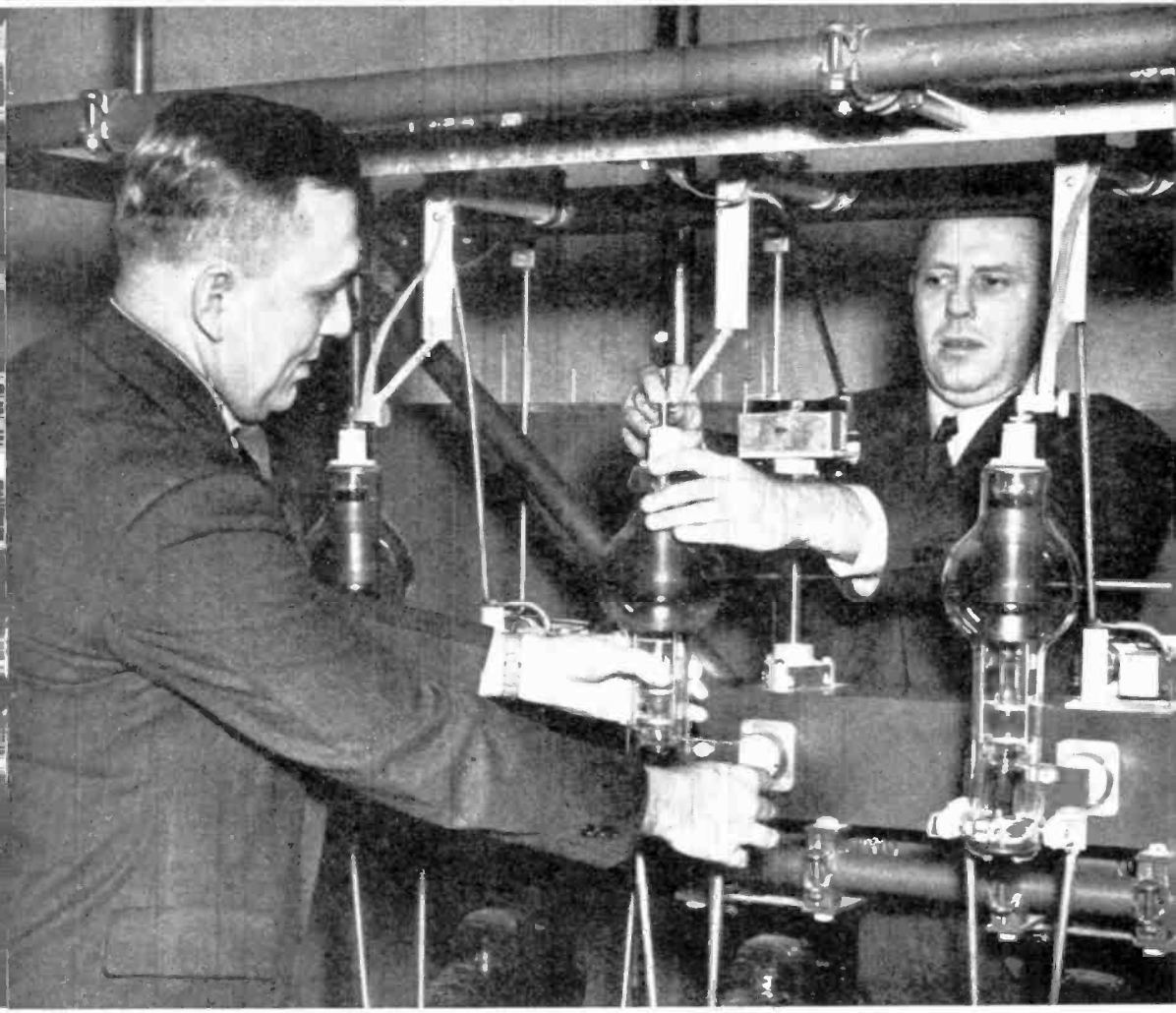
NATIONAL RADIO NEWS



IN THIS ISSUE

Changing Push-Button Radios to New Frequencies

Answers to Puzzling Radio Questions

Alumni Association News

JUNE-JULY
1940

VOL. 9
No. 3

Why Do You Want To Succeed?

There are several answers to this question. You may want to succeed for the very human reason that you want more money with which to enjoy life, or you may have a family for whom you want to provide those comforts they so well deserve—a home, a new car, good clothes, life insurance and financial security.

Your ambition to succeed may be prompted by the desire to bring happiness to an aged father, mother or other near and dear relative whose chief hope in life is to see you enjoy prosperity and prestige, to see you on the pinnacle of success.

Any one of these may be the backbone of your ambition. Each is admirable. That you do have ambition is evidenced by the fact that you have studied to get away from the rank and file jobs—the humdrum existence of low pay—insecure employment. It only remains for you to give full play to this ambition—to follow its dictates and go forward to victory. With ambition, "the game is in your hands."

Determine what is *your* reason for desiring Success. With this reason in mind, resolve firmly that you will never allow your ambition to weaken—that you will never swerve from the path which leads directly to your goal. Make this resolution now and keep it, and all the years to come will be much happier for you—much more prosperous.

J. E. Smith, President.

Make Extra Profits Changing Push-Button Radios to New Frequencies

Some time within the next 12 months, approximately 90% of the broadcast stations in this country are scheduled to change their frequencies to the new values set forth in the Havana Treaty. This means that every one of the approximately eight million push-button-tuned radio receivers must be readjusted. It will be harvest time for radio servicemen, so be prepared! Study carefully this timely article which tells how you, as an N. R. I. student or graduate, can get your share of this profitable business.

"HOW do you do, Madam. I am not the census taker, but there is a question I would like to ask you. Does your radio receiver have push-button tuning? It does—well, that means some of the push-buttons will have to be reset when our local radio stations change to new frequencies. Over eight million sets like yours will need this readjustment, for stations all over the country will change frequencies at the same time. Servicemen can't possibly take care of all these sets at one time, but by lining up the work in advance and scheduling jobs carefully, I can promise to have your receiver readjusted within twenty-four hours of the change-over time. By concentrating my work in this one vicinity, I can go from one set to another with a minimum of time wasted in travel and keep the cost of the work down to a very low figure.

"How much will it cost—well, it won't be more than $3 regardless of what make of receiver you have, and may be a lot less. Let me take a look at your set and I'll give you a definite figure. Here it is—and there's the push-button mechanism on top of the chassis. It is one of the simpler types, so the charge for readjusting it will be only $1.50. Is that all right? Fine—I'll make out a job ticket now, and phone you when the change-over is being made, so we can set a mutually convenient time for the work."

BY J. A. DOWIE

N. R. I. Chief Instructor

Conversations like this will be heard all over the country this summer, as radio servicemen prepare in advance for the biggest rush of work in the history of radio.

The forthcoming frequency reallocation comes as a result of the recent ratification by Mexico of the Havana Treaty. This treaty was drafted in Havana, Cuba, two years ago by representatives of Canada, Cuba, Mexico and the United States and is formally known as the North American Broadcasting Agreement. The chief purpose of the treaty is to reduce interference between stations, particularly the interference created in this country by the high-powered Mexican border stations. Under the treaty, the border stations such as 180,000-watt XERA and 50,000-watt XENT lose their present high-power assignments on preempted channels.

The exact date at which the frequency shift will take place has not been set by the Federal Communications Commission at the time of going to press with this issue, but ample notice will undoubtedly be given the public in advance by radio stations and newspapers. About 90% of the radio stations in the United States will change frequency, so it is extremely unlikely that any present setting of four or more push-buttons on a receiver will remain correct after the change-over.

The accompanying table indicates the general

Col. 1	Col. 2	Col. 1	Col. 2
550	550	1090	1120
560	560	1100	1130
570	570	1110	1140
580	580	1120	1150
590	590	1130	1160
600	600	1140	1070
610	610		or 1170
620	620	1150	1180
630	630	1160	1170
640	640		or 1190
650	650	1170	1200
660	660	1180	1170
670	670		or 1200
680	680	1190	1210
690	*	1200	1230
700	700	1210	1240
710	710	1220	1250
720	720	1230	1260
730	*	1240	1270
740	750	1250	1280
750	760	1260	1290
760	770	1270	1300
770	780	1280	1310
	or 1110	1290	1320
780	790	1300	1330
790	810	1310	1340
800	820	1320	1350
810	830	1330	1360
820	840	1340	1370
830	850	1350	1380
840	*	1360	1390
850	870	1370	1400
860	880	1380	1410
870	890	1390	1420
880	910	1400	1430
890	920	1410	1440
900	930	1420	1450
910	*	1430	1460
920	950	1440	1470
930	960	1450	1480
940	970	1460	1500
950	980	1470	1510
960	*	1480	1520
970	1000	1490	1530
980	1020	1500	1490
990	1030	1510	*
1000	1040	1520	*
1010	690, 740,	1530	1590
	990 or 1050	1540	*
1020	1060	1550	1600
1030	*	1560	*
1040	1080	1570	*
1050	1070	1580	*
1060	1090	1590	*
1070	1100	1600	*
1080	1110		

*Not assigned in U. S.

FIG. 1. Table giving changes in channel assignments as set forth in the Havana Treaty. A broadcast station now assigned to a channel in Col. 1 will be changed to the channel on the same horizontal line in Col. 2. All figures represent kilocycles.

trend of the frequency changes. In individual cases, changes not in accordance with the tabulated values may be made to avoid interference on adjacent channels or for other reasons. Note that present frequency assignments (Column 1 in Figure 1) will remain the same after the change-over for all channels between 550 kc. and 720 kc. inclusive. All other stations will, in most cases, have their frequencies increased. No stations will be dropped.

Naturally, if you are to get your share of this profitable business, you must know how the various types of push-button systems work and must know how to set them up.

Types of Automatic Tuning Systems

Although manufacturers have used many different schemes for providing automatic tuning, we can divide these into three groups according to the operating principle employed, as follows:

1. Mechanical Automatic Tuning Systems. By pressing a button or rotating a telephone-type dial, the listener himself provides the force required to rotate the gang tuning condenser to the setting for a desired station. This is a purely mechanical action, with no electrical switching whatsoever; tuning is essentially instantaneous.

2. Electrical Automatic Tuning Systems. Pressing a button switches an entirely new set of condensers, preadjusted to a particular station, into the tuning circuit of the receiver in place of the gang tuning condenser. The action here is entirely electrical, hence tuning is instantaneous.

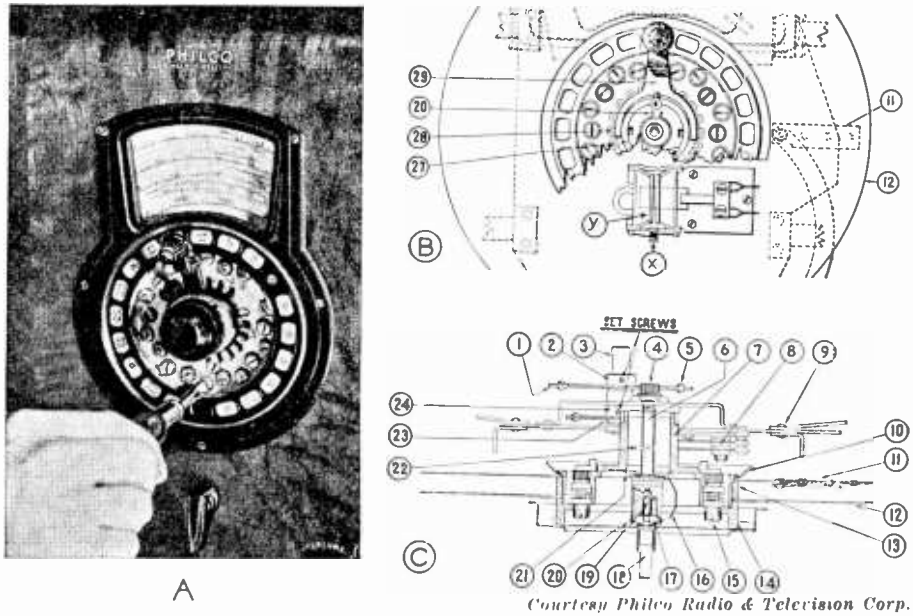
3. Electro-Mechanical Automatic Tuning Systems. Pressing a button closes the circuit to a small electric motor, which then rotates the gang tuning condenser to a desired station. Electrical switching here causes a mechanical force to be applied to the gang tuning condenser. A certain amount of time is required, once a button is pressed, for the motor to complete the tuning process.

In all three systems, the initial adjustments which insure accurate automatic tuning to desired stations have been made by the radio dealer at the time of the installation. Printed tabs having the call letters of the desired stations are attached to the push-buttons themselves or to the escutcheon surrounding the buttons, to identify the station selected by each button.

Mechanical Automatic Tuning Systems

Mechanical automatic tuning systems may be divided into two general groups according to the manner in which they are operated by the listener:

1. Rotary or telephone-dial types, in which the



Courtesy Philco Radio & Television Corp.

FIG. 2. Three views of an automatic tuning system used on a number of Philco receivers which also have A.F.C. The numbered parts on these diagrams are all identified in the Philco service bulletin on automatic tuning.

listener himself provides the rotary motion which turns the tuning mechanism to the correct setting for a desired station. Automatic stops prevent him from moving beyond the correct setting.

2. *Direct push types*, in which the listener applies a direct push or force to a button or lever. Either a gear, cam or lever arrangement is used to convert this force into the rotary motion required to turn the tuning condenser to the correct setting for a desired station.

Philco Automatic Tuning Dial. The general appearance of the Philco telephone type automatic tuning dial with cover plate removed is shown in Fig. *2A*. Constructional details of this mechanism can be seen by studying the front-view diagram in Fig. *2B* and the cross-section view in Fig. *2C*.

In setting up this Philco automatic dial tuning system, a station is first tuned in the conventional manner, with the a.f.c. or magnetic tuning control in its "out" position. The key (item *15*) at the bottom of the dial is then adjusted by inserting a screw-driver in its slot, pressing the key in slightly so it is free to rotate, then turning the key until a click is heard. The receiver is now tuned for maximum output by turning the key back and forth slightly. This procedure is repeated for each other station selected.

Direct Push Types of Mechanical Automatic Tuning Systems. A number of different mechanisms are being used to convert an ordinary direct push on a button into rotation of a tuning condenser to the correct setting for a desired station; let us look over a few of them.

In receivers employing mechanical automatic tuning units, there will be one complete set of parts like those in Fig. *3*, *4* or *5* for each station which is to be tuned automatically. Pressure on the station-selecting button will cause the tuning condenser shaft to rotate. The cams for the different stations are mounted side by side on a cam shaft which is geared to the tuning condenser shaft, the cams being separated by spacing washers and held in position by friction. A mechanical locking device is provided for locking each cam rigidly in position once it is adjusted for a station.

In some systems a straight plunger with or without a roller, is used in place of a lever arm.

In another system of the direct-push type, illustrated in Fig. *4A*, the cam is somewhat egg-shaped and the roller is replaced by a U-shaped

or forked metal piece. Pressing the button makes the forked plunger take the position shown in Fig. *4B*, holding the cam in a definite position.

A finger and rocker mechanism which provides mechanical tuning in still another manner is illustrated in Figs. *5A* and *5B*, and a sketch of this unit is shown in Fig. *5C*. For each station there is a plunger (flat metal strip) sliding freely through two slots in opposite sides of a metal frame. At one end of this plunger is the push-button; clamped to one face of the plunger is a metal "finger" which can be set at any desired

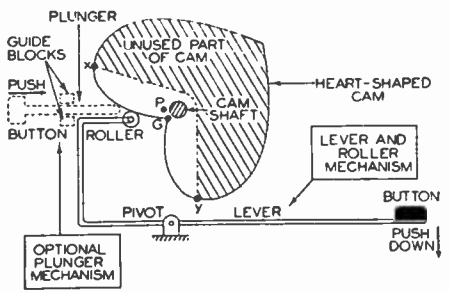


FIG. 3. Operating principles of direct push types of mechanical automatic tuning systems employing a cam with either a lever and roller or a plunger. Pressure on the button in the direction indicated by the heavy arrow serves to rotate the gang tuning condenser (geared to the cam shaft) to the correct setting for the station assigned to that button.

angle to the plunger and held in position by a locking screw and clamp arrangement (omitted from Figs. *5A* and *5B* to simplify the diagrams, but shown in Fig. *5C*). Pressing in a button makes the rocker rotate to the same angle as the finger; on the rocker is a gear segment which meshes with a gear on the tuning condenser shaft and thus provides the correct tuning condenser setting for the station assigned to that button.

Electrical Automatic Tuning Systems

Instead of rotating the tuning condenser when a new station is desired, electric automatic tuning actually removes the variable condensers in the tuned circuits and replaces them with new condensers which were previously adjusted to the correct values for that particular desired station.

Push-button switching mechanisms like that shown in Fig. *6A* are used in electrical automatic tuning systems. When one of the buttons on this unit is pressed down, the button which formerly was down is released, removing that set of condensers, and an entirely new set of condensers is switched in. The entire process of switching is practically instantaneous. It is common practice to mount the set of preadjusted condensers right on the switching mechanism. In Fig. *6B* is a bottom view of the unit in Fig. *6A*; as you can see, there are two trimmer condensers, each adjusted by a screw, for each of the buttons on the unit.

To secure better frequency stability, some manufacturers are using a push-button switching system to substitute adjustable coils instead of trimmer condensers in the oscillator tuned circuit. Special coils employing pulverized iron cores which can be moved by means of an adjusting screw to change the inductance of the coil are used for this purpose. A fixed condenser, usually of the temperature-compensating type, provides the necessary capacity for the oscillator circuit. Because of the higher cost of variable-permeability iron-core coils, they are usually used only in the oscillator circuit. A slight change in trimmer condenser capacity will have *far more detuning effect in the oscillator tuned circuit* than in a preselector tuned circuit.

Initial Adjustments. It is neither advisable nor necessary to make each adjustable part in an electrical automatic tuning system cover the entire 540 to 1,500-kc. broadcast band. A more economical and stable construction is secured by limiting the tuning range of each adjustable coil or trimmer condenser to a definite section of the broadcast band; for example, one set of adjustable parts may be designed to tune from 540 to 900 kc., another set may cover the range from 700 to 1,300 kc., and the third and final set might cover the range from 1,000 to 1,500 kc. There is

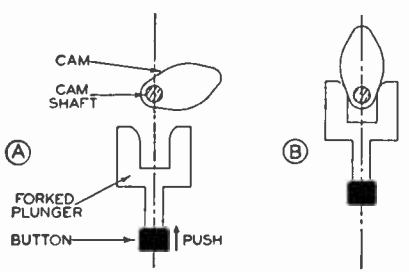
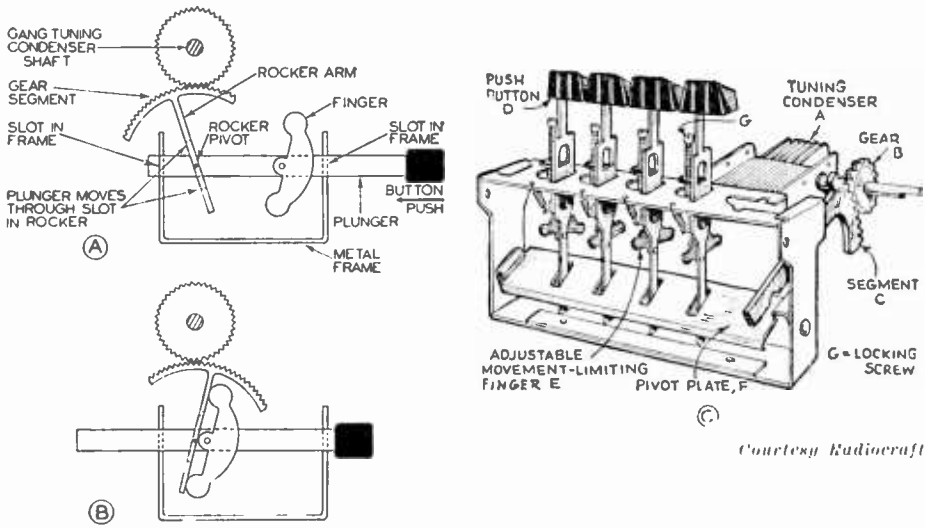


FIG. 4. Egg-shaped cam and plunger mechanism used in the mechanical automatic tuning systems of some Philco receivers.

enough overlapping between these three groups so that a station near the limit of one group may also be tuned in by another group.

Instruct the customer beforehand to turn on the receiver at least half an hour before you arrive, so the chassis will reach its stable operating temperature.

To reset a button for a station, tune in the station manually and note the nature of its program at that time. Now push in the button assigned



Courtesy Radiocraft

FIG. 5. The diagrams at A and B show one of the finger and rocker units used in the mechanical automatic tuning systems of some Crosley receivers (including the Crosley Safety-Tune auto radio), while the sketch at C shows the complete tuning unit with a gear drive to a gang tuning condenser. Tightening the screw on the plunger locks the finger rigidly in position. To set up a button for a station, this screw is loosened so the finger can rotate, the button is pushed all the way in, the station is tuned in manually, and the screw is tightened to lock the finger at the correct angle. A spring returns the button to its normal position when pressure is released, leaving the tuning condenser at the correct setting for the desired station.

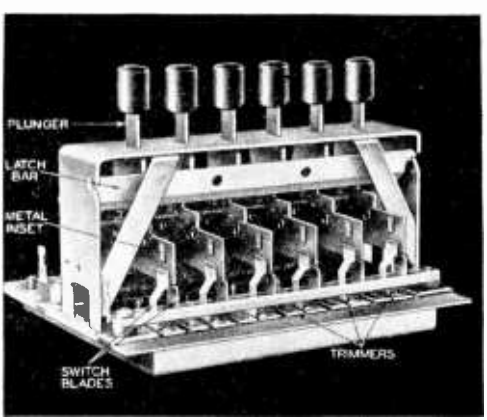
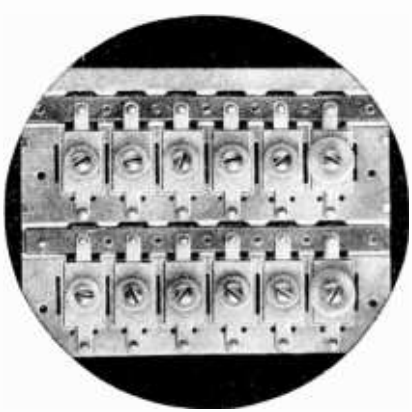


FIG. 6A. Sprague electrical automatic tuning unit with built-in trimmer condensers. The switch blades in the foreground are normally held apart by the strip of insulating material mounted on each plunger; when a button is pressed, the metal inset moves down between the blades, shorting them and closing the circuit to one set of trimmer condensers.



Courtesy Sprague Products Co.

FIG. 6B. Bottom view of the Sprague unit, showing the trimmer condensers and their adjusting screws. Each push-button controls one upper and one lower trimmer on this gang assembly. One terminal of each trimmer is grounded to the frame of the unit, and this frame is in turn grounded to the chassis.

to that station. Locate the oscillator trimmer condenser or variable inductance controlled by that button, and adjust until the station is heard with maximum audio output. For best results do not depend upon your ears, but use an output indicator or the tuning indicator in the receiver (if available). With this done, locate the preselector trimmer condenser which is controlled by this button and adjust for maximum output in the same manner; you will note that this adjustment is quite broad, whereas the setting of the oscillator trimmer was quite critical. Repeat this procedure for each other push-button.

Electro-Mechanical Automatic Tuning Systems

Electro-mechanical automatic tuning systems will generally include the following sections:

1. A small electric motor which drives the gang tuning condenser through speed-reducing gears and which can be reversed by means of a switch.

2. A switching mechanism which can be adjusted to stop the driving motor at predetermined positions which correspond to the gang tuning condenser settings for desired stations.

3. A group of push-button-controlled switches, each of which starts the motor and connects into the motor circuit the proper switch mechanism for stopping the motor at the correct point (these may be located at any reasonable distance away from the receiver, making remote control tuning possible).

4. A means for silencing the audio system of the receiver during the interval when the motor is driving the tuning condenser, in order to prevent annoying blasts of sound as the receiver is tuned past strong undesired stations; a means for releasing temporarily the a.f.c. system while the tuning motor is in motion or just after it stops, in order to allow the desired station to "take hold" of the a.f.c. system.

RCA Electro-Mechanical Automatic Tuning System. A top view of this tuning mechanism is shown in Fig. 7A, and the simplified diagram in Fig. 7B shows how the system operates. The metal disc with an insulated segment and a slot on opposite sides is one of eight discs which are mounted on a common shaft and held in position by friction; beneath each disc is a spring contact. During manual tuning the metal discs turn with the gang tuning condenser but the electric motor remains motionless since the pin on its shaft is not engaged with the crank arm on the speed-reducing gear.

To make the preliminary station-setting adjustment for this RCA mechanism, one of the buttons is pressed, and after the motor has stopped, an adjusting key (provided with the unit and kept in a special adjusting key receptacle when not in use) is inserted in the adjusting hole corresponding to this button; this places the key in the slot on the metal disc, exactly as shown in Fig. 7B. The a.f.c. system is turned off by means of a switch on the receiver panel, and the receiver is now tuned manually to the station desired for that button. Removal of the adjusting key completes the adjustment for this station; the process is then repeated for each other button. It is not necessary to lock the metal discs in position, since there is sufficient friction to prevent them from slipping during normal receiver operation.

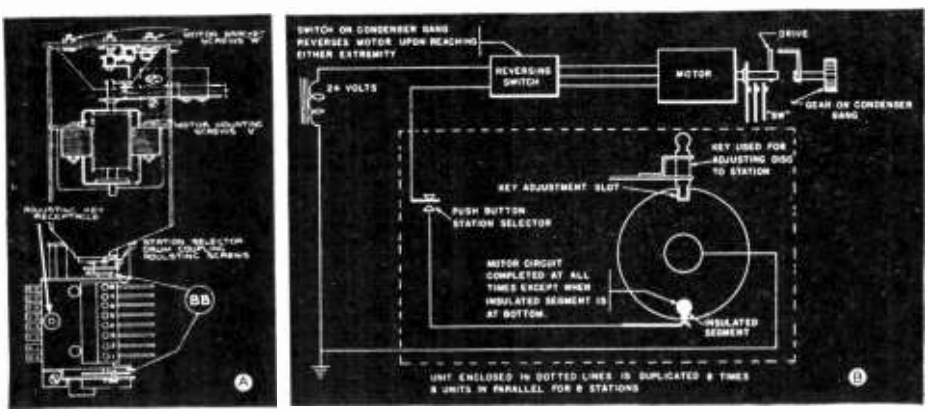


FIG. 7. RCA electro-mechanical automatic tuning system. Shaft coupling units are designated as BB.

Conclusions. In general, the telephone dial types of automatic tuning units will be the most difficult to readjust. If your preliminary examination indicates that trouble may be encountered, it will be wise to write in advance to the manufacturer for instructions on setting up the tuner.

Radio Frequencies and their Allocation

This article was released to NATIONAL RADIO NEWS *by the Federal Communications Commission, Washington, D. C.*

The radio spectrum, or radio waves, form one portion of the total electromagnetic spectrum. The electromagnetic spectrum covers eight different classes of radiation—electric waves, radio waves, infra-red, visible light, ultra-violet, X-rays, gamma rays, and secondary cosmic rays.

The emission of this energy may be likened to the expanding ripples of water suddenly disturbed by a thrown stone. However, electromagnetic energy travels in all directions.

Since electromagnetic radiations have a common speed (that of light), their only difference is in frequency and wave length. "Frequency" may be characterized as the number of these waves per second, and "wave length" as the distance between successive waves.

The divisions between the various classes of electromagnetic radiations are not definite. The lines of separation are based largely upon the effects and the particular method of producing the various emissions. Under certain conditions, some of these electromagnetic impulses may be seen, felt, or heard. Of the eight classes of electromagnetic radiations, that portion classed as "radio waves" covers a relatively small part of the total electromagnetic spectrum.

Radio facilities are extremely limited. In order to provide the maximum possible service for the benefit of the public, it is necessary to control and restrict the use of the available channels. As transmission by radio waves spans great distances, it has been found necessary to have international agreement on the proportion of available channels to be allocated for particular services. To prevent interference within our own country, it is necessary to further apportion the frequencies in the best interests of users.

Besides the standard broadcast channels, our radio spectrum is shared by other primary services, such as: fixed, marine, aviation, emergency, amateur, miscellaneous, experimental, Government, and broadcast services other than standard broadcast. These general service allocations cover various classes of station, including: relay, international broadcast, high frequency broadcast, noncommercial education, facsimile, television, point-to-point telephone and telegraph, agriculture, press, coastal, telegraph and telephone, ship, aircraft, aeronautical, blind landing systems, airport, municipal and State police, marine fire, forestry, geological, mobile press, motion picture, amateur phone, telegraph and television, as well as experimental classes of stations.

The present useful radio spectrum, in which channels are now allocated, ranges from 10 to 300,000 kilocycles, or in terms of wave lengths, from 30,000 meters to 1 meter. That portion below 100 kilocycles is popularly referred to as "long waves"; from 100 kilocycles to 550 kilocycles as "medium long waves"; from 550 to 1600 kilocycles as "broadcast"; 1600 to 6000 kilocycles as "medium short waves"; 6,000 to 30,000 kilocycles as "short waves"; and above 30,000 kilocycles as "very short" or "ultra-short waves."

The band below 100 kilocycles is occupied by Government and commercial long wave fixed service stations. From 100 kilocycles to the beginning of the broadcast band at 550 kilocycles, we have the medium long wave stations, as follows; 100 to 200 kilocycles—Government and private ship, coastal, and fixed service stations.

200 to 400 kilocycles—primarily Government aids to navigation, such as radio navigation for aircraft, and radio beacon service to ships, interspersed with airport on 278 kilocycles, direction finding on 375 kilocycles, and miscellaneous fixed stations.

400 to 550 kilocycles—Government and commercial ship and coast stations in the maritime service centered near the international calling and distress frequency of 500 kilocycles (600 meters).

The rest of the spectrum from the end of the "broadcast" band at 1600 kilocycles, involving the so-called "medium short," "short," and "ultra-short" wave bands, could be pictured as a many layered sandwich, with police, amateur, aviation, Government, ship, coastal, broadcast, mobile press, special services, experimental, television, fixed, forestry, and all other classes of stations providing varying depths of filling.

Of course, this does not mean that all these bands are completely filled. Radio communications is still undergoing change, and the Federal Communications Commission, in licensing individuals and firms to use the public's radioways, is charged with preparing for the future, as well as for the present. Hence, some channels are held open for future developments, while others already allocated, are subject to shift with changing events.

The Laboratory Page

By GEORGE J. ROHRICH

The purpose of this department is to furnish supplemental experiments to students who have completed their Home Laboratory Course, but who wish additional laboratory experience. You are not required to perform these experiments, but you will gain increased knowledge by doing so. Most of the material required will be that received as part of the Laboratory Course. Any other material necessary can be purchased very reasonably and will constitute an investment rather than an expense, as it will serve as replacements in service work or be useful in your shop later.

George J. Rohrich, Engineer
in Charge N. R. I. Laboratory

PUTTING THE LOW FREQUENCY OSCILLATOR TO WORK ON HOUSE-LIGHTING POWER

The signal generators which are constructed from Fig. 48 in Outfit 4BA-1 and Fig. 48A in 5BA-1 have proven to be very popular according to many letters expressing this fact. The simple calibration procedure for marking the frame of the condenser according to instructions for Fig. 48A has appealed to so many students that they have also marked in a similar manner the frame of the condenser of the other oscillator described for Fig. 48 in 4BA-1.

Most of the reports show that the condensers were marked with the proper fundamental frequencies ranging between 550 and 1500 kc., like those shown in Fig. 48D appearing on page 11. Nevertheless, doubt was expressed and felt until we could check and advise about the correctness of the reported calibrations. Perhaps other students have been in doubt also without taking the trouble to inquire. Therefore, the present table and sketch covering Fig. 48D will be of interest in checking those calibrations which you have already made.

The accompanying table and sketch of Fig. 48E also is included to supplement the low frequency oscillator calibrations described for Fig. 48A in Outfit 5BA-1. These calibrations will be useful also in event that you want to add them now or later.

Most students like the simplicity of operating the low frequency oscillator with batteries as regularly specified in the instructions for Fig. 48A and 48B in 5BA-1. However, some have suggested that they would be interested in learning how to operate this oscillator from house-lighting power if this could be done inexpensively and easily, without adding too much complicated equipment. Therefore, those suggestions were considered from a practical standpoint and the circuit shown in the accompanying Fig. 48C is herewith submitted.

You will note that Fig. 48C makes use of a type 12A7 tube, which is actually a combination of two tubes within a single envelope; a half wave rectifier and a pentode amplifier. This tube has been arranged so it uses a resistance filter which is adequate for the simple purpose of producing oscillations as required from the low frequency oscillator.

This tube uses the small type of seven-prong socket. The diagram shows the numbering which applies to this socket while viewing it from the bottom. Therefore, all of the connections can be added without difficulty.

There is only one precaution which should be observed while using the oscillator shown in Fig. 48C; do not permit the frame of the variable condenser to come in contact with a grounded object, such as the chassis of a receiver. This would short-circuit part of the tube and probably burn it out under some conditions. However, no further damage will result because each half of the tube prevents excessive current from flowing through any remaining circuit.

AVERAGE CALIBRATIONS FOR
MODULATED OSCILLATOR
FIG. 48 IN 4BA-1
FREQUENCY (K.C.) vs. DIAL SETTINGS (0-50 DIAL).

K.C		DIAL
515	=	50.0
550	=	44.0
600	=	38.5
650	=	35.
700	=	31.5
750	=	28.5
800	=	26.
850	=	23.5
900	=	21.5
950	=	20.
1000	=	17.5
1050	=	16.
1100	=	14.5
1150	=	13.5
1200	=	12. ⊛
1250	=	11.
1300	=	9.
1350	=	8.
1400	=	7.
1450	=	6.
1500	=	4.

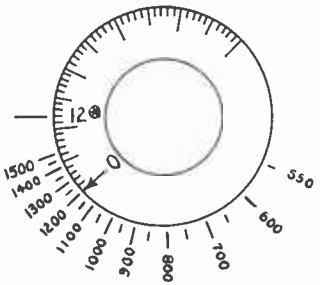


FIG. 48D

AVERAGE CALIBRATIONS FOR
MODULATED OSCILLATOR
FIG. 48A IN 5BA-1 AND FIG. 48C
FREQUENCY (K.C.) vs. DIAL SETTINGS (0-50 DIAL).

K.C.		DIAL
100	=	46.0
110	=	39.0
120	=	35.0
130	=	32.
140	=	29.
150	=	26.5
160	=	24.
170	=	22.
180	=	20⊛
190	=	18.
200	=	16.5
210	=	15.
220	=	13.5
230	=	12.
240	=	11.
250	=	10.
260	=	8.5
270	=	7.
280	=	6.
290	=	5
300	=	4.

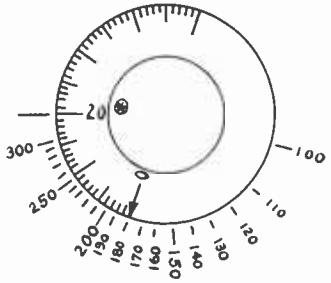


FIG. 48E

USE THE "ZERO LINE" ON THE DIAL AS A "POINTER"
THEN MARK THE METAL FRAME OF THE CONDENSER
AS SHOWN AT THE BOTTOM OF EACH DIAL WITH A PENCIL.

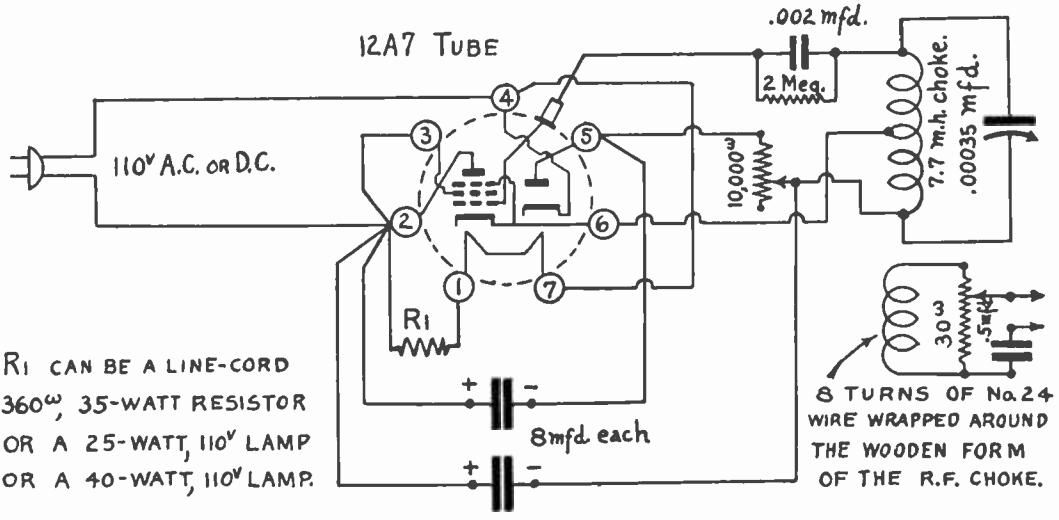


FIG. 48C. LOW FREQUENCY MODULATED OSCILLATOR 100-300 K.C.

It Pays To Do Your Best

Dear Mr. Smith:
I would like to tell you of something that occurred shortly after I received my August-September, 1939, copy of NATIONAL RADIO NEWS.

On the first inside page you had written an article on, "Ten Suggestions for Holding and Improving a Job."

I read that article and somehow it impressed me deeply. I thought back over my years of work with the ..... Company. I had tried to follow most of your suggestions from the time I went to work with them and I firmly believe that I did live up to them. But due to reasons beyond my control I was let go in favor of someone else.

At first I was stunned because I had never been fired in my life and I had had no inkling of anything like that happening. This was the first of 1939 and for a long time I had a hard time of it —even to make a bare living for my wife, child and myself.

Then the latter part of the year I got a job with the ..... Company in Tampa. The job was supposed to be temporary, in fact it was only for two months.

The first month I did only what I was told—nothing else. I took no initiative in anything for I had begun to believe that it did not pay and anyway the job would end in two months.

One day I was looking through my copies of NATIONAL RADIO NEWS and I again read your article. It brought me up with a start. I began to pay more attention to my job and soon saw where I could save the company money in various ways, as well as speed up my work.

My suggestions were well received and soon were in force in the shop. Two months went by, then three and four. It wasn't long before I had been there six months.

The other day I was called in the office and told that I had proven so valuable that the job was mine for as long as I wanted it.

So there you have it. I almost lost everything merely because I let a few "hard knocks" get me down—but thanks to you and your words I am now coming back stronger than ever and nothing will ever lick me again.

GEORGE C. LEVY, JR., Tampa, Fla.

The above letter refers to an editorial by Mr. J. E. Smith, which appeared in National Radio News, issue of August-September, 1939. So many have commented on this editorial we think it is worth repeating. Here it is:

TEN SUGGESTIONS FOR HOLDING AND IMPROVING A JOB

I. Accept and welcome fair criticism. When executives find that certain men resent criticism, they stop criticizing and begin firing.

II. Don't give out unfair criticism. Don't be a chronic grouch or complainer. Stop listening to grouchy associates or you'll become like them.

III. Develop a "we" and "our" attitude toward your company. Show an enthusiasm and interest in the company's success. Realize that what hurts company business hurts you also.

IV. Hard work brings success just as fast today as ever. Remember this—if you never do more than you're paid to do, you'll never get paid for more than you do.

V. Prepare yourself to handle part or all of the work of men above you. A good understudy for an executive is too valuable to fire.

VI. Always be ready to lend a hand to others or do new tasks. Willing workers are hard to fire.

VII. Develop confidence in your abilities, but avoid over-confidence. Bluffers eventually get deflated. Confine your clock-watching to alarm clocks, and make a habit of getting to work on time.

VIII. Keep your head when the routine of work is varied or when an emergency arises. Accept responsibility whenever opportunity offers; a refusal kills chances for advancement.

IX. Don't bury your nose in the details of your job. Organize your work and assign routine duties to your assistants whenever possible, so you will have time for more important things.

X. Devote a few minutes of each day to clear thinking about your job, your future and your company's future. Jot down each worthwhile idea immediately, develop the idea in your mind for a few days, then write it up in detail for consideration by your superiors. Initiative of this form is welcomed and eventually rewarded.

RADIO-TRICIAN
REG. U.S. PAT. OFF.
Service Sheet
Compiled Solely for Students and Graduates
NATIONAL RADIO INSTITUTE, WASHINGTON, D.C.

HOWARD MODEL 300

ALIGNMENT PROCEDURE NOTES

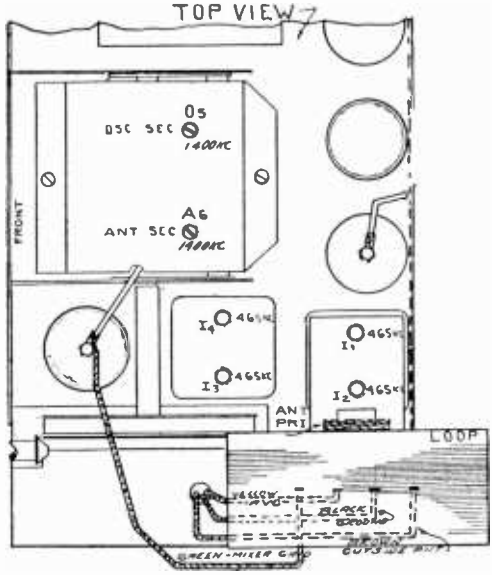
A—Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B—When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 21 MC, then a weaker image will be heard at 21,000 KC less 930 KC, or about 20,070 KC on the dial.

C—When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D—See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

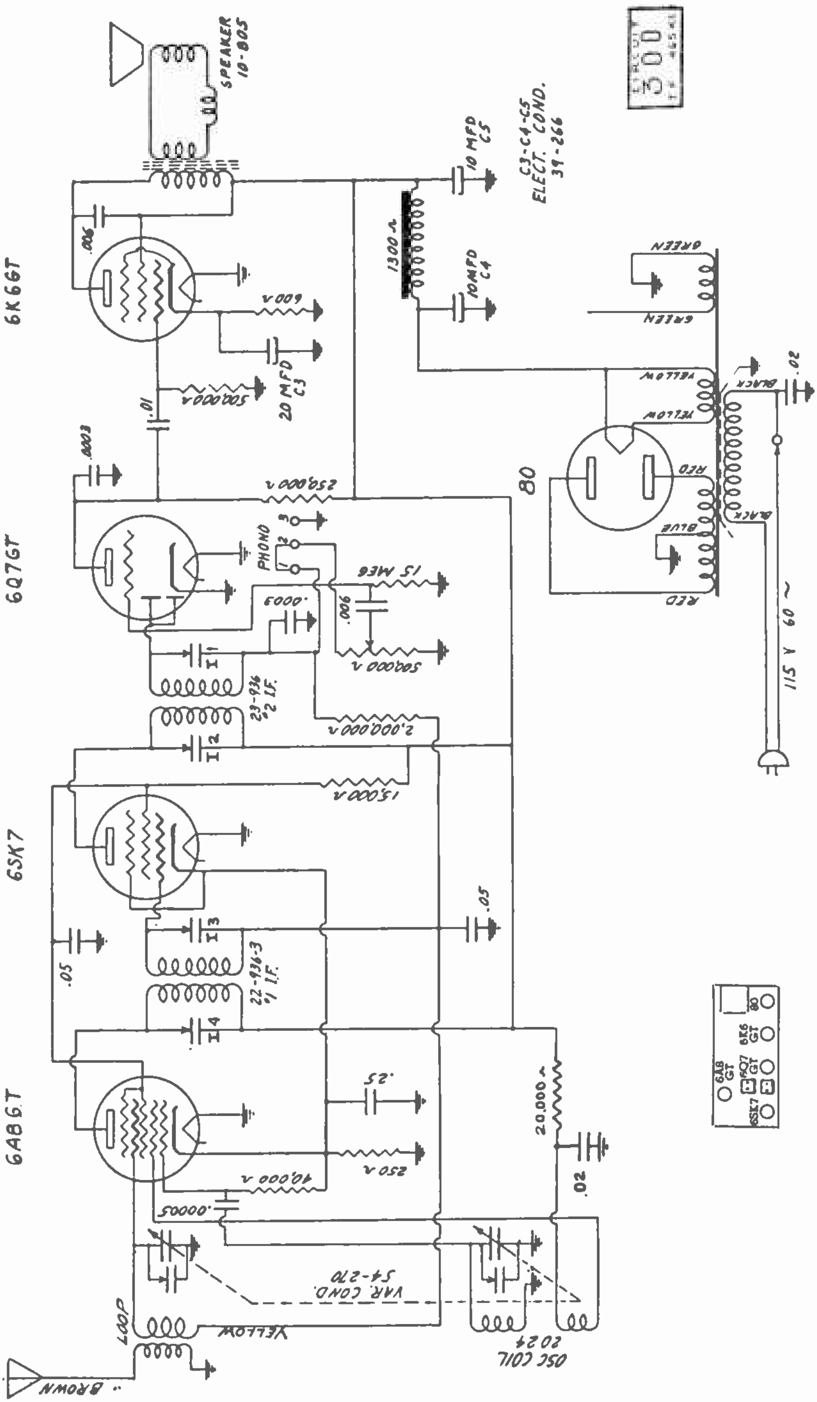
E—The following dummy antenna circuit is recommended, since it is adaptable for any frequency range. The grid cap should remain in place during alignment.



ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
x	Min. Cap.	465 KC	6A8 Grid	A, E	I_1 I_2 I_3 I_4	IF
x	1400 KC	1400 KC	Brown lead	D	O_5 A_6	Osc. & Ant.
x	600 KC	600 KC	Brown lead		CUT PLATE	OSC. SECTION

Readers who file Service Data in separate binders remove page carefully, trim on dotted line for same size as data published heretofore.



Novel Radio Items

-BY L.J. MARKUS-

Radio Tubes Live 4½ Years!

The average life of a radio tube in a typical radio receiver is now about 4½ years, according to the RCA License Laboratory. An ordinary lamp costing fifteen cents lasts 1,000 hours, while a radio tube costs about ninety cents and lasts 6,000 hours. Thus, we pay just about the same per hour of use for radio tubes as for lamps.

———n r i———

Auto Radio Gets European Stations!

The first short-wave automobile radio capable of receiving European broadcasts directly has been announced by Philco Radio and Television Corporation. The chassis of this set has been locked and sealed internally to prevent its use on police bands in violation of some state laws. Domestic short-wave stations can be tuned in when reception is poor on the broadcast band because of summer static.

———n r i———

Stencils Are Cut by Facsimile!

Experiments at Lehigh University showed that stencils could be cut directly on an RCA facsimile receiver simply by feeding in ordinary mimeograph stencils in place of the customary white paper and carbon sheet. Hundreds of copies of weather maps, line drawings or any kind of printed matter sent by facsimile can thus be made within a few minutes of reception.

Gas Flame Operates Radio Sets!

Now on the market in England is the perfected Milnes thermoelectric generator, which operates from an ordinary gas supply and provides A, B and C power for a radio receiver. The unit sells for approximately $20, and operates a radio receiver at a cost of about 2/3 cent per hour on the basis of prevailing gas rates in New York City.

———n r i———

Washington Gets First Booster Station!

FCC authorization has been granted for a new Washington, D. C. radio station broadcasting on 1,310 kc. from two widely separated transmitters having powers of 250 watts and 50 watts respectively. This is the first time a local synchronous booster amplifier of this nature has ever been authorized. It solves the problem of securing full coverage of an area with low power.

———n r i———

Police Carry Portable Radiophones!

Complete radio transmitting and receiving equipment having a range of several hundred feet is now available to special New York policemen. The unit is mounted on a wide belt supported by shoulder straps, so that it can be worn under the coat, with the microphone hidden behind the vest. Evidence picked up by the officer is broadcast to other policemen at a receiver in the vicinity, where it is recorded.

"MAYDAY" MEANS "HELP"! In radiotelephony, the authorized international distress signal consists of the spoken expression "mayday." This corresponds to the French pronunciation of the expression "m'aider." An aviator in distress at sea (or the skipper of a small yacht equipped only with radiotelephone equipment) must therefore say "mayday" rather than "SOS" or "Help!" if he expects to be saved.

POTATO ACTS AS ANTENNA! An N. R. I. student John H. Roberts tells about a customer who made his dead radio receiver work temporarily by pushing a potato over the grid cap of one tube, after finding that reception could be restored by holding a finger on the cap. John found an open filament in the r.f. tube, and deduced that the potato on the mixer-first detector grid cap was acting as an antenna.

RADIO DETECTS STORMS! A radio-operated device being used by the Edison Company of New York City lights up a neon lamp and rings chimes when it detects a storm within a radius of one hundred miles. The lamp gets brighter and the chimes get louder as the storm approaches. The outpost stations of the power company are notified of the approach of the storm by telephone, and prepare for lightning.

Puzzling Radio Questions From Students

Choosing a Tube Tester

QUESTION: *I am now in a position to start a full-time radio service business, and desire to obtain a tube tester. I am somewhat confused by the many different types available and their wide price range. I would like to have your recommendations.*

ANSWER: One of the reasons for the wide difference in price is the addition of features which have nothing to do with tube testing. A number of tube testers contain voltmeter and ohmmeter features, in addition to being tube testers. If you already have a multimeter, there is no reason for spending money on these additional features.

Three major types of tube testers are available: *1.* Emission testers, which measure the emission from the cathode when the tube is connected as a diode and operated at a predetermined plate voltage; *2.* Mutual conductance testers, which check the mutual conductance of a tube by measuring the plate current change when the grid voltage is changed; *3.* Dynamic or power testers, which test tubes under actual operating conditions. All three types should have some means for detecting shorts between electrodes. The more elaborate the measurements made, the more complex is the circuit and the greater is the cost of the instrument.

Another factor which boosts the cost of a tube tester is an attempt by the manufacturer to make it as nearly obsolescence-proof as possible. This may take the form of a series of switches or an elaborate series of push-buttons, many of which are not needed now but are provided to take care of any new tube types which may appear in the future.

In general, the more you pay when purchasing a tube tester from a reliable firm, the better looking will be the equipment and the longer it will serve without being made obsolescent by the appearance of new tubes it cannot test.

Emission-type testers are usually lowest in price; furthermore, when made by *reliable* concerns, they are perfectly satisfactory for ordinary testing of radio receiving tubes by a serviceman. In fact, the great majority of radio servicemen today are using emission-type testers. Keep in mind, however, that you will have to pay at least $15 for a satisfactory tube tester of any type.

The more elaborate mutual conductance and dynamic testers provide a thorough check of the amplifying ability of a tube, but are usually higher in price than emission testers.

Carefully read over the specifications given in radio supply catalogs and in literature of test instrument manufacturers. Look for a tester having the features which will best suit your needs, selling at the price you want to pay. Remember that we, at N. R. I. are always glad to assist in choosing test equipment; just outline your requirements on a Consultation Service Sheet and give the names and model numbers of the testers you are considering.

Police Radio "Chasing" Laws

QUESTION: *Is there a law which prohibits garage owners, ambulance operators or lawyers from listening to police radio broadcasts, then going to the scene of the crime or auto accident to solicit business?*

ANSWER: Yes, Section 605 of the Communications Act of 1934 provides heavy penalties for any person who intercepts a radio message and, knowing that the message is not addressed to him, utilizes the contents of the message for his own benefit or for the benefit of others. Programs broadcast by radio stations or amateurs for the use of the general public are exempt from this ruling, as also are messages relating to ships in distress. Section 501 of the same Communications Act states that any person who wilfully and knowingly violates a regulation in this Act shall, upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for a term of not more than two years, or both.

Voltmeter Puzzle

QUESTION: *When I used the voltmeter section of my multimeter to measure the d.c. plate voltage of one of the tubes in my receiver, the meter pointer came to the same position regardless of whether I used the* 1.5, 15 *or* 150-*volt range. I thus obtained a different voltage reading for each range. On other tubes, I get essentially the same voltage reading (different pointer positions) on all ranges, so I know my meter is working all right. Can you explain this?*

ANSWER: The puzzling results you describe are obtained whenever a voltmeter having a low ohms-per-volt rating is connected to a circuit having a very high resistance. It is observed most often when measuring the d.c. plate voltage of the first a.f. amplifier tube.

The explanation is as follows: The meter resistance is shunted across the d.c. plate resistance of the tube. The meter resistance predominates, since it is considerably lower than the tube resistance. Now, the plate load resistance is extremely high, so that changes in the meter re-

Are Answered By N. R. I. Experts

sistance have only a negligible effect upon the flow of current through the meter and load in series. The same current thus flows through the meter for all of the low-voltage ranges, explaining why the meter pointer takes the same position on all of these ranges.

In cases like this, the meter reading tells only that a voltage is present; this is all you need to know in the usual circuit of this type if other voltages check okay. For an accurate direct voltage measurement, a vacuum tube voltmeter is required.

Tubes for Majestic Receivers

QUESTION: *I am having difficulty in securing replacement tubes for Majestic receivers. Can modern tubes be used in place of these special tubes?*

ANSWER: Replacement tubes for practically all of the original Majestic tubes are still being made by some of the larger tube manufacturers, but these can usually be obtained only on special order because the demand is not great enough to justify their being carried by radio jobbers. In many cases, however, low-priced modern tubes can be used successfully in place of the higher-priced special Majestic tubes. Thus most of the Majestic tubes bearing type numbers ending with *S* can be replaced with ordinary tubes having the same type numbers without the *S*. If oscillation (squealing or howling) occurs, place a shield over the tube and ground the shield. This external shield then acts the same as the metallic coating which was sprayed on the outside of the original *S* tubes.

The chief exceptions to the foregoing rule are the Majestic types 56AS, 57AS, 58AS and 85AS. Use a 76 in place of the 56AS, use a 77 for the 57AS and use a 78 for the 58AS. You will have to order the special 85AS, along with the special Majestic types GS4 (also designated as 2Z2), 6D7, 6E7, 6Y5, and 6Z5 tubes, for there are no exact equivalents of these tubes. Majestic tubes G2, G2S, G4 and G4S can all be replaced with the present 2S/4S. When the 2S/4S is not readily available, try a 56 or 27 tube.

Chassis Shocks

QUESTION: *When I touch the chassis of my a.c. receiver (not a universal a.c.-d.c. set), I get a shock. What is wrong?*

ANSWER: You have a poor ground connection, or none at all. Grounding the chassis will eliminate future shocks. In an a.c. receiver, there is usually a condenser connected from each side of the power transformer primary to the chassis. When you touch the chassis, you are really touching the hot side of the power line through a condenser, and enough a.c. will flow through this condenser to give a shock (the chassis assumes the potential of the line, and your body is essentially at ground potential). Grounding the chassis eliminates this difference in potential between your body and the chassis, and hence eliminates the shock without affecting the receiver.

With universal a.c.-d.c. sets, a shock will be obtained when touching the chassis if the line cord plug is in a particular position. In these sets, one side of the power line is connected directly to the chassis, so the chassis cannot be grounded (a ground would short the power line and cause the house fuse to blow). The best way to avoid being shocked while servicing these universal midget sets is to sit on a wooden stool or stand on a board or rubber mat, so as to insulate your body from the ground. Avoid touching any grounded objects when touching the chassis.

Why Does Volume Change When House Lights Are Switched On?

QUESTION: *I find that turning on electric switches in the house affects the volume of my a.c. radio receiver. What causes this?*

ANSWER: A poor ground connection, or none at all, is the common cause when volume *increases* as electric switches are turned on. The receiver is obtaining its ground connection through capacity between the chassis and the power line. Turning on electric switches places more of the house wiring in the circuit, thereby improving the effectiveness of the ground path and increasing signal strength. Improving the ground connection to the receiver should eliminate this effect. Placing condensers of equal capacity (such as .05 mfd., 600 v.) between the power transformer primary leads and the set chassis will sometimes help. This connection will be found in many late sets.

There may also be an intermittent defect in the set itself, with the slight changes in line voltage causing the trouble to appear and disappear.

In some districts where the line regulation is poor, the turning on of any household device places such a load on the line that the voltage drops considerably. When this condition is present, receiver volume will drop as electric switches are turned on. As rectifier tubes grow old and weak, they have a tendency to emphasize this sort of trouble, so in many cases it may be cleared up by changing the rectifier tube.

Advantages of Outdoor Antennas

Loops and indoor antennas have a definite place in the radio industry, but a good outdoor antenna system is still tops when it comes to picking up distant stations and keeping noise interference at an absolute minimum.

By JULIUS G. ACEVES,
Amy, Aceves & King, Inc.,
Consulting Radio Engineers,
11 West 42nd St., New York, N. Y.

TO one who has specialized for years in signal pick-up and interference elimination technique, the recent attempts to do away with outdoor antennas are something truly to cry about. Indeed, we are going backwards in our radio reception when we get away from noise-reducing outdoor antennas in favor of loops and built-in antennas for operation of moderate-priced and high-fidelity receivers. Convenient and cheap as these antenna substitutes may be, they cannot and do not take the place of the noise-reducing outdoor antenna, in providing for optimum performance from a broadcast receiver. To prove that point is the purpose of the following dissertation.

Also, from your standpoint as a Radiotrician, this antenna-substitute trend is far more than an academic question. It means dollars and cents out of your pocket. For every time a set with loop or indoor antenna is sold, it means the elimination of one more revenue-producer for the service trade. Antenna installations, check-up and repair jobs are "gone with the wind" when antenna-less sets sweep into popularity. Hence it's your concern, too, that the public be educated with regard to the superior results which an outdoor antenna will *always* provide.

First, let's be perfectly frank about this whole matter. We'll concede at the start that there is a definite place for the loop and built-in antenna. Technically, the self-contained signal interceptor is perfectly legitimate for portable sets. Also for tiny midgets that may be transported from room to room, or that may be used in temporary quarters such as hotel room, school dormitory, or hospital.

Economically, in the face of midgets selling for $10 or less, the built-in signal interceptor is again legitimate and even essential. No midget-set buyer is going to spend a few dollars extra for an outdoor antenna, especially in metropolitan areas close to powerful broadcast stations. Meanwhile, the limited tone quality of these bargain-basement sets is such that one or two more handicaps don't mean much, anyway.

Turning to better-grade radio sets, the self-contained interceptor is quite another matter. Technically, the loop, built-in antenna or indoor antenna decidedly handicaps set performance, as we shall presently prove. Economically, such a set owner can well afford another few dollars if much superior results can be obtained. So our interest is primarily in better-grade sets.

Now just a few elementary principles to refresh our memories and pave the way for the reasoning to follow:

Radio waves have two components: *electrostatic* and *electromagnetic*. The device picking up these waves may be actuated mainly by one or the other. Accordingly, we have a collector of the open *antenna* or the shielded *loop* type.

The loop being a directional device, we can get maxima or minima by rotating it in space. Thus, we can differentiate between two waves coming from different directions. One wave may be that of a desired station; the other, a source of interference. Better reception is obtained by turning the loop *against the interference source* rather than for maximum signal reception. By shielding the loop, we practically eliminate the electrostatic component and receive by means of the electromagnetic, with maximum directional effect.

All of this sounds ideal. In localities where radiated interference is very low and signal strength fair, the loop may be satisfactory at least in the broadcast band. Foreign stations in the short-wave bands from 49 meters down to 16, cannot be received with the same broadcast loop because of tuning-range difficulties. Also, since the field strength of overseas stations is usually low, they cannot be heard well even on a special short-wave loop under normal circumstances. The same applies to ultra-high-frequency reception. Television reception is out of the question. For signal pick-up, the loop is no better than an indoor antenna. A shielded loop, however, gives better discrimination against noise than an indoor antenna.

Most homes are none too happily situated with regard to low interference level and high signal level. The radio set may be surrounded by inductive interference or so-called "man-made static." There are motors with sparking brushes, interrupters in thermostatic controls, electric bells, dial telephones, contactors for elevators,

and so on. There may be that arch terror of radio noises, diathermy apparatus. Outside, there may be neon or other gaseous-tube type electric signs, or even incandescent lamp signs with motor-driven contactors. A trolley line nearby doesn't help matters. Neither does a high-tension transmission line with leaky insulators or transformers.

How can the loop take care of this situation? If oriented for a minimum (or even a "null") for

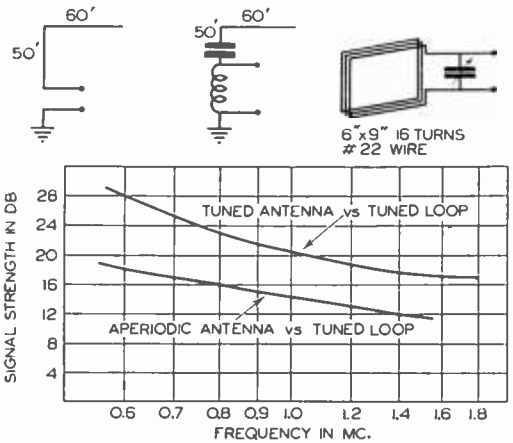


Fig. 1. Signal strength of tuned and untuned antenna compared with a tuned loop.

one source, it is not going to help noises from other directions. Moreover, it is well known that the induced voltage in a loop is very weak in comparison with the electromotive force from an open antenna, even of the indoor type. Therefore, when receiving from stations other than locals, we are going to get tube noises; unless the receiver is extremely sensitive, the automatic volume control cannot take care of fading.

What to do? Can a well-designed outdoor antenna system really reduce background noises and increase signal strength in a typically poor radio location? The answer is decidedly YES.

You may be skeptical. Other servicemen have become skeptical. During the last half-dozen years, the market has been flooded with so-called "noiseless antenna kits." Fantastic claims of noise-reducing properties have been made without proper foundation. It is a safe guess to say that more than 75% of such kits failed to reduce noise as compared with ordinary antenna wire, in any worth while degree to justify the claims. Frankly speaking, there have been many "phonies" marketed, which have given a big shiny black eye to this antenna-kit business.

Nevertheless, there are a few well-engineered antenna kits—and master antenna systems—which are the product of years of study and specialization. These kits really do the job. All they require, from an installation standpoint, is to have the actual pick-up structure (be it a doublet, "T", or vertical rod of proper height) in a noise-free location, equipped with suitable couplers and transmission line and a good quiet ground, in order to effect an amazingly high degree of interference reduction. This is done in a two-fold manner:

1. Neutralizing the interference pick-up from the line connecting the antenna proper with the radio receiver, and preventing the passage of spurious currents from the power line into the input circuit of the radio receiver.

2. Increasing the signal strength by maximum pick-up of the intercepted radio waves.

In order to illustrate these principles, measurements were made of signal and interference pick-

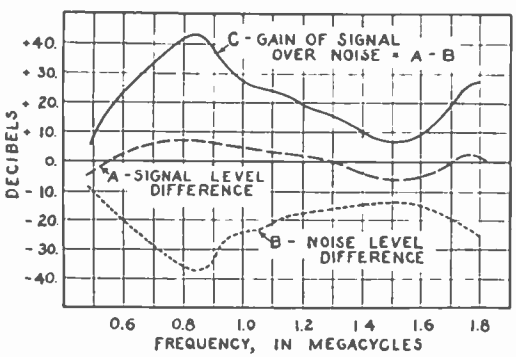


Fig. 2. Comparison of performance of a noise-reducing system with conventional antenna of same dimensions.

up on typical loops and antennas with and without noise-reducing equipment. The results are shown in graphical form as follows:

Figure 1 shows a typical instance of relative signal levels from a tuned loop *vs.* an outdoor antenna of the tuned and untuned types. From these graphs, the superiority of the antenna over the loop for signal strength alone is apparent.

Curves A, B and C in Fig. 2 represent: A, the signal-level difference; B, the noise-level difference; C, the signal-to-noise logarithmic ratio (curve A minus curve B), for a certain noise-reducing antenna kit on the market, as compared to an ordinary outdoor antenna and downlead of same dimensions. Curve C gives the resultant noise reduction for a given signal loudness, and represents the improvement in reception, which is as high as 40 decibels in some instances.

Do you realize what this means? Well, it corresponds approximately to the adding or sup-

pressing of a stage of audio amplification. In other words, it corresponds to raising or lowering the volume of an orchestra from *piano* to *forte*, or in piano playing, from *mezzoforte* to *fortissimo*. This represents the effect of an increase of about 100 times in signal voltage, as a reduction in the noise has the same effect as such a signal increase.

How would you like to soften the interference in your radio receiver from an annoying *forte* to a tolerable *piano* level when listening to the New York Philharmonic Symphony on a Sunday afternoon, if you are a music lover? This would certainly justify the additional expense of a noise-reducing antenna. That is the argument to pass on to your customers.

And so in conclusion: There's no substitute for the properly designed, perfected, noise-reducing antenna system, correctly installed. You can readily demonstrate the practical gain in signal strength and reduction of background noise by installing such a system in your own home or shop, and having set-owners come to hear the results for themselves. You can safely install such a system on a money-back-if-not-satisfied basis, for it does prove itself. In this manner, you can show that antenna-less receivers, threatening to become universal, cannot give the best possible reception. Remember also that antenna-less receivers cut down service revenue.

Editor's Note: The foregoing article represents the views of the writer, a well-known antenna engineer, and was prepared especially by him for the NATIONAL RADIO NEWS.

Most of the loop-equipped sets have provisions for outdoor aerials. By connecting a good aerial to such a set when it is tuned to a distant station, you can demonstrate that signal level noticeably rises and noise goes down. Even holding a finger on the antenna post of many of these sets, while tuned to a distant station, will sometimes prove effective as a demonstration of the need for a good aerial when DX reception is desired. In a noisy location, only a noise-reducing antenna of good quality should be considered.

Although the author made no mention of a specific antenna system in giving performance curves, we presume he is referring to one of the types manufactured under patents held by Amy, Aceves & King. The antenna kits sold by the Technical Appliance Corp., 17 East 16th Street, New York City, using the trade name *Taco*, are so licensed. Information on these kits may be obtained by writing directly to the manufacturer.

Undoubtedly, there are other concerns making kits that will also perform satisfactorily in giving a good signal-to-noise ratio. A trial of several types should be made if possible, at your shop, to determine the best type for your particular location.

A Unique Attention Getter

This little gadget is a guaranteed "crowd stopper" for your window. He is called "Telecan," because he is made from old cans and a coffee pot and anything with "tele" tacked on the front sounds somewhat mysterious.

Telecan stands 36 inches high in his bare feet and weighs about 20 pounds, he has a normal chest expansion of 28 inches because his body is a square two gallon oil can. His eyes are 6T5's and his head will shake a vigorous "No" at anybody.

The passerby operates Telecan by placing his hand over a square metal plate fastened to the inside of the window. Here's the secret. The metal plate is connected electrically, but quite invisibly into a balanced circuit. When window shopper places his hand over the plate he forms a condenser and upsets the balance, a relay thuds home, and behold, Telecan's eyes blink knowingly at him while his head shakes, "No, No."

Telecan was built by Felix Sapanero and Harold Z. Snyder, both N. R. I. men, in business as Maryland Radio Service, 1504 W. Baltimore St., Baltimore, Md.

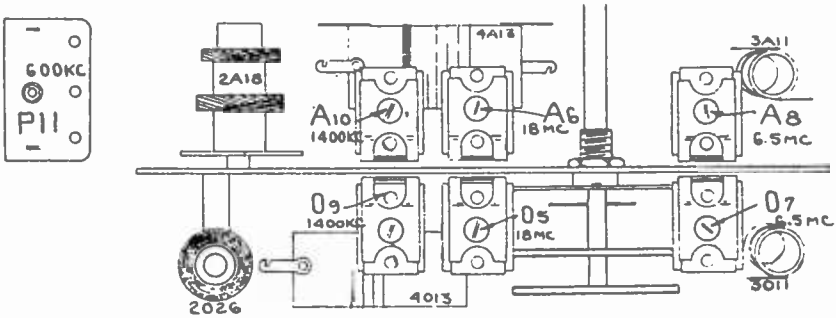
Our Cover Photograph

The Columbia Broadcasting System has recently dedicated their newest transmitter, for Washington, D. C., thus giving the Nation's Capital one of the fifty kilowatt broadcasting stations, which is the maximum power for the United States.

The photo on the cover of this issue of the NEWS shows Mr. John Palmquist (WJSV's control room supervisor, at left) and William Kriz (WJSV's transmitter supervisor) demonstrating to the cameraman how simply and quickly one of the big mercury vapor rectifier tubes of the three phase full wave bridge type 200 kilowatt power rectifier unit can be replaced. This picture not only shows you how large rectifier tubes are changed in case of tube failure, but also how they are mounted in their respective positions on the rack. Of course, no one is permitted to enter the power room or section when high voltage is turned on.

RADIO-TRICIAN
REG. U.S. PAT. OFF.
Service Sheet
Compiled Solely for Students and Graduates
NATIONAL RADIO INSTITUTE, WASHINGTON, D.C.

HOWARD MODEL 565



Alignment Procedure Notes

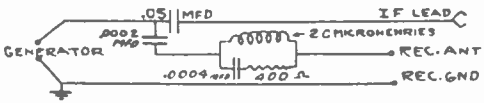
A—Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B—When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 21 MC, then a weaker image will be heard at 21,000 KC less 930 KC, or about 20,070 KC on the dial.

C—When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D—See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

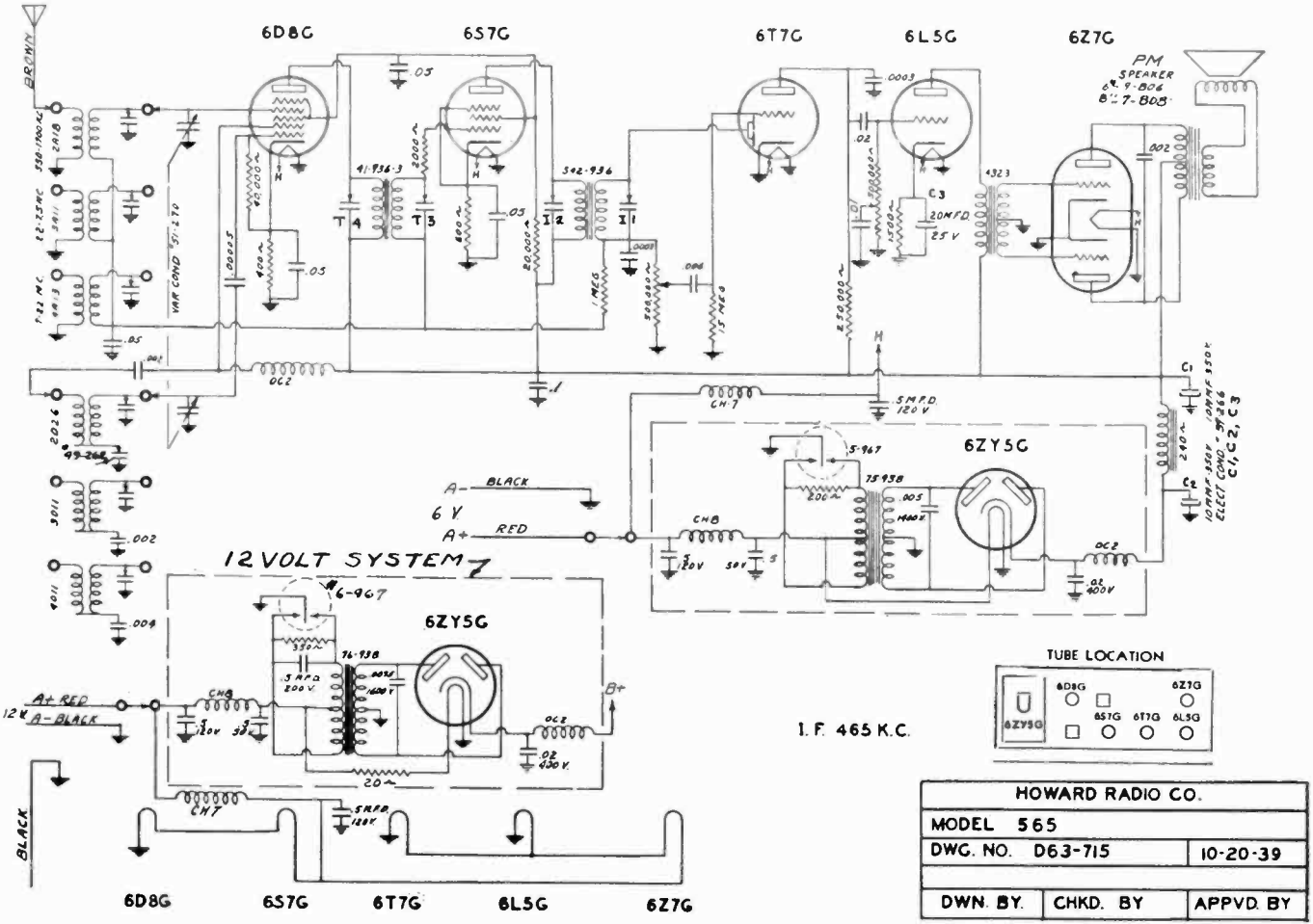
E—The following dummy antenna circuit is recommended, since it is adaptab e for any frequency range. The grid cap should remain in place during alignment.



ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
BC	Min. Cap.	465 KC	6D8 Grid	A, E	I_1 I_2 I_3 I_4	IF
SW	18 MC	18 MC	Brown lead	B, D	O_5, A_6	Osc., Ant.
PB	6.5 MC	6.5 MC	Brown lead		O_7 A_8	Osc., Ant.
BC	1400 KC	1400 KC	Brown lead		O_9 A_{10}	Osc., Ant.
BC	600 KC	600 KC	Brown lead	C	P_{11}	Osc. Pad.

Readers who file Service Data in separate binders remove page carefully, trim on dotted line for same size as data published heretofore.



HOWARD RADIO CO.		
MODEL 565		
DWG. NO. D63-715		10-20-39
DWN. BY.	CHKD. BY	APPVD. BY

The Service Forum

Conducted by

J. B. Straughn, N. R. I. Service Consultant

Send in your service notes. We will re-word them for publication. To qualify your note for the NEWS *you must have observed the same trouble on two or more identical receivers.*

STEWART WARNER
MODEL R1252A — **DEAD**

This is generally due to a breakdown in the .25 mfd. condenser connected to the third tap from the left of the candohm resistor. For replacement purposes, use a .25 mfd. 600 volt condenser.

———*n r i*———

PHILCO MODEL 60 — **DEAD**

If the voltages applied to the tubes are below normal, this is generally due to a short in the receiver. Look for poor insulation on the white lead of the primary of the second I.F. transformer where it crosses the mounting bracket. Insulate the lead so that the short is eliminated.

———*n r i*———

AIRLINE MODEL 198 — **DEAD**

Check for an open in the .1 mfd. condenser connected between the wave band switch and the first lug (from the front of set) on the rack of three trimmers mounted on the coil assembly. If shunting this condenser with another clears up the trouble, the original condenser should be replaced using a 600 volt unit.

———*n r i*———

AIRLINE MODEL 320 — **DISTORTION**

Distortion particularly noticeable at low volume may be eliminated by changing the 500,000 ohm second detector screen resistor to 700,000 ohms. A 1-watt resistor should be employed.

———*n r i*———

BELMONT MODEL 778 — **INTERMITTENT**

If the receiver is intermittent or dead on the low frequency end of the dial, install a new condenser in place of the bakelite condenser connected across the low frequency padder. This condenser frequently opens thus causing the trouble.

———*n r i*———

RCA MODEL 96X12 — **DEAD**

Look for open I.F. transformer underneath the chassis at the rear. I find that greater sensitivity is obtained by mounting a replacement on top of the chassis next to the second I.F.

JAMES F. BARTON, South Carolina.

———*n r i*———

PHILCO — **DEAD OR**
MODEL 39-19 — **INTERMITTENT**

The B plus lead from the 41 output tube is held in place by a clip on the speaker frame. This lead shorts out because of poor ventilation. I place a piece (2 or 3") of spaghetti at this point.

———*n r i*———

GRUNOW 11G — **NOISY AND POOR**
LATE MODEL — **SENSITIVITY**

This is quite often due to a defective screen filter. If the screen filters check O.K. look for open R.F. and detector coil. Replace with Carron part No. D1473. This is an exact duplicate. Litz stranded wire was used in the early model and solid wire in the latter models.

JAMES F. BARTON, South Carolina.

———*n r i*———

A.C. D.C. SETS — **BALLAST TUBE OUT**

The uni-ballast type Y will replace about 99% of ballast tubes. The instructions are easy and simple to follow.

JAMES F. BARTON, South Carolina.

———*n r i*———

DISTORTION AND OVERLOADING IN SETS USING 6U5 AND 6AB5
MISCELLANEOUS — **TUNING EYE TUBES**

Distortion and overloading on strong signals in sets using the 6U5 and 6AB5 tuning eye tubes may be caused by grid current in these tubes. Try out one or more new tubes and check results.

———*n r i*———

WELLS GARDNER SERIES — **REDUCTION**
A26, 5D2 AND 6A27 — **OF HUM**

If hum modulation is noticeable on stations of weak signal strength, the condition may be corrected as follows: Disconnect the .05 mf. grid return condenser (C1 in the Series 6A26 and 5D2 schematic diagrams C2 in the Series 6A27 schematic diagram) from the chassis ground and connect this side of the condenser to B + (point marked "X" in the schematic diagram). On later production sets, this change has already been made.

———*n r i*———

MOTOROLA — **TONE CONTROL**
MODEL 34K — **INOPERATIVE**

If you run into a Model 34K whose tone control does not function, check the location of the tone control condenser. It should be connected to the plate terminal of the output tube, but we have

(Page 27, please)

N.R.I. ALUMNI NEWS

Clarence Stokes ..... President
Dr. Geo. B. Thompson, F. E. Oliver ..... Vice-Pres.
Allen McCluskey, Alfred E. Stock ..... Vice-Pres.
Earl Merryman ..... Secretary
Louis L. Menne ..... Executive Secretary

Clarence Stokes, N.R.I. Alumni President Is Honored Guest at Baltimore Chapter

Chief Instructor Dowie and President Smith of N. R. I. join Pete Dunn, Chairman of Baltimore Chapter, in extending a royal reception to Clarence Stokes, 1940 President of the Alumni Association.

Baltimore Chapter

The high-light of our recent meetings was one in which Baltimore Chapter received a visit from Clarence Stokes, President of the N. R. I. Alumni Association. A delegation of eleven members of Philadelphia-Camden Chapter drove over to this meeting to bring our total attendance up to approximately a hundred. Included in the Philadelphia group, in addition to our National President Stokes, was Dave Blackwell, Chairman, Norman Kraft, Vice Chairman, Charley Fehn, several times Past Chairman and present Treas-

Baltimore Chapter always puts a lot of spirit into anything it does. This is part of the group that turned out to greet Stokes.

urer, Bert Champ, Financial Secretary, Herman Doberstein, our Librarian, Charles Haraburda, Sergeant-at-Arms, James McCaffery, Alfred Wyaczanski, Harold Strawn and M. H. Coulon, Secretary John Biaselli, Jr., at the last moment found it impossible to attend and sent his regrets.

The occasion was given much color by the presence of J. E. Smith, President of N. R. I., J. A. Dowie, Chief Instructor, George Rohrich, Laboratory Engineer, J. B. Straughn and William F. Cook, Service Consultants, B. S. Lavins, Comptroller and L. L. Memne, Executive Secretary of the Alumni Association.

Mr. Smith was the principal speaker and at the conclusion of a thirty minute talk Mr. Smith was given a rousing ovation. His talk was very inspirational. After the meeting Mr. Smith stayed to chat informally with the boys and it was plain to see that he enjoyed himself immensely.

Clarence Stokes and Pete Dunn also made a very deep impression by their remarks. The boys were very glad to have Chief Instructor Dowie present and gave him a big hand. Rohrich, Straughn, Cook, Gralley, Giese, Memne, in fact, too many to enumerate, all had something worthwhile to contribute. Speeches flew thick and fast, but they were mighty entertaining. We didn't know we had so much talent—and so many humorists.

Norman Kraft brought the house down with some entertaining stories and B. S. Lavins obliged with several well selected songs. After the regular program Mr. Lavins led the boys in group singing with most of the fellows off key, but plenty strong in volume.

Our own John B. Gough delivered a corking good talk and our guest speaker, Dr. G. K. Green, Physicist, connected with Carnegie Institute where he is engaged in the construction of a Cyclotron (atom smasher to us) gave a brief but highly interesting technical talk. Dr. Green promised to come back soon to speak to us more at length and we are all looking forward to that meeting. We heard just enough to want a great deal more.

A telegram of good wishes was received from Mayor Jackson of Baltimore, who is an honorary member of our Chapter. Sandwiches and refreshments were served amid the strains of a three piece orchestra.

Pete Dunn, as usual, handled the arrangements in great style. He was ably assisted by a committee of Baltimore members who are deserving of much credit for a splendid program.

These fine looking fellows are all members of the Philadelphia-Camden Chapter. They made the trip to Baltimore by automobile.

We are grateful to the Radio Electric Service Company for the use of the P. A. system and to Mr. Gosnell for the services of the musicians.

At another of our meetings we adjourned early and all visited Station WCAO, with the Chief Engineer acting as our guide.

If you want to meet a fine bunch of fellows drop in on us any first or third Tuesday in the month at Fishpaw's Hall, Baltimore and Gilmor Streets. You can't afford to lose the inspiration which these regular meetings can give you. No one is embarrassed—no one is expected to speak unless

L. L. Menne and Clarence Stokes greet one another while J. E. Smith and Pete Dunn smilingly look on. Chief Dowie is chatting with Gough and Blackwell in the background.

At the height of the party the fellows cut loose in song and other shenanigans. You can easily tell this group was having a good time.

he cares to. You will learn much from our programs and you will gain a lot of new friends. Once you get into the spirit of these meetings you will need no urging to come—until you do you are missing something which can be of much help to you.

E. O. E. Gratley, Secretary.

Philadelphia-Camden Chapter

As this report is made in time to catch this issue, our attention is centered on our next meeting which is to be our Anniversary Party. Mr. Smith, President of N. R. I., L. L. Menne, Executive Secretary and Pete Dunn, Chairman of Baltimore Chapter definitely will be present. We are hopeful that some of the officers and members of New York Chapter will be able to accept our invitation and that a good bunch will accompany Pete Dunn from Baltimore.

This is to be our big social meeting of the year. A full report will be made in the next issue of the News.

Mr. Doberstein, our Librarian, has been leading us in a review of some of our textbooks. This leads to a lively informal discussion and has given us some interesting meetings.

At one of our meetings Secretary Biaselli took charge. His subject was "How to Sell Service, what to do first when you get the receiver in the shop and what to charge for your services."

Mr. Biaselli presided at another meeting at which he talked on "Signal Chasing." Mr. Haraburda also presided at one of our meetings and discussed "Mixer-first Detectors."

Our Chairman, Dave Blackwell took over one of our meetings and gave us a fine talk on "How to Use a Cathode Ray Oscillograph for Service Work." Dave brought some of his own equipment from his shop for practical demonstration.

All of these were excellent meetings.

Our newest member is Mr. Norman Hafler. New members are always welcome. Students may become Associate Members until they graduate, at which time they are eligible for full membership.

The first meeting in each month is a business meeting—the second is devoted to a practical Radio demonstration or discussion.

We meet on the first and third Thursday of each month at 4711 Longshore St., at 8:15 P. M.

John Biaselli, Jr., Secretary.

Morehead Returns to Chicago

Cecil B. Morehead, former Vice President of the N. R. I. Alumni Association, who was temporarily located in Peoria, Illinois, is now back in Chicago. Cece never lost contact with the members of the Chicago Chapter and it is good news to know he is back taking an active part in the affairs of Chicago Local.

found that a mistake was made in a few sets and that it was connected to the screen terminal instead.

———*n r i*———

MOTOROLA MODEL 26C AND 26C7 — INSTALLATION

These models must be centered perfectly in the instrument panel, to prevent binding in the push-buttons.

———*n r i*———

MOTOROLA MODEL 500 AND 700 — 1940 CADILLAC-LA SALLE INSTALLATION

When a Model 500 or 700 is to be installed in a 1940 Cadillac or LaSalle, the location over the steering column is recommended. If a spacer block is used under the left end of the radio so it will miss the wires which pass through the bulkhead at that point, a very neat installation will result. To simplify this installation, the factory provides an Accessory Kit consisting of one long "J" bolt, one spacer block and drilling and installation instructions. ORDER PART NO. A-529 ACCESSORY KIT . . . LIST PRICE 20 cents. This kit will not be required when an installation is made in the "50" Series LaSalle, and the "60-S" Series Cadillac.

———*n r i*———

MOTOROLA MODEL 25F — CHASSIS PICK-UP

If chassis pick-up is experienced in Model 25F after the radio is installed in a 1940 Ford, the interference can be readily removed without disturbing the installation. Proceed as follows: (1) Remove the knobs. (2) Remove the chrome plated medallion which is held in place with two screws. (3) Using the opening as a guide, clean the paint from the radio housing, so the chrome medallion will make a good contact all the way around its edge. (4) Replace the medallion and knobs.

———*n r i*———

MOTOROLA MODEL 27-D, 28-O AND 30-P — OSCILLATOR TUBE TROUBLES

Several Motorola Service Stations have reported that Models 27-D, 28-O, and 30-P will sometimes quit operating if the battery voltage is low. They attribute this trouble to the 6SA7GT tube in the oscillator socket, and suggest that it be changed.

———*n r i*———

SENTINEL 1940 MODELS — INTERMITTENT

This is often due to defective volume controls. In some instances the bad control will be located with an ohmmeter while in others it is necessary to substitute another control.

JOHN I. GREGORY, South Carolina.

———*n r i*———

ZENITH PORTABLE RECEIVERS — GENERAL HINTS

When the A.C.-D.C. battery portables work on the battery but are dead on the line, check the 117Z6G tube first. If this checks O.K. then look for an open resistor next to the cathode of the 117Z6G which feeds the filaments of the other tubes. The filaments of these tubes are all in series and get their filament voltage from the rectified plate voltage of the rectifier tube. The resistor is in series with the filaments and frequently opens up, being only of 1 watt capacity. When set operates weakly and everything else checks O.K. change the speaker. The permanent magnet on these sets seems to deteriorate rather rapidly and produces the above effect. Another thing to look for with weak reception is a moist loop cable. The covering of the loop cable is made of some material which readily absorbs moisture, causing high resistance leakage. Later models of this set have changed the covering. When sets work O.K. on the line but are dead on battery look for poor switch contact at the back of the plug receptacle on chassis. The regular electric plug has to be plugged into this receptacle on back of receiver before it will work on the batteries.

———*n r i*———

MOTOROLA MODEL 89K1 — IMPROPER PUSHBUTTON TUNING

This may be corrected by adjusting the relay reversing contacts so that positive action is obtained.

———*n r i*———

PHILCO MODEL 37-38 — IMAGE INTERFERENCE

This trouble coupled with low volume is generally due to a defective antenna coil. The remedy is to install a new antenna coil.

———*n r i*———

SPARTON MODEL 931 — FADING

In this and in other Sparton receivers using a pre-selector before the fixed tuned amplifier stages, fading may sometimes be traced to the rotors becoming loose on the tuning condenser gang shaft. You may drill a hole through the casting and insert a set screw into the shaft or clean the end of each section of the gang and solder to the shaft.

———*n r i*———

ZENITH 1940 MODELS — NOISY OPERATION OF AUTOMATIC TUNING

This may be caused by leads to the automatic assembly laying against the metal frame of the assembly. Care should be taken that the lead from the tone control condenser and all other leads in the six tube bakelite models be kept away from the 6Q7 tubes, otherwise the tone will be affected.

———*n r i*———

MISCELLANEOUS — INTERMITTENT RECEPTION IN PORTABLE RECEIVERS

This will oftentimes be found due to poor connections at the battery pack plugs. By slightly bending the prongs the trouble will be eliminated.

Here and There Among Alumni Members

The orchestra, which entertained at Baltimore Chapter the night Alumni President Stokes was the honored guest, was under the direction of Mr. Gosnell, brother of the Assistant Secretary of Baltimore Chapter. The music was in fast tempo. And was it hot!

———n r i———

Max T. Wintsch of Lancaster, Penn., recently signed a temporary manufacturer's license contract with a large manufacturer covering the manufacture of a High-Speed Electronic Counting Unit by means of which device any kind of parts may be counted and recorded up to sixty a second. He has eighteen domestic and foreign patents on different devices, all containing Radio circuits in some way.

———n r i———

H. H. Lance is now Chief Engineer and Director of Station WGBR of Goldsboro, N. C. He installed the station. Mr. Lance has now had twelve years of experience, but when he started with N. R. I. he knew nothing about Radio. More power to him.

———n r i———

Fidele Comtois has a fine Radio business in Perron, Que., Canada. He sold 120 new receivers in a few months. Perron in 1937 was a small community in the woods. Now it is a thriving gold mining town. Comtois has built a modern store in the townsite.

———n r i———

Morris W. Fisher has moved from Grand Rapids, Michigan to Belington, W. Va., where he has opened a Radio shop, which is doing very well. He calls it Morey's Radio Service.

———n r i———

Harry G. Huff of Pottsville, Penn., this summer and coming winter will have complete charge of a portable lighting system for night baseball and football in the United States, Canada, Cuba and Porto Rica. Huff also does a nice Radio business in Pottsville.

———n r i———

Dave Blackwell of Skillman, N. J., Chairman of Philadelphia-Camden Chapter, has one of the finest benches in the country. *Radio Retailing* carried a picture of it in the March issue.

———n r i———

Victor Graham, Radio serviceman par excellence, of Long Branch, Ont., Canada, is looking forward to a boost in business by reason of a new transmitter, with increased power, being built by Station CKCL, Toronto, Ont., Canada.

———n r i———

Lowell Lane of Zanesville, Ohio, has built a new shop with garage in combination to take care of his increasing Radio business. He is doing a lot of auto Radio servicing. His new bench is a beauty.

———n r i———

Melvin C. Ashbaugh is going good with the Morris Furniture Store in Orleans, Nebr.

———n r i———

Charles W. Schisler of Macomb, Ill., who has one of the finest Radio shops in the state, writes to say he recently hired C. E. Bowser, also a N. R. I. man.

———n r i———

Roman G. Moncur of Salt Lake City, Utah, has a new reason why he must be successful. It's his bride. Good luck.

———n r i———

William Peterson of Scotts, Mich., is doing mighty well in his full time Radio job with Best Radio Sales Co. of Kalamazoo, Mich.

———n r i———

Murray Ferguson of Toronto, Ont., Canada, who is twenty-two years of age, now holds a Radiotelephone and Radiotelegraph, second class license. He passed the Canadian Government examination with an average of 95%.

———n r i———

Goodway Radio & Sound Company supplies as many as seven P. A. systems at one and the same time. The work is in charge of our Gilbert L. Sweigart of Ephrata, Penna.

———n r i———

John Footitt of Billings, Mont., gave us a nice surprise. He made a recording and sent it in to us. It told us how nicely he is getting along—how he got out of a canning factory and into Radio. It was swell to hear his voice—just about everyone at N. R. I. listened to the record at one time or another.

———n r i———

Ivan Raymer of Tulsa, Okla., has left his Radio servicing job to go in business for himself. Although he has been in business only a few months he has already taken on a full time assistant to help him take care of his rapidly expanding trade.

———n r i———

It's a 7 pound girl at the home of Mr. and Mrs. Raymond Lynn Southworth, Wichita Falls, Texas. The little lady arrived April 13 and was promptly named Mary Kathleen. And is Southworth a proud and happy daddy! Congratulations.

———n r i———

Paul Garon, who is Junior Broadcast Operator, handling Studio Amplifiers, Monitoring Equipment and Transmitter at Station CBJ, Chicoutimi, Que. of the Canadian Broadcasting Corp., is to be married to a lovely French-Canadian girl on July 8. Lucky boy, all around.

———n r i———

J. N. Roberts, who has been at sea for five years as a Radio operator, is now with the Civil Aeronautics Authority, U. S. Airway Communication Station, near Carlsbad, New Mexico.

New York Chapter

Chairman Gordy, at one of our meetings, gave us a fine talk on "Intermittent Reception." He made his talk very clear by practical demonstrations. This was a most enthusiastic meeting with fifty members present.

Mr. Gordy, by the way, was married on April 7. Congratulations are extended to Mr. and Mrs. Gordy by the entire Chapter. Similar good wishes were also received from Headquarters.

Another very good meeting was the one at which we were addressed by Mr. Robert Herzog, Editor of *Service*. Mr. Herzog spoke on "Circuit Tolerances." It was an excellent talk—clear, understandable and informative.

In the last issue of the News it was reported that more than sixty attended the recent meeting at which Mr. F. E. Wenger, Triplett Radio Engi-

Display at New York Chapter when meeting was addressed by Mr. Bruce Burlingame of Supreme Instrument Corporation.

neer, spoke to us on the subject "What Measuring Equipment Means to the Technician." Actually about ninety were present at this meeting, and it was so reported by our Chapter (Editor's error; sorry). Motion pictures of the Triplett plant were shown at this meeting. They required about one and three quarter hours to show and were highly entertaining.

To avoid possible great inconvenience to those who may visit us for the first time we again wish to point out that we meet at 12 St. Marks Place, New York City. Do not confuse this street with one by similar name in Brooklyn. A number of first-timers have gone to Brooklyn by mistake. Included in this group was Mr. Wenger who arrived at the Grand Central Station, jumped into a taxi and was delivered to Brooklyn instead of 12 St. Marks Place, New York City. Mr. Wenger good naturedly accepted it as a laughable incident, but we are anxious to have this point emphasized to guard against disappointment to those who might otherwise have a similar experience.

Meetings are held on the first and third Thursday of each month. Drop in on us—you are most welcome.

Louis J. Kunert, Secretary.

———*n r i*———

Detroit Chapter

We have been holding our regular semi-monthly meetings at 11800 Woodward Ave. in the quarters of Radio Specialties Co. Our attendance has been satisfactory, but we are anxious to increase our membership and invite all N. R. I. men in this area to visit us. Meetings are held on the second and fourth Thursday of each month.

At our last meeting Mr. Menne, our Executive Secretary, met with us. Mr. Menne joined Chairman Stanish and our other officers in pepping things up generally. There were plenty of compliments for John Stanish for his energetic efforts to give us good constructive meetings. Our attendance is gradually on the increase.

We have obtained two radio chassis for use on our bench to iron out any questions that may need actual demonstration.

In one of our recent meetings we discussed various testing methods, their advantages and disadvantages. At another we had a talk on Vacuum Tube Voltmeters and how they can be used to advantage in service work and the following meeting we gave a demonstration on the actual use of the VTVM. These discussions and demonstrations were led by Mr. Stanish, Mr. Ankenny and Mr. Oliver.

All N. R. I. men in Detroit and vicinity are invited to drop in on us anytime. Remember the meeting nights and our headquarters. You will gain much from regular attendance at our meetings.

F. Earl Oliver, Secretary.

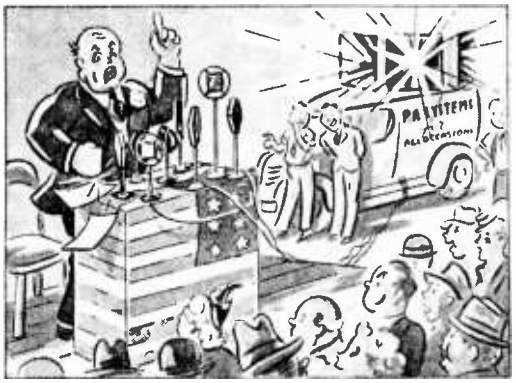
———*n r i*———

Menne Visits Chicago

Earl Bennett, former President of the N. R. I. Alumni Association, Clarence Schultz, Chairman of Chicago Chapter and L. L. Menne attended an Informal Dinner and Smoker as guests of the National Home Study Council, at the Chicago Towers Club.

The following evening Menne addressed a meeting of Chicago Chapter at Eckert Park Field House, headquarters for Chicago Local.

Business Booster No. 7713



Idea from *Broadcasting* magazine.

"Every mike except one is dead, but we find it's good business to make these politicians feel like big shots!"

———*n r i*———

Directory of Chapters

Baltimore—E. O. E. Gralley, Secretary, 623 Gutman Ave., Baltimore, Md. Meet at Fishpaw's Hall, Baltimore and Gilmor Sts., first and third Tuesday of each month.

Philadelphia-Camden—John Biaselli, Jr., Secretary, 1309 Siegel St., Philadelphia, Pa. Meet at Longshore Radio Service, 4711 Longshore St., Tacony, Philadelphia, first and third Thursday of each month.

New York—L. J. Kunert, Secretary, 66-11 74th St., Middle Village, L. I., N. Y. Meet at Damanzeks Manor, 12 St. Marks Pl., New York City, first and third Thursday of each month.

Chicago—Eric Johnson, Secretary, 452 W. 60th St., Chicago, Ill. Meet at Eckert Park Field House, 1400 W. Chicago Ave., first and third Thursday of each month.

Detroit—F. E. Oliver, Secretary, 3999 Bedford, Detroit, Mich. Meet at Radio Specialties Co., 11800 Woodward Ave., second and fourth Thursday of each month.

———*n r i*———

"To cultivate fraternal relations among the Alumni of the National Radio Institute, to promote the welfare of each alumnus by interchange of helpful information, to foster the spirit of unity and loyalty to our Alma Mater,"

Additions to N. R. I. Ham List

The following call letters have been reported since the last issue of the NEWS. In spite of the large number of call letters so far reported, it is felt that there are many N. R. I. amateur operators whose call letters have never appeared in the NEWS. If you are one of them, make it a point to report your call letters the next time you write N. R. I.

W9HJP—R. E. Glatfelter, Jr., Milwaukee, Wis.
W3HOT—Harold Angstadt, Reading, Penna.
W2MSL—Walter S. Kalisty, Beacon, N. Y.
W4FOM—Charles N. Smith, Fairfield, Ala.
W6GUZ—Bill Bailey, Bremerton, Wash.
W6RGG—James Nichols, Douglas, Ariz.
W9HRN—Wallace B. Davis, Hazard, Ky.
W1MJM—Fred J. Ferrero, Kensington, Conn.
W4FZL—Reed Hudson, Hendersonville, Tenn.
W1MPO—Adwin Ruszczek, Wallingford, Conn.
W8UFQ—Ronald B. Ingram, Wriston, W. Va.
W9EVP—Ray Barnett, Beulah, N. D.
W6QXF—Geo. A. Sears, Jr., Porterville, Cal.
W3ICG—Fred Newhoffer, Philadelphia, Penna.
W9NUS—Raymond C. King, Creston, Iowa.

———*n r i*———

Directory of Officers

(To Serve Until January, 1941)

President—Clarence Stokes, Philadelphia, Pa.

Vice-Presidents—
Allen McCluskey, Birmingham, Ala.
F. E. Oliver, Detroit, Mich.
Alfred E. Stock, Brooklyn, N. Y.
Dr. Geo. B. Thompson, Los Angeles, Calif.

Secretary—Earl Merryman, Washington, D. C.

Executive Secretary—L. L. Menne, National Headquarters, Washington, D. C.

———*n r i*———

Chairmen of Chapters

Clarence Schultz, Chicago Chapter, 1158 Diversey Parkway, Chicago, Ill.

Peter J. Dunn, Baltimore Chapter, 713 N. Fulton Ave., Baltimore, Md.

Irving Gordy, New York Chapter, 1746 Bathgate Ave., Bronx, N. Y.

John Stanish, Detroit Chapter, 12551 Camden Ave., Detroit, Mich.

David S. Blackwell, Philadelphia-Camden Chapter, Fairview Ave., Skillman, New Jersey.

THE MAILBAG

Extension Speakers

I eagerly await each issue of National Radio News and think the Novel Radio Items page is the spice of the magazine. Here is something which may be of interest to you and may be especially useful to the rural readers.

I live in the country and my two neighbors on each side of me didn't have Radios and they were anxious to hear the latest war news, etc. I decided to install extension speakers from my Radio, but as they live 800 feet and 1200 feet, the line wire was the next problem. Barbed wire fences connecting our houses did the trick. So now they are able to hear the programs from my Radio.

We also use it as an intercommunicating system. I have individual switches on my set which throw each of their lines into the grid circuit of the second audio stage and I speak through a microphone plugged into the first audio stage.

I also have made the alarm clock do double duty by automatically turning on the Radio when the alarm goes off.

All these ideas would never have occurred to me if I had not been taking the N. R. I. Course. To the Institute I shall always be grateful.

Maynard Campbell,
Avonmore, Ont., Canada.

Liked April-May Issue

I think the April-May issue beats out all the previous ones, especially for those who are just entering the practical side of Radio business. All its pages are full of valuable and practical information. Mr. Kaufman's article on a plan for getting practical training is exactly what we beginners need. Mr. H. E. Luber's article is a good warning to some of us. I also find a good suggestion on the subject of the "buying of Radio parts."

Louis Desrochers,
Senneterre, Que., Canada

New N. R. I. Test Bench

I especially liked the article on the new test bench for the N. R. I. laboratory and I would like to have one similar to it some day.

E. E. Hamrick,
Ft. Gaines, Ga.

Inspirational Mottoes

I want to take this opportunity to thank the N. R. I. for those very inspirational introductions on the inside cover of the lesson texts. They always seem to come to hand at just the right time to offer new encouragement.

Guy A. Emery,
Sacramento, Calif.

See Laboratory Page, This Issue

I have enjoyed reading your laboratory page. I wish you could write articles on how we could turn our idling experimental kits into signal testing devices to be operated from our house lighting outlets.

Manuel Madridano,
Manila, P. I.

Continuity of Radio Circuits

The new feature "Puzzling Radio Questions" is a worthwhile and interesting addition. It is all meat and I devoured every bit of it. The article entitled "Checking the Continuity of Radio Circuits" by J. B. Straughn was very lucid. I was acquainted with my ohmmeter, but after reading that article I knew my ohmmeter much better.

Valentine A. Painter,
Philadelphia, Penna.

This is Praise, Indeed

May I take this opportunity of congratulating you on the excellent make-up of your magazine. I find your articles on new features, also your Service Forum and Service Data Sheets particularly interesting. You have, I believe, the livest house organ in the Radio field.

E. A. D. Hutton,
Montreal, Que., Canada.

Our Big Little Magazine

I have great praise for your "big" little magazine. I liked the article on loop aerials in the last issue very much, also the new feature, "Puzzling Radio Questions." In fact, I like the magazine clear through.

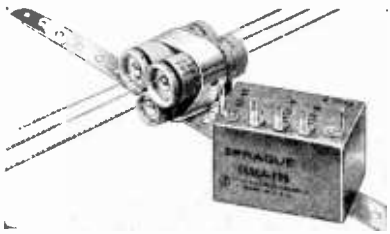
Russell Burhoe,
Woodstock, N. B., Canada.

A Study in Concentration

Albert J. Haas of Rapid City, S. D., caught his young daughter in this pose showing her deeply engrossed in the study of one of his textbooks. She is a real inspiration to her daddy.

Duplicate Condenser Replacement Problems Solved

Supplied free of charge upon request to jobbers with the purchase of Sprague Condensers, is the Sprague ST Metal Mounting Strap. Strong enough to hold any combination of Sprague "Atoms" into one firm, compact assembly, the



strap provides the answer for those hard-to-get replacement jobs where different capacities and voltages are required in a single condenser.

Copy of the new Sprague Catalog showing this development in detail will gladly be sent upon request to the manufacturer, Sprague Products Company, North Adams, Mass.

NATIONAL RADIO NEWS

FROM N.R.I. TRAINING HEADQUARTERS

Vol. 9 No. 3

June-July, 1940

Published every other month in the interest of the students and Alumni Association of the

NATIONAL RADIO INSTITUTE
Washington, D. C.

The Official Organ of the N. R. I. Alumni Association

Editorial and Business Office, 16th & You Sts., N. W., Washington, D. C.

L. L. MENNE, EDITOR

L. J. MARKUS, TECHNICAL EDITOR

Index

Article	Page
Extra Profits Changing Push-Button Radios to New Frequencies	3
Laboratory Page	10
Holding and Improving a Job	12
Service Sheet—Howard Model 300	13
Novel Radio Items	15
Puzzling Radio Questions	16
Outdoor Antennas	18
Service Sheet—Howard Model 565	21
Service Forum	23
Alumni News	25
Here and There Among Alumni Members	28
The Mailbag	31