

# Suppose

**S**upposin' fish don't bite at first,  
 What are you goin' to do?  
 Throw down your pole, chuck out your bait  
 And say your fishin's through?

You bet you ain't; you're goin' to fish,  
 An' fish, an' fish an' wait  
 Until you've ketched a bucketful  
 Or used up all your bait.

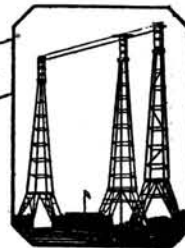
Suppose success don't come at first,  
 What are you goin' to do?  
 Throw up the sponge and kick yourself  
 And growl, and fret, and stew?

You bet you ain't; you're goin' to fish,  
 An' bait, an' bait ag'in,  
 Until success will bite your hook,  
 For grit is sure to win.

Reprinted  
 Courtesy Goodfellowship



# NATIONAL RADIO NEWS

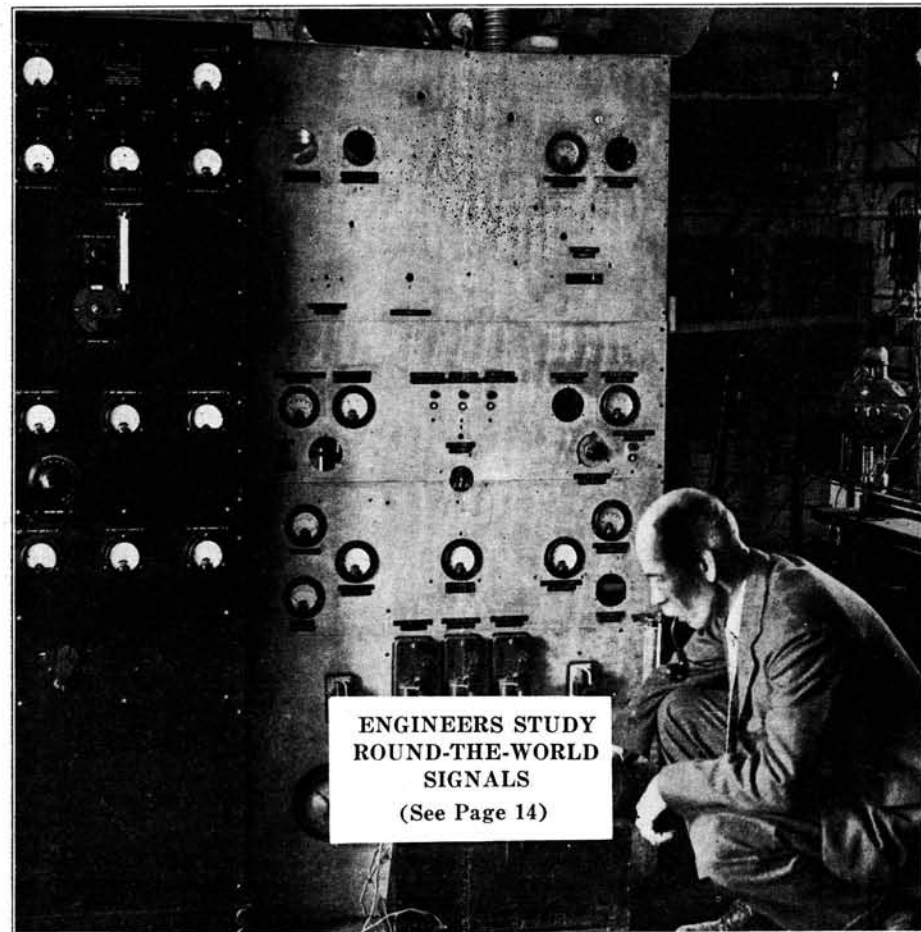


**FROM N.R.I. TRAINING HEADQUARTERS**

VOL. 3—NO. 6

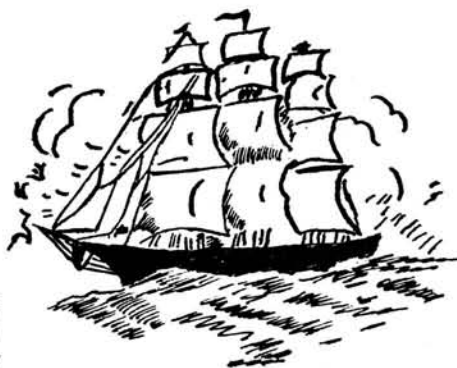
WASHINGTON, D. C.

JANUARY, 1931



**ENGINEERS STUDY  
 ROUND-THE-WORLD  
 SIGNALS  
 (See Page 14)**

# Full Sail Ahead



IN the old days crossing the ocean was quite an adventure. At the first sight of land mariners gave the order "Full Sail Ahead."

To see solid earth just ahead after the hazards of the journey produced a sense of security among the passengers and crew because a happy landing was close at hand.

The good ship "America" is nearing land after a hazardous journey. Adverse winds of reduced buying power; black nights of business indecision; high waves of unemployment made it discouraging—but *solid land is sighted*—FULL SAIL AHEAD.

A new year is at hand in which to do the things that count. Business in general is headed upwards. Radio promises to exceed previous bounteous seasons. The solid shore of Radio opportunity is well in sight—Full Sail Ahead.

J. E. SMITH, *President.*



## Europe, Like America Needs Trained Radio Men

By GRADUATE HEINZ A. MUELLER

*Graduate Heinz A. Mueller, travelling abroad, gives readers of National Radio News his impression of European Radio. We know all N. R. I. students and graduates will join the News in thanking Mr. Mueller for this article.—Editor.*

About the only similarity between European Radio conditions and the American Radio Industry is that both need Trained Radio Men.

The Radio public on the North American continent would never tolerate in this day and age, conditions as they are in the lands through which I am traveling.

The entire structure of the European Radio business rests in the hands of a few large companies. These firms are not rendering good service for two reasons. First, the buying public does not expect from Radio what Americans justly expect from an art so highly perfected. Second, the Radio companies do not have efficient personnel for rendering service the way we understand it. These Radio firms want good Radio men, but the supply is entirely inadequate to meet the demand.

The question naturally rises—"Why not learn Radio, educate the Radio public and put Radio on a better foundation?"

Very simple to say, but there is no National Radio Institute on this side of the Atlantic. There are Radio schools here, and good ones, too, but the tuition is so high that attendance by the average fellow—the man who needs education—is out of the question.

Yet, with these conditions existing and particularly with business here bordering on a crisis in almost every line, there is still an increasing tendency in the Radio business. This is certainly sufficient proof of the forward stride of Radio.

It is not a difficult matter here, as elsewhere, to find plenty of young men, who

are willing to accept Radio positions on the assumption that they can learn enough from the job to get by. But Radio doesn't want that type of man. It wants the man who can do the first job right without having to learn as he goes.

I was surprised to read in magazines here in Switzerland that newspaper ads for capable Radio men go unanswered because too few can meet the qualifications.

Where do people buy Radio? They buy where dealers can do more than give a sales talk. They buy where the service men can give valid information on operation and maintenance. How frequently is a salesman asked about the operation of a broadcasting station. By the answers its easy to detect the untrained or improperly trained Radio man. The Radio purchaser may not be technically trained but he can usually detect unreliable information. It just doesn't ring true.

The American-made Radio set I brought to Europe with me failed to function properly when first installed. It was very noisy. My first idea was to have the tubes checked. Visits to numerous Radio stores were fruitless. They had no tube checking apparatus.

Several Radio men told me I could not expect to operate a set without the crackling noises due to the mountains and other causes. I realized that reception conditions here are not as good as in America, but I also felt that all too frequently these fellows confuse climatic

(Please turn to page 14)

## National Radio News

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NATIONAL RADIO INSTITUTE

Washington, D. C.

January, 1931

### A Billion Dollar Year 1931



E. R. HAAS  
Vice President and  
Director

Present indications point to the American public spending more than a billion dollars for Radio sets and accessories during the

year of 1931, is the estimate made by M. S. Burns, Vice President of E. T. Cunningham, Inc., Radio tube manufacturers.

This huge amount, Mr. Burns adds, compares with a total sales of Radio sets of approximately \$5,000,000 in 1922. Mr. Burns' belief that the new year will set a record for Radio and accessory sales is based on several factors, among these being: lower cost per unit; advanced mechanical features incorporated; better type and diversity of broadcast programs; new applications developed for Radio, such as use with automobiles, and the opening up, on a wholesale scale, of new markets both in the replacement field and in the farming areas of this country.

**SPEAKING** before a group of electrical engineers in New York, O. H. Caldwell, the former Radio commissioner, announced that any city's smoke evil is easily curable by the use of automatic electronic smoke detectors. Simply an adaptation of the ordinary Radio tube, these remarkable

new "electrical brains," he said, can be installed at the source of the smoke, can actually "see" the smoke released by a careless fireman and can automatically apply correctives without the intervention of the human hand.

SOMETIMES we get blisters on our hands climbing the ladder of success but that's a lot better than getting splinters sliding downwards.

**Today or Yesterday** know to slide down is to accept the method of yesterday as good enough for today.

Ex-President Calvin Coolidge recently said: "Life will not be easy for those who try to live by the old methods. With the increased use of machinery, with the growing perplexity of existence, more and more training, skill and education will become necessary. General education will be greatly increased."

Don't let anyone discourage you from an education by pointing out some well-known business man who succeeded even though he had practically no schooling. The chances are that he would be a much greater success had he had a specialized training.

Some men can pick up more practical information through reading and observation than others can, but it is reasonable to believe that had their study been directed in a systematic way, they would have far surpassed their present station. Ask them.

**"OPPORTUNITY** knocks once at every door."

You've heard that line lots of times.

**When Opportunity Knocks**

Teachers preach it. It is quoted again and again in all sorts of success literature.

The only trouble with that line is that there is not one grain of truth in it.

The truth is that now-a-days, opportunity knocks perpetually at everybody's door. It is one of the most persistent callers that we have. The trouble is not with the lack of opportunity but the lack of proper training, to take advantage of it when it calls.

Life is like a football game with each one of us as a player. The football itself represents opportunity. During the game, the ball will come within our reach quite frequently. When it does come do we make a score in the game of life or do we get thrown for a loss?

As the ball sails through the air you may grasp it only if the eye and the hand have been trained to make the catch. If you are improperly trained you will fumble—someone else will recover the ball and profit by your inability to take advantage of your opportunity. There are times when out of pure luck the untrained man may make the catch—look as though he will advance with it, but unless he has the strength and endurance of training he will falter long before he reaches the goal to which this same opportunity would have carried the trained man.

# RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

## CROSLLEY MODELS 53, 54 AND 57

A wiring diagram of the Model 53 receiver is shown on the following page. Models 53 and 54, while practically identical in circuit and electrical characteristics, differ in mechanical construction. Model 54 is built on a more compact chassis, for use in a "mantle type" cabinet. Model 57 corresponds to Model 53. It differs from Model 53 only in slight circuit changes described below, primarily for adapting it to an improved type of speaker.

There are two terminals, marked "P. H." for phonograph pick-up devices. These are joined by a wire which must be cut if a phonograph pick-up is connected. Connect the leads from the pick-up to these terminals. Also connect a single-pole, single-throw switch to the terminals by means of short leads. In operating the phonograph pick-up, open the switch and detune the receiver. To operate the receiver, close the switch and tune to stations as usual. If the pick-up and switch are later disconnected, a wire must be connected between the "P. H." terminals before the receiver may be operated.

### Models 54 and 57

Model 54 differs from that shown in the diagram in the following particulars: The "P.H." terminals are between the R.F. transformer and the 0.1 microfarad condenser, instead of between this condenser and ground as shown. The triple unit condenser near the center of the diagram has values, from right to left, of 0.1, 0.1, 0.5 microfarad instead of those shown. There is no dial light on Model 54.

Model 57 differs in circuit from the above description in the following particulars: an additional condenser of 0.25 M.F. capacity is shunted across the filter choke. The primary of the speaker output transformer is connected in the position in which the speaker field is shown in the diagram. Instead of being connected to the 1,650 ohm resistor through a condenser, as shown, the bottom speaker terminal is connected to the

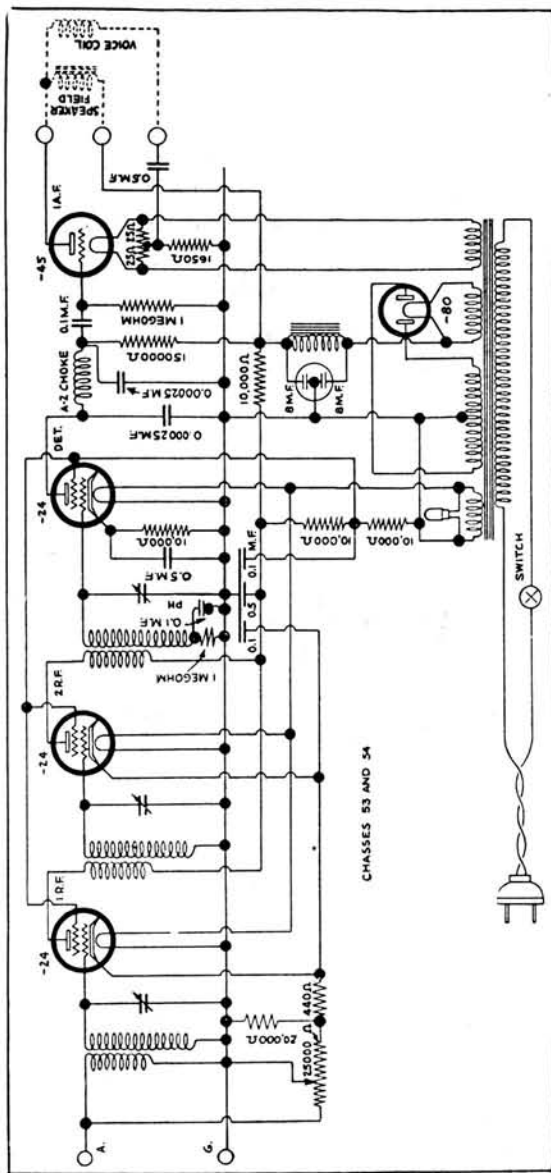
ground. The speaker field is connected from this grounded terminal to the middle speaker terminal on the diagram, so that current from the positive B circuit flows through the speaker field to the ground. A fixed condenser is shunted across the 1,650 ohm output biasing resistor.

There are four secondaries on the power transformer. One of these supplies current for the heaters of the radio-frequency and detector tubes. This is the one farthest to the left on the circuit diagram. The next one toward the right is the high-voltage secondary, and is connected to the plates of the rectifier tube. The third secondary supplies the current for the rectifier filament, and the fourth supplies current for the output tube filament.

A middle tap on the high-voltage secondary is grounded to the chassis. This represents the negative, or low-potential side of the plate supply circuit. An end tap on the rectifier filament secondary represents the positive or high-potential side of the circuit.

A high-potential side of the plate circuit is connected to a filter system consisting of a choke coil and a Mershon condenser. Thence it branches into three circuits, one going through the speaker field to the plate of the output tube, one going through a 150,000 ohm resistor and a choke coil to the plate of the detector tube, and the third going through a 10,000 ohm resistor and the primaries of the respective radio frequency transformers to the plates of the radio frequency tubes. The resistors are of appropriate values to insure the application of the proper voltages between the plates and emitters of the tubes.

A branch from the radio frequency plate supply circuit passes through a second 10,000 ohm resistor to the screen elements of the screen-grid tubes, keeping them at the appropriate positive potential with regard to the emitters. A third 10,000 ohm resistor carries the necessary bleeder current from the second 10,000 ohm resistor to ground.



Wiring Diagram Crosley Models 53, 54 and 57.

Filament Voltages—

R. F. Tube .....	2.4 to 2.7
Detector, 1st Audio and Output tubes .....	4.3 to 4.8

Plate Voltages—

R. F. and 1st Audio tubes .....	120 to 130
Detector tube .....	110 to 120
Output tubes .....	150 to 160

Control Grid Voltages—

R. F. tubes .....	1.6 to 2.0
Detector tube .....	4.3 to 4.6
1st Audio and Output tubes .....	4.3 to 4.6

Screen Grid Voltages—

R. F. tubes .....	48 to 55
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## The Inventor of an Industry Builder

By GEORGE ROHRICH  
Engineer in Charge of N. R. I.  
Practical Training

It is interesting to recall that while Radio is a very modern industry, inventors of many centuries have contributed largely to its present state.

The invention of "drawing wire," for instance, is credited Rodolph, who conceived the idea in the year 1410. Prior to that time wire was "hammered" out. Can you imagine a present day receiver using hammered wire, when in an At-water Kent speaker alone there are 11,000 feet of very fine wire?

Radio owes its origin to electricity and while the greater electrical experimenters have lived since the year 1800 the ancient philosopher Theophrastus mentions the power of amber to attract dry leaves and straws as early as 312 B. C. Pliny, in 70 A. D., writes about the same subject and it is from "electron," the Greek name for "amber" that "electricity" receives its name.

The progress of electrical development, so essential to Radio of today, must be traced through such inventors and experimenters as Michael Faraday, who discovered the principles of the dynamo in 1831; James Watt, Joule, Watson, Charles Coulomb, Andre M. Ampere, G. S. Ohm and Carl Gauss, in addition to the long list of American inventors and contributors to electrical research since the days of Benjamin Franklin.

Never in all those ages, however, has the inventive mind been offered such opportunities to commercialize. The industry is in a receptive mood for new ideas—new inventions. Manufacturers vie with each other in their attempts to secure new refinements for their sets, because with keen competition—with the buying public becoming more "Radio-wise" it is the set with something new—something different, which sells.

The field is therefore ripe for Radio inventions. The thoroughly trained man

(Please turn to page 14)

## "Results Contest" Carried Over

The big Results Contest was scheduled to close midnight, October 31st, the winners to be announced in this issue of National Radio News.

However, numerous suggestions have been made that the Results Contest be carried over so that the big winter months could be included, enabling more and bigger results to be reported.

The Contest Editor, after careful consideration and with the approval of the Contest Judges, has agreed to do this. The Contest will now be open for letters until midnight, February 28th, 1931, and the winners announced as soon after that time as possible.

Everybody has a good chance to win a cash prize. There are sixty of them, totaling \$300, to be given away absolutely free to the writers of the sixty letters the Contest Judges think are best.

Get busy, you students and graduates, get your letters in to the Contest Editor and get lined up for those cash prizes.

You fellows who have already sent in letters and care to do so can make additions or changes in them by notifying the Contest Editor. In submitting new letters and changes where letters have already been written, be sure to state which Contest you are entering or in which Contest your letter is already entered.

Full details of the Contest rules were published in the August, 1930, National Radio News. Read the rules and get in the Contest.

Be sure to place the number of the Contest that you are entering on the top of your letter and send it in a separate envelope to the Contest Editor.

Letters written on the same sheet with lessons, requests for Consultation Service, or material of any other type will not be considered as eligible for the Contest.

There is \$300 up here at N. R. I. waiting for sixty men to win it. All it takes to win a prize is a good letter stating facts. Your letter has as much chance as that of anyone else. Let's go! Flood the Contest Editor with result letters.

### THIRTY-MILE GROUND

Thirty miles of copper wire make up the ground wire system of the fifty thousand watt WLW Transmitting Station.

# SOUND PROJECTION SYSTEMS for THEATRES

By **J. A. DOWIE**, Chief Instructor



It is estimated that 10,000,000 persons have been added to the weekly motion picture audience by Sound Pic-

tures. They are directly a branch of Radio because vacuum tubes, audio amplifiers, electrical phonograph pick-ups, photo-electric cells and loudspeakers are used in the systems.

Sound Projection Systems can be used for talking Motion Pictures, wherein speech or music is reproduced with motion pictures with an effect equivalent to the artists being present in person; Synchronized accompaniments, specially recorded musical accompaniments provided with feature pictures. In these two types voice or music is synchronized with the picture, the sound heard at the same instant the action is seen on the screen.

Pictures with no special accompaniments can be provided with an orchestral accompaniment from commercial records. This non-synchronous reproduction requires special turntable apparatus.

When it is difficult in some parts of a theatre to properly hear the performers, an amplifier system functioning like a public address system can be used. This requires a special microphone pick-up and switching apparatus. Announcements and emergency calls are made from the manager's office by a small microphone pickup. This equipment is called an announcing system.

There are two general methods of recording sound in making "talking moving pictures":—the Vitaphone Method in which the sound is recorded on a disc like a phonograph record except considerably larger; the Movietone and Photophone systems where sound is

photographed on motion picture film. Theatre equipment is available which can be used with either or both of these methods. The difference is in the pick-up apparatus at the projector, amplifiers and loudspeakers being identical in both systems. A simple switching operation permits immediate change from one method to the other.

The sound to be recorded is picked up by a microphone which generates a small electric current whose variations correspond to sound waves. In disc recording, this current controls an electro-magnetic recording stylus, whose movements cut the record on a wax disc in the usual manner. In film recording, the amount of light falling on a moving film is made to vary according to the fluctuations of the microphone current, and so a photographic record corresponding to these fluctuations, and therefore, to the voice or music, is impressed on the film. The amount of light falling on the film can

be varied by using the microphone current either to control the brightness of the lamp furnishing the light ("flashing lamp" method), or to open and close an aperture through which light reaches the film ("light valve" method). In the Movietone system, sound is recorded on the film as a track of constant width, but varying density. Sound recorded by the Photophone system is in form of a track of constant density but varying width.

Depending on which of the two methods is used, the current is obtained, either from an electrical reproducer playing on a disc record or from a film reproducing attachment through which the film passes on leaving the projector head.

The disc records employed are run

at about half standard Phonograph speed; one record plays throughout an entire reel. The synchronized film used with the disc record, is ordinary, except that one frame at the beginning is marked to give the starting point.

In the Movietone method, the sound record is a band of microscopic lines, about  $\frac{1}{8}$ " wide, called the sound track, running on one side of the film. The spacing of these lines, i. e., the contrast between light and dark, regulates the pitch sound. In the Photophone system, sound waves recorded form a single jagged heavy line. After leaving the lower sprocket of the projector head, the sound film enters the reproducing attachment where it passes over a sprocket that moves it along at constant speed. A narrow, bright beam of light from a high-intensity exciting lamp is focused on the sound track of the film through lenses and an aperture plate. The light passing through the moving film will vary in intensity according to the variations of the lines on the sound track. This light falling on a photoelectric cell, produces an electric current varying according to the light, to the sound which was recorded.

The small current from the electrical reproducer or the photoelectric cell passes along to one or more vacuum tube amplifiers which deliver a greatly magnified copy of this current.

The current from the amplifiers is converted into sound by receivers and loudspeakers located at the screen. The number and location, depend on the size and acoustic properties of the theatre. Usually a special type of screen is employed, which reflects light well, enables a good picture to be obtained, yet permits a free passage of sound waves. Loudspeakers are placed immediately behind the screen

so that a perfect illusion is obtained, that the voice or music is coming from the artists seen on the screen.

In the disc method, perfect synchronism is assured by driving the projector and the record turn-table with the same motor. If film and record are started together, they must keep in step through the entire reel. In the film method, the fact that the sound record is on the film with the picture makes synchronism inherent.

By using two projectors alternately, a continuous program can be run as with ordinary pictures. A device called a fader is employed in making the transition from one machine to the other, causing no break in the music. The volume of sound heard in the theatre is also controlled by means of the fader.

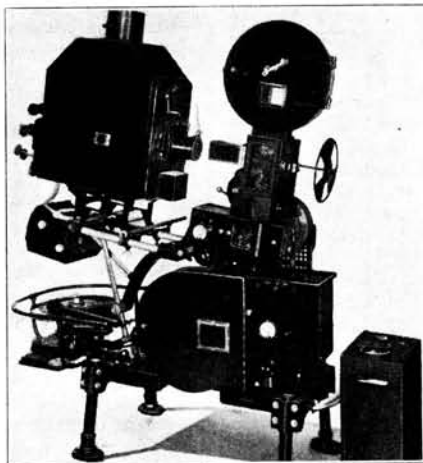
Unlike ordinary moving picture projection, where film is run at a faster speed than it was taken, synchronized film must be run at the same speed as recorded, otherwise the sound would be distorted.

Non-synchronous reproduction is similar to synchronous disc reproduction, except that since the record is not synchronized with the film, it is not necessary to drive projector and turn-table by the same motor.

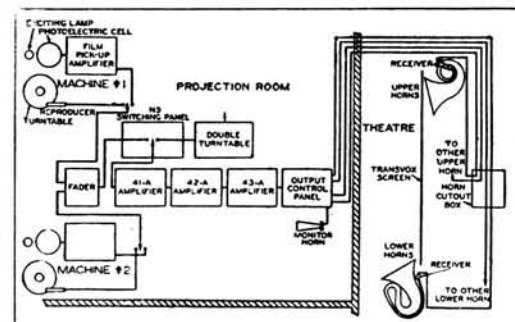
In voice amplification systems sound is picked up by microphones, placed on the stage or in the

orchestra pit. The microphone current goes to the same amplifiers which are used at other times for synchronous or non-synchronous reproduction. The output from the amplifiers is converted into sound by receivers and loudspeakers.

Announcing Systems may be installed in the manager's office or elsewhere. Speech is transmitted through the regular amplifiers and the loudspeakers at the screen or the voice amplification system loudspeakers.



(Courtesy Bell Telephone Laboratories)  
Simplex projector equipped for both disc and film reproduction.



Schematic diagram showing layout of equipment used with talking pictures in theatres.

## Protect Your Credit You May Need It



By GORDON BIRREL  
Merchandising Expert

Good credit is a necessary foundation for success.

Young men starting out in the world should have this impressed upon them as early as possible, before they make the mistake of damaging their credit.

Credit is like a frail flower. It flourishes in the sunlight of truthful dealing. It withers and fades when individuals make promises they are unable or unwilling to fulfill.

It is estimated that seventy per cent of all business today is conducted on credit. Everything from daily newspapers to international warfare is operated on the deferred payment plan.

No one should hesitate to buy on credit, but before buying, definite plans should be made for paying for the merchandise or services received. And there is no disgrace in asking a bank for a loan for business purposes—in fact, it is good business to do so.

Suppose a man has several hundred dollars due his creditors at a certain time and doesn't see his way clear to pay them. If his credit is good, he should be able to borrow the money at from six to ten per cent, pay off his bills, take advantage of discounts for prompt payment, and not only keep his credit in fine shape, but establish additional credit for taking care of his loan when it is due.

J. Pierpont Morgan, the outstanding financier of the last generation says that the best security for a loan is character. And a big factor in any man's good character is his willingness and ability to meet his bills and obligations on time. Good credit is little more than a reputation for reliability.

The man who insists on your making your payments on time is doing you a big favor. He is helping you maintain a most valuable asset, your credit.

Modern business has established an elaborate system of individual credit rat-

ings. Every town of any size and consequence has its trade associations. These associations maintain Credit Information Bureaus, which supply credit information not only locally but maintain reporting services to other bureaus all over the country.

Apply for credit in a store or business house of any kind and your application is referred to the Credit Agency. If they have no unfavorable reports from merchants or other credit bureaus, you get what you want. Otherwise, you pay cash.

Excuses don't go with these fellows. They are not interested in a hard luck story. With them it is a case of "Do you pay, or don't you?" They feel that a man should analyze conditions far enough in advance to know when and how he can meet his credit obligations.

Employers frequently check up on the general character of a man before they hire him. A man who is conscientious in paying his bills is usually straightforward in his dealings with his employer.

To the man who expects to go into business for himself at some future date—good credit is his most valuable asset. He can get along on a small capital if he has good credit but if not—as soon as his capital is invested in equipment, etc., he has no place to turn for additional capital.

I have in mind the case of a man who made \$75,000 in his business in three years. Then came a period of depression. He lost it all and \$22,000 besides. That was a big hole to climb out of, but he did it; he had a reputation for paying his bills promptly, consequently, very liberal credit. Right now he is well on his feet again, but he wouldn't be if his credit hadn't been good.

N. R. I. wants to help students build and maintain a good credit standing. A plan is operated here whereby credit certificates are issued, signed by both Mr. Smith and Mr. Haas, certifying the prompt payment of students' accounts.

The best rule for establishing a credit standing is to never buy anything you can't pay for and to pay all bills promptly as they fall due.

The longer I live, the more deeply I am convinced that that which makes the difference between one man and another—between the weak and the powerful, the great and the insignificant—is energy, invincible determination, a purpose once formed and then death or victory.

—Powell Buxton.

# RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

VICTOR MODELS R-35, R-39, RE-57

### Voltmeter Continuity Test of Electrode Parts

TEST	TERMINALS	APPROXIMATE Voltage (10 V. Scale)	TEST ACROSS AMPLIFIER TERMINALS	VOLTAGE SUPPLY	NORMAL VOLTAGE
Electric Pickup	On P. U. Connector Block	9.0 Volts	1 and 2	UY-224 and UY-227 Filament	2.4 Volts A. C.
Record Volume Control	Two Ends	8.6 Volts	3 and 7	UY-224 Plate	170 Volts D. C.
Input Transformer	1 and 2	9.0 Volts	3 and 6	UY-227 Plate	65 Volts D. C.
	1 and 3	8.5 Volts	3 and 8	Screen Grid	89 Volts D. C.
	1 and 4	4.4 Volts			

Amplifier Terminal Strip  
(CAUTION—High Voltage)

### Radio Chassis Tube Socket Tests

TEST	SOCKET NUMBER	TUBE	NORMAL VOLTAGE	NORMAL CURRENT	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
Filament "A"	1	UY-224—1st R. F.	2.1		Open or shorted wire or contact in filament supply.
	2	UY-224—2nd R. F.	2.1		
	3	UY-224—3rd R. F.	2.1		
	4	UY-224—Detector	2.0		
	5	UY-227—1st Audio	2.1		
Plate "B"	1	Same as above	173	3.1	Open or grounded wire or contact in plate supply. Open plate coil 44, Fig. 2) short in any of the by-pass condensers 43, 55, 57, 60, 64, Fig. 2. Open or shorted resistor board (see Fig. 18). Open in plate winding of any of the R. F. coils. Short between plate and grid section of R. F. coils. On detector, open or shorted plate filter 26, Fig. 1) open choke 62, Fig. 2) open .5 meg. resistor, Fig. 18.
	2		173	3.1	
	3		173	3.1	
	4		50*	.3	
	5		67	1.5	
Control Grid "C"	1	Same as above	3.1		Open or shorted wire or contact in grid voltage supply. Open or ungrounded R. F. coil, Fig. 1. Open or shorted resistor on resistor board (see Fig. 18). Open in control grid section of volume control. Any defect listed above which would cause an abnormal plate voltage would also cause an abnormal grid voltage. On UY-227 an open link in radio terminal strip (radio only) or open in wiring or poor contact in control switch (combination).
	2		3.1		
	3		3.1		
	4		3.1		
	5		1.5		
Screen Grid	1	Same as above	89		Open or shorted wire or contact in screen grid voltage supply. Open link in radio terminal strip (radio only) or open in wiring or poor contact in control switch (combination). Open in coil 44, Fig. 2. Any defect listed above which affects plate and control grid voltages will also affect the screen grid voltages.
	2		89		
	3		89		
	4		3.4		

\*250 V Scale

### Amplifier Tube Socket Tests

TEST	SOCKET	NORMAL VOLTAGE	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
Filament	UX-245	2.25	Open or shorted wire or secondary winding in filament supply.
	UX-245	2.25	
	UX-280	4.9	
Plate	UX-245	222	Open or shorted wire in plate supply; open primary of output transformer 2, Fig. 3; open or shorted field or reactor coil; shorted condenser in condenser bank 1, Fig. 4.
	UX-245	222	
	UX-280	40 M. A.	Open or shorted wire in plate circuit. Open high voltage secondary of power transformer; any items listed above which affect UX-245 plate supply; any items listed in Chart No. 3 which affect UY-224 plate supply.
Grid	UX-245	37	Open or shorted wire in grid circuit; open secondary of interstage transformer; open or shorted grid bias resistor 32, Fig. 4; faulty ground in center tap of secondary interstage transformer 2, Fig. 3, or faulty ground in grid bias resistor 37, Fig. 4.
	UX-245	37	

# NEWS of the RADIO WORLD

## MAY ABANDON EIFFEL BROADCAST

Broadcasting by long waves from Eiffel Tower, generally regarded as France's national station, is likely to be abandoned shortly in favor of a new station to be erected by the government in order to reserve the tower transmitter for official communications and experiments.

To replace the present system of hand signaling, the railroad has ascertained that the upper wave length can be employed in this communication.

By means of short wave Radio sets located in caboose and cab of the locomotive, it is possible to keep the front and rear end of the train in constant communication, adding to the safety of the train and eliminating many delays.

## TELEPHONE SERVICE BETWEEN U. S. AND AUSTRALIA

Regular commercial telephone service is now available between North America and Australia, over the longest circuit ever established for commercial use. It consists principally of two Radio links, one across the Atlantic and another between England and Australia. With the wire lines involved in the connection the circuit between New York and Sydney is more than 14,000 miles long. Service is available to all points in the United States, Cuba and to the principal cities of Mexico. This service adds nearly 500,000 telephones to the network now within reach of the Bell System. In Australia, the service area includes the states of Queensland, New South Wales, and Victoria, and the city of Adelaide. The cost of a call between New York and any Australian point is \$45.00 for the first three minutes and \$15 for each additional minute.

## NEW AERO-RADIO SERVICES

Radio stations have been established at Newark, Camden, Harrisburg and Pittsburgh to keep pilots in constant communication with the ground during the Allegheny hop of the newly contracted transcontinental air mail and passenger route of Transcontinental Air Transport and Western Air Express. All planes of the service will be equipped for two-way Radio.

The addition of 15 more stations to the fast expanding Radio network of Aeronautical Radio, Inc., cooperative communication subsidiary of the leading air transport lines, has been authorized by the Federal Radio Commission. They will be located at Dallas, El Paso, Big Springs and Abilene, in Texas; Phoenix, Douglas and Tucson, in Arizona; Hopeville, Ga.; Jackson, Miss.; Shreveport, La.; Birmingham, Ala.; Alameda, Calif.; Omaha, Nebr.; Cresson, Pa., and Newark, N. J.

## STATIONS IN NORTH AMERICA

There are approximately 1,100 broadcast stations in the world at this time. Over one-half of these are in the United States. To be exact—the number in this country is 623. To this, if we add Canada's 77 stations and 7 for Mexico, we have a total of 707 stations on the North American continent.

## IRISH TO HAVE HIGH POWER STATION

Word has been received from London of a super-power station to be owned and operated by the Government of the Irish Free State.

This station will be capable of a power output of 120,000 watts. Contracts for the erection have been awarded the British Marconi Company.

## NEW ZEALAND-AUSTRALIA RADIO TELEPHONE LINK

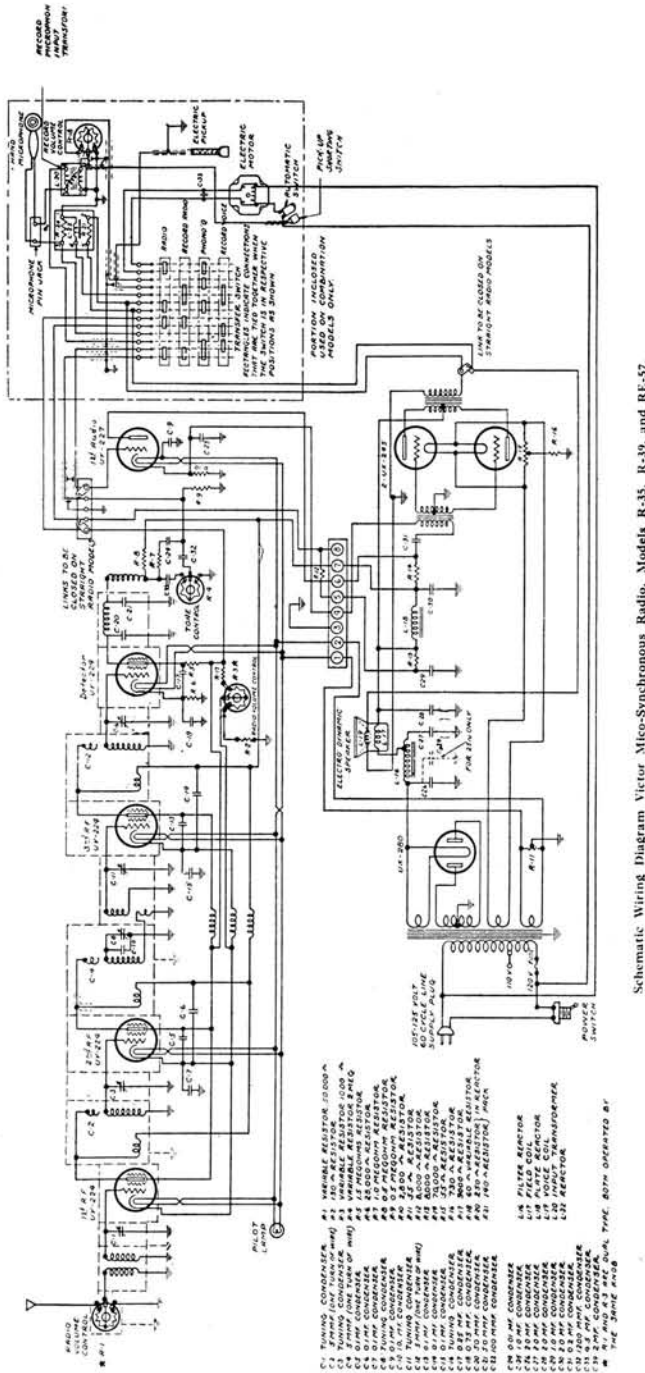
Testing of the Radio telephone link between New Zealand and Australia has commenced. Initial tests have proved very satisfactory and telephone conversation can now be exchanged without difficulty between two Radio stations. In addition to communication between the Radio stations, a great deal of work has to be done in connection with the linking up of the wireless section with the toll lines of the country.

## COST OF RADIO POWER

Engineers estimate that it costs considerably less than one cent an hour to operate an A.C. Radio receiving set. The electric bill for powering a set having seven or eight tubes and in use four or five hours a day should not amount to more than \$1.00 a month.

## RADIO AIDS TRAIN CREWS

Use of short wave Radio in maintaining communication between the ends of freight trains, sometimes more than a mile in length, has been found practicable.



Schematic Wiring Diagram Victor Micro-Synchronous Radio, Models R-35, R-39, and RE-57.

## EUROPEAN RADIO CONDITIONS

(Continued from page 3)

conditions with man-made interference.

The result of my investigations proved that the great majority of the noises came from faulty switches, motors and electrical appliances in the hotel where the set was installed. I corrected some of these and my set operates perfectly.

I cannot help but realize how lucky we are in America, where a fortune for education is not necessary—in fact, finances are of least importance—will-power and energy being the prime factors.

Radio on both sides of the ocean needs trained—well-trained men. I am mighty proud that I conceived the idea of enrolling with N. R. I.

Lucerne, Switzerland,  
September 9, 1930.

## Radio Manufacturing Aids Other Industries

The strikingly large quantity and variety of materials which is annually consumed by the American Radio industry in the manufacture of receiving sets goes a great way in aiding the various industries supplying these materials.

A statistical report compiled by the Electrical Equipment Division, Department of Commerce, from information furnished by manufacturers, shows that 158,965 tons of material go into the estimated annual production of 3,900,000 receiving sets.

Steel leads the metals in quantity, totaling 110,000 tons per year. Copper and copper alloys follow with 16,000 tons. Aluminum is placed at 4,000 tons. Tin, 1,800 tons. Nickel alloys, for tubes, amounts to 1,500 tons. Zinc totals 1,200 tons.

Paper is consumed to the extent of 4,365 tons annually. Synthetic resin products amount to 2,600 tons. Glass, used in the manufacture of tubes, reaches the total of 3,000 tons. Cloth insulation finds its place with 1,000 tons.

Various woods, such as poplar, chestnut, walnut, birch, burl maple, spruce, and balsa; felt, kid, graphite, lava, hemp, mica, rosin, cotton threads, cord, glue, paraffin are used by the thousands of tons.

It is quite evident from these figures that Radio creates employment for thousands, not actually connected with the Radio industry, by these demands for materials.

## Navy Radio Engineers Study Round The World Signals

(See Front Cover.)

The mysterious high frequency Radio signals which encircle the earth and return to the receiving station in the form of wierd echoes, are being studied by engineers of the Naval Research Laboratories in Washington.

These round the world signals sometimes cause quite a bit of interference on high speed recording equipment on certain frequencies.

The Government, in its interest in Radio, is conducting quite a bit of research along these lines. Photograph on the front cover of this issue of the News shows Dr. A. Hoyt Taylor, noted high frequency expert, adjusting the transmitter which is used in the tests.

## Tube Manufacturer Optimistic

Ernest Kauer and E. T. Maharin, president and vice-president, respectively, of the CeCo Manufacturing Co., passing through New York on their way home to Providence after a business trip to Eastern and Middle West cities, sounded an optimistic note for Radio.

"There is considerable activity in the trade," Mr. Kauer stated. "In sets, this is particularly noticeable in the case of midgets and super-heterodynes. The tube business is becoming exceedingly active again. Sales of new sets and replacements of tubes in presently owned sets have caused sales to mount above expectations."

## The Inventor—An Industry Builder

(Continued from page 7)

is in on the ground floor because he has a definite, thorough understanding of the underlying principles, which enables him to work directly towards his goal, once he has the idea of an invention.

And there's money in Radio inventions. Good money. When a Radio manufacturer makes up his mind that a certain improvement is necessary to make his set sell to the public, he will not hesitate to pay and pay well to the owner of the patent.



## SHORTER HOURS—MORE PAY

"I am proud to say that, without asking for it, my salary on my regular job has been raised from \$125.00 to \$150.00 a month. I had to quit playing in an orchestra to give more time to my Radio work, as I have lots of extra jobs, that pay me more with fewer working hours." Rudy Alma-guer, San Antonio, Texas.

## PRAISES EMPLOYMENT SERVICE

"Thanks to your Employment Department, I landed a job with G. V. Miller Radio Company. I'll never forget your help in this matter and I'll write you a long letter shortly telling you how I make out." Elmer D. Smith, Washington, D. C.

## STUDENT PRICE GETS STARTED

"I have just completed my first Radio service job. I didn't know it could be so easy until I got started. It was then that I realized how the lessons, the help of your Staff and your personal help made it impossible to go wrong. I got along fine on my first job and I'm going right on after more." Clayton Price, Ashland, Virginia.

## GOOD WORK, McCASKILL

"I wish to say a few words complimenting you on your splendid Radio training, which course I recently completed. As a result of my training I have not been stumped by any job as yet.

"Since I enrolled with N. R. I. about a year ago, I have made about \$350 in spare time, and expect my earnings to increase now that I have graduated. N. R. I. gets the credit for the success I have had so far. It is certainly impossible to praise N. R. I. training too highly." W. R. McCaskill, Green Cove Springs, Florida.

## MADE FOREIGN EDITOR

"I have been made Foreign Editor to "Radio Industries" Magazine. I am establishing myself here in Amsterdam and look forward to some very interesting work in my new connection.

"I hope to be of lots of service to N. R. I., on this side of the water, and if there is any way that I can help the Institute, you have simply to call on me. My best regards to all of the N. R. I. Staff." Louis Bruchiss, Amsterdam, Holland.

## LEAR WINS PROMOTION

"As you know, I got a job as repair man with the R. C. A. Victor Company in Camden, New Jersey. I have been working for the company for about a month and have just been made head of the repair department." Donald W. Lear, Camden, New Jersey.

## CLOTHIER TELLS HOW

"About a year ago I went to a bank and borrowed \$100 and put it into Radio stock and testing equipment, along with a little money of my own. I worked at my regular trade and did Radio work as a side line. The money made from Radio has been re-invested in this little business and I have now been able to accumulate quite a stock of equipment.

"I did some advertising at first, but soon found that my best advertising was my satisfied cus-

tomers. They stay with me and each one tells a friend or so, etc.

"My list of customers increases all the time and my little shop in my garage is getting entirely too small to handle my work and just as soon as I can spare the time, I intend to enlarge it.

"I am getting plenty of service work on A.C. receivers now. For a long time I did not get much because the sales guarantee took care of A.C. set owners, but now, as the guarantee runs out, I get the work.

"From present indications, it looks as though it will not be long before I'll have to give Radio work my full time. I have long since paid back the money I borrowed and don't owe a red cent for what stock and equipment I have. Everything that comes in now is velvet. One of my merchandising plans is never to buy anything that does not sell readily. This fact and re-investing my earnings have made my business successful." J. G. Clothier, Santa Maria, Calif.

## McNANEY LANDS JOB

"I am glad to tell you I am working for one of the largest and most up-to-date Radio dealers in this city. The company is the Consolidated Gas, Electric Light and Power Company of Baltimore, Maryland.

"I find that I can do everything expected of a service man of Radio receiving sets—that's why I say I'm on the road to success in Radio. Thanks to the Faculty of N. R. I.—they are the men who started me on the road to success!" J. T. McNaney, Baltimore, Maryland.

## \$300 THIS WEEK?

"I'm taking an hour off for lunch today and if I don't have to cut it short and deliver another Ozarka Radio I'll finish this letter.

"This is Thursday and I've sold six Ozarkas this week already. Don't ever advise a fellow to get into Radio if he doesn't want to work. I haven't even had time to count my bankroll lately.

"My sales and installations keep me so busy that I don't get much time for service work though I get lots of calls.

"A fellow called me up the other night; said his set wouldn't perk properly. I asked how it acted. "Plays a while and then goes dead," he told me. I suggested a new detector tube but another service man had said tubes were all O. K. I had to go over and convince him and then sold him eight new tubes—profit for one hour, \$6.35.

"Last night I sold two Ozarka Vikings, netting me a profit of \$51.50. If I don't clean up \$300 this week, I'll be surprised." E. E. Winborne, Norfolk, Va.

## A GOOD INVESTMENT

"At first I thought that what you have written me about other fellows making nice money was impossible, but now I've opened my eyes and changed my mind.

"The money that I have put in the National Radio Institute's course has been returned double, on repair work alone." E. Weber, Union, New Jersey.

*The "Mailbag" wants to tell other students your ideas. What are you doing in Radio? How do you get Radio spare-time work? Tell us about special jobs that N. R. I. training has helped you handle. Send your ideas in—we want to publish them. Watch the Mailbag for helpful ideas from other students.*