	B Volts	C Grid Volts	Plate Current M.A.	Screen Grid Volts
1	224	1st R.F.	2.2	190	.2	3.5	80
2	224	2nd R.F.	2.2	190	.2	3.5	80
3	224	3rd R.F.	2.2	190	.2	3.5	80
4	227	Det.	2.2	0	0	0	
5	227	1st A.F.	2.2	40	.5 to 2.5	1.1	
6	227	2nd A.F.	2.2	115	.5	3.8	
7	245	3rd A.F.	2.48	260	46	31	
8	245	4th A.F.	2.48	260	46	31	
9	280	Rec.	4.85			48	

Fuse in 115 volt position. Line voltage 115 volts.



Wiring Diagram of Edison Receivers, Models R-6 and R-7.

THE CHIEF'S CORNER

Testing Modern Radio Receivers

Usefulness of Set Analyzer In Service Work

J. A. DOWIE

The success of a Radio-Trician now-a-days in servicing a Radio Receiver depends upon his ability to quickly diagnose the trouble of a set and put it in good working order. In days gone by when the apparatus in a receiver was not shielded, the wiring was easy to get at and the voltages were not very high, then trouble shooting was usually done with a cheap voltmeter, head-phones and battery. Today this method is more or less obsolete and in many cases cannot be used.

Receiving sets at the present time are tested as nearly as possible to actual operating conditions. The circuits of the receiver are tested where they come to the surface until the exact location of the trouble is found.

With the modern set analyzer designed for testing any type of receiving set whether operated from Batteries, Eliminators or Power Packs, it is a simple matter to measure the various voltages and currents used in the Radio, test continuity of circuits, and test vacuum tubes under the same conditions as exists when the tubes are in their regular sockets.

Radio-Trician Using a Set Analyzer.

In most cases these various tests can be made by using the regular voltages supplied to the receiving set by its own power supply.

In testing a Radio receiver for example using a typical set analyzer such as shown in the picture (which uses two instruments, an A.C. voltmeter and a D.C. milliammeter) tests are made by placing the plug in the vacuum tube socket of the receiver and the vacuum tube is placed in the socket of the set analyzer.

Readings are taken by manipulating the various marked switches on the panel of set analyzers.

The A.C. voltmeter has three ranges, namely: 150, 8 and 4 volts. These ranges are for the purpose of measuring the filament voltages of tubes when the filaments are heated with raw alternating current. The 150 volt range is provided for measuring the line voltage. The D.C. volt-milliammeter has four voltage ranges, namely, 600, 300, 60 and 8 volts, and two current ranges, 150 and 30 milliamperes. The 600 and 300 volt ranges are for plate voltage, the 60 volt range for grid bias, and the 8 volt range for filament voltage measurements of D.C. tubes. The 150 milliampere range is provided for measuring higher plate currents than 30 milliamperes and the output of rectifying tubes.

When making a continuity test and in

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