The Jenkins Radiovision transmitter now broadcasting radio movies regularly from Station W3XK.
Vice President Curtis Lauds Radio's Progress

Speaks at Opening of Washington Radio Show

It was less than 10 years ago that Radio was first introduced to the public of the United States. Most of you remember the early days of broadcasting; the limited and unsatisfactory entertainment; the crude, home-made sets.

What a change has taken place. We have seen the evolution of Radio from a novelty, a toy, a fad, into a luxury, and thence into a necessity of our daily life; it is an epic of modern business growth. As I stand here tonight, in the midst of a show displaying the latest perfection in Radio receiving sets I marvel at the development of the radio industry. Even in the United States, where we are becoming accustomed to rapid industrial growth and advancement this progress is breath-taking. And yet Radio is still in its infancy with greater developments still to come.

We are hearing much these days to the effect that modern inventions are destroying American home life. This is not true of Radio. It holds a unique place in that it is returning us to our firesides, bringing to the home the best in entertainment and educational information.

In radio broadcasting’s first few years of existence, entertainment was paramount. While I believe that entertainment always will be paramount in radio programs, yet I also believe that Radio is an indispensable medium for disseminating timely information and a means of instruction on topics of general interest.

Because the Radio penetrates to hearth and home, it is the most personal medium of public communication of which I know. It has tremendous possibilities for good.

I am very glad to say that the great broadcasting companies of today have kept it on a high level; have kept it clean; have kept it worthy of our great Nation.

Radio knows no distance. For it State lines are meaningless; borders between nations no longer exist; the seas no longer separate continents. Radio is bringing the people of our great Nation closer to each other; promoting better understanding between the people of the United States and foreign nations.

We marveled at the first sectional hook-ups for Radio programs, and now international broadcasting is not far distant—in fact, it has been accomplished. In the recent speech of Great Britain’s prime minister, James Ramsay MacDonald, we had an excellent example. This envoy of peace and good will spoke to you over the Radio the other night and his voice was broadcast not only throughout this nation, but throughout the world.

The possibilities of international broadcasting, the interchange of Radio programs between America, England, France, Germany, and other countries of the world is established; its full benefits will be felt in the not far distant future. It will help us realize that when we speak of the other nations of the world, we are really speaking of individuals much like ourselves. I am looking forward to the day of the international program, for I know that when that time comes a new era will dawn.

Radio has played an important part in our life for the past 10 years; it will play a still greater part in the days to come—this is demonstrated in the latest products of manufacturers as shown on display in this room.
HINTS ON LEARNING

By GRADUATE VICTOR L. OSGOOD

IT IS probably more customary to en-
title such an article as this, "Hints on Stud-
ying,” but it is my wish to differen-
tiate between the two. I have found very helpful in my ad-
vancement of Radio knowledge. Study-
ing without learning which is studied quite easy; studying and learning at the same time is a little more difficult; but learning without studying is a long and tedious process and it is doubtful if any-
one, except a genius, could even keep up with the advance of the art by learning in this way.

The N. R. I. offers the best of advice on how to study the course and have completed it myself, I am in a position to say that it is entirely comprehensive enough to fit anyone, who will LEARN it, for a good position with one of the numerous radio companies in the country.

To study, more or less, but not to be taught, is not nearly as satisfactory a method of fixing facts in the mind as that of con-
ceiving and visualizing the why and wherefore of a statement of fact or formula. Take for granted the truth of a statement made by one who KNOWS, but don’t be satisfied until you have seen, in your mind’s eye, why it is true. As a simple example, Ohm’s law says, in effect, that the current through a re-
stance varies directly with the voltage across the resistance when the resistance remains con-
stant. No doubt about it, but if you will
think over to yourself, when you read that

1 = E
R

that the current is the result of the volt-
age and SHOULD, therefore, increase or decrease in value with an increase or decrease in the voltage value (a cause and effect), then the formula ceases to be only a mathematical way of stating a fact, and becomes a logical statement of common sense.

Graduate Osgood has written a number of interesting technical articles for the New York Sun Radio Section and other publications. He has gladly written this article specially for the "News." Read it—it contains some worthwhile information from a fellow N. R. I. man.

J. E. SMITH

The process by which I have found electrical terms to be very understand-
able is to think of them in terms of their mechanical equivalents; because each one HAS its physical analogy, and these physical analogies are all familiar to us in our everyday life. They are listed below:

Electrical. Physical.
Voltage............Pressure, or force.
Current...........Velocity, or speed.
Resistance..........Friction.
Inductance..........Capacity.

Weight is not really mass, though they have the same ratio to each other for all objects on the surface of the earth. But an article weighing five pounds, more or less, on Mars, yet the mass would be the same on either planet. That is, at a given rate of speed it would travel the same distance, but at a different amount of weight, the effect being sudden.

Weight is not really mass, though they have the same ratio to each other for all objects on the surface of the earth. But an article weighing five pounds, more or less, on Mars, yet the mass would be the same on either planet. That is, at a given rate of speed it would travel the same distance, but at a different amount of weight, the effect being sudden. We are not going to Mars and so we may consider inductance as being the equiva-

lent of the more familiar term, weight.

If we have a one hundred pound object on the floor and we exert a force against it to slide it along. If that force re-

ains constant and the friction with the floor remains constant, the speed of the object will also be constant. But if we double (or triple) the force, the friction still remaining constant, we will double (or triple) the speed. On the other hand, doubling the frictional resistance would cut the speed to one-half under a constant pushing force.

This is Ohm’s law illustrated, and in a way with which most anyone is familiar. Substituting the electrical equivalents will readily show you why the law applies to electrical circuits. Imagine a weightless steel bar mounted in such a manner that one end is rigid while the other end may be moved by flexing the steel. Here we have a ca-
pact which offers infinite resistance to a constant motion in one direction (con-
sidering the spring to be unbreakable). It moves through a short distance and

(Continued on page 15)

E. R. HAAS

Washington, D. C.

December, 1929

NATIONAL RADIO INSTITUTE

NATIONAL RADIO NEWS

Published monthly in the interest of
N. R. I. students and graduates, by the
NATIONAL RADIO INSTITUTE

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NATIONAL RADIO INSTITUTE

December, 1929

NATIONAL RADIO NEWS

This — the Christmas Season—is one of the happiest times of the year for us here at the Institute. Mr. Smith, "Chief" Dowie and I run together and check back over the accomplishments of the year, look over the records of students and graduates, the jobs you are holding down, the step by step progress you are making, and the opportunities that lie ahead of students just starting in the course.

Year in and year out we have seen men come into our student body, study hard, master Radio and graduate into promis-
ings positions in a new, fascinating field. Before us there is a sort of parade of men from the ranks of the unskilled, the lowly paid and untrained on to the field of Radio opportunity equipped with the weapon of specialized training ready for a Radio career!

Now, isn’t that enough to fill one with joy? Nothing gives more satisfaction than being able to help others achieve big things—to live richer, more successful lives.

To those of you who have not yet graduated we are looking ahead with you to the time when you will be full-fledged Radio-Tricians. There are better times ahead for you. There are times ahead when an hour’s study now may mean hundreds of dollars to you! There are times ahead when you will be called upon to make important decisions, solve problems and do other high-grade professional work. So let me urge you to carry on in the traditional N. R. I. spirit. Master your work step by step, carefully, thoroughly, so that during the coming year you, too, may take advantage of Radio’s big opportunities! E. R. HAAS.

"The great need at the present time is for men who are really trained and who will think."—Thomas A. Edison.

Every man is knocked down at least once—it is the getting up that counts.

To earn more, learn more.

IMPORTANT

When you write in for Consultation Service we want you to give us a quick, accurate reply. You can help us serve you better by stating your problems clearly and fully. For instance, if you want to know something about a certain set or want some advice on repairing a certain circuit—be sure to tell us the name of the set, the model, the number and type of tubes used, etc. We have to know those essential facts before we can give you accurate, rapid Consultation Service.

J. A. DOWIE.
Radio-Trician's Service Manual
on the
Earl Receivers, Models 21, 22, 31, 32 and 41

The Earl receivers, Models 21 and 22, use a neutralyse circuit having three '26 type tubes as Radio frequency amplifiers, one '27 type tube as a detector, one '27 as the first audio amplifier and two '71 type tubes as a push-pull amplifier. The schematic diagram of these receivers is shown in Figure 1.

Models 31 and 32 are also neutralyse type of receivers using three '27 type tubes as radio frequency amplifiers, one '67 tube as a detector, one '27 as the first audio frequency amplifier, and two '45 type tubes in a push-pull amplifier. The schematic diagram is shown in Figure 4.

Model 41 is practically the same as Models 31 and 32, with the following exceptions: Model 41 has an additional stage of R.F. amplification using a '27 tube. In Models 31 and 32 the neutralizing condenser is connected from the grid to a tap on the secondary winding of the next R.F. transformer. In Model 41 the neutralizing condensers are connected from the grid to a special neutralizing coil connected to the plate coil of the same tube.

The power supply of Model 41 is the same as the power supply used in Models 31 and 32.

Removing Chassis From Cabinet
(a) Remove aerial and ground connections.
(b) Disconnect the attachment cord from house lighting socket.
(c) Break the A.C. connection to the speaker and remove their friction tapes and unsoldering leads. (Note: This step is eliminated when inductor dynamic speaker is used.)
(d) Disconnect speaker leads from chassis.
(e) Dismount switch from cabinet.
(f) Remove tuning and volume control knobs.
(g) Remove bolts holding chassis to cabinet.
(h) Chassis may then be removed through rear of cabinet.

When placing chassis in cabinet, care should be taken to see that the tuning and volume control shafts are properly centered.

Special Service Notes
In testing the continuity of the circuits of the ordinary B battery and high resistance voltmeter method may be used. Careful study of the schematic diagram will enable the Radio-Trician to determine the approximate voltage reading that should be obtained when making such tests.

Such continuity tests, however, will not always prove the source of trouble. The information contained in the following paragraphs will cover practically all cases of trouble encountered in servicing these receivers.

Incorrect Voltages

Low Filament Voltages—
(a) Defective power transformer.
(b) Poorly soldered connections in filament circuit.
(c) Grounded filament circuit.
(d) Defective tube or tubes.

High Plate Voltages—
Open 15000 ohm resistor or open connection between detector tap and ground.

Low Plate Voltages—
(a) Defective rectifying tube.
(b) Defective power transformer.
(c) High resistance leak in plate circuit or power supply.

No Detector Plate Voltage; All Other Plate Voltages Low—
Short-circuited wiring in detector plate circuit.

No Detector Plate Voltage; All Other Plate Voltages High—
Open 25000 ohm resistance.

No R.F. and Detector Plate Voltages; All Other Plate Voltages Low—
Short in radio frequency plate circuit.

No R.F. and Detector Plate Voltages; All Other Plate Voltages High—
Open 4000 or 5000 ohm resistance.

Set Will Not Neutralize—
(a) Open by-pass condenser in R.F. plate circuit.
(b) Shorted R.F. choke.
(c) Defective neutralizing condenser.
(d) Open neutralizing circuit.
(e) Poor soldering in neutralizing circuit.
(f) Grid to plate capacity of neutralizing tube incorrect.

No Signal
(a) Aerial grounded or disconnected.
(b) Lead-in strip broken or corroded.
(c) Aerial and ground terminals shorted together.
(d) Speaker not connected to terminal strip.
(e) Speaker terminals shorted (at set or speaker).
(f) Defective speaker (try another speaker).
(g) Set not connected to A.C. source or current turned off at socket.
(h) Poor contact at attachment plug to wall outlet.
(i) Attachment cord broken.
(j) Defective tube or tubes.
(k) Tubes not making perfect contact to socket prongs.
(l) Variable condenser shorted or stator grounded.
(m) Variometer grounded or open.
(n) Broken pigtail on variometer.
(o) Grid condenser shorted, open or grounded.
(p) Grid leak grounded.

Hum
(a) Defective rectifying tube (try another tube).
(b) Rectifying tube making poor contact in socket.
(c) Defective tube or tubes.
(d) Tubes not making good contact at socket.
(e) A.C. line in close proximity to aerial, ground or set itself.
(f) Grounded 227 filament circuit.
(g) Loose laminations in power transformer or coil loosely mounted on core. (Tighten lamination screws or wedge coil.)
(h) Reverse either yellow and orange, or red and green leads in filter condenser.
(i) Open condenser in filter condenser block.

Oscillation
(a) Antenna too short.
(b) Set not grounded.
(c) Set not neutralized.
(d) Shorted R.F. choke coil.
(e) Open .1 mfd. condenser from plate side of R.F. choke to ground.
(f) Open connection to neutralizing condenser.
(g) Primary of coil reversed.
(h) Defective R.F. tube.

Distorted Reproduction
(a) Defective tubes.
(b) High or low plate and grid voltages.
(c) Missing or defective grid leak.
(d) Set in oscillating condition.
(e) Speaker out of adjustment.
(f) Grounded 2000 ohm biasing resistor first audio.
(g) Open 2000 ohm biasing resistor first audio.
(h) Defective audio transformer.
(i) One-half of push-pull input transformer secondary open, shorted, or grounded.
(j) Detector tube overloaded.
(k) Open .002 condenser.
(l) Speaker leads incorrectly connected to chassis terminals.

Noise
Disconnect the aerial and ground leads from the receiver. If the noise stops or diminishes, it is a sure indication that it is coming from the outside and must be eliminated at its source. If the noise continues with the same intensity with the aerial and ground disconnected, check for the following:
(a) Poor or dirty tube contacts.
(b) Poorly soldered or broken connections.
(c) Defective grid leak.
(d) Defective grid condenser or leaky by-pass condenser.
(e) Noisy volume control.
(f) Noisy resistors in power supply.
(g) Defective rectifying tube.
(h) Pilot lamp loose in socket.
SHORTAGE OF EXPERIENCED OPERATORS CONFRONTS FIELD OF RADIO COMMUNICATION

Demand For Additional Men Said to Be Increasing Rapidly Due to Growth of Industry

A "serious shortage" of experienced radio operators confronts radio communications and will become more acute within the next few years because of the expected growth of radio communications as a whole. J. H. Barron, radio inspector in charge of commercial operators, of the Radio Division, Department of Commerce, stated orally October 22.

At present, there are about 7,000 licensed commercial operators of all grades, practically all of whom are employed, Mr. Barron declared. Radio, he stated, affords an excellent field for young men, comparing favorably with aviation, but the supply of eligible operators hardly meets the demand.

The demand for operators is increasing greatly, according to Mr. Barron. Opening of new radiotelegraph services, such as those authorized by the Universal Wireless Communications Co., Inc., the Radio Corporation of America and Mackay interests, he stated, will require the services of hundreds of operators, while new provisions adopted by the Safety of Life at Sea Convention in London will necessitate the doubling up of radio staffs on many vessels which heretofore have retained only one operator.

Besides these conditions, which Mr. Barron said are certain to come, the development of visual broadcasting and experiments in the higher frequencies eventually will open up new uses for radio, all of which will require the services of operators and engineers.

Of the licensed commercial operators now on the rolls of the radio division, said Mr. Barron, more than 5,000 are employed commercially, with the remaining serving in governmental agencies. Government operators, he explained, do not have to be licensed by the Commerce Department, and undergo government tests, but a large number of them have taken the examinations as a matter of course.

There are about 2,200 ships under the American flag, which retain, roughly, 2,500 operators, said Mr. Barron. The 350 point-to-point radiotelegraph stations in the United States employ about 700 operators; the 600 old broadcasting stations about 1,000, the 101 transoceanic stations some 500, the 77 ship-to-ship stations about 300, and the 180 experimental stations about 200.

Mr. Barron said that the Universal Company, which is now establishing radiotelegraph service between 110 cities to serve them like the existing land lines, will probably need 600 experienced operators upon completion of its program. RCA, which is establishing a continental service serving a dozen cities, likely will need 100 additional operators, while Press Wireless, Inc., which has already gone on over the higher frequencies above 25,000 kilocycles, said Mr. Barron, it is expected that new bands of frequencies will be opened for communication of some character. Further demands for experienced operating personnel will accrue, he stated.

The safety of life at sea convention adopted in May last year, and which becomes effective on July 1, 1931, foresees more rigid requirements respecting radio watches, will cause a substantial increase in the number of operators aboard vessels, said Mr. Barron. It specifies that all passenger vessels of more than 3,000 gross tons shall carry two operators, and that cargo ships of more than 5,500 gross tons shall maintain continuous radio watches, which will require two operators.

Radio operators, either employed by broadcasting stations or for code transmission shore, earn a minimum of about $50 per week, said Mr. Barron. Abroad vessels the salaries range from $95 to $150 per month, with room and board.

The radio division is constantly in receipt of correspondence from individuals who desire to become commercial operators. Mr. Barron declared. He pointed out that the demand for radio instruction is reaching the stage where classes should establish special courses in radio.

The radio division itself is having difficulty in procuring candidates for positions of radio operators, said Mr. Barron. There are 63 such positions in the service throughout the country. He declared, but half a dozen vacancies still exist.
Remote

Remote control is gaining in popular favor. Keep awake to its opportunities. You’ll like the "Chiefs" article. Read it. J. E. S.

A FEW years ago radio receiving sets used to have many dials on the panel, which meant that it was necessary to carefully adjust these dials to tune the various circuits so as to receive programs from different broadcasting stations.

Now the design of receivers has advanced to such a stage that this can be done from any room in a building located some distance from where the receiver is installed and these operations can be confined to the simple manipulations of pushing a button for starting the set, pressing others for selecting transmitting stations, and turning a knob for the control of volume. The above method is known as Remote Control of a radio set.

What Remote Control Means

Remote Control of a radio receiving set was brought out by the engineers of the Kolster Radio Corporation and is everything that the name implies in regard to the operation of a receiver from a distant point.

The radio cabinet is installed in a convenient and desirable place in the home where it can be placed in an attractive position, blending with the home surroundings. The cabinet does not seem to be a radio set as it requires no external devices projecting from the front, and its beauty is enhanced in comparison with the radio receivers showing the controls.

The "on" and "off" power positions, volume control, tuning and indicating dials are not in sight, yet they can be operated either at the set or at a distant point.

If it is desired to operate the receiver from any part of the living room, dining room, or other convenient locations in the home, it can be accomplished by the use of a small and compact remote control unit, scarcely larger than a man’s hand. This contains all the miscellaneous equipment for actual remote control.

Power, Station, and Local Control

It is necessary to apply power to the receiving set, and this is accomplished by pressing a small button on the control box marked "Start." Power is thus automatically applied, all the vacuum tubes in the receiver are lighted, and the set is ready for operation. To show that the set is ready for reception of programs, a small red jewel is illuminated on the control box and another one is indicated at the set.

A choice of stations is next desirable, and this is accomplished by pressing a button marked with the call letters of the desired station, and a red jewel is illuminated on the control box.

Selection of stations is next desirable, and this is accomplished by pressing a button marked with the call letters of the desired station, and a red jewel is illuminated on the control box.

Control of a Receiving Set

By J. A. DOWIE, Chief Instructor

point, for all controls are also available at the remote control set where complete manipulation of the receiver is conveniently arranged.

In the side of the cabinet, out of sight in a recess, a control panel is easily accessible, on which are mounted the necessary lever buttons, knobs, and indicating lamps for the proper and complete operation at the local point.

In order to operate the radio set from the local position, a similar procedure is followed as at the remote point. The two operations can be performed independently, that is, manipulation of the set at the remote point is not dependent upon any adjustments being left in the proper position at the local point.

Pushing a momentary "start" button at the local places power on the receiver, illuminates a red indicating light on the panel, and lights a corresponding red jewel at the remote control box.

Selection of stations is similarly controlled by pressing a button marked with the call letters of the desired station, and a red jewel is illuminated on the control box.

In addition to the automatic selection obtained by the use of the eight buttons, a manual control is provided on the panel which can be stopped at any point. That is, by turning a knob, complete and select tuning is obtained throughout the entire kilocycle range. A marked scale is provided etched with numbers and kilocycle readings.

The use of a "stop" button automatically disconnects the power from the receiver, and the red indicating lamps go out.

Technical Description of Remote Control Unit

The selection of stations is obtained by the proper setting of brush contact buttons on the control panel in the receiver.

Remote Control Unit

Fundamental diagram of Automatic Tuning Method of Kolster K-45 Receiver.

If, for example, a certain broadcasting station is desired, the receiver is tuned to that station by turning the manual control knob on the panel. Then, all that is necessary is to set one of the brush contact buttons on an insulating segment located on a moving drum. Thus, the setting of the stations is a simple adjustment.

Construction

The construction of the automatic tuning unit is comprised principally of a low-gearered reversible motor, one double-pole double-throw locking relay, one double-pole double-throw locking relay, one double-pole momentary relay and a solenoid motor clutch.

The driving motor, when a selector button is depressed, is automatically and mechanically connected to the gang condenser and to a commutator drum with two insulated segments. The variable selector adjusting makes contact on the revolving commutator completes the selector circuit through this device which controls the period end direction of the motor operation. The variable selector contact positions, which are in series with the selector buttons, are adjusted on the commutator so as to reach the insulator sector and thus open the motor driving...
"During my spare time I have been doing a good radio business. Have had a phone put in, and a sign put on house. I have sold three Spartan radios during the last two weeks and have enough radio orders coming in for at least a week. I expect to sell a school of seven Spartan Radios, including a $75.00 combination radio and victrola."—Mr. E. M. Adams, 5029 Pimlouth Rd., Hamilton, Baltimore, Md.

"I have been doing all kinds of Radio work since enrolling with you. The spare time jobs commenced coming in shortly after I began the course."—C. C. Wilcox, Route 4, Oscoda, Md.

"I have the charge of the Radio Department of the L. & L. Tire and Battery Company, this city. We are distributing the Kellogg and Erla lines in Kentucky and Southern Indiana. For the convenience and assistance to our dealers in Louisville, we added a service department headed by an expert radio man. We have the latest up-to-date service and testing equipment. Each day I find new uses for the knowledge gained through your study of your Course which is proof that it is practical."—Mr. E. McConnell, 816 Satellite Ave., Louisville, Ky.

"I have not had as much spare time as I would have liked, have however, I have repaired a few sets and have installed some so that they are running well and are now in use. And I am still busy working with you daily. I enrolled."—Carl L. Mattson, Box 506, Ft. Benning, Ga.

"I am now employed by the local jobbers of "Radiola" and "Earl" Radios, and I am also selling Radios in the evenings, thanks to you, Mr. Smith, and the wonderful encouragement and cooperation of the entire N. R. I. You know, Mr. Smith, it seems funny when I started this course many of my friends said I was very foolish, as it was impossible to learn Radio by mail, but if that was foolish, I want to continue to be foolish as it has proven very profitable for me."—Mr. Louis C. Harder, 8351 West 50th Ave., Denver, Colorado.

"Up to the present time I have not had one dissatisfied customer, and I have had two sets that I sent to Colorado that I know have satisfied customers. I am extremely happy with the Information that they could not be fixed."—R. G. Clother, 559 Railroad Ave., Santa Maria, Calif.

"I am in business for myself now. I do a lot of repairing and also sell the Philco Radio in my spare time. I made $20.00 in one month besides my other work. I must hand it to the N. R. I. for their course, I do not know how to operate a machine worth $16,000 for my course."—Earl L. Smith, 113 Stroud Ave., Oswego, Pa.

"I would not start with my course for $10,000.00 and I love the Money-Back Agreement that you sent me. I have been so busy servicing sets around this district, that I've not had an hour to call my own for the last two and a half weeks since I came out here to Wyoming."—Mr. Frank Kleindienst, Box 129, Superior, Wyo.

"Well, Mr. Dowie, I never was lucky enough to have a brother, but you really seem that near to me. I am happy to know you, and in my way it seems that as we were closely related, we certainly do appreciate all your kindness and as far as the N. R. I.'s guarantee is concerned, I have no doubt that you will stand by it, you certainly do not need any guarantee. A fellow who would not be pleased with your service would have to be a professional CHANCE man. I sold Radios to the last man you sold them, to Mr. Dowie, Mr. Smith and Mr. Murray."—Mr. George F. Dearin, West Fork, Arkansas.

"Just a line to let you know that I'm getting along just fine. I've rented a nice place right down town. I have a nice room where I display all models of Atwater-Kent Radio sets. In the rear of this room I have a large workbench with different tools and tools. My income for the month of September was $1,000.00 on sales and $200.00 on repair jobs. I distributed those cards which you sent me in different places in the city. I advertise in one daily paper and in the weekly paper, also in the weekly paper, also in the city telephone KDLK every day. In that way I sell all the work I can take care of."

"Man is never too old to learn. I am nearly 44 years old, and know absolutely nothing about the fundamentals of Radio, until I started your course, and after finishing 23 lessons I have built a Radio complete, that operates O.K., and repaired nearly every Standard make of receivers on the market, also Power Units, Lead Speakers, and R Eliminators. That if a fellow can read and will use his brain and eyes, there is no course that he cannot learn Radio, as taught by you."—J. B. Fountain, 117 Patten Heights, Lakeland, Fla.

HINTS ON LEARNING

(Student Finds Time to Study on World Cruise)

(Continued from page 4)

steps when the counter force has become equal to the applied "push." Now the condenser is charged and the amount of displacement is the amount of charge, but there is no more current (velocity). If it should break, we have a punctured condenser.

If we apply a back-and-forth motion, however, we may keep up the motion of the bar, time we had to ourselves. I've always found it a pleasure to sit down in any vacant seat, whether under a turret or window. Time I read my N. R. I. lessons and then. In every part of France I was always gazing at something new and interesting. I was always making careful notes, either in my head or on my return lesson sheet, which I always kept. I used to study the service given by the N. R. I. by reading their lessons. Now, isn't it that the N. R. I. spirit for you? Pleasure, travel and work—but still there was a little spare time for studying his Radio lessons and preparing himself for his life ahead."

The best day for doing your best is every day.
Remote Control of a Receiving Set

(Continued from page 13)

circuit at any point on the dial corresponding to the frequency of the desired broadcast station. When a station selector is depressed and the motor is in operation, the current flowing through a series momentary relay temporarily closes a D.C. circuit supplying the exciting voltage for a solenoid motor clutch, thereby engaging the driving motor and the gang tuning condenser. This automatic clutch device is necessary in order to keep the inertia of the motor armature from turning the condenser gang after the selector or motor circuit has opened. The same relay also closes contacts which short circuits the voice coil of the loud speaker, thereby eliminating the possibility of any sound being heard until the motor stops operating and the desired signal properly tuned in.

The double-pole-single-throw locking relay is for the purpose of conveniently starting and stopping the set from a remote or local point. A momentary pressure on the button is sufficient to either start or shut off the apparatus. The remaining double-throw locking relay, one coil being in series with each of the starting buttons, automatically changes the effectiveness of the volume controls to either remote or local points. This relay permits only one or the other control to be in the circuit thereby eliminating any reaction between them.

ABOVE—A general view of the arrangement of loud speaker horns of the public address installation at the world famous Madison Square Garden. New York City. Public address systems are but another branch of the big Radio field. Auditoriums, hotels, schools, skating rinks, amusement parks are all prospects for special installations. Several N.R.I. men are already getting in on these profits. Student H. W. Solomon, Mearford, Ontario, Canada, wrote recently: "I have landed a contract for $500 to install and supply a powerful amplifier system for the ice skating rink here. Also in the last three weeks I have sold and installed $1150.00 worth of Radios." Watch next issue of the "News" for a big scoop in Public Address work that another N.R.I. man made.

J. E. S.