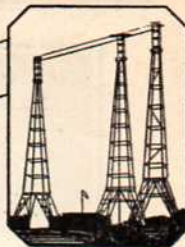


# NATIONAL



# RADIO

# NEWS

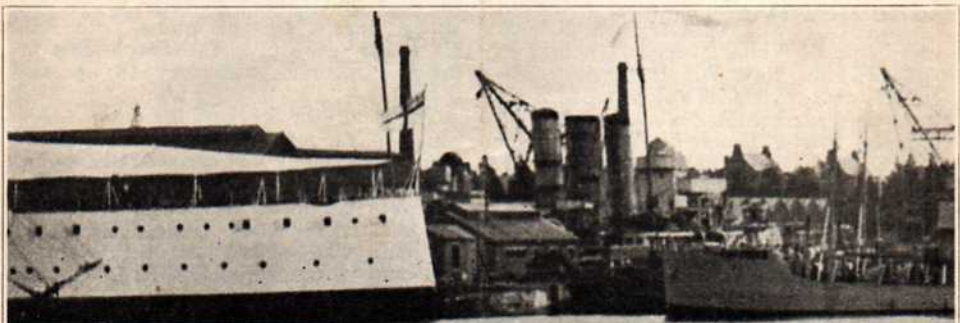


**FROM N.R.I. TRAINING HEADQUARTERS**

VOL. 3—NO. 3

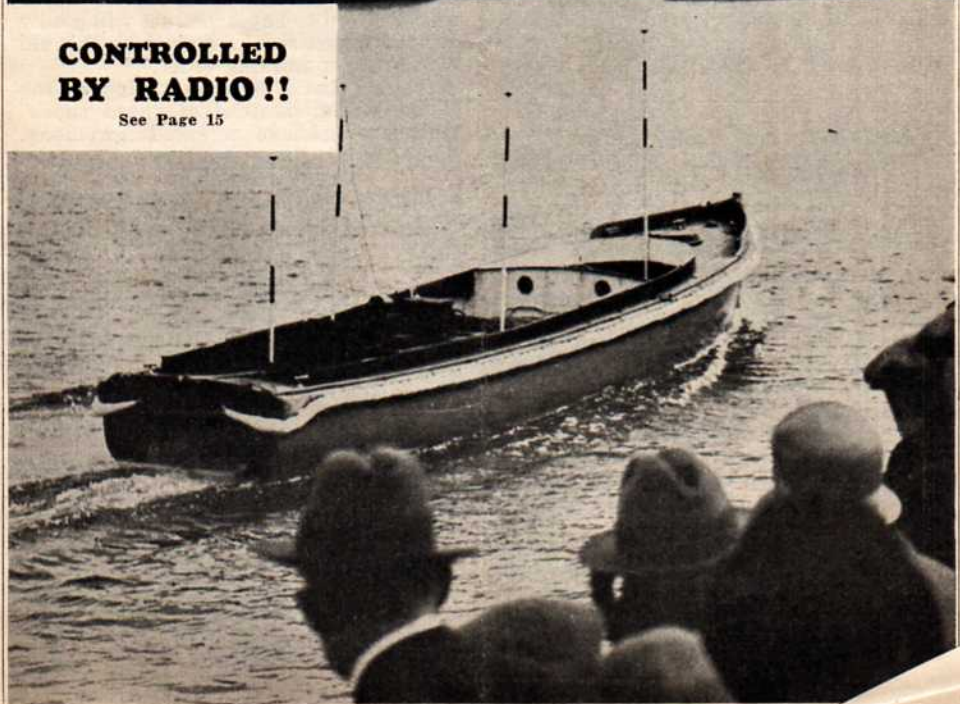
WASHINGTON, D. C.

OCTOBER, 1930



**CONTROLLED  
BY RADIO!!**

See Page 15





J. E. SMITH

## The PRESIDENT'S PAGE

ACCORDING to O. H. Caldwell, Editor of the "Electronics," 1930 receiver sales will exceed 3,500,000 sets. That is, a new receiver will be installed in one out of every five American homes. While 20,000,000 homes in America are now supplied with electricity, only 7,700,000 utilize modern alternating current Radio sets. 2,000,000 of these "wired" homes have battery sets—10,300,000 do not have receivers. Mr. Caldwell conservatively estimates that 12,300,000 householders in wired rooms are now waiting to be sold modern A. C. sets.

What a market this opens; what profits these more than 12,000,000 prospective buyers hold out to the Radio industry. It is small wonder that Radio-Tricians are optimistically facing the best part of the 1930 Radio season.

ANYBODY can make money when times are good and plenty of money is in circulation. But the Radio-Trician is among the few who can count on a good income when business depression hits the country.

Right now many industries are complaining about "hard times," yet the Radio industry is going full blast. Radio manufacturers are increasing production, offering employment to thousands of trained men. Mr. F. A. D. Andrea, President of the Fada Company, recently stated that the Fada production schedule doubled August 1st, and that indications pointed to further increases in the immediate future.

Why does the Radio industry prosper when other businesses face hard times? The answer is simple—Radio offers entertainment and amusement at cheaper cost to those who reduce expenditures during times of depression. The man

whose salary has been cut must give up accustomed amusements, such as shows, motor trips, and sporting events. This would be a real sacrifice were it not for the fact that he can continue to get his music, drama, football games, etc., via his Radio receiver at the simple cost of the few pennies necessary to operate the set.

Thousands of workers in other fields who are facing reduced salaries, part-time employment, and other offsprings of bad business years, are looking to their receivers for most of their amusement. The demand for Radio sets will increase; the number of service jobs will multiply. The man whose budget ordinarily allows \$400 a year for amusements will spend \$200 on a receiver; even the man who cannot afford to buy a new set will gladly pay the expert service man to put his old one in proper working order.

Trained Radio men are sitting on top of the world. Instead of "hard times" their earnings have increased right along.

I AM for the service man because he is the very backbone of the Radio Industry. Take him away and in a year the junk piles would be filled with receivers; the demand for sets would decrease; and the Radio business on a whole would fall into a slump.

Who would buy an automobile if the auto mechanics left their jobs? Few would want the responsibility—or would be capable—of repairing their own cars. The same holds true in Radio. People buy receivers knowing full well in the event of a break-down that a capable Radio-Trician can soon put the set in working order.

But the Radio-Trician must be capable; must know the "how and why" of receivers like a book. The day of the "tinkerer" has passed. Today set owners would no more trust their receivers to an untrained service man than they would their automobiles to a blacksmith.

The old time Radio "handy man" has passed away; his place has been taken by the trained Radio-Trician—the surgeons of Radio.

## If I Wanted to Make Money in Radio—I'd--

By HUGH RAY

First, I'd get the knowledge I needed to go out after Radio work. This is absolutely necessary. With knowledge, the "sky is the limit"; without it, you haven't a chance in Radio. Granting that I knew how to do the work, I'd make definite plans to get my share of the business.

I would make a thorough survey of my territory, taking into consideration such factors as general business conditions, number of set owners and the average income of prospects. With this information I would be able to accurately gauge the business I could get. I would now be ready to go out after Radio work.

I'd distribute business cards among the Radio stores or any store handling Radio as a side line. I'd tell the manager I was capable of doing Radio service and installation work and urge him to let me handle his service jobs, either in spare or full time. I'd also drop cards in mail boxes in the houses where I saw arials.

I'd run an ad in my daily or weekly newspaper to inform Radio owners that I was qualified and ready to do their Radio work. This would not necessarily be a large ad—one or two inches would do. I'd find out what special broadcast was coming and several weeks before each one my "ad" would read something like this: "Get that Radio working 100% before the big fight, the President's speech, or whatever the occasion is, by telephoning, (my number), etc."

I'd put a sign on my porch or fence advertising that I was a trained Radio-Trician. A sign like this would cost only a small sum—one job would pay for it. I'd put other signs in windows of business places that would consent to let me do it.

The most important advertising I'd do would be to pass out business cards to friends. It isn't necessary to come right



out and ask to fix their sets—a word about ability puts them "wise." I'd ask them to tell other friends about me. This "word-of-mouth" advertising is the best a fellow can get.

I'd make the mails bring me business. I'd get up a good form letter or circular, have it multigraphed, and leave it in the mail boxes or mail it to set owners. A postal card, already addressed to me would be enclosed with this letter. On the back of the card I'd have something like this:—"Dear Radio-Trician: Call and inspect my set. I understand you render this service without obligation." After that, I'd leave two lines for the name, address and phone number of the set owner.

When the work began to come in I'd guarantee satisfaction to build customer-confidence. This shows the set owner that you have confidence in your ability and it makes him willing to pay you a little more than the fellow who will not make a guarantee.

I'd be prompt and courteous. I'd handle every call "on the dot" or else I'd tell my customer when I could come because nothing annoys the customer so much as to be kept waiting for a promised service call. Promptness and courtesy build up a good reputation and profitable business naturally goes to the man who is dependable.

There are a number of other things that I'd do such as using my telephone to obtain business, making arrangements to handle overflows of Radio stores, securing commissions on sales for dealers, selling accessories, building sets to order, etc. Earning money is like making a garden—you must prepare the ground, plant the seed, care for the sprouts, in order to reap the harvest.



IT PAYS TO ADVERTISE

## A College Degree By Radio

By GRADUATE SYLVANUS EBERT  
Chief Engineer, Station WSUI



Graduate Ebert in the control room of Station WSUI

The great war broke into the plans of many young men who were forced to discontinue their studies in order to serve their country. After the Armistice a great many of these men were unable to finish their college work. There is one special case still vivid to me—that of the disabled war veteran who left school, but after the war was confined to his bed, unable to continue his work at college. Radio solved his problem. The extension broadcast of the University of Iowa through the station they own and operate, WSUI, offered the courses he wanted. A receiver at his bedside made it possible for him to obtain the credits he needed by means of the Iowa Radio course and he was later granted a degree, by Radio, at one of the regular convocations.

The University of Iowa has been a leader among educational institutions offering college courses by Radio. Radio was still an infant industry when the University began its experimental work in educational broadcasting. From the

first the idea received enthusiastic popular support. There was a challenge to the imagination in the thought that individuals or family groups might sit around their own firesides and avail themselves of the many advantages which would otherwise be confined to actual attendance at an educational institution.

As early as five years ago, Radio courses were being offered by the Extension Division of the University. Students at distant points enrolled for these courses for full credit. Developments in Radio broadcasting came so rapidly that the Radio authorities of the university began to suggest that Iowa could make a worthwhile contribution to education in general by taking the microphone into the classroom.

This would give the listener much of the atmosphere of the classroom. Questions of students and the answers of the instructor would be a part of the broadcast. During this last two years this

(Please turn to page 10)



1930 convocation exercises at the University of Iowa

## How to Add a Tone Control

By JOSEPH KAUFFMAN

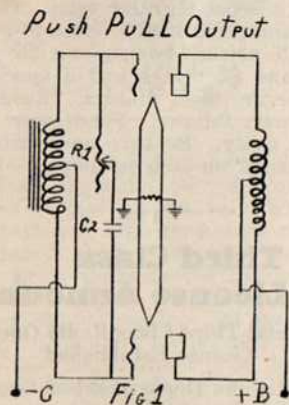


JOSEPH KAUFFMAN

The tone of radio receiving sets can be changed very easily by making small changes in the grid circuit of the audio amplifier. A Radio-Trician who is looking for spare time work will find that making this change will be very remunerative and one in which he can interest his customer, as new receivers just being placed on the market have a tone control. By properly presenting the subject to his customers, he can convince them that such changes should be made in their receiving sets.

Many customers, of the better sort, desire the tone of their Radio receivers to be very low—the lower, the better. There are many methods of increasing the low-frequency response, or cutting down the intensity of higher frequencies.

Figure 1 shows the method used when the output of the receiver is of the push-

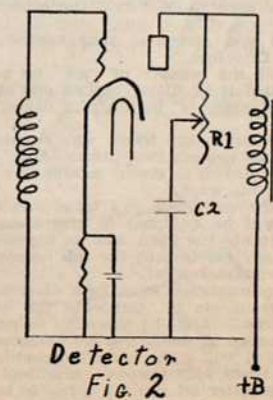


pull variety. To make the desired changes, it is only necessary to solder two wires onto the grids of the tubes. One wire goes to the variable resistor  $R_1$  (500,000 ohms)—the other to the condenser  $C_2$  (.005 mfd.).  $C_2$  and  $R_1$  are then wired together. A howl may result if the new leads are run near the input of the other stages which may be eliminated by properly placing the wiring so that no energy is transferred to other circuits. You will have to experiment until the proper position is found.

$R_1$  may be mounted on the panel and acts as a variable tone control. By increasing or decreasing the amount of resistance at  $R_1$  one is able to vary the depth of tone to any level desired.

There are some receivers which use only one stage of audio. In this case the tone control is placed in the plate circuit of the detector tube as shown in Figure 2. Be sure and use a condenser having a voltage rating of at least 200 volts, and preferably a mica condenser. An XL variable of .005 to .01 mfd. may be advisable. This will prevent the condenser from breaking down under any loads which might be impressed upon it.

When you come across a job in which the receiver uses a single 245 or a larger power tube in the output, better results will be obtained by using the same control combination—connected from the plate of this tube to the ground. It will then be necessary to use a larger capacity condenser (larger mfd.). The voltage rating, of course, will depend on the type of tube employed. If the set is equipped with a 245 tube, the condenser should be built to withstand a potential difference of 400 volts; if a 250 tube is used, the safety factor must be increased to 600 volts.



## National Radio News

Published monthly in the interest of  
N. R. I. students and graduates, by the  
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J. E. SMITH, Publisher. E. R. HAAS, Editor.  
R. S. HUDIBURG, Managing Editor.  
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NATIONAL RADIO INSTITUTE

Washington, D. C. October, 1930

### Your Director Speaking—

The Directors of a large Radio factory recently met to discuss the selection of a man for a newly created position.

Two employees were being considered for the new job. The merits of each were carefully weighed to determine which would best fill the opening. Both men had been with the organization about the same length of time; both had good records as hard workers. There was little choice between the two and the Directors were "up a tree" which to promote.

Finally it was decided to test both men, the job going to the fellow who made the best showing. Each man was given a telephone book with instructions to count the number of times the letter "a" appeared in the first fifty pages of the book.

Several days later the two men were called upon to give the results of their count. One fellow stated there were 28,550 "a's"; the other claimed 27,967.

"How did you arrive at your answer," asked one of the Directors.

"I counted the number of 'a's' on one page and multiplied it by fifty," replied one applicant.

"I counted every 'a' in the fifty pages," stated the other.

The job went to the fellow who counted every "a." He had proved two things—first, that he would follow orders as given; second, that he was thorough in his work.

Fellows, the man who can take orders, is the man who will be qualified to give them. Even more important—the man who is thorough, who conscientiously carries out the job before him, is the man employers want.

If you are instructed to make a diagram in one of your lessons—do it. Cultivate the ability to "follow orders." And—be thorough in making it. Make a practice of doing the job assigned to you—and doing it well. The more thoroughly you do your work, study your lessons—regardless of what you do—the better off you are going to be.

E. R. HAAS, Director N. R. I.

### Result Contest Going Strong

Already students and graduates have reported results from N. R. I. training which will receive careful consideration for prizes in the contest now running.

Profits from single Radio jobs, practical plans for getting spare time work, amount of money earned in spare and full time, good jobs secured, difficult jobs well handled, etc.—N. R. I. men are writing remarkable letters of actual accomplishments or results obtained from their Radio studies.

There is still plenty of time to enter this big "Result Contest." If you haven't already written your letter telling what you have accomplished as a result of N. R. I. training—send it in at once. The contest closes at midnight, October 31st.

Every N. R. I. man has a good chance to win one or more of the SIXTY cash prizes. Remember, there is a grand prize of \$50, a second grand prize of \$25, a third grand prize of \$15, seven \$10 prizes, seven \$5 prizes, twenty-one \$3 prizes, twenty-one \$2 prizes and a special \$10 prize for the most unusual "Result."

Get busy, fellows. Send your letters in right away. Be sure and write "Result Contest" on each envelope.

### New Third Class License Announced

Commercial Third Class Radio Operator's License Established

Recently the Department of Commerce announced the addition of a commercial third class license.

Applicants for this class of license must pass code test of fifteen words per minute in Continental Morse Code, plain language (5 characters to the word) and a practical theoretical examination, consisting of questions on the care and operation of vacuum tube apparatus and Radio laws and regulations. A percentage of 75 will constitute a passing mark.

Holders of this class of license will be authorized to operate Radio telegraph or Radio telephone installations on aircraft and such other stations that may be designated by the licensing authority.

Application forms for the new license may be procured from the same source that other operators' applications have been secured in the past—the Supervisor of Radio in charge of the district in which the applicant resides. If you desire to know the address of the Radio supervisor of your district, write to Mr. Murray, Manager of N. R. I. employment service.

# RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

## PHILCO MODEL 30 RECEIVER

The Model 30 Receiver is designed for use with the latest 2-volt filament type tubes only.

Table 1—Tube Socket Readings Taken with Average Set Checker

\*These readings reversed with respect to other Filament Voltage readings.

Tube	Circuit	Filament Volts	Plate Volts	Grid Volts	Plate Current Milli-amperes	Screen Grid Volts
32	1st R. F.	2.0	150	..	.0015	60
32	2d R. F.	2.0	150	..	.0015	58
32	3d R. F.	2.0	150	..	.0015	58
30	Detector Rectifier	2.0	..	..	..	..
30	Detector Amplifier	2.0	15	..	..	..
30	1st Audio	2.0	90	Note 1	.002	..
31	{ 2d Audio }	2.0*	150	24	.008	..
31	{ Push-Pull }	2.0*	150	24	.008	..

Note 1. With volume control in "Off" position, approximately 4 volts; with volume control full on, less than 1 volt.

Always use high-resistance voltmeter, preferably 1000 ohms per volt, when checking voltages in the Receiver. For reading plate and screen voltages, use a 250- or 300-volt scale. Voltage readings taken with meters having less than 250,000 ohms resistance will be lower than voltages given in the table.

When testing a Model 30 Receiver, all tubes must be in their proper sockets. The speaker must be connected and the tube shield must be fastened in place.

The readings in Table 1 were taken using "A," "B" and "C" batteries.

Compensate the Model 30 in the usual manner. Use an oscillator for the R. F. signal, connect the oscillator lead to the ANT terminal of the receiver. A good ground should be connected to the GND of the receiver. With the receiver set up for operation adjust the oscillator signal to a frequency between 1200 and 1300 kilocycles. The volume control should be turned on "full" and the receiver tuned sharply to the oscillator note. If the signal is too loud for accurate adjustment then reduce the volume control.

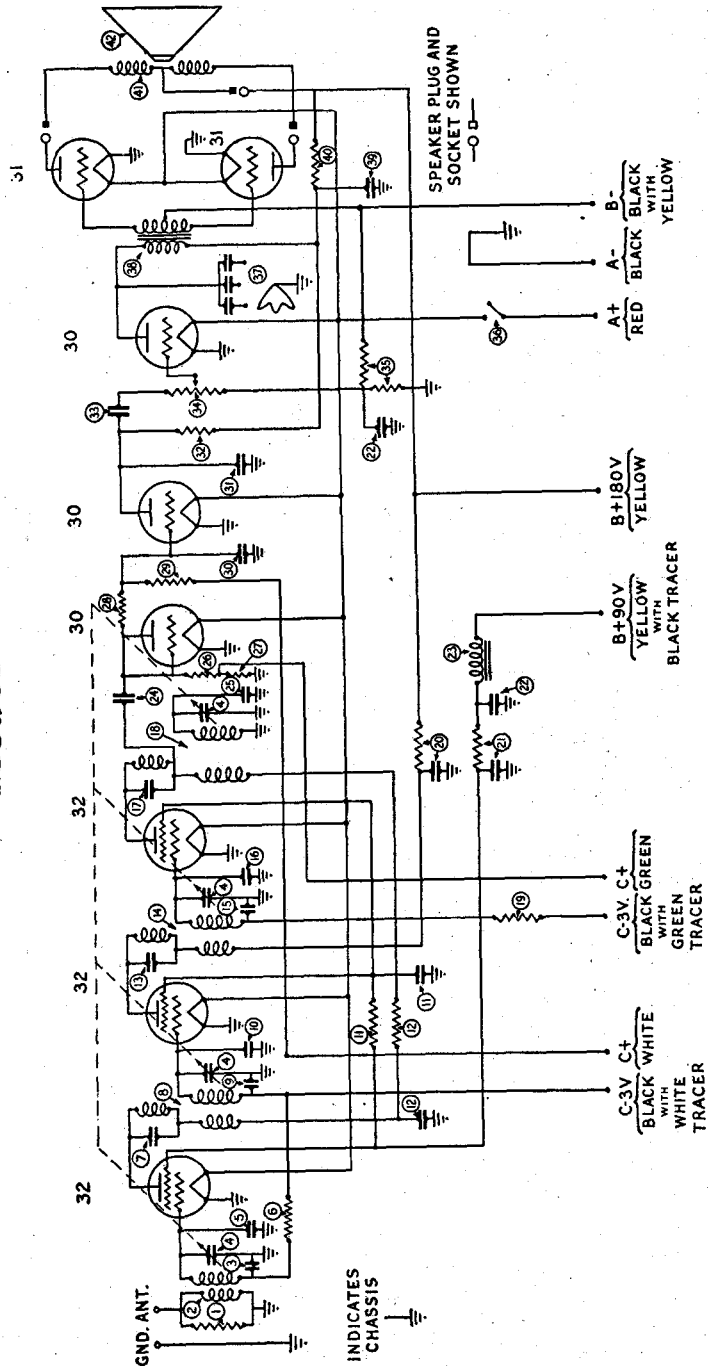
Table 2—Resistor Data

No. on Fig. 1	Color	Resistance Ohms
①	Golden Yellow	5,000
④⑩	Auto Buff	25,000
⑥	Jade Green	70,000
②⑥ ②⑦	Silver Gray	100,000
②⑧	White	250,000
①⑨ ②⑨ ③②	Battleship Gray	500,000
③⑤	Tubular	{ 250
	(two section)	{ 800

Table 3—Condenser Data

No. on Fig. 1	Capacity—MFD
②④	.00005
③⑩ ③①	.000250
③③	.01
③ ⑨ ①⑤	.05
①① ①② ②⑩ ②①	.05 with 250-ohm resistor winding
③⑨	.25 single section
②②	.25 two sections

**Model 30**



**The Radio-Trician and the Architect**

Radio in the home is heading definitely in a very interesting direction. Remote control and built-in apparatus will gradually eliminate Radio cabinets in many homes. The architect in the future is going to design living rooms to accommodate built-in receivers and the acoustics of living rooms will be carefully studied for the installation of equipment. We will find special closets with the Radio chassis built in, with control obtainable by sliding open a door. The dynamic or condenser speaker will be placed ornamentally on the wall and set in such a direction as to obtain the best acoustic effect.

Station control will be available at the chassis or through remote control devices, placed near armchairs, easy chairs, and desks. In fact, it may be possible to control them from other rooms. This possibility is no longer a dream as new remote control devices conclusively proved that remote control isn't a plaything but a workable device.

Built-in Radios can be installed in many homes today, in the china closet, using an ornamental speaker as a console with the remote control wire concealed in the molding. In homes having a large staircase, the chassis and the speaker may be built into the lower portion of the staircase with great success. Then, too, the Radio chassis may be placed either in clothes closets or directly below in the cellar to meet the demand of the customer.

Built-in Radio offers a new, profitable field for trained men. The Radio-Trician who cooperates with the architect, pointing out the advantages of built-in receivers, should find increased earnings. Ironing boards, breakfast sets, even kitchen cabinets, are being built into walls—so why not a Radio?

**Attended I. R. E. Convention**

In August Mr. Smith attended the convention of the Institute of Radio Engineers held at Toronto, Canada. Mr. Smith will discuss this convention in a forthcoming issue of the News. While en route to Toronto, Mr. Smith visited Graduate Lyman T. Newell, who is in charge of the Airway Radio Station at Bellefonte, Pa.

**Radio City to Cost \$250,000,000**

John D. Rockefeller, Jr., has announced plans for a Radio City, occupying three full blocks in the heart of New York, at a cost of one-quarter of a billion dollars.

The Radio City will contain a great variety of theatres and studios devoted to broadcasting, television, sound motion pictures, electronic music and other developments in Radio entertainment and education.

Twenty-seven studios will be used for broadcasting sight and sound. Ten studios will be equipped for sound picture photography and recording. Four large theatres will provide vaudeville, "talkies," musical comedy and drama. An enormous symphony hall will be used for concerts.

Surrounding the office buildings will be magnificent garden plazas—a veritable show place. Towering above the entire development will be a sixty-story shaft containing offices and studios. The buildings and plazas are expected to be completed by the Fall of 1933.

The enormous amount of money being invested by the Rockefeller interests in Radio clearly points to the expected growth in this industry during the next three years.

**\$200,000 Radio Installation for New Hotel**

The world's most elaborate and expensive Radio receiving installation is now being placed in the new Waldorf-Astoria Hotel in New York City. The actual cost of this intricate Public Address System will run from \$150,000 to \$200,000.

The Radio installation is unique in that in addition to providing six channel Radio and Public Address Service to each room, more than a hundred apartments in the building are provided with a centralized antenna system. The equipment will be arranged so it can be used as six separate Public Address channels or six individual program supply channels. Nine of the public meeting halls will be provided with Public Address facilities for incoming and outgoing programs. All Radio apparatus will be located in a separate station atop of the building. Here six receivers will pick up entertainment for distribution to guests.

Other hotels will follow in the footsteps of the Waldorf by installing Public Address Systems for the convenience of patrons. This will open up many new Radio jobs.

## Make Trade-Ins Bring New Sales

"I'll buy the receiver if you'll give me a good trade-in allowance on my old set."

How many Radio-Tricians have been faced with this problem? If you are working for a large dealer who has a definite trade-in policy, well and good, but if you are "on your own" you naturally do not want to become over-stocked with obsolete models taken as down payments on trade-ins.

Some fellows would, in many cases, rather lose a sale than tie up profits in a trade-in. How can the condition be eliminated so that the independent Radio man can turn "trade-in" receivers to his own profit? Here is a workable plan.

Suppose you are selling the \$150 XYZ receiver. You find a good prospect, sell him the set and take his old ABC model for the \$30.00 down payment which you require. Or, if you allow 20% or \$30 off, taking his old set as a trade-in, your 20% profit is tied up in the old set until you dispose of it. What's the quickest way to get your money out of the old receiver?

First, put the "trade-in" receiver you took into good condition. Then, advertise "Receivers For Rent." Charge a nominal fee for the use of these sets—\$1.00, \$2.00 or \$3.00 a week. If you can make a profit on the rentals, fine, but the fact that the old receiver is in a home where a receiver is not owned, opens up a larger field of potential profits.

After the set has been in the home for six or eight weeks, suggest a demonstration of the receiver you are selling. You will be able to point out the fact that the rentals to date would have made up the initial payment on a new receiver. To clinch the sale offer to apply the paid-in rental fund as a down payment on the new set. You won't have to take a trade-in now, because your prospect will not own a set. A good selling talk should enable you to leave the new receiver in the home, taking the old trade-in with you, to be used again to secure another good prospect.

Visitor: "How many controls have you on your Radio?"

Host: "Four. Me, my wife, son and daughter."—Student Lester C. Kinosh, 112 Mitchell Ave., W. Asheville, N. C.

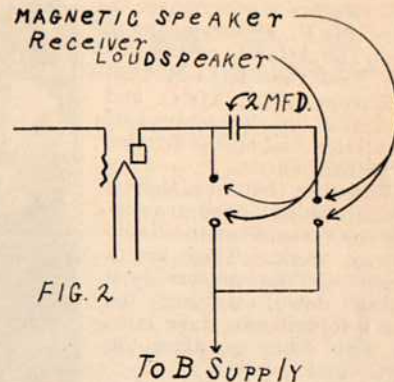
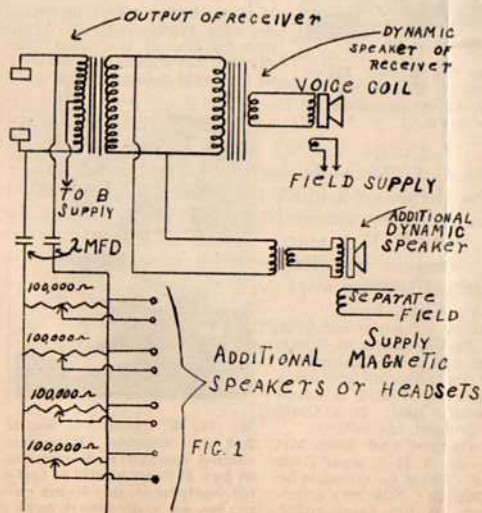
## Adding Additional Loudspeakers

By D. B. LOONEY  
N. R. I. Technical Staff

One way in which the wide-awake Radio-Trician can increase his bank account is by installing additional loudspeakers at dance halls, bathing beaches, stores or in private homes. Many home owners would like an extra speaker on their porch, in the garden or kitchen. This last appeals strongly to the busy housewife and is a good selling point.

Figure 1 shows how we may connect as many as thirty magnetic speakers to a single broadcast receiver (or phonograph amplifier). Connections for an additional dynamic speaker are also shown.

The two 2 mfd. blocking condensers are to prevent the direct plate current from flowing through the speakers while at the same time allowing the alternating component of the plate current to flow through the magnetic speaker windings. As these speakers are connected in parallel, the maximum volume from each will be the same. The individual volume is controlled by the 100,000 ohm resistors. Don't run the common lead from the output of the receiver in metal covered wire as the capacity effect would decrease the volume. Good rubber covered wire will suffice. There is no fire hazard if the 2 mfd. condensers are



built to withstand a potential of 400 volts when using 245 tubes and 600 volts with 250 tubes. However, the leads should be well separated.

When using extra dynamic speakers, connections may be made directly across the output of the receiver as shown, although if the dynamic speaker input impedance is like that of a magnetic speaker, it may be connected with the latter. We must, however, use a separate field excitation for the additional speaker. Most dynamic speakers have incorporated in them either a dry metallic rectifier or a vacuum tube rectifier. Suitable speakers can be secured from wholesale Radio mail order firms.

When you wish to add additional speakers to a receiver which does not use a push-pull output, follow the hook-up shown in Figure 2.

Many manufacturers of broadcast receivers have plans and parts already assembled for adding additional speakers to their sets. On a big job it would be a good idea to write to them stating all the facts of the case—the type of receiver—the number and type of speakers to be added and any constructional details which have to be surmounted. Manufacturers are always glad to cooperate on matters of this sort and by writing to them mistakes may be avoided and much time saved.

Radio-Tricians are picking up extra money installing additional loudspeakers—here is a profitable field in which N. R. I. men should "cash in" right along.



A typical classroom broadcast from the University of Iowa.

### A COLLEGE DEGREE BY RADIO

(Continued from page 4)

plan was put into operation in several courses. The last response from listeners showed that hundreds of persons are attending these classes by Radio in addition to the persons who are taking the work for credits. There is unbounded opportunity for expansion of this plan. The offering of additional courses is limited only by requirements of installation of technical equipment. This has been done and we are now able to broadcast by remote control from any of the University classrooms. The year just ended brought to a close the successful broadcasting of five Radio courses. No other institution has gone so far with a program of educational broadcasting. The courses given last year were Music, English, Astronomy, French and Spanish.

The apparatus necessary to present a classroom broadcast differs little from that used in other remote control pick-ups. The microphones are of the condenser type and their output operates the speech input apparatus at the broadcasting station. A switch is placed within easy reach of the instructor and at the beginning of the class he needs merely to press the button to place his voice on the air. Several microphones are used in each classroom, depending upon the size of the class. The output of these microphones is connected across the telephone line leading to the broadcasting station.

Radio is not only used for extension work—remote control apparatus is in constant use. Special built broadcasting rooms are located above the university swimming pool, basketball court, baseball stadium, and football stadium.

All university buildings as well as local hotels and theatres are equipped for broadcasting. The use of remote control enables the university authorities to be in constant touch with any portion of the campus desired.

No longer is Radio a source of entertainment alone—it is now an important factor in education, and it is in this field that the university of Iowa is taking a prominent lead. A richer and more complete home life, with mental stimulus and pleasant relaxation has been made possible through broadcasting and its corollary, the home Radio receiver.

## The Cream Goes to N. R. I. Men

They are everywhere—these N. R. I. service men. From the Atlantic to the Pacific, from Canada to Mexico, in Europe, Asia, Africa and Australia, in the centers of population and on the fringes of civilization.

Wherever they are, there's one sure thing—they are getting the "cream" of the Radio Service work. They are a bunch of "go getters"—no sitting down, waiting for plums to fall into their laps. No, sir! They go after the work—and get it.

It's easy to know why they get the work. Regardless of where, who or what they are; whether old or young, short or tall, fat or thin, they know their Radio. N. R. I. men "cash in" because set owners in every community realize the true worth of the Radio-Trician. While some fellows are whinning about "conditions" the N. R. I. man tightens his belt, grabs a handful of tools and steps out to make service calls. When he gets back the other fellow is still whining but your N. R. I. man is busy making out another deposit slip to bank his day's profits.

When Abernethy, Sas-



Mr. Lewis Giannone, 620 River Street, Paterson, New Jersey, took in \$975.00 in four months from radio sales and service work.



Mr. M. Nimelstein, 610 Keefer Place, N. W., Washington, D. C., figures his assets as \$2,103.93 after one year of radio work.

katchewan—a town of 250 souls—was gripped in the throes of a hard winter, when roads were snowed under, Don Mills, your N. R. I. man, sold ten receivers besides handling a profitable amount of service work. Some record, if you ask me.

Harold Buxton was in a lumber camp in the foothills of the Andes, down in South America. Rumors of his Radio knowledge spread to the city of Pailahueque and upon a visit to that place he found a large amount of work awaiting him. In a short time he more than doubled his salary.

Let's jump over to Egypt and meet Mr. N. G. Mavrommatis—an N. R. I. man from the land of pyramids. When he enrolled he could scarcely read English. Now he's a recognized Radio Expert in his community.

Now to India—Bombay—where Mr. N. G. Motwane turns his time into money. Or to Auckland, New Zealand, where Roy Keith owns a profitable Radio shop. To British Guiana and Student George A. Johnson. To Alfred Bauer, in Glasgow, Scotland. To the Federated Malay States, where Teja Singh is regarded as a "coming" Radio Engineer.

But why leave the United States when fellows like Joseph Drolet, Ventnor, N. J., tallies an extra \$800 a year to his income. Or G. F. Walton, Norfolk, Va., who nets \$500 in spare time. Or Fountain F. Lynch out in Sapulpa, Okla., who receives sets sent from towns a hundred miles away and who "cashes in" to the tune of \$839.60 in eight months.

Right here in Washington, D. C., W. G. Spatheif cleaned up \$600 while taking the course. Up in Chadds Ford, Pa., R. W. Hoffman left the flour milling business to answer the call of Radio. Is he glad? You bet, because his weekly receipts now amount to as high as \$155 a week. Out in Chicago, Ill., Theodore Hilmers puts in a few extra hours and adds \$175 to his bank account in three weeks. In Philadelphia, Pa., Saul D. Gilles, earned \$1000 in addition to his regular pay.

There's no use naming any more—space forbids mention of the hundreds of N. R. I. men who are "cornering" the Radio Service work in their communities. The files at the Institute are crammed with "success stories" of students and graduates: every mail brings a fresh batch of letters telling of new achievements in Radio. More power to you, fellows. You are spreading the fame of N. R. I. by establishing such enviable reputations as Radio Experts and at the same time you are advancing on the road to financial independence.

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Mr. M. W. Clark, 911 South 2nd St., Clinton, Missouri, earned enough in 6 months to buy \$175.00 worth of testing equipment, pay living expenses, set aside \$800 in bank.

# RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

## CROSLY BUDDY and CHUM 1929 RECEIVERS

Crosley Buddy and Chum receivers employ the same chassis mounted in different types of cabinets. The circuit makes use of a total of 6 tubes, including the rectifier. Screen grid UY 224 tubes are used in the Radio frequency stages, a UY 227 heater tube in the detector socket, UX 171A's in the push-pull audio stage and a UX 280 in the rectifier socket. In order to vary the pick-up the local-distance adjustment, controlled by a toggle switch, is provided. The Radio frequency and detector stages are tuned by variable condensers, mounted together as a single gang, and controlled by the station selected. A small aligning condenser is provided across each variable condenser (aligning condensers are not shown in the circuit diagram).

The output tube plates are connected directly to the armature of the Dynacoil speaker, without the use of an output transformer or choke. The armature consists of four coils. Two of these are connected in series in the line from each output plate. After passing through the armature coils, the plate circuits join in a common lead, which connects to the speaker field. The B supply current comes from the speaker field through this common lead, branching at the armature coils to pass through two of the armature coils to one output plate, and through the other two armature coils to the other output plate.

The armature coils are so arranged that the magnetic effect of the D. C. component of the output plate current cancels out, while the A. C. signal com-

ponent is effective in moving the armature. To understand this, assume that the D. C. plate component is flowing through all four armature coils all of the time, while the signal component is only flowing through two armature coils, to one tube plate, at any one time. Thus by bucking against each other the pairs of armature coils in the two plate leads, the D. C. plate current effect may be cancelled out without decreasing the effect of the signal current.

After it returns from the speaker field to the receiver, the high potential side of the B circuit branches, one branch going to the detector and radio-frequency plates, the other going through a 6000 ohm resistor to the screen grids, through a second 6000 ohm resistor to the emitters of the radio-frequency tubes, and finally through a 115 ohm resistor and the volume control rheostat (400 ohms) to ground (chassis).

The grids of the radio-frequency tubes are connected through their respective radio-frequency transformer secondaries to ground (chassis). By virtue of the voltage drop in the previously mentioned 115 ohm resistor and volume control rheostat, the radio-frequency grids are biased with a negative potential with respect to the emitters of these tubes. The amount of bias is regulated by the volume control rheostat.

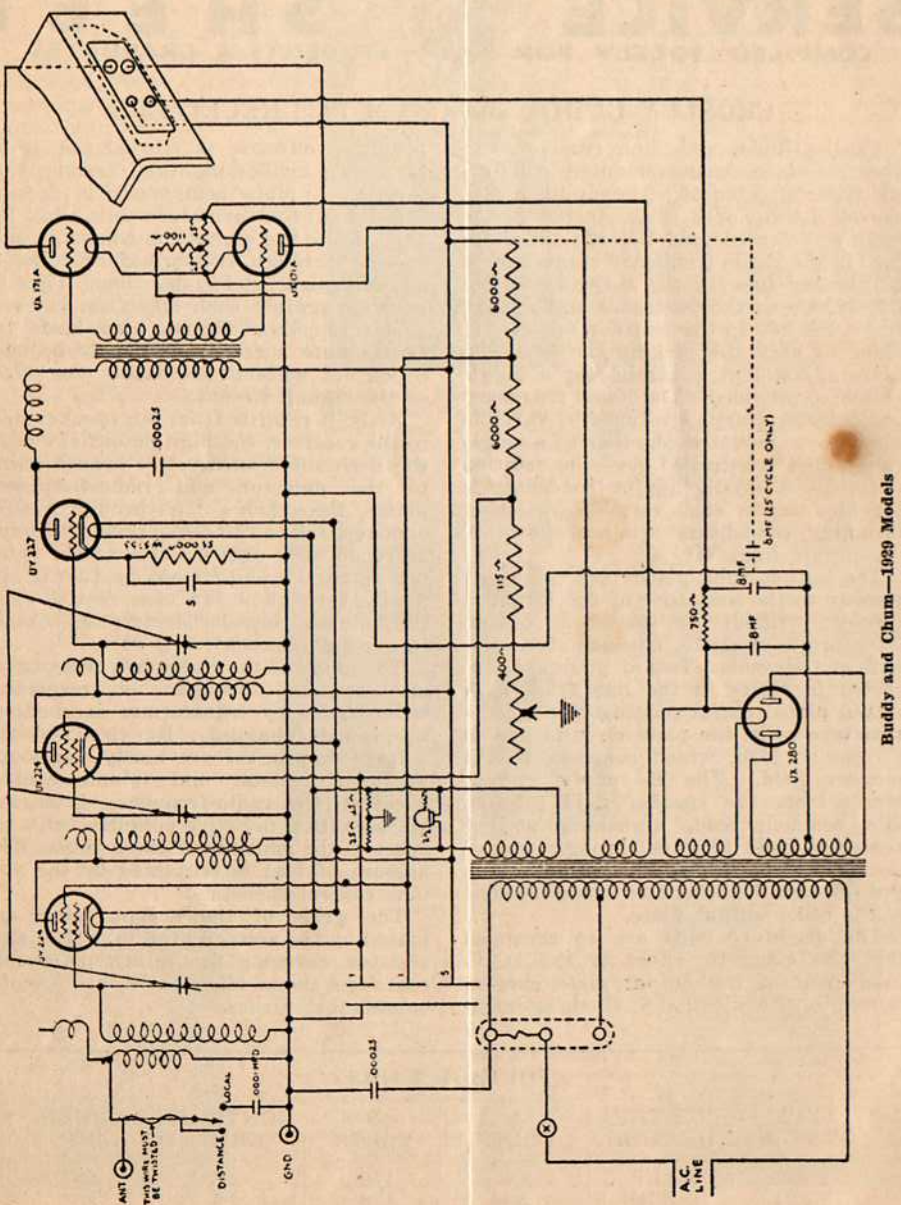
The grids of the output tubes are biased by the voltage drop in a 1100 ohm resistor, carrying the return plate current from the middle of a 50 ohm potentiometer to the chassis.

VOLTAGE TABLE

TYPE OF TUBE	POSITION OF TUBE	A VOLTS	B VOLTS	CONTROL GRID	SCREEN GRID
UY 224	1st RF	2.4	170	2.8	85
UY 224	2nd RF	2.4	170	2.8	85
UY 227	Det.	2.4	170	12	..
UX 171A	AF	4.8	170	38	..
UX 171A	AF	4.8	170	38	..
UX 280	Rect.	4.8	250	....	..



Mr. James S. Russell, 207 Burtner Street, Greensboro, North Carolina, works from 12 to 4 in the afternoon and adds \$900.00 to his income in eight months.



"I am willing to bet that a person would have to pay a thousand dollars to get the same results your course gives." William Ristan, 206 Himrod St., Brooklyn, New York.

"At the beginning of the course I was just 'one of the service men' while now I have advanced to head of the Service Department, and I give the credit to your splendid course, as it covers things that could never be gotten by the 'here and there' reading method." J. R. Gilbert, Lynchburg, Va.

"I have had wonderful success in Radio work. I have repaired nearly all types of circuits, both A. C. and D. C., and have never been stuck on a job, which is entirely due to your training." Emory S. Baith, 5701 Maryland Ave., Altoona, Pa.

"I find that the course teaches subjects that very few Radio service men in this territory know are in existence. I am getting more work than I can take care of, and the best of it is, work that other fellows turned down as unfit to repair. I have not run into any job that I did not finish. There is hardly a day passes but someone comes in and says 'so and so' sent me here. Something like that makes a fellow feel pretty good." Herman F. Krentz, 2623 Washington St., Dubuque, Iowa.

"When I sit down to study my lessons, it sounds to me as if you were right at the table with me helping me out." Frederick Greensword, 2514 St. Antoine St., Montreal, Que., Canada.

"I wouldn't take ten times the cost of the whole course for what I have already learned about Radio. It's worth the cost just to be associated with such a bunch of good fellows." William Wright, 2106 Madison Ave., New York City.

Dear Mr. Smith: "Radio sure is wonderful. All the experiments were very successful. I rigged up a one-tube set and got station WMAX, Buffalo. That is something I could not do a month ago, even with a blueprint to go by—I did not know what function different parts performed. I do now, thanks to your teaching." Matthew J. Keever, 3006 Highland Avenue, Niagara Falls, New York.

"I want to tell you of some easy money I made the other day. I bought a Radiola 20 for \$15, and sold it the same evening for \$50. That was the most and easiest money I ever made in one day. And I know that I never could have done this if it was not for the knowledge I got from your course." Harold Bechtel, Massillon, Ohio.

"I have had quite a bit of repair work to do. From the theory I gained from the first eight lessons I wired a new house. To be sure of myself, I had an electrician to look it over and he said it was the best job he ever saw a boy do. I am sure glad I have enrolled for the course when I did." Woodrow Horsley, Vanceburg, Ky.

### NOT A SOUL ABOARD

The front cover of this issue shows a phantom boat, controlled entirely by Radio. This experiment was made at Portsmouth, England, at the recent Navy Week Show.

The speed and direction of the boat are completely controlled by Radio, making it unnecessary to carry a single man on board.

There is no doubt but that eventually ships, airplanes, trains, even automobiles can be controlled from distant points entirely by Radio. This development means another big field for trained men.

### N. R. I. Men Recommend Mail Order Houses

In the August issue of the News students and graduates were asked to recommend wholesale Radio supply houses which rendered good service. To date, dozens of letters have been received giving the names of reliable concerns selling Radio parts and apparatus through the mails. This information was passed on to the News readers who may wish to buy from these concerns:

CHICAGO, ILL.—Allied Radio Corp., 711 W. Lake St.; W. C. Braun Co., 563-71 W. Randolph Street; Chicago Radio Apparatus Co., 415 S. Dearborn Street; Chicago Salvage Stock Store, 509 S. State Street; Harrison Wholesale Co., Peoria at Washington Blvd.; New England Mills Co., 851-53 Washington Blvd.; Twentieth Century Mail Order Corp., 200 Jackson Street; Western Radio Co., 128 W. Lake Street.

CLEVELAND, OHIO—Acme Electric Company.

KANSAS CITY, KANSAS—Sterling Radio Co.; Western Radio Co.

ST. LOUIS, MO.—Van-Ashe Radio Co., 10th and Pine Sts.

NEW YORK, N. Y.—American Sales Co., 1921 Warren St.; Dixon Radio & Electric Co., 110 E. 23rd St.; Federated Purchaser, 16-22 Hudson St.; Radio Circular Co., 225 Varick St.; Radio Surplus Corp., 56 N. Vesey St.; Royal Eastern Electric Supply Co., 16 W. 22nd St.; S. S. Jobbing House, 150 W. 26th St.; Wholesale Radio Service Co., 36-38 Vesey St.

PHILADELPHIA, PA.—Mastowitz-Herbach, 512 Market St.



# A Billion Dollar Year Ahead

\* \* \* \* \*

## Importance Seen In Short Wave Radio Experiments

### Predicts Unlimited Application to Future Art of Communication

While much has been written to date about experiments being made in developing and improving short-wave receiver units, and allied equipment, few of the general public are aware of the significance of these experiments to the future of the radio art, and their application to every-day commercial and industrial activity.

### Sees Many Benefits In Cross-Sea Programs

The popularity of international broadcasting is making steady headway both here and abroad, as is evidenced by the fact that during the past month no less than eight programs originating in the British Isles were broadcast in this country.

### Photo-Radio Holds Many Developments

Recent experiments made with what is known technically as photo-radio promise to open up a vast new field of facsimile reproduction for instantaneous transmission of entire booklets, folders, reports, and similar material across thousands of miles of space, it is stated by officials.

### RADIO PRODUCTION NOW A SPECIALTY

One of the best evidences that radio has arrived at a sound merchandising stage is noted in the trend toward specialization throughout the industry, wherein necessary parts and accessories are being produced by

### Radio Performs Manifold Duties

Perhaps no other mechanical device ever developed has been called upon to perform more manifold duties than has radio. It has been used for information on road and traffic conditions, weather data, reports on time signals for regulating watches and for economic social and political

**50 Per Cent of Radios Are Over 2 Years Old**  
More than half of the homes in this country have a radio.

### Stress Radio's Aid To Aviation Is Only Certain Means for Maintaining Contact Between Plane and Ground

Perhaps in no other field of endeavor is radio's application destined to have a more important bearing than in that of aviation. It is stated

knowing the exact location of company ships at all times is becoming more important; likewise, the need for the pilot keeping informed of weather conditions ahead has been demonstrated to be of vital concern.

#### Other Phases

Aside from this important field of communication, however, there are other phases of the radio art which, undoubtedly, will play a major part in the development of this, our newest industry. Reference is had to the progress being made with the radio beacon, which already has proved itself in guiding the pilot accurately along his course, and the installation of beacon equipment on coast

### Sees Radio Soon in Billion Dollar Class

Radio having grown to the status of an \$800,000,000 business within a period of but six or seven years and by covering but forty percent of American homes, should easily enter the exclusive billion dollar class within the next twelve months, is the opinion expressed by George K. Throckmorton, Executive Vice-President and General Manager of E. T. Cunningham, Inc., radio tube company.

Based upon the foregoing, and due to the fact that there still remains a vast potential market of thousands of homes not yet equipped with radio, Mr. Throckmorton states it as his belief that the next five years will witness an expansion of the industry "that shall pale into insignificance the huge growth already experienced."

### RADIO IS ACCEPTED

#### As Necessary Convenience Article in Modern Home

Radio, like the electric refrigerator and washing machine and similar appliances, has grown to the accepted status of a convenience article which the rentor of the apartment is expected to have for granted.

## Major Radio Sales Seen Centering In Farm Areas

### Manufacturers Producing Improved Battery Sets and Accessories

A radio sales movement of major proportions centering on the farming communities of the country will be witnessed.

### IMPORTANT NOTICE

For your own protection send all remittances by check or money order. Do not send currency as it may be lost in the mails.

S. M. ARMSTRONG, Service Director.