

Three-Tube Set Said to Have Almost as Much Power as Six

New Inverse Duplex Receiver Employs Two Stages of Radio Frequency and Three of Audio Amplification. Transformers of Low Turn Ratio Essential

The three-tube set herein described does almost the work of six tubes. It has just been developed by Henry M. Neely, Deland, N. J., and is based on the inverse duplex system invented by David Grimes, Mr. Grimes himself, in conjunction with Mr. Neely, worked out this circuit. Technically, it is known as the Grimes-Neely inverse duplex circuit.

In any circuit, the values of the inductances and capacities, as well as the mechanical arrangement, is of prime importance. The fan who wishes to build this new receiver for himself must follow all directions and specifications to the letter. Before beginning construction of this receiver, bear in mind that it is necessary to place all instruments exactly as specified.

The receiver uses only three tubes and a crystal detector. However, there are two stages of radio-frequency amplification and three stages of audio amplification, which is accomplished by reflexing. When using more than two stages of audio amplification it is important to mount the audio transformers at right angles to one another.

It is also essential that the transformers be of low turn ratio. Transformers having a ratio of higher than five to one rarely give greater amplification and also have a tendency to distort.

Many fans have tried to use the inverse duplex system on their regular reflex sets, but the combination didn't work. If the usual reflex hook-up does not work it is to be expected that the inverse hook-up will also fail.

This receiver employs three tuning coils and the familiar neodyne receiver. The selectivity of the set is very good. Its tuning is sharp, which is, of course, an essential in any good radio receiver.

Following is a list of materials necessary:

Two 2A5 bakelite panels.
Three neodyne coils.
Three Hammarlund .0005 mfv condensers.

Three tube sockets, standard base.
Three Jefferson audio-frequency transformers, ratio 2 1/2 to 1.
One Sylvania 6A6 fixed crystal.

One Federal double-circuit jack.
One Federal single-circuit jack.
Three rheostats.

Two Duhler .001 fixed condensers.
Two Duhler .002 fixed condensers.
Three UV-201A or 301A tubes.

For the fan who wants to wind his own coils the following directions are given: The coils are wound on a 2 1/2-inch section of three-inch insulating tubing. Three pieces of tubing are required, one for each transformer. On the tubing at one end is wound about 10 turns of wire, which forms the primary winding.

Next to this is wound another coil of about 50 to 55 turns of wire, constituting the secondary. It does not make much difference whether the wire is size No. 22, 24 or 26. Use double cotton-covered wire.

The above number of turns will be sufficient for a .0005 mfv condenser. If a small condenser is used it will be necessary to increase the number of turns on the secondary of the transformer.

In laying out the panel, the center holes for the shafts of the neodyne motor should be spaced as far apart as possible. The distance between centers is approximately seven inches. To prevent feedback the neodyne motors are mounted at an angle of about 45 degrees, as in the neodyne receivers.

It was found advisable to use a sub-panel, measuring seven by 18 inches. The sub-panel is fastened to the front panel high enough from the bottom edge of the panel to allow the mounting of the audio-frequency transformers.

The only parts showing above the sub-panel, not including the neodyne motors, are the three tube sockets, the binding posts and the fixed crystal. By this arrangement it is possible to conceal all wiring, which gives the receiver a very neat appearance.

In the receiver the bases of the sockets are placed below the sub-panel, that is, holes are drilled in the sub-panel large enough to permit the metal tube holder of the socket to extend above the sub-panel.

The audio transformers are mounted on the front panel and placed as far apart as possible to prevent their magnetic fields from interfering with one another. Next results will probably be obtained with separate rheostats for each tube.

In wiring some fans may find it easier to follow the circuit when different colored wires are used. It is usually best to begin by wiring the filaments. Connect a wire from the minus A battery binding post to the rheostat, and then from the other side of the rheostat to one filament terminal of each tube socket.

Connect another lead from the A minus binding post to the F terminals of the three audio-frequency transformers.

The positive side of the filament is next

wired in. Connect from the positive A binding post to the remaining filament terminal of each tube socket and continue the ground binding post and also to one side of the primary of the three neodyne motors. Connect from the aerial to the other side of the first neodyne motor.

Connect from the plate of the first tube to one side of the .002 fixed condenser and from the other side of the condenser to the primary of the second neodyne motor. The plate of the second tube is connected to the primary of the third neodyne motor in the same manner.

The grid of the second tube is connected to one side of the second neodyne motor, and from there to the fixed plate terminal of the second variable condenser. Connect the movable plate terminal of this condenser to the other side of the second neodyne motor.

From the fixed plates of the third condenser a wire is run to the crystal and from there to the secondary of the last neodyne motor. The other side of the secondary is connected to the movable plates of the same condenser and also to the "P" terminal of the first audio transformer.

The "B" plus terminal of this audio transformer is connected to the crystal unit. A .001 fixed condenser is connected across the primary of the audio transformer.

The plate of the first tube is connected to the "P" terminal of the third audio transformer, the "B" terminal of the transformer and the "B" terminal of the second audio, as well as one side of the single circuit jack go to the plus 90-volt binding post.

The "P" terminal of the second tube is connected to the "P" terminal of the second audio transformer. The grid of the last tube is connected to the "G" terminal of the third audio transformer. The "B" terminal of the first audio transformer is connected to the secondary of the second neodyne motor.

The "G" terminal of the second audio transformer is connected to one side of the .001 fixed condenser, and from this point to the movable plates of the first condenser and to the bottom spring of the loop jack. The other side of the .001 fixed condenser is connected to minus filament terminal of the first tube.

The fixed plates of the variable condenser are connected to the grid of the first tube and to the top spring of the loop jack. The secondary of the first neodyne motor is connected to the inside spring of the loop jack.

Now, a few words about crystals and tubes. It is strongly recommended (UV-201A or 301A) be used in this circuit. It may be possible to get good results using other types of tubes, but this circuit is designed primarily for the last tubes specified. WDI1 and WDI2 type tubes will not prove satisfactory. It is important that the tubes selected be good radio frequency amplifiers.

Some fans prefer to use a loop antenna. A loop that has been found to work very well with this set has the following dimensions: It is 18 inches on a side, or about 25 1/2 inches by diagonal measurement. It is made with ordinary No. 22 wire, and consists of 15 turns, tapped at every other turn. An inductance tap switch is fastened to a small piece of bakelite on the side of the loop frame and is used to select the number of turns wanted.

It is necessary to use fewer turns when listening to nearby powerful stations, because otherwise the tubes have a tendency to choke. The number of turns used changes the setting of the first condenser.

It may be found upon completing the receiver that it gives out "squawks." The squawks may be classified under three separate headings, oscillation squawks, "audio" howls, "overload" howls.

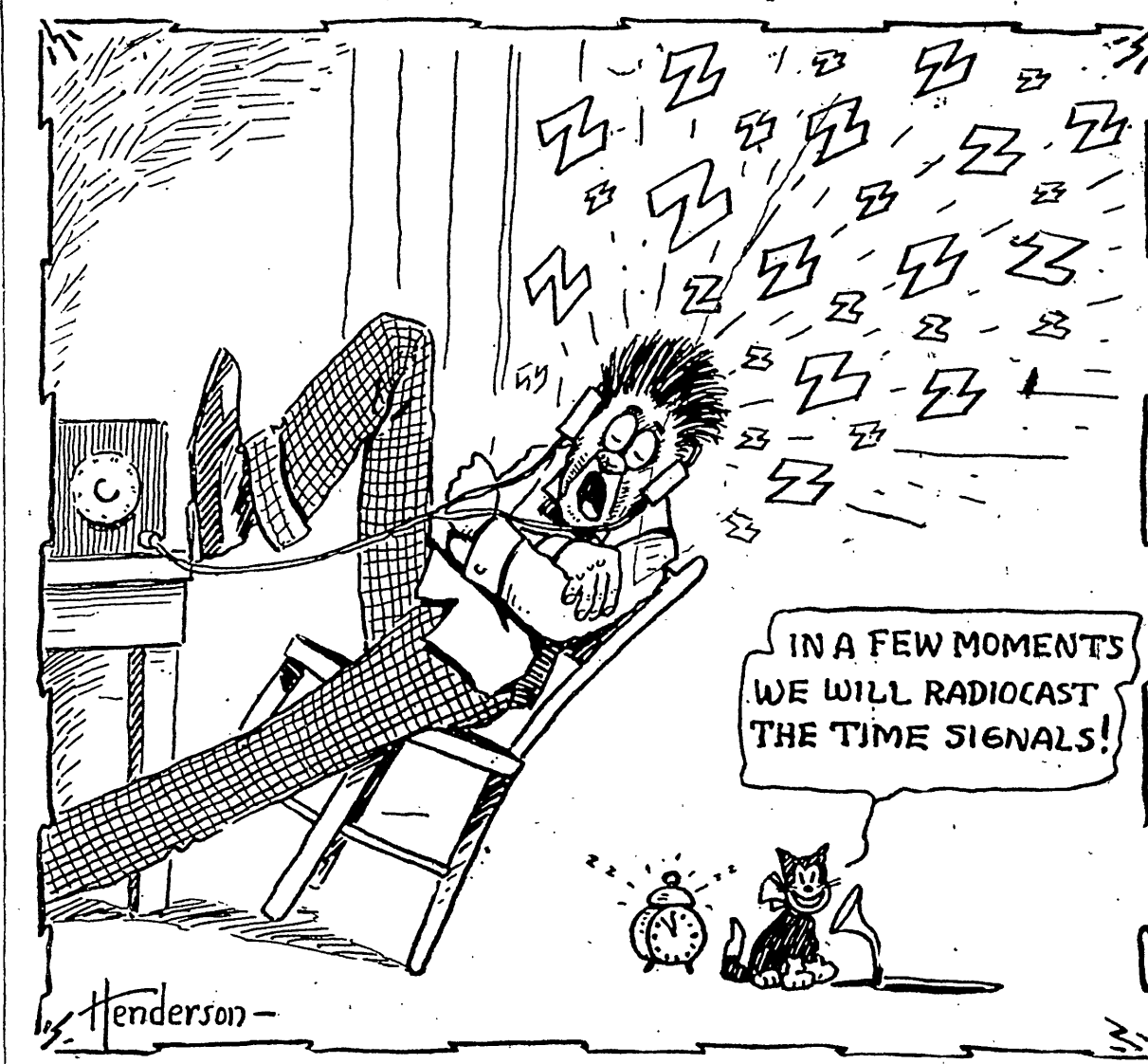
It is important to eliminate the oscillation squawk. It has been found that if the usual number of turns is used on the neodyne transformer primary that the receiver may break into oscillation. This oscillation may be overcome either by using the regular neutralizing procedure or by reducing the number of turns on the primary. Use of about 10 turns, it has been found, will keep the set from oscillating.

It is also to be remembered that the neodyne coils must be mounted so that the magnetic field of one does not cut through the field of the other. The 67 degree angle mounting should be followed.

It may be that the squawk still persists even after the turns on the primary have been reduced and the coils placed properly. If this condition exists examine the leads to the "B" batteries. They should not be too long.

To overcome the effect of long battery leads a .005 mfv condenser should be

To-day's Hook-Up



During Those Long Campaign Speeches

placed across the negative "B" and the 90-volt binding posts at the set.

In assembling the set do not get the radio-frequency transformers too close to the audio transformers.

It is advisable to try to eliminate the oscillation in the receiver by other methods rather than to remove turns from the primary of the transformer.

By reversing the leads to the secondary winding of the radio frequency transformers, oscillations may be stopped.

When using the loop aerial it is often the case that feedback occurs due to the closeness of the loop to the neodyne motors. Shielding the set will eliminate this trouble. Care, however, should be observed in shielding either this receiver or any other. Do not place metal close to inductances. Impedance shielding will spoil an otherwise good receiver.

When using three stages of audio amplification, such as is used in this receiver, an audio howl may develop. The greatest tendency toward an audio howl comes from the feedback between the audio transformers or in the "B" battery circuit. To prevent audio feedback between the transformers care should be exercised in placing them at right angles to each other.

Audio howl caused by feedback in a common "B" battery circuit may be done away with by reversing the primary connections on the audio transformers; reversing the secondary connections on the last audio transformer is usually all that is necessary to clear up this howl.

If the above means fail the by-pass condenser across the secondary of the second audio transformer should be increased to .005 mfv, as has already been suggested. Some types of audio transformers require higher value by-passing condensers. Keep the value of these condensers as low as possible.

An "overload howl" is due to a nearby powerful transmitting station. The set receives more energy than it can take care of. There are many ways of controlling this, but the simplest is merely to detune the first condenser slightly.

The whole subject of "overloading" is exceedingly complex. Overloading, however, does no damage to equipment or tubes.

It does not mean that the set is radiating. Reflex sets have a tendency to pick up noises from adjacent power lines. The noise may be recognized as a hum. Usually it can be reduced or changed by opening and closing the main lighting switch in the house. This affords a good clue to the trouble. Removing the set from near by electric light lines will probably eliminate the disturbance.

There is still another difficulty which may be encountered. A microphonic noise is caused sometimes by a loose filament in the last audio stage. The tube having this loose connection should be used in the last stage where the noise caused by it will be not noticeable.

RADIO PROGRAMMES

To-day Providence radio listeners will have an opportunity to tune in on one of the most important musical events in the history of the community. For the benefit of those who cannot attend the concert, WJAR will put on the air at 2 o'clock this afternoon the entire dedication programme which is to be given at the Benedict Monument to Music in Roger Williams Park. This week WSAD, which has been silent during the summer, will resume broadcasting. Programmes are scheduled for every day except this afternoon, but the new features being planned by the director will not get away until later. It is announced. WKBF does not begin its fall schedule until next week. WEAN will broadcast two church services to-day, and WJAR will put its usual evening concerts on the air.

WJAR, THE OUTLET COMPANY.
(360 METRES.)

TO-DAY

1:45—Announcement concerning dedication concert at the Benedict Memorial to Music, relayed from Roger Williams Park.
2:00 p. m.—Dedication concert at the Benedict Monument to Music, relayed from Roger Williams Park. The concert will be given by the Providence Festival Chorus, organized and directed by John B. Archer, the United States Marine Band of Washington, conducted by William H. Santelmann, and Mme. Marie Sundellus of the Metropolitan Opera Company. The complete programme as it will be broadcast is printed on the Music Page of today's Sunday Journal.
7:20-9:15 p. m.—Musical programme by "Roxey and His Gang," from the Capitol Theatre, New York, city, by courtesy of the Capitol Theatre management and S. L. Rothfarb (Roxey). The first part of the programme will be taken from the stage of the theatre, and will consist of music by featured artists and selections by the Capitol Theatre Orchestra. The second part of the programme will consist of a special presentation by Roxey of vocal and instrumental artists direct from the broadcasting studio in the theatre.
9:15-10:15 p. m.—Organ recital direct from the studio of the Skinner Organ Company, New York city.

MONDAY
10:00 a. m.—"Housewives' Radio Exchange. A department conducted by Mrs. Wood on all matters of household interest.
10:00 a. m.—Style talk.
1:05 p. m.—Studio programme.
8:00 p. m.—Baseball scores.
8:05 p. m.—"The Woodland Baptist Violin Concert Orchestra will Pawtucket Quartet, Misses Florence Brown, Elsie Spilster, Alice Wright, Artemesia Anderson.
TUESDAY
1:05 p. m.—Providence Biltmore Concert Orchestra direct from the hotel.
7:30 p. m.—Baseball scores.
7:30 p. m.—Musical programme under direction of A. Ligouri.
8:00 p. m.—Talk by Arthur S. Berberian, President of Stammerers Club, in behalf of the Providence Safety Council.
9:00 p. m.—Entertainment relayed from New York studio.

WEDNESDAY
10:00 a. m.—"Housewives' Radio Exchange. A department conducted by Mrs. Wood on all matters of household interest.
10:45 a. m.—Style talk.
1:05 p. m.—Studio programme.
7:30 p. m.—Programme direct from our New York studio by Amphion Male Quartet, Harry Foley, first tenor; Arthur Foley, second tenor; Hubert Leister, baritone; Charles Hohmann, bass.
7:30 p. m.—"Wanted, Business Trained Leaders of Farmers," by Prof. C. S. Morgan of the School of Business of Columbia University.
8:00 p. m.—The Three Peasants, programme of Sicilian dance music played on the mandolin, guitar and violin.
8:30 p. m.—Amphion Male Quartet.
8:30 p. m.—Sadie Eskin, concert pianist.
8:45 p. m.—"History of Cane Sugar and Food Value of Cane Sugar," by George A. Zabriske.
9:35 p. m.—The Three Peasants.
9:10 p. m.—Sadie Eskin, concert pianist.

THURSDAY
1:05 p. m.—Hotel Graystone Orchestra, E. J. Dantzig, director.
FRIDAY
10:00 a. m.—"Housewives' Radio Exchange. A department conducted by Mrs. Wood on all matters of household interest.
10:45 a. m.—Style talk.
1:05 p. m.—Twin Elm Orchestra, direction of Martin J. Casey.
8:00 p. m.—Baseball scores.
8:05 p. m.—Roy Partington, tenor, accompanied by Iva Fielder.

SATURDAY
1:05 p. m.—Studio programme.
7:05 p. m.—Baseball scores.
7:10 p. m.—Musical programme.
7:30 p. m.—Isabel Tarrago, soprano, accompanied by Miss Gladys E. A. Smith.
WEAN, THE SHEPARD STORES.
(278 METRES.)

TO-DAY
10:45 a. m.—Service from the First Baptist Church, Prelude, "Priere," from the "Suite Gothique," Beethoven; choir sentence, "Chorale," Bach; invocation, prayer of thanksgiving; hymn, "When Morning Gilds the Skies," Laudes Domini; responsive reading, Psalm 27; anthem, "Suite Gothique," Beethoven. John B. Archer, musical director; Miss Louise Tracy, soprano; Mrs. George F. Hiller, contralto; Walter R. Morris, tenor; David A. Mitchell, bass; George Faulkner, organist.
7:30 p. m.—Service from the Mathewson Street M. E. Church. Organ solos, "Wedding March," De Koven; "Sol d'Antenne," Swinnen; hymn, "I Love to Tell the Story," Hanky; prayer; chant, "The Lord's Prayer," quartet, "Let Not Your Heart Be Troubled," Foster; Psalm, "Thirtieth Sunday Evening," "Gloria Patri," Grotto; Scripture lesson; offertory anthem, "Come to Our Hearts and Abide," Macy (unaccompanied); Doxology; sermon, "Is Your Heart in the Right Place?" R. D. Hollington; hymn, "Flight the Good Fight," Pentecost; benediction; amen, Glenn Liturgy; organ postlude, "Grand Choeur," Rogers.

MONDAY
12:00 p. m.—Colonial Concert Orchestra.
12:15 p. m.—Musical programme.
12:55 p. m.—Time signals.
4:00 p. m.—Colonial Dance Orchestra.
4:15 p. m.—Selections on reproducing piano.
4:30 p. m.—Weather report.
4:35 p. m.—Colonial Dance Orchestra.
8:00 p. m.—Concert programme.
TUESDAY
10:00 a. m.—Message to housewives by Gladys J. L. Peckham.
12:00 p. m.—Colonial Concert Orchestra.
12:10 p. m.—Weather report.
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4:10 p. m.—Incidental music by the

companied by Miss Iva Fielder. Piano solos by Iva Fielder.
8:30 p. m.—Speaker from the Rhode Island Electrical League.
11:00 p. m.—Providence Biltmore Orchestra in a programme of dance selections.

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Continued on Page Six.

To-day's Programmes in Brief

For the convenience of radio fans the following hourly schedule of broadcasting to-day is given in brief form, the complete programme being given under the regular listing of announcements.

The hours are based on Daylight Saving time.

LOCAL STATIONS
10:45—Church, WEAN.
1:45—Monument to Music concert, WJAR.
7:20—Concert, WJAR.
7:30—Church, WEAN.
8:15—Church, WJAR.
OUT-OF-TOWN STATIONS
9:00—Children's hour, WJZ.
10:30—Church, WGY.
10:45—Church, WJZ.
11:00—Church, WJZ.
11:15—Church, WKDK.
11:45—Weather forecast, WGR.
12:00—Church, KYW.
1:00—Church, WSB.
2:00—Church, KFI.
2:30—Church, WJZ.
Recital, WOO.
2:45—Concert, WKDK.
3:00—"Hymn sing," WEAF.
Church, KGO.
Religious service, WHN.
Church, WGR.
3:30—Chapel service, KTW.
4:00—Religious service, WEAF.
4:45—Vespers, WKDK.
5:00—Adventure hour, music, Talk, WGI.
Religious service, WCAP.
6:00—Orchestra, WWJ.
Recital, WOO.
6:15—Baseball scores, WKDK.
6:30—Concert, WKDK.
6:45—Church, WJZ.
7:00—Orchestra, WJZ.
Church, WSB.
7:20—Concert, WEAF.
Concert, WCAP.
Concert, WMFA.
7:30—Orchestra, KGO.
7:45—Church, WGY.
Church, WOO.
Church, WKDK.
8:00—Church, WFAP.
8:15—Specialty, WJZ.
Recital, WJZ.
8:30—Church, WJZ.
Concert, WJZ.
9:00—Concert, WJZ.
9:15—Organ recital, WEAF.
Organ recital, WCAP.
9:30—Church, WSB.
10:00—Concert, WJZ.
10:15—Concert, KFI.
11:00—Recital, WFAP.
11:30—Orchestra, WFAP.
Revue, WHN.
11:45—Church, KGO.
12:00—Concert, KFI.
1:00—Concert, KFI.
2:00—Concert, KFI.

Tubes Will Not Blow Out When Protected by New Radio Device

Bulb Protector Made As Binding Post or Switch Said to Limit Current Which Reaches Filament.—Glow Warns of Short Circuit Due to Wiring Errors

One of the valuable accessories for radio sets is a device which makes it impossible to burn out tubes when the B battery is connected to the filament. It is most surprising to connect 90 volts from a B battery to the filaments of a UV-200 tube and find that not only is the filament still intact, but the coating has not been affected in any way. The same thing is true of the larger tubes such as the UV-201-A or DV-3.

This tube protector, made either as a binding post or a switch, has in the center part a long thin electric light, mounted on a miniature base. The lamp itself is not as large as the end of a lead pencil. The device is connected between the plus A binding post and the minus B of any radio set of one or more tubes. It is necessary, of course, to remove the connection that is ordinarily provided between these two points. When the protector is connected in that way, the positive terminal of the B battery can be connected to any part of the set without disastrous results. The circuit from the B battery must be completed through the protector. Therefore, with the device in operation, the tubes cannot be injured.

The whole secret of operation is in the little electric bulb. Instead of having a filament one-fourth inch long, as in the ordinary miniature electric bulb, the filament is several inches long. Finer than a hair, it is wound, when manufactured, on a small wire so as to form a spiral. So fine is the filament that, upon examination, it is almost impossible to see that it is wound like a delicate spring.

Because of the special material of which

the filament is made, the resistance is only a few ohms as long as just a small current is flowing through it, that is, not enough to make it glow. Instantly, however, when a heavier current, enough to light the filament, is passed through, the resistance increases to over 800 ohms, a value so great that it is not possible for sufficient current to flow to burn out the vacuum tube filament. Thus, when the circuit is completed from the B battery through the tube filament and the little lamp, the resistance in the circuit slows down the current to less than 0.04 ampere with a 45-volt B battery.

The development of this lamp has been a difficult problem. In the first place, the resistance of the filament must increase to maximum instantly. That required an exceedingly fine wire in order for it to heat quickly enough. The resistance, when cold, could not exceed a few ohms, for, as has been pointed out many times, any excessive resistance in the filament would have the effect of reducing the life of the B batteries. On the other hand, the resistance when hot must rise sufficiently to hold down the current below the value which would burn out UV-200 or other tubes. A work of two or three months was required to perfect the device.

Another limiting factor was the necessity for having the filament glow when only 22 volts were applied to it and yet not burn out at 100 volts. This was necessary so that the glowing of the filament would warn the operator of short circuits, due to errors in the wiring or to slips when working on the set, with metal tools, while the batteries are connected. There is scarcely an experimenter or set owner who has not burned out tubes by a slip of the screw driver in bending up a tube socket contact.

The protection afforded by this device is particularly important to those who are not familiar with the proper connections for batteries on their radio sets. It is almost impossible to make a mistake and see the tubes suddenly flash up and go out forever. (Copyright, 1924, 21st Century Press.)

WSAD RESUMES BROADCASTS

Will Be on the Air Every Day This Week.

After being silent during the summer months, WSAD will resume broadcasting daily to-morrow afternoon with a musical programme at 2:30 o'clock. The station is returning to the air somewhat earlier than was expected and several new features which it is planning for this season will not only work on week days, but two Sunday afternoon concerts which were given all last year are to be a part of this season's schedule, but will not start until later in the fall.

Thursday evening each week is to be known as "Musical Evenings," when programmes of musical and semi-classical music by well-known local artists are to be presented. Occasionally Thursday evening will be devoted to a distinctive type of popular programme, and the first of these is planned for Oct. 2 at 8:30 o'clock. Talks by prominent speakers on subjects of general interest will be one of the new features at WSAD.

Special attention will be given to the arrangement of programmes for children. Foster's Story Lady, Beale Archer Anderson, and other popular features of each week will appear on the schedule every evening this week at 6 o'clock. WSAD will continue to broadcast on a wavelength of 281 metres and its activities continue under the direction of announcer XYZ.

PLAN RADIO EXPOSITION

Features Arranged for National Show in New York Nov. 3.

The American Radio Exposition Company has changed the date of the third annual National Radio Exposition, at the Grand Central Palace, New York, from October to the week of Nov. 3. This was done in order to have a longer period elapse between the Radio World's Fair to be held Sept. 22-23 and the exposition. The exposition this year will be in progress on election day. Election returns will be broadcast at the show.

The entire main floor of the Grand Central Palace and mezzanine floor will be taken up by exhibits.

Several features have been planned for the exposition. A series of motion pictures will be shown which will illustrate the problems of radio transmission as well as radio reception. American scientists and radio engineers are now working to complete these films, which will be ready for exhibition in November.

A series of set-building and other contests that will bring to New York the leading radio amateurs of the United States will be announced shortly.

The United States Army Signal Corps, the Marine Corps and other branches of the service have been invited to participate in the exposition, and it is expected that their displays will demonstrate the part that radio is destined to play in national defence.

In addition, it is planned to have the announcers of the many national and larger broadcasting stations throughout the country take their turn before the microphone, thus enabling the public to see their favorites in action.

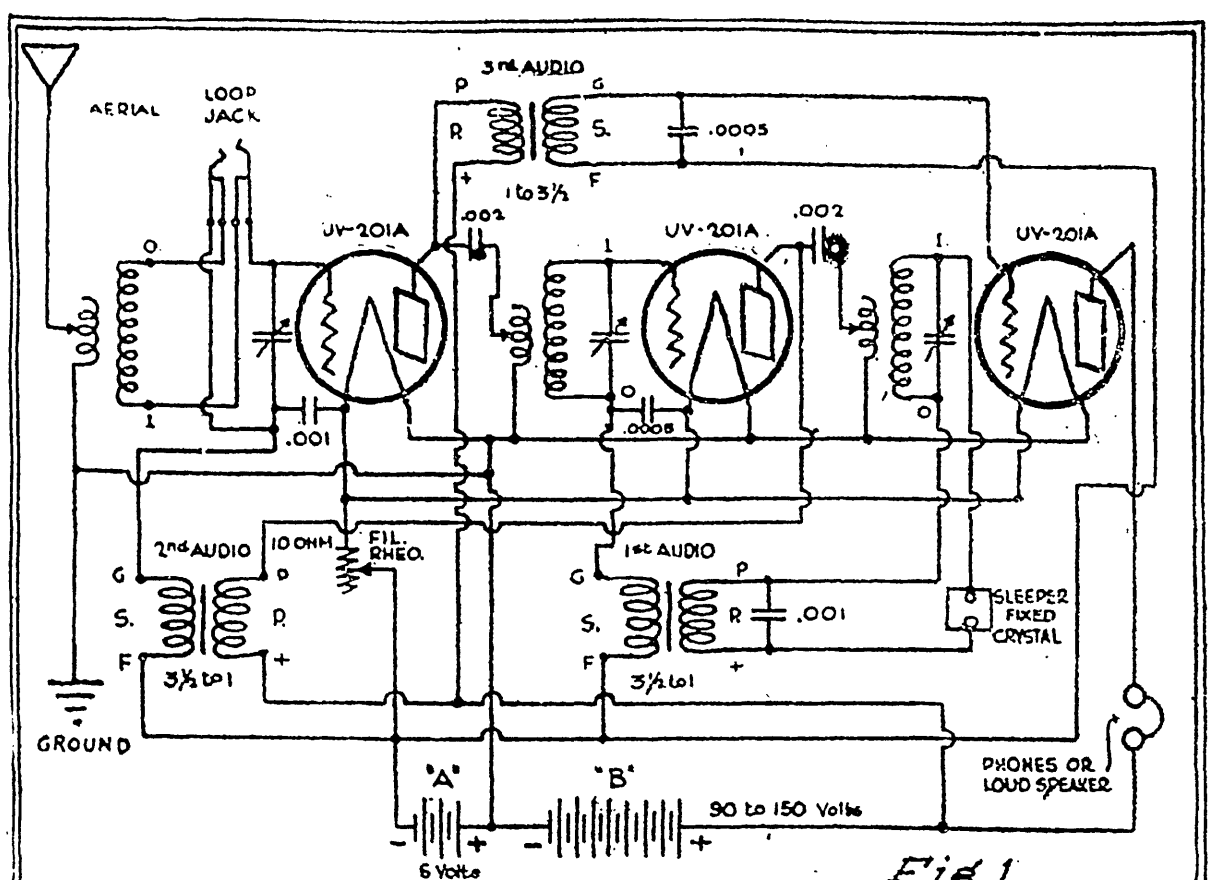
PREDICTS LITTLE CHANGE

Engineer Believes Reception Methods Will Be Same for Many Years.

"Don't worry about attempting to receive short wave long distance signals on your broadcast receiver. For many years radio will be carried on almost identically as it is today," said Ernest Walker Gargner, prominent radio engineer recently in discussing radio subjects with interviewers.

"Programmes will change," he continued, "and new departures in entertainment will come, but short wave directional will be, at least for some years yet, for control only. Naturally with improved control of distant stations you will wish to listen in mostly on your local stations. Broadcast receivers' manufacturers are meeting this situation by redesigning their sets to give clearer, sweeter and purer tones and overtones."

"Resistance coupling, impedance coupling and audio amplification are replacing ordinary audio amplification. Crystals are again being brought out and are coming season will see various modifications in use of these devices to improve tone qualities. 'Eliminate distortion' is the war cry for the season."



Schematic Diagram of Grimes Three-Tube Set

RADIO ACTIVITY HERE INCREASES

Hook-Up and DX Fans Welcome
Cool Fall Days.

Dealers Prepare for Record Season
and Local Broadcasting Stations
Will Soon be Working on Maxi-
mum Schedule. — Trans-Atlantic
Trains Planned.

With the arrival of cool fall days and the return of hundreds of vacationists to their city homes Providence is preparing for a season of unprecedented radio activity. Although the past summer proved that radio is established as a year-around pastime, dealers and broadcasters point out that there is increased interest in the art as the weather grows cooler and fans spend more of their time indoors. Then, too, the summer atmosphere dampens the enthusiasm of the RCL who likes to tune in stations on the Pacific coast, in Cuba and in Canada in the course of one evening, but from now until spring the weather favors him.

There is no official opening of the fall radio season scheduled in Providence, but in various ways there are indications that the season is now well under way. Listeners are beginning to report the reception of distant stations which they have not picked up since last spring. Dealers are devoting more attention to the display of new sets for neophytes and accessories for the experienced hook-up fan. Local radio merchants report that business is improving, and some are already predicting that this will be a banner year from their standpoint.

Providence broadcasting stations within a few weeks will be working on a maximum schedule. WJAR and WGAN, which have been on the air all summer, are planning to give listeners as many varied features as possible. WGBS, which has broadcast intermittently during the summer, will be on its regular schedule again the first of October and has announced special events expected to interest fans. WSDA, which closed the first of the summer, plans to feature musical entertainments of the best type when it reopens some time this week or next.

Important questions of interest to local fans as well as to others throughout the country will be discussed at the third national radio conference, to be held in Washington, D. C., Sept. 30. The way has been cleared for the allocation of additional wave bands from 200 to 222 metres to broadcasters, and if this is done some of the present congestion in the ether will be cleared. Other questions which it is expected will be discussed deal with broadcasting advertising and linking Western stations by land wires with the Eastern stations.

Another indication that the radio season is here is the announcement of an international broadcasting test scheduled for Nov. 24 to 31. It is expected that many local fans having powerful sets will listen in on the signals which United States stations participating in the test will send from 10 to 11 o'clock Eastern standard time, and which the foreign stations will transmit from 11 o'clock to midnight. Stations not participating will be silent so that listeners will have an opportunity to test the sensitivity and range of their receivers without interference.

RADIO PROGRAMMES

Continued from Page Five.

6:00 p. m.—Foster's story lady.
6:15 p. m.—Musical programme.
WEDNESDAY
2:30 p. m.—Concert.
6:00 p. m.—Foster's story lady.
6:15 p. m.—To be announced.
THURSDAY
2:30 p. m.—Concert.
6:00 p. m.—Foster's story lady.
6:15 p. m.—Musical programme.
FRIDAY
2:30 p. m.—Foster's story lady.
6:00 p. m.—Foster's story lady.
6:15 p. m.—To be announced.
SATURDAY
2:30 p. m.—Concert.
6:00 p. m.—Foster's story lady.

6:15 p. m.—Musical programme.

WKBF, DUTEE W. FLINT, INC.
(286 METRES.)

TUESDAY

9:30 p. m.—Arcadia Orchestra, Al Mitchell, director.

KDKA, EAST PITTSBURGH, PA.
(324 METRES.)

TO-DAY

11 a. m.—Services of the First United Presbyterian Church, Rev. J. Alvin Orr, D. D., minister.

2:45 p. m.—Organ recital by Josiah Poole, from the Calvary Episcopal Church, Pittsburgh.

4:45 p. m.—Vesper services of the Shadyide Presbyterian Church, Pittsburgh, Pa., Rev. Hugh Thomson Kerr, minister.

6:15 p. m.—Baseball scores.

6:30 p. m.—Dinner concert by the Pittsburgh Athletic Association Orchestra, Gregorio Scialo, director.

7:15 p. m.—Services of the East End Christian Church, Pittsburgh, Rev. John Ray Ewers, minister.

WBZ, SPRINGFIELD, MASS.
(337 METRES.)

TO-DAY

10:55 a. m.—Church services from the South Congregational Church, Rev. James Gordon Gilkey, pastor, music by Professor William P. Moore, organist and choir of 24 voices. The quartet is as follows: Mrs. Grace R. Donovan, soprano; Mrs. A. E. Waite, contralto; William L. Spittall, tenor; Albert Edwards, bass.

8:30 p. m.—Concert from the Estey Organ Studio.

9:30 p. m.—Concert by the Cosmopolitan Chorus from the Hotel Brunswick Studio, Boston.

WGR, BUFFALO, N. Y.
(310 METRES.)

TO-DAY

11:15 a. m.—Weather forecast as issued by the United States Weather Bureau for marine and aviation interest.

3:00 p. m.—Vesper services, Buffalo Council Churches, W. W. Shannon and Charles H. Willard, speakers.

WNAC, BOSTON, MASS.
(278 METRES.)

TO-DAY

11:00 a. m.—Service from Cathedral Church of St. Paul.

6:45 p. m.—Service from Park Street Congregational Church.

WOO, PHILADELPHIA, PA.
(309 METRES.)

TO-DAY

2:30 p. m.—Musical exercises opening the regular Sunday afternoon session of Bethany Sunday school.

6:00 p. m.—Sacred recital on the Wampanoag grand organ, Clarence K. Bowden at the console.

7:30 p. m.—Evening services from Bethany Presbyterian Church, Twenty-second and Bainbridge streets, Philadelphia. Broadcasting will include an organ recital from 7:30 to 7:45, with Miss Caroline Quigg at the console; sermon by the pastor, Rev. Dr. A. Gordon MacLennan.

KFI, LOS ANGELES, CAL.
(469 METRES.)

TO-DAY

2:30 p. m.—L. A. Church Federation service.

10:45 p. m.—Metropolitan Theatre programme.

12:00 midnight—Ambassador Hotel Concert Orchestra.

1:00 a. m.—Programme from studio.

2:00 a. m.—Orchestra.

WCAR, WASHINGTON, D. C.
(469 METRES.)

TO-DAY

12:00 noon—Service from the Rhode Island Avenue, M. P. Church at Washington. Rev. James H. Straughn will deliver the sermon.

5:00 p. m.—Open-air service held at the Peace Cross on the grounds of the National Episcopal Cathedral at Mount St. Alban, Washington.

6:30 p. m.—Speeches and exercises incidental to special services to be held at the Monument Grounds, Washington, under the auspices of the National Holy Name Convention in the capital city, including an address by the President of the United States.

7:30 p. m.—Same as WJAR.

9:15 p. m.—Same as WJAR.

KGO, OAKLAND, CAL.
(312 METRES.)

TO-DAY

3:00 p. m.—Service of the Tenth Avenue Baptist Church, Oakland, Cal.

Radio Station Built in Glass Cage

The latest novelty in radio broadcasting stations is WGBS, New York city, which is inclosed in a glass cage. So that the public may see how broadcasting is done and how the apparatus functions, the entire station, including the studio in which the artists perform, the transmitting room and the power room, is in a glass inclosure. Each instrument is labelled and its purpose briefly explained. Visitors will be allowed in the studio when programmes are being put on the air and a special receiving room is being built which will enable persons to gather and hear important events broadcast by other stations. The towers of the station will be 135 feet high, with the aerial 225 feet above the street. WGBS expects to go on the air officially about the first of October, and will operate on a 316-metre wave-length.

7:30 p. m.—Concert by the KGO Little Symphony Orchestra. Carl Rhodehamel conducting; and All Souls' Episcopal Church choir of Berkeley, Cal., Kathleen Sherrie Luke, accompanist and director.

11:45 p. m.—Service of the Tenth Avenue Baptist Church, Oakland, Cal.

KYW, CHICAGO, ILL.
(354 METRES.)

TO-DAY

12:00 noon—Central Church service will be broadcast from Orchestra Hall, Chicago. Dr. F. P. Shannon, pastor. Musical programme will be under the direction of Daniel Frother.

3:30 p. m.—Studio chapel service will be broadcast from KYW's studio in the Commonwealth Edison building, Chicago. The Chicago Church Federation will conduct this service.

WEAF, NEW YORK CITY
(492 METRES.)

TO-DAY

3:00 p. m.—"Sunday Hymn Sing," auspices Greater New York Federation of Churches, William B. Miller, General Secretary, presiding.

4:00 p. m.—Interdenominational services, auspices Greater New York Federation of Churches, William B. Miller presiding. Address by Rev. E. LeRoy Dakin, D. D., pastor of the Baptist Temple, Brooklyn, N. Y. Music by the Federation Radio Chorus, with Arthur Billings Hunt, baritone and musical director; Bernadine Wolf, soprano; Carlos Abba, harpist; Frank D. Penney, violinist, and George Vause, pianist.

7:30 p. m.—Same as WJAR.

9:15 p. m.—Same as WJAR.

WFAA, DALLAS, TEX.
(476 METRES.)

TO-DAY

8:00 p. m.—Radio Bible class, Dr. Wil-

liam M. Anderson, pastor First Presbyterian Church, teacher: Bible study and gospel song.
11:00 p. m.—Sacred song recital by choristers from Cliff Temple Baptist Church, Dr. Wallace Bassett, pastor.
11:30 p. m.—Jack Gardner's Orchestra in popular music recital.

WGI, MEDFORD HILLSIDE, MASS.
(360 METRES.)

TO-DAY

5:00 p. m.—Adventure hour; musicale: talk, auspices Greater Boston Federation of Churches.

WJY, SCHENECTADY, N. Y.
(380 METRES.)

TO-DAY

10:30 p. m.—Service of First Baptist Church, Schenectady, N. Y.

7:30 p. m.—Service of First Baptist Church, Schenectady, N. Y.

WHN, NEW YORK CITY
(360 METRES.)

TO-DAY

3:00 p. m.—Queens County Christian Endeavor. Programme: Address by the Hon. Burt Jay Humphrey, county judge of Queens, "Uniting All Religious Sects to Promote Religious Training (in the sense of morality and honesty) in the Public School Curriculum." Programme by the Crab Family Orchestra of Queens.

11:30 p. m.—Ted Lewis Revue with Cliff Edwards and Joyce White, from the Parody Club.

WIP, PHILADELPHIA, PA.
(509 METRES.)

TO-DAY

10:15 a. m.—Morning service, broadcast direct from Holy Trinity Church, Rittenhouse square, Philadelphia, Rev. Floyd W. Tompkins, D. D., rector.

WJY, NEW YORK CITY
(403 METRES.)

TO-DAY

8:15 p. m.—Specialty numbers.

WJZ, NEW YORK CITY
(453 METRES.)

TO-DAY

9:00 a. m.—Children's hour. Original stories by authors, music by the composers, comic stories by the originators of famous comedies.

11:00 a. m.—West End Presbyterian Church services, direct: sermon by Dr. A. E. Kiegle.

2:30 p. m.—Radio Bible class, auspices Greater New York Federation of Churches, "God's Contract with Man," Rev. Timothy Tinsley, pastor, Ridgewood Heights Christian Church; Church Community Chorus, C. W. Allen, director; Royal Male Quartet, Charles N. Kerr, Walter Sellers, Sidney Sellers and Edwin Baldwin.

7:00 p. m.—Nathan Abas's Orchestra.

8:15 p. m.—Anna Pinto, harpist.

9:00 p. m.—Alphonse Bohrer, pianist.

10:00 p. m.—Elizabeth Gibbs, contralto.

WMAF, SOUTH DARTMOUTH, MASS.
(563 METRES.)

TO-DAY

7:20 p. m.—Musical programme direct

from the stage of the Mark Strand Theatre, Broadway and Forty-eighth street, New York city, by courtesy of Moe Mark. Second part of the programme from the broadcasting studio in the theatre by the featured vocal and instrumental artists, personally presented by Mr. Plunkett.

WSB, ATLANTA, GA.
(429 METRES.)

TO-DAY

1:00 p. m.—First Presbyterian Church.

7:00 p. m.—Sabbath twilight sacred broadcast.

9:30 p. m.—Wesley Memorial Church service.

WWJ, DETROIT, MICH.
(517 METRES.)

TO-DAY

6:00 p. m.—Orchestra.

8:30 p. m.—Services at St. Paul's Epis-

copal Cathedral, broadcast from the cathedral.

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