

NATIONAL



RADIO NEWS



FROM N. R. I. TRAINING HEADQUARTERS

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NUMBER

BANNER RADIO YEAR AHEAD



FROM all indications 1930 will be Radio's Banner Year. It will offer more in Radio opportunity than at any time in the past. Here are some of the reasons why N. R. I. men can count on a big year right ahead—

First, there is Television. Some have felt that Television would be in the homes by this time, but the more conservative of us have always believed that the Radio public wants Television to be just about perfect before taking it on. Television has been in the laboratory for some time—the kinks

are being taken out of it. Around 20 stations are broadcasting television, several firms are manufacturing kits, and even Televisors, and it is practically a certainty that it will be introduced to the public on a commercial scale very shortly. Doubtless, 1930 will see marked development in that field.

Then, the sound engineering field will continue to make increased demands for men with a knowledge of Radio's basic principles. The country is going "talkie." Public address systems and sound projection apparatus will be installed in thousands of theatres, auditoriums, amusement centers and other places through the year. N. R. I. men should get their share of this work.

Here is another factor that will make 1930 a big year in Radio. The public has been pursuing a policy of watchful waiting—delaying their buying of Radio apparatus until they are satisfied that receivers have been standardized and that their new set will not become obsolete over the week-end. That stage has been reached in Radio today. Set design is fast becoming standardized. The new sets equipped with remote control and other features should appeal to the buyer. There are over 14,000,000 wired homes that today are without adequate socket power operated sets. Improved types of battery receivers are available for the unwired home. So it looks like a big year in sales, service, and repairs.

International broadcasting will be on a broader scale than ever this year. Arrangements have been made between the American chains and the broadcast companies in England, France, Germany and other continental countries for more frequent interchange of programs, and American audiences will very shortly have the privilege of listening often to the best productions rendered by European Symphony orchestras.

The use of Radio in Aviation will expand in 1930. Government plans call for an enlargement of the Radiobeacon system to make safe our trans-continental passenger and mail lines. Hundreds of point-to-point stations are being constructed to provide weather information and other data to planes in flight. Point-to-point land Radio communication will be advanced. So it's clear that this is going to be one of the biggest years yet for the man who knows Radio, and when next Christmas rolls around I'm sure that N. R. I. men will have reaped a full measure of Radio's prosperity.

J. E. SMITH.

Synchronism — One of Television's Problems

By S. H. ANDERSON

Radio Engineer

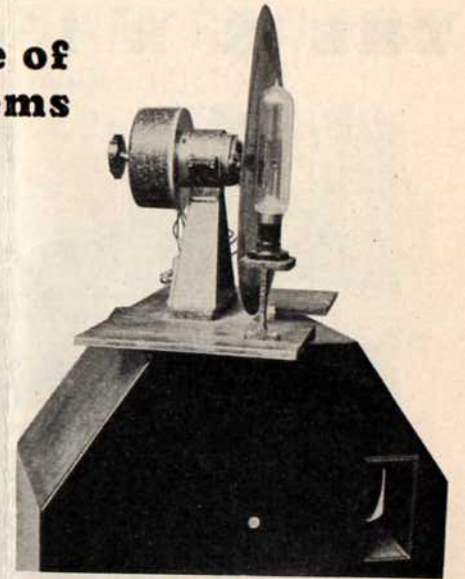
Clarostat Manufacturing Company



THERE appears to be little difficulty in picking up television signals in almost any part of the country, because of the dozen or so television broadcasting stations. However, many experimenters complain about the difficulty of unscrambling the whirling dots so as to obtain satisfactory images. The trouble is, therefore, one of synchronization, or matching the speed of the receiving disk with that of the transmitting disk.

Certain television workers recommend synchronous motors. This practice is ideal in certain areas served by the same alternating current power system. The same alternating current supply insures absolute regulation of both transmitting and receiving disks operating on the common power supply. However, when the transmitter and receiver are located in different power supply areas, the synchronous motor is no longer such a happy solution. The use of a synchronous motor with friction drive, as recommended by Jenkins in particular, does not prove so effective in most cases, because of the slippage between driving and driven disk.

The leading television workers have found the variable resistance method of controlling speed the most satisfactory. Here the problem is to have a variable resistance that is stepless, so as to obtain precise speed adjustment, together with a steady resistance value at any setting. The problem of developing a suitable micrometric resistance has been far from simple, for most variable resistors are not intended for handling the considerable current called for in a motor control application. Nevertheless, by certain detail changes in our power clarostat, we have succeeded in evolving a device that provides the necessary stepless resistance range, together with a current handling capacity of 80 watts, or more than ample to control the usual motor of $\frac{1}{8}$ th horsepower or less.



The first picture of the Baird televisor which is in use in the British Isles. Steady, sure progress is being made in Television and it will pay every wide-awake Radio man to keep his eyes on that field. Nothing can stop it—television is right ahead of us.—J. E. S.

With the power clarostat, it is relatively simple to bring the scanning disk into step. By studying the pattern of whirling dots, and regulating the speed up and down, one soon becomes aware of whether the speed is too fast or too slow. The shifting of the pattern to one side or to the other indicates the speed of the receiving disk with relation to the transmitting disk. The speed is gradually adjusted until the dot patterns become solid masses and these masses evolve into animated subjects. The speed is readily held by means of the accelerating button which simply short circuits the power clarostat.

The handiest form is the speed control clarostat, mounted in a metal case complete with accelerating button. However, where the disk is mounted in a wooden cabinet, the power clarostat can be suitably mounted with just the knob and the accelerating button exposed.

Aside from the problem of synchronization, there is nothing very complicated about television reception, particularly the simple radio movies of black-and-white silhouettes broadcast by C. Francis Jenkins from W3XK in Washington, D. C. Television signals, when handled on short waves, can be received at distances of several hundred miles with any short-wave set and suitable amplifier. While the pictures themselves are of little intrinsic interest, the novelty of receiving pictures through space makes such experimental work quite thrilling.

THE N R I CELEBRATES



In the little room shown in upper left-hand corner the first N.R.I. class met back in 1914. Below is shown a section of the Student Service Department of the Institute today. In other parts of our two-story home are housed the Graduate, Employment, Stenographic, Publicity and other departments. The helpful service that my staff renders, enables N.R.I. men to go farther in Radio and is also responsible for the growth of the N.R.I.—J. E. S.

FIFTEEN years ago the National Radio Institute was founded. Mr. Smith and Mr. Haas equipped a little 10x12 room with a code machine and started out with a class of four students. That was six years before the first broadcast station was built. Radio sets, as we know them today, were unheard of. Indeed, there was little to encourage the founders. Even their friends laughed and said that wireless was just a fad that would soon be forgotten.

But Mr. Smith and Mr. Haas foresaw a huge industry in the making that would offer unbounded opportunities to trained men—yes, they envisioned a world in which Radio would play a dominating part. Their prophecy has come true.

And, along with Radio's giant strides the N. R. I., pioneer Radio home study Institute, has grown. The success of the thousands of ambitious men it has trained and is today training has made possible the growth and widespread fame of the Institute.

The Institute today occupies its own beautiful building on 16th Street, Washington's finest. It's Instruction, Service and Administrative staffs occupy the 12,000 feet of floor space. A trained staff of 125 assist President Smith, Vice-President Haas and Chief Instructor Dowie in giving every possible service and assistance to N. R. I. men the world over.

Never before has the Institute been so ably equipped to train men for the Radio field. Never before have Radio opportunities been so abundant. President Smith sums it up in these words: "Little did I realize when I faced the first class of four students that I would have the opportunity of fitting many thousands into profitable Radio work, and on this 15th Anniversary of the founding of the Institute I want to pledge anew my faith in the future of Radio and of the man who faces it with firm, technical training."

FIFTEENTH ANNIVERSARY

Leaders In Radio Congratulate NRI And Point To Big Future Of Trained Man



shoulders can be

On the occasion of the Fifteenth Anniversary of the founding of the National Radio Institute, I should like to extend my heartiest congratulations.

No man familiar with the amazing and steady growth of the Radio industry throughout recent years can doubt for a moment that the successful solution of the many engineering and servicing problems attendant upon this rapid growth has been tremendously facilitated by the work of your Institution in providing for manufacturers a source of trained young men, upon whose shoulders many responsibilities have been placed.

McMURDO SILVER,
SILVER MARSHALL, INC.

Only one home out of four is now equipped with a Radio. Three-fourths of the sets now in use are obsolete, so it would seem that the surface has barely been scratched and the future of the Radio business is bright for years to come. There is a growing demand for trained Radio men in this great industry.

POWEL CROSLY, JR.,
PRESIDENT,
CROSLY RADIO CORP.

We need man-power to continue operating on our present knowledge and we need man-power to learn more about this remarkable science of which we have merely scratched the surface. Radio's greatest need today from the technical side is capable, well-trained men.

WILLIAM S. PALEY, PRESIDENT,
COLUMBIA BROADCASTING SYSTEM.



At no time during the past has the future looked so bright for the seeker of Radio knowledge as at present. In the past, Radio has come through vast revolutionary changes and the last fifteen years were really a period of preparation for the Radio industry. Right now is the time that every able-minded and able-bodied radio man begins to cash in on his Radio knowledge. In the Radio servicing field, in Radio Sound Engineering, in Television there is a tremendous opportunity—far greater than at any time during the past fifteen years. At this moment, there is a great scarcity in Radio service men and Radio sound engineers and with the coming of Radio equipped automobiles during the next few months this scarcity will become more acute.

HUGO GERNSBACH,
EDITOR, RADIO-CRAFT.

Radio has broadened of late years, into a means of entertainment as well as of communication. Its methods are of increasing value in numerous fields. It offers a multitude of opportunities to men who are not afraid of hard work in pioneer directions. It is believed that the years will bring an ever increasing number of openings for men trained in the various subdivisions of Radio Engineering and its applications.



A. N. GOLDSMITH,
VICE PRESIDENT,
RADIO CORP. OF AMERICA.

The future of Radio with its wonderful opportunities of development into the unknown fields of public service depends upon the ability of men. Only trained men with vision can delve into the unknown with success. I believe that the Radio industry is the most interesting and most progressive of all. It is interesting because of its great public service and it is progressive because it is new and many of its most important problems remain unsolved.

M. H. AYLESWORTH, PRESIDENT,
NATIONAL BROADCASTING CO.



Congratulations on completion of fifteen years of training men for Radio work. There is every reason to expect Radio to continue to extend its usefulness as it has in the past. Your contribution to this growth is an essential one, since modern civilization increasingly depends upon the man with specialized training.

J. H. DELLINGER, Director,
RADIO LABORATORY,
BUREAU OF STANDARDS.

Heartly congratulations to the Institute on the remarkable work being accomplished. I wish to compliment the graduates and students on their commendable efforts in seeking more knowledge in this highly technical field. Radio needs the American youth as inventor, technician and expert, and a technical education is vital.

PAUL A. GREEN, CHIEF ENGINEER,
COLUMBIA BROADCASTING SYSTEM.

The Radio industry during 1930 must take television seriously. With the inauguration of television transmitting stations, operating on a regular schedule, there is certain to be widespread interest in television reception. Vast experimental possibilities are at hand. And so the industry must provide the necessary components at first, followed by kits and then practical televisions, finally leading to the refined televisor which will be incorporated in the same cabinet as the sound broadcast receiver. 1930 will be the first television year.

C. FRANCIS JENKINS,
JENKINS TELEVISION CORP.



Cash in on the farm market. Too many farm homes are equipped with old, out-of-date sets. They need the new modern sets more than ever now. A number of manufacturers are designing special equipment for the farmer, and it will pay N. R. I. men in the rural sections to take advantage of the rich farm market now opening up.



By E. A. NICHOLS
Vice President
Radio-Victor Corporation
of America

volume and better tone through refined loud speaker design, on the other, have made possible a battery-operated radio set about on a par with the average socket-power radio set, plus the advantage of a noiseless background for tuning distant stations which is so important for the listener who is a considerable distance from the centers of population.

The combined engineering and research forces of the Radio Corporation of America, the General Electric Company and the Westinghouse Electric & Manufacturing Company, have been at work on this new conception of an efficient battery-operated radio receiver. After many months of intensive effort, such Radiolas have been developed, and will soon be made available. These new sets will not be simply revamped versions of old storage battery or dry battery radio sets. Instead, they will be entirely new conceptions of battery-operated sets, designed to establish rural selectivity, simplicity, economy, tone and radio more on a par with metropolitan radio. In the matters of sensitivity, power, there will be little more to ask for. **SELL THE FARMER!**

"I have built quite a few sets besides service work. Some weeks I make as high as \$25.00 in a few hours spare time."—Lynn Henderson, 817 Elgin Court, Jackson, Mich.

"I have the agency for three of the best standard Radios and I purchased a Supreme testing outfit—built me a work bench and put in a stock of equipment. The result is work and more of it. I am clearing around \$15 a day."—Jesse A. Still, Beach, North Dakota.

Radio-Trician's Service Manual

on

Zenith Models 52, 53, 54, 522, 532, 542

The Zenith 50 series circuit incorporates three stages of audio frequency amplification. The first stage is resistance coupled, the second, push-pull using two 227 tubes and the third, also push-pull using two 245 tubes. Only two push-pull transformers are shown in the diagram, the third being in the speaker. The plate circuit from the output or third transformer is completed through the cable provided with the 5-prong plug.

The grid bias for all tubes excepting the UX-245 or C-345 tubes is obtained by usual voltage drop through resistances connected between cathode and ground. .2 condensers are connected across the resistors.

Instead of the usual grid leak and condenser in the detector grid circuit, the linear detection method is used. This consists of a 50,000 ohm resistance paralleled with a .2 condenser between detector cathode and ground. This method allows a greater amount of volume input to the detector tube without blocking or distorting as is the case with the other methods of detection.

The circuit diagram of Models 52, 53, 522, 532 is shown in the Figure 1. Models 54 and 542 use exactly the same diagram with the exception that there is a two-point switch in the grid circuit of the first tube which disconnects the inductance coil from the circuit and connects one side of the loop aerial to the grid of the first tube. The other side of this loop is grounded to the chassis. The power pack used in these models is shown in Figure 2.

To Remove Chassis From Cabinets

First, remove the two lower screws in the escutcheon plate. These secure the escutcheon plate to the chassis and if not removed before attempting to move the chassis, damage to the escutcheon plate will result.

Second, remove the four bolts running up through the cabinet shelf into the bottom of the chassis.

Third, make certain all wires fastened to binding posts are removed. Also remove the multicable running from the power unit to the chassis. This is done by loosening the nine screws on the contact strip and slipping the terminal strip to the right. Make certain the dial light

bracket is slipped out of its holder so as to prevent damage. The plug connections should be pulled from their sockets.

Fourth, loosen the two hexagonal head set screws holding the coupling between the automatic tuner and the tuning condenser shaft.

NOTE: Do not remove the large hexagonal head bolt that secures the large coupler to the condenser shaft.

The chassis may then be pulled out the rear of the cabinet.

Hints on Servicing

MERSHON FILTER CONDENSER.

The Mershon filter condenser is used instead of the conventional tin foil and paper type.

This condenser is as near trouble proof as can be made. In the event that a portion of the electrolytic contents of the condenser is spilled or allowed to leak from the condenser, no harm will result with respect to fabrics, metals or wood finishes. However, a white spot will appear where the solution has been but this can be removed with a damp cloth.

If, during the operation of the set, a frying sound emanates from the condenser, the cause is high line voltage and the fuse should be placed in the 120-volt position. A line resistance should be used to reduce the A.C. supply if the fuse is already in the 120-volt position.

When testing the voltage divider (63-105) for continuity, the Radio-Trician should remember that unless the test leads are touched on the proper terminals of the voltage divider a false reading will result. The reason for this is: The Mershon condenser will pass current in one direction. If a voltmeter with a battery in series is used for testing the voltage divider or Mershon condenser and the test lead running from the positive terminal of the voltmeter is touched to a point that connects with one of the terminals of the Mershon condenser and the test lead running from the negative terminal of the battery is touched to a point leading to the copper can of the condenser, which is negative, a low reading will be obtained. If the test leads are then reversed, the true reading will be obtained. Often times when testing the circuit of the set, a



SELL THE FARMER—

RADIO means even more to the rural home than to the city home. To the farmer, radio spells a vital business service just as much as entertainment for leisure moments; and recently, broadcasting stations have come to recognize the farm listener as an important part of their listening audience, so that agricultural programs have been developed to a remarkable degree.

The radio industry has not forgotten the rural home. Radio engineers have turned to the requirements of the un-electrified home, eager to duplicate in that field what has been achieved for city and town radio enthusiasts. They have evolved new and refined types of loud speakers capable of supplying ample volume and rich tone from a minimum input. Because of the relative inefficiency of loud speakers in the past, it has been necessary to employ more tubes with a larger current drain. A small increase in drain means a considerable decrease in battery life. Hence battery sets of the past have not been very economical, unless loud speaker volume and tone were lowered.

The recent development of the screen-grid tube, with an amplification factor several times that of the usual three-element or standard battery tube, has also been a step in the direction of the ideal battery set. Indeed, with a single screen-grid tube replacing between two and three of the usual tubes for the radio frequency end, and, when also used as the detector, replacing the first audio tube as well, battery current has been reduced to new low levels. These current economies on the one hand, combined with the possibilities of greater

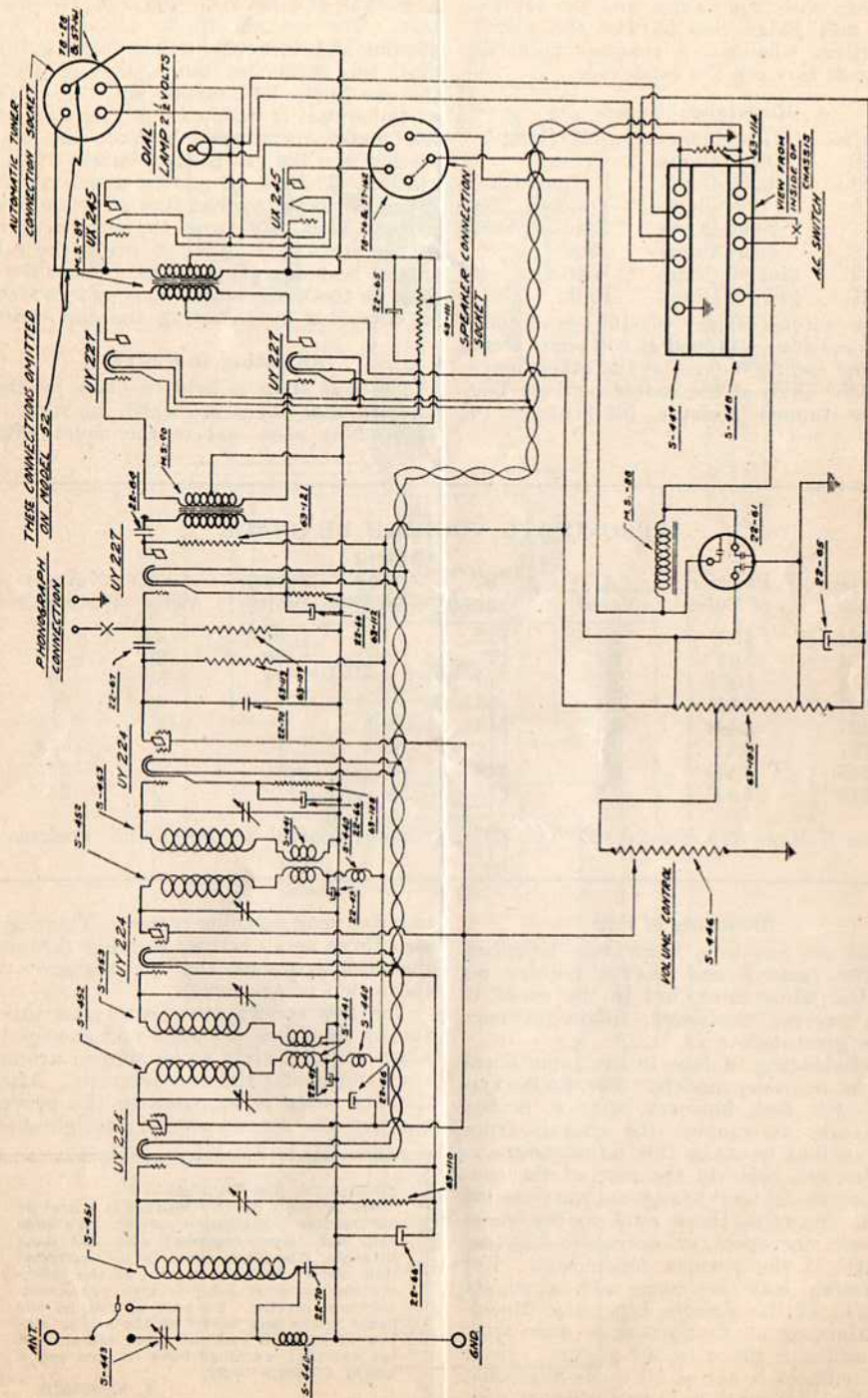


Figure 1.—Circuit diagram of Zenith Receiver, Models 52, 53, 522 and 532.

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Resolutions and Wish-Bones



A N O T H E R New Year is here—resolution making time. It's easy to sit by a warm fire, look forward to the year ahead and make a lot of resolutions, but it's quite another thing to carry them out.

There are plenty of men in this world who want to succeed—who want to break away from the old order of things and amount to something. They are the ones who will make the greatest number of resolutions this year and they should, but how few of them will live up to them! They are the never-do-wells—the fellows with WISH-BONES where their backbones were intended to be. They haven't awakened to the fact yet that it's the men who smash through with their ideas and plans that succeed in this world!

I believe that every N. R. I. man is the type of man who makes New Year resolutions, but unlike many others, he carries them out! You have already demonstrated that, for by studying your course you are fulfilling your ambition to make good in Radio. So, as you lay your plans for 1930 with its 365 days brim full of opportunity, RESOLVE to grow with Radio and get your full share of the rewards it has in store for the trained man.

E. R. HAAS,
Vice President and Director.

Dr. Lee De Forest Says—



The Radio Industry has assumed such tremendous proportions that a survey of its present situation and a forecast of its future would fill many large volumes.

In every line of human industry in America, Radio is playing a more and more important or indispensable part.

Besides the almost limitless fields of communication, by wire and wireless, telegraph, telephone, photographic and facsimile transference, the railroads now use Radio, in signaling and safety devices. Even passenger elevator installations are beginning to use Radio.

The science of Aviation depends more and more on Radio for signaling and guidance. The multitudinous uses of Radio in marine service are constantly increasing, for direction finding, fog signaling, ticker service, telephone and weather map service on shipboard.

Today Radio is being used to locate ore and oil deposits in the western ranges. Television with its unlimited possibilities is rapidly approaching the dimensions of a great industry.

I have not mentioned the Radio Manufacturing Industry with its \$600,000,000 of annual turnover, its half million or more of employees, operatives, superintendents, managers, engineers and directors. Nor the tens of thousands engaged today in the manufacture, installation and servicing of talking motion picture theatre equipment. Nor the research engineers and laboratory assistants intensively engaged in invention and design of better amplifiers, and acoustic devices—all the direct outgrowth of the Radio, and intimately related to Radio.

With such an astounding situation, such unlimited possibilities and unprecedented opportunities for the young man who is wide awake, ambitious and industrious—need anyone ask advice regarding the possibilities of finding interesting and lucrative employment with a prospect of rapid advancement, in the field of Radio?

It's a fine thing to answer when opportunity knocks at your door, but if it's a little late—don't wait. Get out and stir up your own opportunity.

Training is the best insurance against long hours with low pay!

