NATIONAL RADIO NEWS

IN THIS ISSUE

Installing Push-Button Tuners

New Radio Gadgets

Alumni Association News

JUNE-JULY
1933

VOL. 8
No. 3

A TRIBUTE TO RADIO'S HEROES

"ERECTED IN MEMORY OF WIRELESS OPERATORS LOST AT SEA AT THE POST OF DUTY."

Thus reads the inscription at the head of a list of twenty-six names inscribed on the Wireless Operators' Monument, erected in Battery Park, New York City on May 12, 1915. Among those honored is George Arundel Geare, one of the first instructors at National Radio Institute; he taught Radio subjects and code to hundreds of N.R.I. students during 1914 and 1915, then accepted a position as wireless operator on the bark Monga Reva. The ship foundered in the Atlantic Ocean in November, 1916, before help could arrive in answer to his SOS calls.

Each Memorial Day we at National Radio Institute pay tribute to George Geare and to those other wireless operators who so gallantly gave their lives in the performance of duty aboard ships at sea and in the air, in order that others might live. It is indeed proper and fitting that the names of these men, true pioneers in Radio, be perpetuated in granite for all time.

E. R. HAAS, *Vice President and Director.*

Make Extra Money Installing Push-Button Tuners

By J. A. DOWIE
N. R. I. Chief Instructor

THE many ingenious types of push-button tuning units which have recently appeared on the market offer exceptionally good extra-money opportunities for alert servicemen and even for beginners in the radio servicing field. These units, which can be installed in a few minutes on practically any conventional type of radio receiver, convert out-moded receivers into modern push-button tuning sets. Installation problems are complicated enough so that the set owners cannot do the work themselves, but if you will follow the suggestions given in this article and those supplied with the tuner assemblies you should have no difficulty.

J. A. DOWIE

Prospects for Push-Button Tuners. A person who has owned a conventional radio receiver for some time, even for a few months, has in most cases tired of listening to distant and shortwave stations, and will concentrate his listening on programs of a limited number of favorite local and near-distant stations. Such a set-owner is a good prospect for a push-button tuner installation. Another ideal prospect is the set owner who has become quite fond of his receiver (because of cabinet design, tone quality, performance or simply because of memories associated with it); he will welcome the opportunity to have his set brought up-to-date without injuring its appearance or performance.

An actual demonstration of a table model radio in which you have installed a push-button tuner will help you to get the job. You can point out these advantages of push-button tuning: *1*, a person can listen in on each of the local stations, one after another, in less than a minute, and then choose the most desirable program; *2*, when a program no longer pleases, a new station can be tuned in instantly; *3*, accuracy of tuning is secured automatically so even small children can operate the tuner; *4*, a choice of at least five different stations is provided for on the average tuner (these will take care of at least 99% of the operating time of the radio receiver); *5*, the regular tuning dial can be used at any time for tuning in distant stations; *6*, the tuner need not affect the operation of the short-wave section of a receiver.

Always make a careful inspection of the customer's radio set, determining the number of stages in it, the model number, the number of sections in the gang tuning condenser, and noting whether it is an all-wave or ordinary broadcast receiver. You will then be able to recommend the type of tuner best suited for this particular receiver. Furthermore, this inspection will show the prospect that you are giving his receiver personal attention.

The cost of the average push-button tuner to a serviceman is such that a charge of about $10 for a complete installation will give a good profit. This charge is most reasonable considering that it gives the equivalent of a brand new receiver with its convenience of tuning.

Types of Push-Button Tuners. The three general types of push-button tuners on the market today are: *1*, trimmer type tuners, which replace the ganged tuning condenser in the receiver when in use; *2*, adapter type tuners, which replace the preselector, oscillator and mixer-first detector stages of the receiver when in use; *3*, converter type tuners, which are entirely independent of the receiver (these tune in the desired signal and convert it to the fixed frequency in the broadcast band to which the radio receiver is tuned when push-button tuning is used). All types use much the same switching units; when

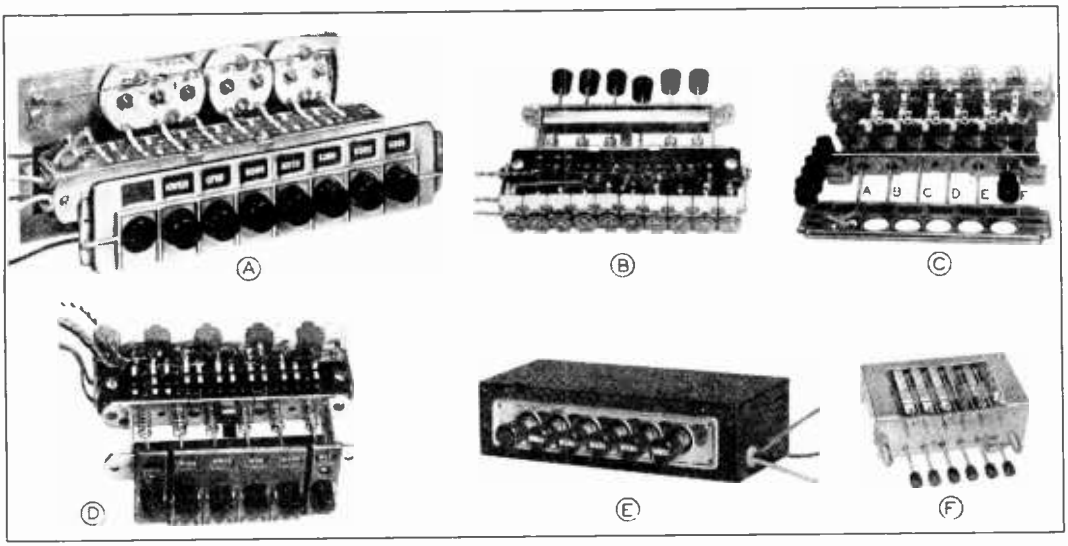


FIG. 1. Typical trimmer-type push-button tuners available to Radiotricians and Teletricians for converting ordinary radio receivers to have modern automatic tuning. For descriptive literature and prices on any of the units shown in this article, write directly to the manufacturer of the unit, using the address given in the caption.

A—Meissner 7-station Automatic Push-Button Tuner, suitable for semi-automatic or full-automatic operation as desired. Note how station call letters fit into depressions in escutcheon. Made by Meissner Mfg. Co., Mt. Carmel, Ill.

B Hetro-Matic 5-station Press-A-Button Automatic Tuner, provided with three leads for semi-automatic operation; two more can be added to make operation of tuner independent of tuning dial setting. Available with trimmers either on end as shown or on one side. Made by Hetro Electrical Industries, Inc., 4611 Ravenswood Ave., Chicago, Ill.

C Knight Select-O-Matic 5-station push-button tuner for semi-automatic operation. Trimmer condensers on this unit have an exceptionally wide tuning range (Button A 540-1000 kc.; button B—590-1150 kc.; buttons C and D—750-1400 kc.; button E—920-1500 kc.; button F manual tuning), making adjustment easy for any station. Sold by Allied Radio Corp., 833 W. Jackson Blvd., Chicago, Ill.

D—Harbray Automatic 5-station Push-Button tuner, for semi-automatic or full automatic operation. Button at extreme right can be set to any station in range from 1400 kc. to 2400 kc., and can therefore be used for police calls. Made by Harbray Company, 4701-13 North Sheridan Road, Chicago, Ill.

E Automatic Devices "B-6" 5-station Automatic push-button tuner for automatic operation. A similar unit (B6J) with two extra leads for full-automatic operation is available. Made by Automatic Devices Mfrs., 4243 West Ogden Avenue, Chicago, Ill.

F Aladdin PBH 6-station Automatic Push-Button Tuner, which might also be considered an adapter since it replaces the entire antenna and oscillator tuning circuits on a superheterodyne receiver having an I.F. value between 456 and 465 kc. A separate switch must be provided for change-over from manual to automatic tuning. Tuning condensers are fixed, adjustable Polyiron-core inductances being provided for each station. Excellent stability is claimed. Made by Aladdin Radio Industries, Inc., 466 West Superior St., Chicago, Ill.

one button is pressed, it stays in position until released by pushing in any of the other buttons.

Trimmer type tuners are by far the most popular, being low in cost and fairly easy to install. Examples of these tuners are shown in Fig. *1*; the first five units have two trimmer condensers for each station push-button, and one extra push-button which restores manual tuning. Pressing a station button actuates a switch mechanism which places the corresponding antenna trimmer in parallel with the R.F. coil in the receiver, and places the oscillator trimmer in parallel with the oscillator coil in the receiver; these trimmers are adjusted to the desired station at the time of the installation.

The trimmer-type unit in Fig. *1F* operates in much the same way except that it uses two adjustable inductances for each station button, with one set of fixed condensers replacing the gang tuning condenser in the receiver.

Ordinarily the receiver tuning condenser must be in its minimum-capacity position when push-button tuning is desired, giving what some engineers call semi-automatic operation, but it is possible to connect a trimmer-type tuner for full-automatic operation which is independent of the position of the tuning condenser. Both types of connections will be discussed in this article as they apply to units using trimmer condensers.

With the semi-automatic connection, only three leads from the tuner unit are used. One is connected to the frame of the receiver tuning con-

denser, one goes to the oscillator stator section of the condenser, and the other goes to an R.F. stator section of the condenser.

With full-automatic operation of a trimmer-type tuner, the connections are somewhat more difficult, for they involve cutting the connections to two of the stator sections on the tuning condenser and running two extra leads up to the tuner. Many trimmer type tuners are provided with these leads or with two extra terminals for them. Either the gang tuning condenser or one set of trimmer condensers is effective at any one time, whereas both are effective with semi-automatic operation.

There are several drawbacks to a full-automatic connection, however; oftentimes the stator connections are not readily accessible from the top of the chassis, necessitating removal of the chassis from the receiver. Furthermore, the extra inductance caused by running the tuning condenser wires up to the tuner and back again seriously affects operation of the receiver on short-wave bands or may even make short-wave reception impossible.

On all-wave receivers it is best to use the semi-automatic connection so as not to affect short-wave reception. On broadcast receivers either connection gives satisfactory performance; if the customer is willing to pay for the slight extra convenience of full automatic operation, by all means use that.

Trimmer type tuners can be used with practically any radio set, either T.R.F. or superheterodyne, which employs a two or three-gang tuning condenser.

Choosing the Best Location. Three important factors affect the choice of location for a trimmer type push-button tuner: *1*, appearance of cabinet after tuner is installed; *2*, convenience of tuning location; *3*, nearness of tuner to gang tuning condenser. Naturally, the feminine members of a household will be most particular about cabinet appearance, and they should be consulted. The position of the receiver in the home must be considered when checking the convenience of a particular location, for oftentimes adjacent furniture will make a side-of-the-cabinet location undesirable. Furthermore, the connecting leads to the tuner should be as short as possible, and therefore a location directly above or alongside the gang tuning condenser is to be preferred from an electrical standpoint.

Photographs of three representative installations appear in Fig. *2*; in the case of Fig. *2A* a side mounting is used because there is no room for the tuner on the front of the cabinet (the position of the loudspeaker leaves no room for a horizontal mounting directly above the tuning dial).

The top mounting, as illustrated in Figs. *2B* and *2C*, will in most cases prove highly convenient. This is to be recommended whenever there are

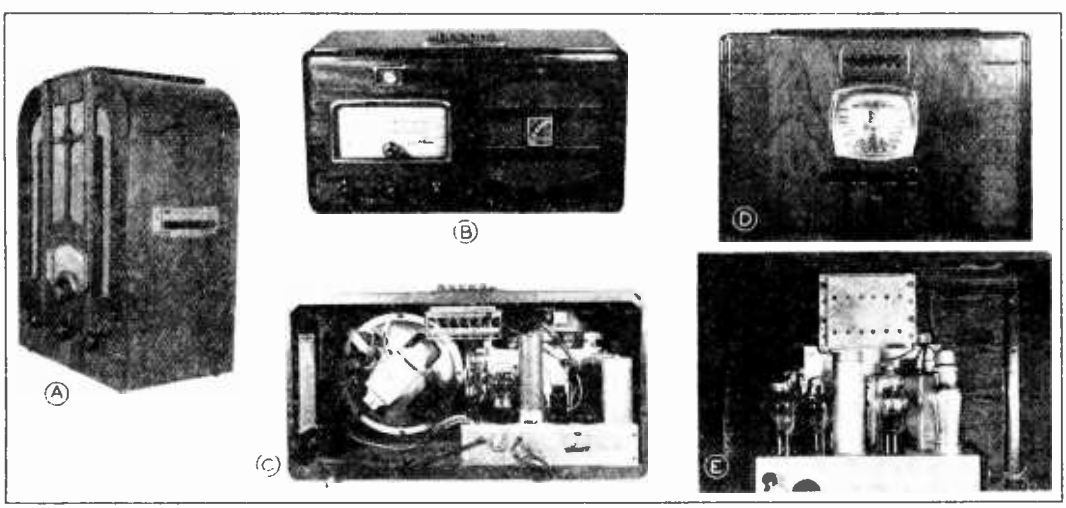


FIG. 2. These photos show a few of the many possible locations for trimmer-type push-button tuners. *A*—Installation of Hetro-Matic tuner on side of cabinet of an RCA all-wave table model receiver; *B* and *C*—Front and rear views of push-button tuner installed on top of cabinet of table model General Electric all-wave receiver (this tuner was made and installed by Sprague Specialties Co., North Adams, Mass.); *D* and *E*—Front and rear views of a Sprague Specialties Co. push-button tuner installed above the tuning dial of an Emerson console model two-band receiver. Another excellent front-of-the-cabinet installation of a push-button tuner (a factory installation in this case) appears on the front cover of this issue. It is a General Electric model F-96 Electric Touch Button Tuning Radio.

no objections from the standpoint of appearance, for it permits locating the tuner directly above the gang tuning condenser.

An example of a well-located front mounting is that in Figs. *2C* and *2D*, where the tuner is directly above the tuning dial. Trimmer-type tuners may be mounted in any position, horizontal or vertical.

Drilling the Mounting Holes. Printed templates are supplied with most tuners as guides for drilling the mounting holes. Mistakes in drilling are difficult to correct; serious mistakes, which leave holes showing outside the escutcheon, will ruin the job, so do this part of the work very carefully. You will need a small hand drill for drilling mounting holes, and a bit and brace with a $\frac{1}{2}$" wood drill (or whatever other size of drill is called for in the installation instructions). When using a wood drill, be sure to hold a block of wood inside the cabinet at the point where the drill will emerge in order to prevent splintering as the drill breaks through. The point of the drill will enter this block and help in pulling the drill through, thus eliminating the need for extra pressure.

The actual mounting of the unit is a simple task since detailed instructions are furnished. The escutcheon is fastened to the outside of the cabinet with tiny wood screws; it is a good idea to place the buttons on the tuner rods first and make sure that the buttons will all clear the holes in the escutcheon. An odd-colored button is always provided for that rod which changes over from automatic tuning to manual operation.

Making Connections. In Fig. *3* is shown the basic schematic circuit diagram of a trimmer-type tuner. Some units will have only the three leads indicated (to *C*, *F* and *G*); these are for semi-automatic operation, and in a broadcast band receiver with a two-gang tuning condenser they would be connected as indicated to the two stator sections and to the tuning condenser frame.

Other units will come with two extra leads, going to points *B* and *E*, or will have terminals corresponding to these leads. Units of this type, one of which is shown in Fig. *5*, would be connected in one of the ways indicated in Figs. *4* and *6* (depending upon the nature of the receiver circuits) for full-automatic operation, while for semi-automatic operation the two extra leads would not be used and could be cut off. Observe that with full-automatic operation, pressing in the *MANUAL TUNING* button makes the switch connect together points *B* and *C* in Fig. *4*, (connecting the antenna coil to the antenna stator section) and points *E* and *F* (connecting the oscillator coil to the oscillator stator section), thus giving regular manual tuning. In the off or out position of this button, the coils are connected to points *A* and *D* respectively in the trimmer condenser circuit.

All connections should be neatly and carefully soldered, using rosin-core solder and no other flux. One lead always goes to the nearest convenient point on the frame of the tuning condenser; solder it directly to the frame or to a soldering lug which can be slipped under some convenient frame bolt.

In receivers having three-gang tuning condensers, the push-button tuner is connected to only two of the three stator sections. Make one connection to the oscillator section, which can usually be identified by the fact that there will be no wire going from its terminal to the grid cap of a tube. The other connection should be made to the R.F. stator section (which usually is the middle section of the gang tuning condenser, and is connected into the grid circuit of the first detector). The first stage of the receiver thus serves as an untuned R.F. stage during automatic operation; the resulting loss in gain and selectivity is unimportant since the other R.F. sections provide more than ample gain for the local stations to which push-button tuners are generally set. This applies regardless of whether you use semi-automatic or full-automatic operation.

In receivers which have separate coils for each short-wave band, connections can be made at the

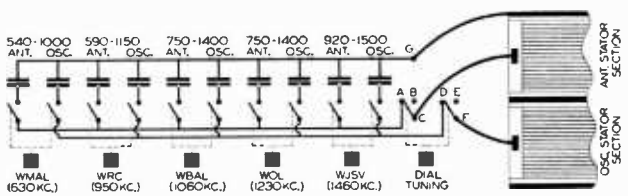


FIG. 3. Basic trimmer-type push-button tuner circuit as connected to a 2-gang tuning condenser for semi-automatic operation. The buttons are labeled as they might be set up for a customer in Washington, D. C. Frequency ranges are those of the Select-O-Matic tuner (Fig. 1C).

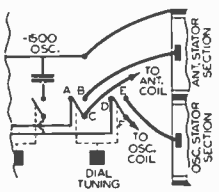


FIG. 4. Basic trimmer-type push-button tuner circuit as connected to a 2-gang tuning condenser for full automatic operation.

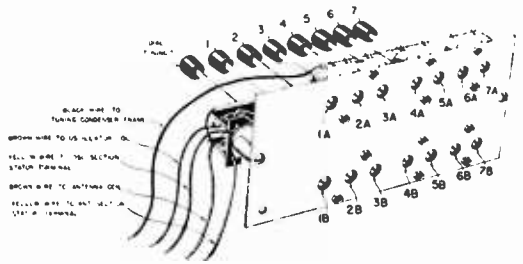


FIG. 5. Rear view of Meissner Automatic Push-Button Tuner, showing the five leads used for full-automatic operation. The two yellow wires are cut off when semi-automatic operation is desired. There are two station-setting adjusting screws at the back of the unit for each push-button.

grid terminals of the coils or at the wave band switch, whichever is shorter. By using this method, the tuner is connected into the circuit only when the wave band switch is in the broadcast position, and has no effect whatsoever upon dial calibrations for short-wave bands. If the secondary windings of all tuning coils are in series, however, there is nothing to be gained by making connections to the coils, and the easier direct connections to tuning condenser stator sections will be preferable.

Setting Up The Trimmers. Push-button tuner units are not pre-set at the factory to any definite stations; this must be done by the serviceman or the customer.

The instruction sheet supplied with a tuner will generally indicate the frequency range of each pair of trimmer condensers. The frequencies of the five stations desired will determine which button is used for each station; for example, in Fig. 3 the frequency ranges of each pair of trimmers are indicated above the diagram, while

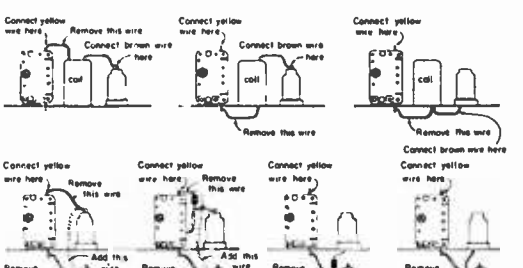


FIG. 6. These sketches, drawn for the Meissner unit but applying to any trimmer-type tuner, show how connections are made for full-automatic operation in seven different types of receivers.

the station selected for each button (and its frequency) is indicated below.

Trimmer adjustments are best made with an alignment screw-driver as illustrated in Fig. 7, in order to eliminate effects of body capacity, but an ordinary small screw-driver with insulated handle can also be used.

To set up the trimmers for a push-button, first push in the *DIAL TUNING* button, tune the radio receiver manually to the desired station, and determine the nature of its program at that moment. Now turn the gang tuning condenser to its minimum-capacity position, push in the button which is to serve for that station and adjust the oscillator trimmer (the instruction sheet will indicate which it is) until the same station is heard.

If the same program is heard at several settings, choose that setting which gives maximum clearness and volume. The explanation is

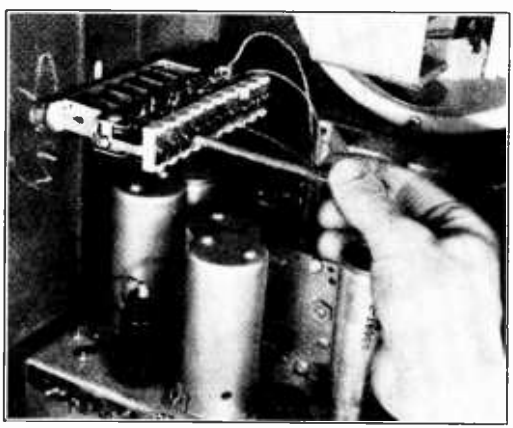


FIG. 7. View of inside of RCA receiver in Fig. 24, showing how trimmer condensers are adjusted with alignment screwdriver.

simply that a number of stations, including the desired local station, are carrying the same network program. Now adjust the antenna trimmer for that same button until maximum volume is secured. Re-adjust the two trimmers again if necessary for maximum volume. You can verify the setting later by listening for the regular quarter-hour station announcement.

Repeat for all other trimmers. Do not force the trimmer screws at any time for this may strip the threads. It should never be necessary to force a screw if you have chosen the correct trimmers for the desired station frequency.

The trimmer adjustments should be made just

as carefully as if tuning in a station with the regular tuning dial. Some type of tuning indicator will be of great help in securing exact adjustments, for AVC tends to mask the effects of slight changes in trimmer settings.

It is often advisable to readjust all trimmers a few days or so after an installation has been made, in order to compensate for any drift due to atmospheric changes or vibration. Bear in mind that with semi-automatic tuning the gang tuning condenser must be in its minimum capacity position; with full-automatic operation the setting of the tuning condenser is immaterial during the trimmer adjustment procedure or at any other time.

Ordinarily it is not necessary to realign a broadcast band receiver after a tuner has been installed. With all-wave sets, however, the additional capacity provided by the tuner leads may

FIG. 8. Howard Model 211 8-station Automatic Push-Button Converter, made by Howard Radio Co., 1731 Belmont Ave., Chicago, Ill. Also sold by Radolek Co., 601 West Randolph St., Chicago, Ill.

affect the accuracy of dial calibrations on short-wave bands, making realignment necessary. If this necessitates removal of the chassis to get at the adjusting screws, leave the tuner connected (removing the mounting bolts) and prop it up in approximately the same position with relation to the gang tuning condenser as it had in the cabinet.

A printed sheet of broadcast station call letters is generally provided with each push-button tuner. All you have to do is cut out the call letters corresponding to the station chosen, and insert these either in the slots provided on the tuner section or, in some cases, press them into the depressions in the push buttons themselves.

Converter Units. When a converter type push-button tuner such as the Howard 211 automatic

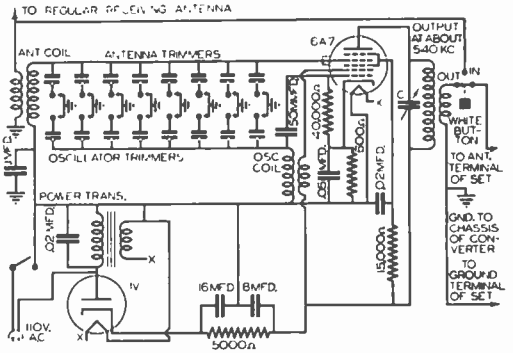


FIG. 9. Circuit diagram of Howard Model 211 Converter. Receiving antenna must be connected directly to converter, but ground connection may be made either at converter or receiver.

push-button converter shown in Fig. 8 is used, no changes whatever are necessary in the radio set. The converter unit is complete in itself in an attractive cabinet, and need only to be connected to the antenna and ground terminals of the receiver and plugged into a convenient power outlet. Remote control tuning is possible, for the tuner cabinet can be located alongside an easy chair or at any other convenient location in the room; this is an outstanding advantage of a converter, and should be stressed when any comparison of the various types of tuners is made.

The circuit diagram of the Howard 211 converter is given in Fig. 9; as you can see, it is an oscillator-mixer-first detector stage with a tuned input circuit. Actually it converts an ordinary superheterodyne into a double super, or converts a T.R.F. receiver into a superhetero-

(Page 11, please)

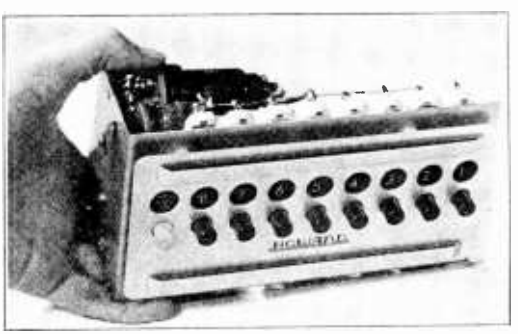


FIG. 10. Howard Model 210 8-station Automatic Tuning Adapter.

The Laboratory Page

By GEORGE J. ROHRICH, Engineer in Charge N. R. I. Laboratory

EXPERIMENT NO. 65

Objects: 1. To show how a rectifier can be added to a D.C. meter. 2. To study the full-wave rectifier which employs common anode and separate cathode connections. 3. To study the full-wave rectifier which uses common cathode and separate anode connections.

Apparatus Required: Power supplied to one outlet which is known to be D.C. and to another outlet which is known to be A.C., with voltage of each source ranging between 90 and 120 volts; power limiting panel described for Fig. 83 in a preceding laboratory page; a 10-watt lamp; 2 type 30 or 31 tubes; 2 sockets; 2 30-ohm resistors (Item No. 14); 4 dry cells; 2 test prods; 0-50 voltmeter (Item No. 12); potentiometer with dial (Items Nos. 13 and 18).

Apparatus Assembly: Connect the parts as shown previously for Fig. 83. Plug No. 1 may be inserted and used in Socket No. 1 for A.C. in any convenient manner but it is advisable to insert it in the special way so the lamp (or lamps) will be in the ungrounded side of the A.C. power line. Place one 10-watt lamp in one lamp socket in this power limiting panel.

Assemble the remaining parts as shown in Fig. 100.

Experimental Procedures: 1. Insert the Plug No. 1 in the Socket No. 1 for D.C.

2. Insert similar tubes (type 30 or 31) in each socket and adjust each filament voltage to 2 volts.

3. Rotate the potentiometer dial to 50.

4. Hold the test prods of Fig. 100 in the slots of Socket No. 2 and note the deflection.

5. Reverse the test prods in the slots of Fig. 100 and again note the deflection. If this deflection differs from that obtained in Procedure No. 4 then adjust the potentiometer dial slightly until the deflections are alike in these two procedures.

6. Remove one of the tubes from its socket and repeat Procedures Nos. 4 and 5.

7. Replace the tube removed in Procedure No. 6 and remove the other tube. Then repeat Procedures Nos. 4 and 5 again.

8. Replace the tube removed in Procedure No. 7.

9. Insert the Plug No. 1 in the Socket No. 1 for A.C.

10. Repeat Procedure No. 4 and *carefully* compare with results obtained previously with D.C. applied.

11. Repeat Procedure No. 5 and adjust the potentiometer dial until the highest deflection is obtained.

12. Repeat Procedure No. 6 and *carefully* compare with results obtained previously with D.C. applied.

13. Repeat Procedure No. 7.

Observations: 1. Procedures No. 1 to No. 3 inclusive are preliminary adjustments for obtaining proper action while applying D.C. to the circuits.

4. When contact is made with the metal connections of the socket you will obtain a deflection which can be used for reference in measuring another voltage with the value of your D.C. power line.

5. When you reverse the connections a similar deflection is obtained as in Procedure No. 4 and can be made equal to it by rotating the dial on the potentiometer. This arrangement then can be used for measuring voltages, regardless of the polarity of the source of power. Naturally, this arrangement would have advantages in that it is not necessary to reverse the test prods in

(Page 10, please)

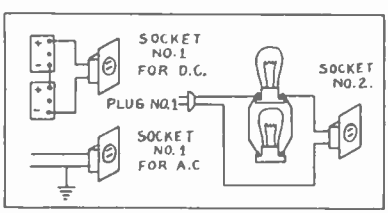


FIG. 83

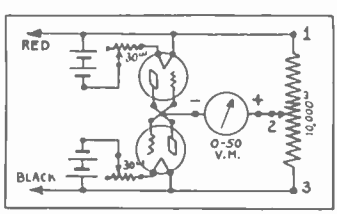


FIG. 100

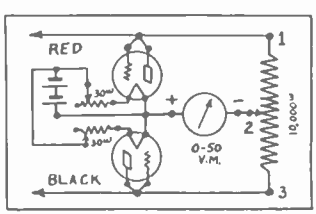


FIG. 101

 (Continued from page 9)

order to obtain up-scale deflections. However, it would not permit determining the polarity of a source of supply which is often desirable in D.C. circuits.

6. When one of the tubes is removed you will get *no deflection* from one of the tests. This may happen with Procedure No. 4 or No. 5, depending upon the polarity. In this arrangement only one tube functions as a half-wave rectifier in a similar manner as described in the preceding Experiment No. 64. Therefore, a deflection is obtained only when the proper polarity is applied by reversing the test prods.

7. When the tubes are exchanged in their positions then the reverse observations are made. In other words you will obtain a deflection with that test which produced no deflection in No. 6. Likewise, you will get no deflection with that test which did give a reading previously. This shows that the other tube also functions as a half-wave rectifier but does so when the first tube is idle. Consequently, we can now understand why we get deflections in Procedures Nos. 4 and 5 when both tubes are in use.

8 and 9. These procedures are preliminary for making similar tests while A.C. is applied.

10. With A.C. applied the readings are greater than those obtained with D.C. This is caused primarily by the fact that the meter is responding to the peak voltages of A.C. These peak voltages are about 1.4 times the effective voltage. In other words if the source of power has a voltage of 100 volts in "effective voltage" this 100 volts of A.C. will light a lamp as brightly as 100 volts of D.C.

Yet the A.C. varies regularly and for short intervals in each alteration the voltage reaches a maximum of 140 volts. Of course, for some intervals the voltage also is less than 100 volts. Consequently, the effective voltage can be considered somewhat like being the average of the voltages above and below while the changes take place.

This "average" is not a simple average but it can be worked out by fairly complicated arithmetic and shown to be equal to the "root mean square" of the voltages which occur at all instances in the complete cycle. For this reason the "effective voltage" is often called the "root mean square voltage" or simply "R.M.S. voltage."

11. In this procedure the highest reading is obtained at that adjustment near the center of the dial where the path of electron flow has equal impedance for the forward and reverse directions of flow. This requires knowledge of the circuit over which the electrons travel for each half of the wave. We can trace one half of the wave by removing one of the tubes in Fig. 100. Let us remove the top tube. Then let us say that the red test prod is attached to the negative terminal of a battery while the black test prod is connected to the positive terminal of this battery. Tracing the path over which the electrons flow, we see that electrons originate at the negative terminal of the battery, continue to the red test prod and to terminal No. 1 of the potentiometer, then through the potentiometer to the black test prod and positive terminal of the battery.

Although it appears that the electrons could divide at terminal No. 2 of the potentiometer and enter the meter, this does not happen because the electrons cannot pass from plate and grid (the anodes) of the bottom tube in this case.

Still consider only the bottom tube of Fig. 100 being used. Reverse the polarity of the battery. The circuit through the potentiometer is in the reverse direction as before. However, in addition the electrons also can enter the heated filament (the cathode) of the tube, continue to the anode and pass through the meter and rejoin the other portion of the electron stream at terminal No. 2 of the potentiometer. Thus the meter deflects.

If we move terminal No. 2 toward No. 1 we shorten the path of electrons passing through the meter for the bottom tube but increase it for the top tube when it is in position.

12. Here we use a half-wave rectifier and find that the deflections are less than those obtained with the full-wave A.C. connection and also less than those obtained with a single tube and D.C.

The reason is that the electrons are only acting upon the meter for a comparatively short period during the half-wave action and we realize at once that a full-wave connection would be more desirable for getting deflections from small values of A.C.

13. This observation bears out the same conclusions reached in the preceding observation.

We can now turn our attention to repeating each one of these tests while the circuit is changed and arranged as shown in Fig. 101. Each one of the observations will be identical with those described for Fig. 100. Therefore, either circuit can be used as a full-wave rectifier.

Comparing Fig. 100 with Fig. 101 will reveal that only a single set of batteries is needed for heating the filaments of both tubes in the latter circuit. Therefore, from a standpoint of economy, this last arrangement is preferred.

Figure 101 could be simplified still further in a permanent arrangement of a full-wave rectifier by using only one filament resistor. However, this will change filament voltages when removing a tube.

Push-Button Tuners (Cont. from page 8)

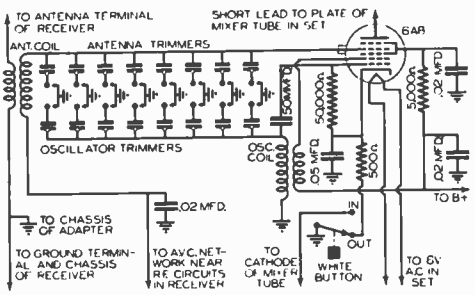


FIG. 11. Circuit diagram of Howard Model 210 Adapter.

dyne. The output frequency of a converter is generally made equal to the frequency to which the receiver is tuned when the gang tuning condenser is in the *maximum-capacity* position (plates fully meshed); this will be in the vicinity of 540 kc.

The initial adjustments of a converter for desired stations are much the same as with trimmer-type tuners, there being one antenna trimmer and one oscillator trimmer for each station. Condenser *C* in the converter output circuit is adjusted for maximum volume on one station, and is then correct for all stations. Remember that with a converter type tuner the gang tuning condenser must be in the maximum-capacity position for automatic and remote operation.

The difference between the list price of the Howard 211 converter and the net price to servicemen allows a profit of approximately $9 per unit; this will usually be sufficient to cover the time you spend in delivering the unit, hooking it up, adjusting the trimmers, and explaining its use to the customer, while still giving you a fair profit on the sale itself, so no extra charge need be made for installing the unit.

Adapter Type Units. Automatic tuning adapter units such as the Howard 210 unit pictured in Fig. *10* can be built into a customer's radio without interfering with conventional manual operation and without throwing any of the radio receiver circuits out of alignment. The position of the adapter in the cabinet is independent of the location of the gang tuning condenser, and an adapter is therefore ideal for an installation where the tuner cannot be placed close to the tuning condenser.

The schematic circuit diagram of the Howard type 210 adapter is given in Fig. *11*. A study of this circuit shows that it is a conventional oscillator-mixer-first detector stage employing a 6A8 pentagrid converter tube, with its resonant input circuit and its oscillator circuit tuned by trimmer condensers controlled by the push button. When automatic tuning is used, this converter tube feeds directly into the I.F. amplifier of the receiver, while the oscillator-mixer-first detector stage and any preselector stages in the receiver are made inoperative by the switch which is controlled by the white button. When conventional manual tuning is desired, the switch disconnects the adapter tube and restores operation of the regular tubes in the receiver.

The Howard adapter unit is designed to operate on receivers having I.F. values of about 460 kc., since the adapter tube delivers this frequency. Adapters for other I.F. values are available at slight additional cost.

———*n r i*———

Artificial Television Signals

To solve the problem of experimenting with and testing television receivers in localities far away from television stations or at times when television stations are not on the air, the Phasmajector tube has been developed by the Allen B. DuMont Laboratories, Inc., of Upper Montclair, N. J. This tube provides a uniform tele-

vision test signal when connected into relatively inexpensive associated apparatus. In place of the usual fluorescent screen of the cathode-ray tube which it closely resembles is a metallic plate on which is printed the desired picture or test pattern. The tube has a conventional cathode-ray electron gun and deflecting electrodes, and a special collector electrode near the metallic plate. When the Phasmajector tube is used with proper sweep circuits and amplifiers, the picture printed on the metallic plate is readily scanned and transmitted to a television receiver, or can be reproduced on a standard oscilloscope cathode-ray tube.

———*n r i*———

Party for the Youngsters

Vice-President E. R. Haas and Mrs. Haas recently gave a party for the children of employees of N. R. I. A considerable number of grown-ups also attended to help keep things under control—and get in on the fun.

There was the usual ice cream and cakes, a toy for every child and plenty of games and entertainment. Among other specialties was a real magician engaged by Mr. Haas—yes, sir—the kind who could pull rabbits out of a hat. He had the youngsters spellbound with his tricks.

Thank you very much, Mr. and Mrs. Haas, for a fine party. It was swelelegant.

NEW RADIO GADGETS

A purely "local" radio receiver with no tuning dial and no short-wave bands has been placed on the market by RCA for music lovers interested only in high fidelity reception of local programs. This RCA symphony model, priced at $125, has nine automatic push-buttons for tuning, a volume control and a 6-position selectivity-fidelity control giving a maximum frequency range of from 50 to 7,000 cycles. The console cabinet emphasizes the pleasingly simple lines of the eighteenth century. Eight metal tubes give a maximum output of 12 watts to the 12" loudspeaker.

An all-electric record-player which is complete in itself, requiring no connection to a radio receiver, is now offered by Allied Radio Corp., Chicago, Ill. It contains a five-tube audio amplifier delivering full 3 watts output to a 6" permanent magnet dynamic speaker. Unusual compactness makes this unit well suited for portable use wherever 110 volt A.C. power is available.

A combination screw-driver and wire-dresser has been devised for servicemen by Philco engineers. The insulated screw-driver is intended for adjusting trimmer condensers in receivers and push-button tuners; a specially-hooked end on the screw-driver permits arranging of wiring in a radio set and testing of soldered joints.

A new super-power loudspeaker developed in Germany operates on much the same principle as the ribbon type velocity microphone. Signal currents are sent through two corrugated aluminum ribbons, each of which is located between a pair of magnet coils which produces an intense magnetic field. The loudspeaker unit is 3 feet high, and operates with an input power of 1,000 watts.

The new Scott Telematic all-wave radio receiver can be secured with an automatic program selector. This can be set up in the morning, while referring to a radio program, so that any desired one of eight different stations will be tuned in automatically throughout the day. Around the rim of a clock built into the receiver panel is one hole for each fifteen minute period, and alongside the clock are a number of plugs for each of the eight stations. Inserting the plug corresponding to a particular station in one of these holes means that the receiver will be tuned automatically to this station during that fifteen minute period. Other features of the new Scott receiver include remote control push-button tuning, a built-in high-fidelity phonograph with automatic record changer and needle scratch eliminator, and a frequency range of from 30 to 16,000 cycles. Further information on this receiver can be obtained from the E. H. Scott Radio Laboratories, Inc., 4450 Ravenswood Ave., Chicago, Ill.

A line of multiple push-button switches for applications where the pushing of any one button automatically releases the button which had previously been depressed is announced by P. R. Mallory & Co., Inc., Indianapolis, Ind. These switches are intended for automatic push-button tuning units, inter-office communication systems, tube checkers, multimeters, transmitter switching applications and other applications requiring a device for making, breaking or transferring multiple circuits in any desired sequence.

A number of condenser manufacturers are now offering new mica condensers in which the customary metal plates or sheets of foil between layers of mica are replaced by thin layers of silver plated directly upon the mica by a new process. This new construction gives a highly stable and accurate unit.

The latest in remote control units for home radio receivers is a unit which can be plugged into any electrical outlet in the home, without direct connection to the receiver. The unit contains push-buttons for tuning in any one of six stations, for turning the receiver on or off and for controlling the volume. All control is effected through the electrical wiring in the house; the control unit sends R.F. carrier frequencies of different values over this wiring to a number of relays at the receiver, each of which contains a special cold cathode discharge tube and filter circuit which responds only to one carrier frequency. It is expected that a number of the higher-priced new radio receiver models will incorporate this "wireless remote control" feature which has been announced by the RCA License Laboratory.

A plug-in type filter unit designed to reduce interference caused by electric razors, heating pads, hair dryers and similar fractional horsepower motor-driven devices, is offered by Sprague Products Company of North Adams, Mass. It plugs into any wall outlet, and the appliance plug is inserted in the end of the filter.

Zenith has placed on the market a carrier-type one-way communication device called a "Radio Nurse." The microphone or "ear" is plugged into an electric outlet in the nursery or bedroom; the loudspeaker unit can be plugged into any other outlet in the house, to reproduce all sounds picked up by the ear. Further information can be secured from Zenith Radio Corporation, 6001 Dickens Ave., Chicago, Ill.

A flat five-cable extension cord which can be run under rugs to chairside radio receivers is now available from Alden Products Company, 715 Center St., Brockton, Mass. Two wires are for power, two for a doublet antenna and one for a ground connection.

Television Will Be Demonstrated at New York World's Fair, 1939

Television, which millions still regard as something vaguely mysterious and decidedly "new-fangled," is to be demonstrated in the special building of the Radio Corporation of America at the New York World's Fair 1939. The popular demonstration of television promises to be one of the most absorbing phases of the Fair's program of "Building the World of Tomorrow."

David Sarnoff, President of the Radio Corporation of America, who recently signed an agreement with Grover A. Whalen, President of the World's Fair, has revealed that the complete history of Radio—the world's youngest industry which has proved so beneficial to everybody—will be unfolded in a series of demonstrations which the RCA will provide in association with its service companies. In this manner millions from all corners of the earth will be provided with the opportunity of studying the development of Radio from the days when Guglielmo Marconi discovered wireless telegraphy to television, which is tomorrow's chapter in the sensational history of Radio.

By terms of the agreement, the Radio Corporation of America will construct on the Fair grounds at Flushing Meadow an ultra-modern building which will house a veritable museum containing all branches of the Radio art and its developments.

As viewed from the air, the RCA Building, will be shaped like a huge Radio tube 136 feet in length and resting on a broad base 190 feet wide. The front of the two-story building will be of glass, which will be brilliantly lighted at night. In the large rotunda there will be working models of various Radio devices and around the sides there will be six television viewing rooms.

The visitor who walks further into this tube-like section of the building, will see the latest in Radio receiving sets and tubes in actual process of construction, together with demonstrations of many principal RCA services.

Behind the building will be a large garden with trees and fountains, providing outdoor exhibits of the RCA communication and marine services. The plans were made by Skidmore & Owens, New York architects, with Paul Cret as consultant.

"The Radio Corporation of America," said Mr. Sarnoff in outlining the plans for the exhibition, "will tell the complete story of Radio and its relationship with both the world of today and the world of tomorrow."

No recent invention has been more discussed than television, and in dwelling on this science Mr. Sarnoff said:

"The youngest child in the family of RCA services is, of course, television. This infant is not yet out of the nursery, but is now learning to walk and to talk. The progress we are making daily in the development of transmitting sight through space gives promise that by the time the

Model of R.C.A. exhibit building to be erected at the New York World's Fair 1939. It will be shaped like a Radio tube. Television programs will be featured.

World's Fair opens on April 30, 1939, television will be greatly advanced over its present-day position. Whatever its status may be at that time, we propose to demonstrate to the public at the World's Fair the workings and the possibilities of television.

"While the problems of developing a nationwide television system are enormous, we have faith in the future of this new Radio art. Television is bound to have a profound influence on the lives of all of us. It will extend but not replace our present-day system of Radio broadcasting. Our experimental field tests, which have been in progress for over a year, have already demonstrated the practicability of our television system. The NBC is now engaged in developing the new program technique required by television."

Other Radio exhibits will also be on view in the Communications Building, which will cover an acre of ground and will be erected at an estimated cost of $400,000. It will be built by the Fair Corporation itself and the structure is completed except for interior work. The Communications Building will face toward the north end of the $60,000,000 Central Mall. About it will be placed a group of buildings to be erected by private exhibitors in the communication industry.

Stories of Progress in Am

A digest of two Saturday afternoon radio talks, "The Electrical G
partment of Commerce and broadcast recently by Harry R. Daniel
Only those portions of the talks which deal with electricity, radio, t

WE are all familiar with the story of Benjamin Franklin and his kite– how, in 1752, he drew electricity from the clouds, charged a Leyden jar, and proved that atmospheric electricity, which causes lightning, and frictional electricity are one and the same.

But Franklin's experiment, though successful, failed to clear up the eternal mystery of electricity. What is electricity? No one has ever been able to answer this question.

Over 2,000 years ago, in ancient Greece, philosophers knew that amber, when it was rubbed and thus charged with electricity by friction, had an attraction for other substances. The compass, which guides our ships by electrical magnetism, was in use thousands of years ago among the ancient Chinese. Except for the compass, however, the marvelous power of electricity remained unharnessed for all practical purposes until less than 100 years ago.

In ancient times the patriarch Job asked his friends, "can'st thou send out lightnings, that they may go and say unto thee, 'here we are?'"

On a spring day in 1844 Job's question was answered. This was when Samuel Morse demonstrated the successful operation of the world's first telegraph line, between Baltimore and Washington. A gathering of notables had assembled in the chambers of the Supreme Court in Washington to listen to the first message. Almost breathlessly they waited. At length Morse, solemn faced, sat down at the instrument. Click-click, click-click went that first telegraph message ever to be sent. Instantly Morse's assistant in Baltimore replied with the same words: "What hath God wrought!" And true indeed a miracle was wrought that day.

A few years after that, in a lonely telegraph office in Stratford, Canada, an American boy named Thomas Edison was working as night operator. During every spare moment young Edison was busy with electrical experiments such as all boys like to make. The one thing that bothered him was that nobody could explain the telegraph. There was an old Scotch lineman working around there and Edison used to talk with him about it. But the only explanation of the mystery of the telegraph which the Scotchman could throw on the subject was this: "If you had a dog long enough to reach from Edinburgh to London, and if you pulled his tail in Edinburgh, he'd bark in London."

Edison was not completely satisfied with this explanation. He continued his experiments, taking the telegraph instruments apart and putting them together again. In the years that followed, Edison helped to perfect the telephone, first invented by Alxander Graham Bell; the dynamo, for producing electric current; and most wonderful of all, the modern incandescent electric lamp. In 1882 Edison carried all the incandescent lamps in the world at that time to New York City in a market basket. Today the total production of light bulbs each year equals about 880 million, or enough to put a band of bright lights entirely around the world.

ALMOST every day in the year, the American electrical industry presents a new marvel to American life. One of the most wonderful of all the servants of man is the new photoelectric eye, a cell so sensitive to light that it will turn on street lights automatically as daylight fades, protect buildings against fires, control street traffic or elevators, inspect various products before they come from the factory, and even match colors. It may be that the photoelectric eye will prove to be one of the answers to the kidnapper, for it operates just as well with invisible, ultraviolet rays as with ordinary beams of light. If, in an attempted kidnapping from a child's bed or crib, one of these invisible light rays should be interrupted, the electric eye instantly would sound an alarm.

In some American cities the photoelectric eye is already used to control traffic. At a point, for example, where a bridle path crosses a busy highway, the horse and rider, as they approach the street crossing, interrupt the beam of the electric eye. This causes a red light to flash on the street signal, and traffic stops till the horse and rider have gone by.

By using the photoelectric eye it is possible for a motorist driving home to have his garage doors swing open automatically without the touch of a hand, and to close behind him when he leaves the garage.

erican Electrical Industries

oods Industry" and "Industries of Tomorrow," sponsored by the De-
over a coast-to-coast hook-up of the Columbia Broadcasting System.
elevision, and electronics are reproduced here.

AMONG the great industries which seem at this time to be just over the horizon is television. In the pioneer stages of this miracle of science, there stands forth one predominating, dramatic personality.

A few years before the Wright brothers' first flight, an Indiana farm boy, Francis Jenkins, came to Washington to take a Government post. But after a few years, he gave up his job to devote his life to inventing. This was the period when Marconi wireless waves were first being heralded, and soon all over America amateurs were communicating by dots and dashes. In those days, radio broadcasting was unknown. But already young Jenkins cherished a fantastic dream of sending sight, as well as sound, through the air.

In order to raise money to build his elaborate experimental machinery Jenkins began to invent things. One of these was the self-starter for automobiles. He also helped develop the projector which has made possible the modern motion picture. All told, he secured patents on 400 inventions. By the year 1922, he had carried his experiments to the point of sending the first still photograph by radio. But the dream of sending living, moving pictures through the air still haunted him. And he needed money so badly!

Turning aside temporarily from his television, he invented the paper ice-cream cup and the modern milk-bottle cap. With the proceeds of these lowly but useful inventions, he turned again to television.

And then, one bright Saturday morning in June 1925, in the old naval radio station in Washington, Jenkins focused the television camera upon a small model of a windmill. The blades of the windmill were set in motion by the wind from an electric fan. Hurrying back to his laboratory, several miles distant, Jenkins watched the image of the little windmill turning steadily in his receiving set. He rushed to the telephone and called Secretary of the Navy Wilbur.

"Mister Secretary," he cried. "Mister Secretary, come over here at once! My radiovision is working!" Secretary Wilbur and other Government officials dropped all work, jumped into taxicabs, and rushed to the inventor's laboratory. The blades of the little windmill were turning in the first successful television demonstration ever made. Years of experimenting continued.

And then the tragedy! Three years ago Francis Jenkins died. He never lived to see the complete fulfillment of the dreams that had been his through all the years. But every night, in New York City, experimental television programs are now being broadcast. And these broadcasts, it is said, are being received clearly both as to sight and sound by experimental receiving sets scattered throughout a radius of 40 miles. Of course, great obstacles still remain before television enters the average home. Experts predict that at the present stage of development something like one billion dollars' worth of new equipment will have to be manufactured and sold before television really comes into its own.

SO far, we have not mentioned the radio. Many of you, I am sure, have listened to the thrilling accounts of the rescue work during floods; it is a fact that many lives thus were saved through radio. And the most wonderful developments of radio are as yet ahead of us.

Perhaps, even before the billion-dollar television industry is developed in the United States on a commercial scale, radio will have gone into other fields which now seem entirely fantastic. Before long it may be possible for you while riding in your automobile to pick up a wireless telephone and talk with your home, or with any other telephone connection, anywhere. Such an invention already has been successfully demonstrated abroad. And still more amazing is the possibility of small portable radio telephones and receiving sets of vest-pocket size with each person assigned his own radio telephone number.

ALEXANDER THE GREAT, so it has been recorded, wept when he found there were no more worlds to conquer. But modern man knows no such limitations. The attitude today is that there is no limit to the worlds which remain to be conquered. So, a salute to our men of science, to our inventors, and to our industrialists, for under their leadership the dreams of today will become the realities of tomorrow.

New Midget Electrolytic Condensers

Amazing reductions in size are clearly evident in the new lines of etched-foil type tubular dry electrolytic condensers announced by two manufacturers. With these new units, installation becomes as simple as for mounting a tubular paper condenser. Terminals are insulated and have pig-tail leads, while a protective cardboard sleeve insulates the container. The new units can thus be used for practically any replacement regardless of the size of the original unit.

The midget electrolytics introduced by the Sprague Products Co. of North Adams, Mass. are known as Sprague "Atoms." An 8 mfd., 450-volt "Atom" is shown exact size in one of the illustrations; it is only ¾" in diameter and 1⅝" long, and has a list price of only 60¢. Other sizes and dual units in the Sprague line are proportionately small in size as well as low in price. A folder describing the new Sprague line of condensers will gladly be sent by the manufacturer upon request, or can be obtained from any Sprague jobber.

The new Cornell-Dubilier line is known as the Type BR etched-foil electrolytic line. These are available in single sections only, in capacities up to 40 mfd. at 150 volts D.C. rating, and up to 8 mfd., 450 volts D.C. For full details, write to Cornell-Dubilier Electric Corp., South Plainfield, N. J. An exact size illustration of one of the new Cornell-Dubilier BR electrolytics is shown.

———*n r i*———

New IRC Catalog Now Available

A completely new and attractively printed 12-page catalog, detailing the complete merchandise line of IRC Standard Resistors and Volume Controls has just been issued by the International Resistance Company, 401 North Broad Street, Philadelphia, Penna.

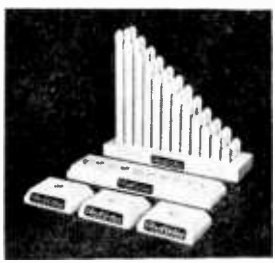
Philco Diagrams in Handy Form

The Philco Wiring Diagram Book for servicemen and service departments is now available in two volumes, according to an announcement from J. R. Jackson, Philco service engineer. Volume One contains all wiring diagrams of every Philco home radio built from the start of the company through 1936, with parts layout diagrams and complete parts lists. Volume Two includes the same information on the 1937 and 1938 models, with all alignment and adjusting data for these models. Additional information concerning these books can be secured from any Philco distributor.

———*n r i*———

Wood Pegs Support Any Chassis

A set series of 36 hardwood rods varying in length from 1½ to 8", fitting into wood bases, are available to servicemen for supporting any size of radio chassis in an inverted position during repair work.



This device can be set up without loss of time and without screwing or clamping.

For a descriptive circular and price of this RADIOJAC, write to Cooks Mfg. Co., 274 Miles Square Road, Yonkers, N. Y.

———*n r i*———

New Photoelectric Control Unit Has Built-In Light Source

The latest in photoelectric burglar announcers is a single compact unit which can be installed anywhere simply by plugging into a wall outlet. Phototube and light source are mounted side by side; the unit is aimed in any desired direction, and persons or objects interrupting the light beam within the detecting range of the unit reflect light back to the electric eye, thus setting off the alarm. An extremely sensitive circuit makes unnecessary the mirror or separate light source formerly required in photoelectric units of this type. Additional information on this self-contained photoelectric control unit can be obtained from the manufacturer, the Photobell Corporation, 96 Warren Street, New York City, New York.

Why N. R. I. Teaches Theory

By JOSEPH KAUFMAN
N. R. I. Director of Education

JOSEPH KAUFMAN

WILL the arrival of a modern all-wave, high-fidelity receiver in your shop result in a feeling of bewilderment—a fear that the many new gadgets will prove too much for you?

Because every new Radio receiver development is simply a new combination of old and familiar Radio principles, a working knowledge of Radio Theory is the antidote for the problems created by new Radio developments. This knowledge of theory is the one big advantage you will have over the self-made radio man.

* * * *

When called upon to give an estimate, will you be able to locate the trouble promptly in the presence of the customer and give an accurate estimate, or will you have to guess at the trouble and run the risk of either taking a loss by quoting too low, or losing the job by quoting higher than necessary for a fair profit?

Each Radio ailment has definite symptoms; a knowledge of Radio Theory enables you to recognize these symptoms and interpret them in terms of circuit defects. By locating the trouble quickly, you prove your competence and better your chances for securing the job at a profit.

* * * *

Will receiver complaints like distortion, fading and intermittent reception bring headaches to you? Will you waste time poring over circuit diagrams and files of service hints, replacing one part after another until you hit upon the trouble, then find yourself unable to collect for this wasted time?

Localizing of defective parts takes by far the greater portion of the average serviceman's time. An understanding of the theories underlying the performance of each part enables you to recognize symptoms as being due to defects in particular parts or groups of parts: theory plus brain work accomplishes in one minute a job which may take your fingers sixty minutes. You profit from this saving of time.

* * * *

Can you read service instruments in terms of defective condensers, open coils, and burned-out resistors, or do you simply read them in terms of volts, amperes and ohms and then wonder what to do next? And those curves you will get on your cathode ray oscilloscope—will they reveal innermost secrets of receivers or will they simply be curves?

Every Radio servicing instrument has a host of stories to tell — if you can understand its language. Theory tells you which readings are normal and which are abnormal, which curves represent practical perfection and which indicate trouble. A knowledge of Radio Theory thus enables you to get the most out of the dollars you spend for servicing instruments.

* * * *

Will you use that old-fashioned technique whereby you painstakingly check all tubes, voltages, point-to-point resistances and parts values on a receiver when your first random guesses fail? Will you waste valuable hours poring over circuit diagrams and voltage tables, servicing by guesswork rather than brain-work? Will you find it necessary to work far into the night, leaving no time for the rest and recreation so vital to your health and enjoyment of life itself?

Modern service techniques, which work directly from effect to cause without the elaborate, time-wasting rigmaroles of the past, permit you to do service work so much faster that you can take on extra jobs, boost your income and still have plenty of time for recreation. But modern technique is based upon a thorough understanding of what goes on inside the receiver cabinet—upon a working knowledge of theory as presented in the N.R.I. Course.

* * * *

When you are unable to secure locally, the exact part specified in a service manual, will you spend time and money ordering it by mail or will you try available parts until you hit upon one which works after a fashion?

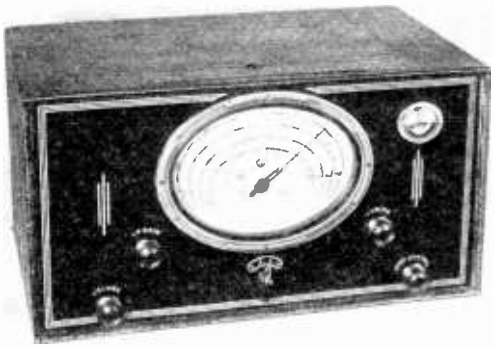
Variations of greater than 100% in part values are permissible in some Radio circuits, while in others it is necessary to use exact duplicate replacement parts. A practical working knowledge of Radio theory reveals the limits for the part in question, eliminating wasted time.

BROWNING ALL-WAVE RECEIVER KIT

For those who want the thrill of building an all-wave superheterodyne receiver which really can give sensational distance-getting results along with good fidelity and exceptionally low noise level, Browning Laboratories, Inc., have developed the Browning 83, a 10-tube, 4-band kit which can be assembled with no more tools than a screw-driver, a pair of pliers and a soldering iron.

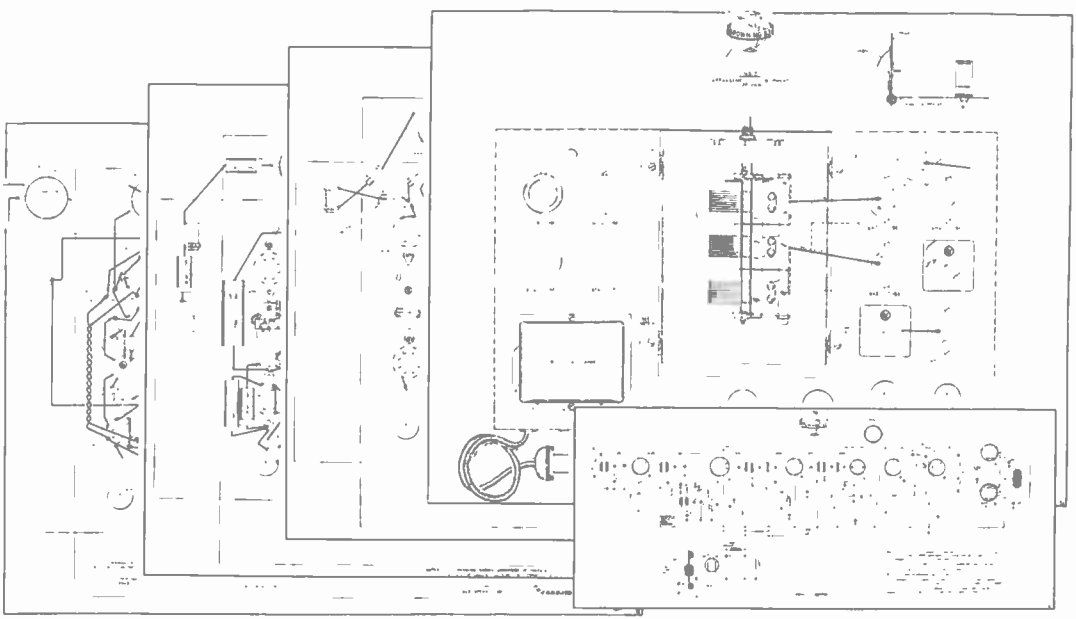
The complete kit contains every part needed, including a special etched and engraved front panel and a formed chassis with all holes punched; the only extras required are the tubes, loudspeaker and a cabinet. Included with the kit are remarkably simple and detailed assembly instructions, a schematic circuit diagram for checking purposes and four actual-size wiring diagrams, as follows: *a*, arrangement of parts and wiring above chassis; *b*, filament circuit wiring diagram; *c*, resistor wiring diagram; *d*, condenser wiring diagram, and all connections now shown in the other diagrams. The tuning unit is completely assembled, wired and aligned at the factory, and the band-pass I.F. transformers are accurately tuned to the correct I.F. value of 456 kc., so even the novice can secure proper alignment of the entire receiver *without the aid of a signal generator.*

The Browning 83 kit is ideal for those who already have a good console cabinet or have built a modern combination radio cabinet and bookcase and want to install therein a good modern receiver chassis. The 110 volt A.C. power pack can be replaced with a Mallory 6-volt Vibrapack to give a portable all-wave set for camping and vacation trips.



Completed Browning 83 all-wave receiver

Literature giving complete technical data and prices on the complete Browning 83 kit as well as on sections of the kit can be obtained free on request by writing to Browning Laboratories, Inc., 750 Main St., Winchester, Mass.



Here are a few of the diagrams furnished with the Browning 83 kit

Novel Radio Items

—BY L.J. MARKUS—

Electric Fingers Feel .00001 Inch!

An instrument which measures the thickness of metal foil to an accuracy of .00001 inch without even touching the foil is among the newest products of the General Electric research laboratories. The foil is passed through a high frequency magnetic field which induces eddy currents in the foil; the effects of these eddy currents on the field are measured with ordinary electrical instruments calibrated in terms of foil thickness.

———*n r i*———

Native Wife Costs One Radio Set!

The price of an average wife in Uganda, Africa, has gone up to the level of one radio set. For a first-class maiden, however, a phono-radio combination may be asked.

———*n r i*———

A Below-The-Waves Radio Broadcast!

A radio broadcast from a submerged submarine was recently made for the first time by NBC. Coaxial cables were sent up through the periscope after the sub had submerged, in order to get the antennas above water. The sounds of torpedoes being fired from the U. S. S. R-14, as well as the voices of officers and crew, were radioed to a surface craft for rebroadcast over the nationwide NBC network.

Now You Tell One!

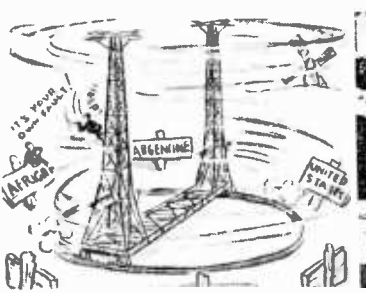
According to one Mexican radio fan, "When a lot of people tune in on the same program, there aren't enough radio waves to go around, so sets which are tuned in late won't get loud. The thing to do is tune the station in early and grab your share of the radio waves before some one else does." (Theoretically there is some truth in this belief, but actually the power absorbed by a single radio receiving antenna is almost negligible in comparison to that radiated by a broadcast transmitter. Regular broadcast stations in this country together send a total of about 3,250,000 watts of power into the ether.)

———*n r i*———

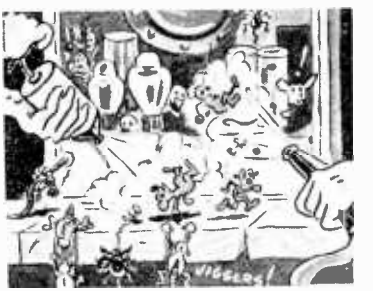
Village Radios in India Are Padlocked!

Many villages in India have only one radio receiver, this being provided by the government for community reception. Each of these battery-operated receivers is mounted in a metal box, is permanently tuned to the nearest radio station, and is controlled by a clock-work time-switch which turns the set on and off at the correct time each day for the village listening hour. The box is padlocked, to prevent tampering by curious natives. About once every three weeks a technician makes the rounds of these receivers, changing the storage battery which serves as the power supply and winding the time clock.

RADIO COMMANDS PUZZLE LIONS! Clyde Beatty, famous animal trainer, recently directed his lions via a microphone and an NBC radio station, with a radio receiver in the lions' cage. The lions recognized the voice of their master but became so confused in trying to figure out where he was that they started a free-for-all fight. Beatty's arrival in person ended the scrap.



ANTENNAS RIDE ON MERRY-GO-ROUND! The two 195-ft. high antenna towers of short-wave station PCJ in Holland are mounted on a massive 145-ft. long steel "merry-go-round" which can be rotated on its circular track. Signposts indicate the correct tower positions for concentrating the highly-directional 31-meter signals on a particular country.



RADIOS ARE INSECT HOTELS! Truly ingenious are the methods used by radio servicemen in the South for killing the cockroaches, scorpions and spiders occasionally found in radio sets. Some favor cleaners' naptha applied with a spray gun; others place the radio under a canvas hood to form a lethal chamber, and force in auto exhaust gases for a few minutes.

N.R.I. ALUMNI NEWS

A MESSAGE FROM VICE-PRESIDENT EARL BENNETT OF THE N. R. I. ALUMNI ASSOCIATION

Why I Am A Member of N.R.I.A.A.

I have been a member of N. R. I. Alumni Association since 1930. That's eight years. Every day of those eight years I've had my eye on the ball wherever the Alumni Association is concerned. I've worked for it—been elected Vice President for four years, and I've been Chairman of the Chicago Chapter four times. I am holding both offices right today, and am trying my best to do all in my power to make the Association the greatest organization of Radio servicemen in the world. (It really is an international organization, you know.) Do I get tired of doing these things? NO! I am proud to volunteer my services to the Alumni—and I am proud of the Alumni!

We don't like to ask fellows to join the Alumni. We would much rather have them feel it is a privilege to be able to join. Membership in this organization is a distinction—an honor money cannot buy.

I have often been asked, "What can the Alumni Association do for me?" My answer always has been, "That is not the spirit which makes for success. We are all working for better things in Radio for servicemen everywhere. It is not a matter of what the Alumni can do for you. It is a matter of what you can do to help the Alumni."

In organization there is strength. Take the words of Mr. B. E. Jenkins, Manager, Electronic Division, Weston Electrical Instrument Corporation, Newark, N. J., who said in a letter: "Organizations now in existence have bettered the serviceman's position. They have obtained much needed recognition from Radio manufacturers. Furthermore, they have increased the Radio man's earning power, at the same time eliminating many unfair practices. All servicemen who believe in their future should belong to, or support an organization devoted to their welfare."

I wish we could all get together once a year for a big rally to the colors of N. R. I., but we can't do that. For this reason, we have these pages set aside for us in National Radio News. I am intensely interested in each line of each issue, and am grateful for the chance to greet you all in this way. If I can do anything to help a fellow member you'll find me at 1408 Brown Ave., Evanston, Ill. You'll find me a real booster for N. R. I. A. A., and any of its members.

Fraternally yours,

Earl R. Bennett,
Vice President,
N. R. I. Alumni Association

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.*

PHILCO MODEL 37-361 **DEAD**
Look for shorted part in voltage divider which is 35 ohms, replace with new 35 ohm resistor.
L. Stevenson, Canada.

VICTOR MODEL R-33 **DISTORTION**
Look for shorted condenser in filter circuit. Condenser rated at 150 volts 4 mfd. replace with 4 mfd. 600 volts.
L. Stevenson, Canada.

MAJESTIC MODEL 50 **DEAD**
Look for wire which goes to screen grid of R.F. tubes. This wire goes from voltage divider through condenser can to the screen grid of R.F. tubes. Found wire was shorted in can, replaced with new wire then found by-pass condenser had broken down, replaced condenser which is .1 mfd.
L. Stevenson, Canada.

PHILCO MODEL 70 **MOTOR-BOATING**
Look for shorted by-pass condenser in grid circuit of output tube 47.
L. Stevenson, Canada.

RCA VICTOR MODEL C5-3 **DISTORTION**
Look for shorted resistor in voltage divider which is 5000 ohms, replace with new one of 2 watts.
L. Stevenson, Canada.

DEFOREST-CROSLEY 850 **DEAD**
Look for burnt out resistor in screen grid circuit which is riveted to the chassis, replace with 6000 ohm 2 watts.
L. Stevenson, Canada.

NORTHERN ELECTRIC 53 **DEAD**
Look for loose rivet on tuning condenser frame which will cause a short when tuning from one station to another, replace with nut and bolt.
L. Stevenson, Canada.

ROGERS MODEL 861 **DEAD**
Look for shorted tone control condenser. Will not show up if shunted with new one, must be disconnected from set and tested.
L. Stevenson, Canada.

MARCONI MODELS 73-76 **DEAD**
Look for shorted or dead condenser in plate circuit of oscillator tube. Will not show up if shunted with new one. One end must be free. Also check resistor for right value as the condenser being dead or shorted causes resistor to over-heat.
L. Stevenson, Canada.

ROGERS MODEL 611 **DEAD**
Look for shorted by-pass condenser in screen grid supply voltage circuit.
L. Stevenson, Canada.

DELCO AUTO RADIO MODELS 611 AND 613 **DEAD**
Set draws abnormal current. If the vibrator is found to be O. K. check the buffer condenser across plates of 6X5C, replace with a 1500 volt rating unit.
A. E. Barwood, South Africa.

GENERAL MOTORS MODEL 628 **DEAD**
If low or no screen voltages on 6D6, R.F. or 6A7 tubes check the by-pass condenser, if O. K. check the twin 25,000 voltage divider for opens or change in value. This resistor is located on top of chassis near 85 tube.
A. E. Barwood, South Africa

1937 & 1938 OLDSMOBILE **USING RUNNING BOARD AS ANTENNA**
See that the guards which are supplied with antenna do not touch the running board supports as these are insulated from chassis.
A. E. Barwood, South Africa.

(Page 27, please)

Here and There Among Alumni Members

The Baseball season is in full swing. Fans will be interested to know that Willis Hudlin of the Cleveland Indians is a former student of N. R. I. Roy Weatherly of the same team is at present a student of N. R. I. Several professional players in minor leagues are also enrolled with N. R. I.

Speaking of athletes, wrestling fans will recognize the name of Carl Van Hoffman, professional wrestler, who also is a student of N. R. I.

Elmer Westman of Fenton, Mich., has a good stunt. He prints a card one-half of which is a business card featuring his Radio servicing business, the other half gives a complete schedule of the home games of the Detroit Tigers.

M. L. Githins writes to say he is Junior Radio Operator, Bureau of Air Navigation, Department of Commerce, at Rawlins, Wyo.

Steve Buzanoski, Bristol, Conn., has had a boost in his family from three to four with the coming of a daughter. The little lady is doing fine and we are glad Mrs. Buzanoski is improving steadily after being seriously ill.

William H. Cooper, Jr. of Philadelphia is highly recommended by the Captains of the Atlantic Refining Co. and Gulf Refining Tankers for work done on their sets. Cooper shows a clear profit of $2360.90 for the last twelve months from his full time Radio business.

Word comes to us that our member, P. J. Bergot passed away. He had a fine position with All-America Cables, Inc., Santo Domingo. We'll miss him.

Frederick H. Brill of West Haven, Conn. is doing part time operating at Station WELI. He has a Radiotelegraph First Class License.

Graduate Charles Dreschnack is so enthusiastic over the benefits of N. R. I. training, he never overlooks an opportunity to recommend it to an ambitious man. As a result sixteen students, so far, are traceable to the work of Mr. Dreschnack. N. R. I. is very grateful for this cooperation.

Lowell E. White, who graduated in June, 1927 is doing splendidly with John Davison Radio Co. of St. Petersburg, Fla.

We are glad to know that Edward A. Madonio of Dunlo, Penna., who has been in poor health for some time, is now well on the road to recovery.

James Skelton of College Point, N. Y., recently graduated and immediately joined the Alumni Association. But what we wanted to tell you is this. He traveled forty-three miles each way, each day, to work and still found time to study. Where there is a will there is a way.

A blessed event at the home of Jack A. Kelsey of Los Angeles, Calif., but he doesn't say whether it is a boy or girl—or both.

Charles Adler of Madison, Indiana, is Superintendent in a large plant, but he is better known for the expert Radio work which he does in his spare time.

One of the finest shops in the Middle-West is operated by Leon R. Lember of Staunton, Ill. He graduated in 1933, and says his N.R.I. training has given him a profitable life-time vocation.

Dr. W. E. Everette, who graduated in 1924 and who was a staunch supporter of the Alumni, passed away at Radio Summit, San Rafael, Calif. His work on earth will long be remembered.

"I am now in possession of a Commercial First Class Radiotelegraph license, endorsed for Radiotelephone first class. Not a single question in either phase of the examination, covering both branches, was asked but what it had not been covered by lesson text furnished by N.R.I.," says Richard E. Fricks of Portsmouth, Va.

Graduate F. R. Hills, who is known to just about everyone who has anything to do with Radio for miles around Regina, Sask., Canada, has been down for several weeks with a severe case of flu and at last report was recovering, although still very weak.

Hoyt Moore of Indianapolis, Ind., has a great deal of fun showing the movies which he took while attending the original convention in 1929, when the N.R.I. Alumni Association was formed. Moore is completing his eighth year as instructor of Radio in the Y.M.C.A. night school, besides doing a nice servicing business. N.R.I. has enabled his family to enjoy a higher standard of living right through the years.

A graduate of 1924 writes us he is doing very well in Elkins, Ark. He is Edmon D. Woods, who has made a lot of dough in the Radio business these last fourteen years.

A. E. Wilkie of Sebastopol, Calif., owns a poultry ranch in a section surrounded by a number of live towns. His part time Radio business has grown to a point where he must give full time to it. Anyone interested in a poultry ranch will find Mr. Wilkie ready to sell.

The Service Forum (Continued from page 25)

AUTOMOBILE RECEIVERS — NOISE
When ignition interference noise becomes annoying in an auto radio installation which originally was quiet, clean and inspect the spark plugs. It has been shown that the use of high test gasoline containing lead-tetra-ethyl results in deposits on the spark plug points which reduce the resistance to ground and thereby make the spark suppressors which are installed in the car interfere with the proper functioning of both the auto engine and the auto radio at certain speeds.

———————*n r i*———————

MIDWEST MODEL 16-35 — WEAK
When this condition accompanied by distortion on strong locals exists and the dimmer pilot light operates in reverse when using sensitivity control on locals, excessive A.V.C. voltage is being applied to the second I.F. stage. The A.V.C. for this stage is connected to the high side of the diode load resistor of the 6B7 tube. Simply disconnect this lead and connect it to the tap on the diode load resistor at the point where A.V.C. for the first R.F. stage is obtained. The reduction in A.V.C. voltage will eliminate the overloading.

———————*n r i*———————

BOSCH MODEL 31 — INTERMITTENT
Replace the 300,000 ohm resistor in the intermediate frequency stage.

———————*n r i*———————

PHILCO MODEL 11 — FUSES BLOW
If the vibrator is in good condition and none of the buffer condensers are shorted, check for a short between the speaker field housing and the on-off switch which is mounted on the volume control.

———————*n r i*———————

GRUNOW MODEL 6D — MOTOR-BOATING
When this action occurs with reduced volume control setting replace the .05 mfd. tubular condenser connected from the low end of the volume control to the chassis. A 600 volt replacement condenser may be employed for this purpose. Also the 12 mfd. electrolytic condenser rated at 25 volts and shunting the .05 mfd. unit may be checked by substitution.

———————*n r i*———————

LYRIC MODEL 900 — DEAD
If the plates of the 80 rectifier tube become red, check the I.F. transformers for a short circuit between the primary winding and the shield which is grounded. A sheet of insulating paper between the transformer winding and the shield will eliminate the short although in many instances a new transformer must be installed.

LYRIC MODEL 900 — MUTER INOPERATIVE
If adjustment of the manual noise suppressor control produces little if any effect on inter-station noise, look for a leaky first A.F. cathode bypass condenser. A new 10 microfarad electrolytic unit will make a satisfactory replacement.

———————*n r i*———————

MAJESTIC MODEL 70 — NEUTRALIZING HINTS
The holes through the top of the chassis are quite small and the ordinary neutralizing tool may not go through them. The hex bolts on the neutralizing condensers may be taken out, placed in a vice and a slot sawed through the top so that they may be turned with an insulated screwdriver instead of a wrench.

———————*n r i*———————

HALSON MODEL 50R — DISTORTION
Replace the input filter condenser.

———————*n r i*———————

FAIRBANKS MORSE MODEL 238T32 — NOISY RECEPTION
This trouble has been traced to the vibrator unit being too tightly mounted on the chassis. The insertion of a sponge rubber washer between the metal washer under the screw head and the bottom of the chassis at the point where the unit is mounted on the chassis will eliminate this difficulty.

———————*n r i*———————

FAIRBANKS MORSE MODEL 42 — SHORT LIFE OF BATTERIES
To eliminate this difficulty trace out and remove the 20,000 ohm one-quarter watt resistor connected from the C minus 16½ volt lead to the chassis. With this resistor in the circuit a continual drain is placed on the B batteries because of the voltage divider system in the receiver. Removal of the resistor will not affect the operation of the set and the battery life will be materially lengthened.

———————*n r i*———————

HOWARD MODEL W — RECTIFIER TUBE DEFECTIVE
This is usually due to excessive plate current drawn by the 2A5 type power tubes. This may be caused by a defective 2A5 type tube or a slow heating 56 rectifier type tube. The 56 rectifier tube supplies bias for the control grids of the power tubes and if it does not heat up quickly the plate currents of these tubes may rise to such an extent that the rectifier will be ruined. Therefore be very careful to use a quick heating 56 tube and 2A5 power tubes which do not show any cathode to heater leakage.

New York Chapter

Chairman Barrette and Secretary Kunert report that the attendance at meetings has been unusually good. A number of students have visited the Chapter as guests. They are most welcome at all times. The officers of New York Chapter wish it to be understood that it is not necessary to be a graduate of N. R. I. to qualify for membership in the Local Chapter.

Students may be accepted as Associate Members until such time as they graduate when they are eligible for full membership. Any students in the New York metropolitan area who would like to join our Chapter will be extended a most hearty welcome.

At one of our meetings our own member, Mr. Irving Gordy gave an interesting talk on Amplifiers which was well received by the members.

Mr. Joseph Kaufman, Director of Education, N. R. I., recently addressed the members of our Chapter. About 175 were present at this meeting. An effort was made to send an invitation to attend this meeting to every student and graduate in the New York metropolitan area. Anyone living in this area who did not receive an invitation to attend this meeting is advised to communicate with Headquarters for the purpose of checking his present address.

Meetings are held at 8.30 P. M. on the first and third Thursday of each month at Damanzeks Manor, 12 St. Marks Place, New York City. The address of Chairman Joseph Barrette is 1266 65th St., Brooklyn, N. Y., and the address of Secretary Louis J. Kunert is 66-11 74th St., Middle Village, L. I., N. Y.

Philadelphia-Camden Chapter

A delegation from Philadelphia-Camden Chapter drove down to Washington to visit Headquarters. After several hours of conferring with J. E. Smith, J. A. Dowie, Jos. Kaufman and L. L. Memne, the party had lunch at the Hotel Roosevelt. The usual snapshots were taken. In order to include the entire group Don Quade of the Instruction Department was persuaded to snap the shutter of an unfamiliar camera. When the films were developed they showed nothing but some black spots which looked very much like the buttons on a vest. Could it be possible Don had the camera faced in the wrong direction?

The visit was a complete surprise, although Chairman Fehn insisted that he had sent a letter three days previously. While the boys were here the postman delivered the letter and to the complete embarrassment of Mr. Fehn, it was discovered that he had addressed it to Philadelphia, Pa., instead of Washington, D. C.

Before leaving Washington the fellows took a few snapshots of their own. In the above group, reading from left to right are H. Doberstein, Financial Secretary, C. Stokes, Treasurer, Charles Fehn, Chairman, J. Weldon, and A. Wysoczansky, Librarian. A. Schiavoni, Recording Secretary, who took the picture is, of course, not included in the above group.

Starting the homeward trip late in the evening, the fellows stopped at Baltimore to telephone to Chairman Jensen of that Chapter. Learning that the Baltimore Chapter was holding a meeting that very night, the entire group went to Fishpaw's Hall where they were warmly received by Chairman Jensen and the members present.

Philadelphia-Camden Chapter has been unusually active this year. One of the outstanding events was a roller skating party which was liberally attended. The fellows really had their ups and downs and it is a safe bet that most of them ate their breakfast from off the mantlepiece the next morning.

The Chapter has built a workbench at Headquarters and has purchased some equipment in order that they might have practical demonstrations at their meetings. Members are earnestly requested to attend and visitors are always welcome. Meetings are held on the first and third Thursdays of each month at Headquarters, 3105 Kensington Ave., Philadelphia.

Detroit Chapter

The much talked of test bench has now been completely assembled and from this time on the members of the Chapter will have a very fitting place to do practical Radio servicing work.

Members have been requested to bring in Radio receivers which have been particularly troublesome so that all of the members might participate in the diagnosis and solution of the problems.

As in other Chapters the questions and answers period has proved extremely popular. These interesting discussions are led by Chairman Oliver.

A vote of thanks is extended to the Detroit Chapter of R. S. A. for an invitation to our Chapter to hear John F. Rider, who recently addressed them. This courtesy was very much appreciated.

A number of new members were welcomed into the Chapter including Mr. Thomas Patterson, Mr. Floyd Campbell, Mr. Herman Linick and Mr. Edward Demeske.

Our meetings are held on the second and fourth Fridays of each month at 11305 Woodward Avenue. Visitors are assured a cordial reception.

Baltimore Chapter

A lively discussion on ways and means for getting more members to attend meetings started off the last April meeting of the Baltimore Chapter, with Pete Dunn, National President of the N. R. I. Alumni Association, firing in one peppy idea after another. Practically everyone present took part in this discussion, and gradually a promising plan was evolved.

Each of those present agreed to write personal letters to at least five absent members, inviting them to attend the next meeting. Chairman Jensen supplied Baltimore Chapter stationery to each for this purpose, and promised to send a sample letter and the names of each person's "proteges" as soon as possible.

Promptly on schedule at 9:15 the meeting was turned over to Mr. L. J. Markus, Technical Editor at N. R. I., who came over from Washington with Mr. Thomsen to settle once and for all the question "Is It a Series or Parallel Resonant Circuit?" After reviewing the fundamental ideas on the behavior of these circuits on and off resonance Mr. Markus pointed out the clues which permit instant identification of any ordinary resonant circuit, and Mr. Thomsen presented additional practical data during the discussion which followed.

A barrage of questions on Radio servicing problems, each answered by Mr. Thomsen in his clear and understandable way ended a most lively evening.

The next big meeting is scheduled for Tuesday, June 7th at Fishpaw's Hall, Baltimore and Gilmor Streets. Big doings—refreshments.

Chicago Chapter

It was feared that the effort to hold meetings in the homes of members would strike a snag in maintaining attendance, but the fear was groundless. There has been no drop at all, and our meetings have had an air of friendly informality they never achieved in the hotel meetings.

The first of the meetings was held in the home of M. F. Brenan on the North Side. After a bit of routine business our Chairman, Earl Bennett, took the floor for a talk on phase inversion. His blackboard illustrations were very helpful and much appreciated by those present.

For the second meeting the fellows went south to the home of Edward Sorg and this time Chairman Bennett had the long haul from Evanston. However, he picked up a gang of North siders and Secretary Sam Juricek also brought out a full load. This kind of cooperation is getting the fellows out and distance seems to be no barrier.

Talk of a picnic cropped out at the last meeting and all present seemed to be in favor of one to be held at the earliest possible time. Our previous picnics were always tremendous successes and we may have even two or three of them this year.

The group advertising idea is proving quite successful and a number of members intend to use it for all it is worth. It is still an experiment, but the results are very encouraging.

Instructive talks were made by Mr. P. W. Kidd of the Supreme Service Shop, Mr. C. B. Morehead and others at various meetings, and, of course, our Chairman, Bennett, is always capable of giving a very informative talk on any subject pertaining to Radio servicing by reason of his long experience in the work.

The meetings always wind up by opening the question box which leads to lively discussions on practical problems which are faced by the members in their daily work.

If at any time members, students and graduates are interested in obtaining information pertaining to time and place of meetings they are requested to telephone C. B. Morehead, Editor of the Chicago Chapter Chatter at Edgewater 6177 or Chairman Bennett at Greenleaf 4900.

Liked Mr. Straughn's Article

I must voice my opinion on your fine magazine, the NEWS. It has been a great help and pleasure to me ever since I started getting it. The last issue, April-May, is particularly good. I mean the article entitled, "Servicing Universal A.C.-D.C. Receivers," by J. B. Straughn. The Service Forum couldn't be better. Whatever you do, don't let anyone talk you into putting these notes on both sides of a sheet. I am going to file them all in a loose leaf note book.

ROLAND L. KUCK,
Kaukauna, Wis.

n r i

There Will Be More Like It

I enjoy every page of the "NATIONAL RADIO NEWS." The article "Servicing Universal A.C.-D.C. Receivers" by Mr. J. B. Straughn was wonderful, so clear and so helpful. I would like to see more like it.

RICHARD A. GILBERT,
Haverhill, Mass.

n r i

Yes Sir! Automatic Tuning, This Issue

Reference to articles such as "Universal A.C.-D.C. Receivers" and "Automatic Tuning is Here to Stay"—may we have more of these. They are just the thing to keep a Student or Graduate up-to-date in the field of Radio.

Would like to see "Electronics, Inc." in every issue of our magazine.

J. SHUMARD,
Berwyn, Alta., Canada.

n r i

A Helpful Magazine

NATIONAL RADIO NEWS is a very helpful magazine, not only in its Radio sense, but in the way that it keeps the graduates and students in contact with each other.

HAROLD BAUSINGER,
Williamsport, Penna.

Wants More of Jay and Ozzie

After reading, for the first time, "Electronics, Inc.," I know why everyone has been boosting the adventures of "Jay and Ozzie." They were excellent. Would like more of the same.

The article "Radio Marches On," by our President, Mr. J. E. Smith, surely was inspiring.

MICHAEL C. URAM,
McKees Rocks, Penna.

n r i

Just What He Wanted

I sure liked the article on Servicing Universal A.C.-D.C. Receivers. It helped me a lot and will continue to do so, as we have lots of Radios of that type here. Your articles in last few issues have been more than good and just what we want.

CARL E. SLATER,
Coolidge, Ariz.

n r i

Thank You, Mr. Underwood

I have just finished studying your article "Servicing Universal A.C.-D.C. Receivers" which appears in the April-May issue of our magazine N. R. NEWS and I want to tell you that this is the clearest, most instructive and helpful treatise I ever read on these midget receivers.

F. C. UNDERWOOD, JR.,
Quitman, Ga.

n r i

How About It Fellows—Do You Agree?

Our Radio NEWS is one of the best books I ever saw. It gives so much useful information. I received the latest copy today and was glad to see that "Electronics, Inc.," was back again. I certainly enjoy reading Electronics, Inc. This type of fiction makes very good reading and gives some workable ideas as to the use of Radio.

FRANK L. NOEL,
St. John's, Newfoundland.

Who Started This Anyway?

In filing the Service Sheets, I arrange them according to name, and insert a blank sheet with the receiver name, either written or typed, in between each name section. It all adds up in speed and efficiency.

PETE J. VARGAS,
Los Angeles, Calif.

———*n r i*———

A Little Strong But We Like It

This small magazine is better written and explained than any other magazine on the market, and I am glad that I am getting it.

MARTIN EHLERS,
Tucson, Ariz.

———*n r i*———

Only Two Things Wrong with News

I sure like the NATIONAL RADIO NEWS, I can see only two things wrong with it. It should be twice as large and come at least twice as often. It's so hard to wait two months for a magazine like that.

WALLACE E. BABB,
Davenport, Iowa.

———*n r i*———

Electronics, Inc., Delights His Wife

The present way of printing the service formulas is quite agreeable with the majority of us, I'm quite sure.

Electronics, Inc. is well liked—more power to Mr. L. J. Markus. Even my wife, a registered nurse, delights in reading NATIONAL RADIO NEWS, when Electronics, Inc. is within.

F. R. NORTON, JR.,
Hartford, Conn.

———*n r i*———

What Say You to This?

I hate to talk about the stories of Mr. Markus, but if he would change his form somewhat, and not have everything happen in Washington, and also change the use of the truck some I think it would be much better. I like the stories, but hope they don't appear too often, or everyone will be getting tired of them.

CLARENCE J. RUNYEN,
Norfolk, Va.

———*n r i*———

Plenty of Comments Like This

It gives me pleasure to thank you for the wonderful article, "Servicing Universal A.C.-D.C. Receivers," appearing in NATIONAL RADIO NEWS, April-May issue. Gentlemen, just what I have been waiting for.

ERNEST GRAY,
Baltimore, Md.

Let's Have Some Criticism Too

I like the NATIONAL RADIO NEWS; most of all "Business Problems in Radio Servicing" and "The Service Forum."

CARLETON LEVER,
El Centro, R. of C., S. A.

———*n r i*———

Do You Mean Electronics, Inc., Mr. Schaaf?

I certainly enjoyed that story in the last issue of the NEWS and I'd like to see more of them.

RAYMOND H. SCHAAF,
Ft. Wayne, Ind.

———*n r i*———

Thinks the News Is Swell

No foolin', I think that the NATIONAL RADIO NEWS is sure a swell magazine. I particularly liked the fiction, "Electronics, Inc." The articles on the inside front page always touch me to "drive on to the finish." Making a long story short, it is going to be mighty hard for anyone to figure out a better magazine than N. R. NEWS.

ELWOOD CLARK,
Hulbert, Okla.

———*n r i*———

Electronics, Inc. Are Tops With Him

Have received my third copy of NATIONAL RADIO NEWS and wish to state that I've thoroughly enjoyed each one.

Regarding the Service Forum, I prefer the present method of printing.

Electronics, Inc. are "tops" with me.

CLARENCE A. THEIS,
Darby, Penna.

———*n r i*———

Enjoys Reading N. R. News

I certainly enjoy N. R. I. NEWS and wish to express my appreciation of it. Three of the four men in my department are taking the N. R. I. Course and I am always glad to encourage them, since I am an old graduate. I am employed by RCA Manufacturing Company.

CHARLES H. RICHMAN,
Pitman, N. J.

———*n r i*———

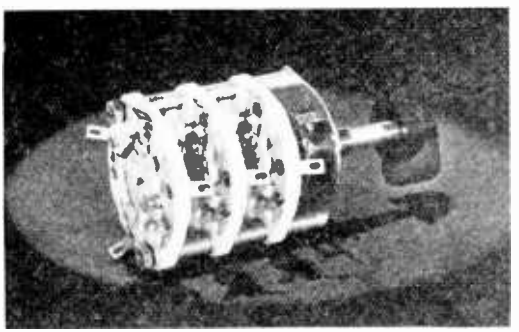
That's the Spirit, Mr. Wilson

I feel that our NEWS and the other help supplied will do their part to keep us chaps informed as to the latest events as they appear. I certainly have much appreciated receiving Radio NEWS in the past, and glad of a small part in prospering its continuance.

A. E. WILSON,
Havelock, Ont., Canada.

New Switches Defy High Voltage

A complete line of selector switches assembled with Isonlantite insulation for use in high voltage amateur transmitter circuits and other high frequency circuits has been announced by Centralab. One group of these switches has sufficient clearance between all electrical parts to operate safely at potentials up to 1000 volts D.C. The contacts are designed to handle up to 100 watts in transmitters circuits. The other group, for low voltage applications, is available in all the usual multiple pole multiple position types.



It is particularly advantageous to use these Isolantite switches in high frequency circuits. Isolantite has a power factor many times better than the best grade of bakelite, and its superior loss factor makes it ideal for use in transmitter circuits. Isolantite's substantially uniform dielectric constant means that tuned circuits in which this insulator is used will be more stable than those where other types of insulation are included.

Bulletin #684 describing this new line of Isolantite switches will be sent free on request to those writing to Centralab, 900 E. Keefe St., Milwaukee, Wis.

—————*n r i*—————

Additions to N.R.I. Ham List

Allen Schiavoni—W3GEZ—Philadelphia, Penna.
B. J. Prestini—W7GGN—Clayton, Wash.
C. R. Fernstrom—W6IPG—Oakland, Calif.
C. A. Burchfield—W5GTR—Hartford, Ark.
Stanley A. Jensen—W8IAE—Belding, Mich.
Cecil W. Chisholm—W9BRA—Paynesville, Minn.
Stanley Harrison—ZS5AS—Maclear, So. Africa.
Linton H. Jenkins—W3HHF—Washington, D. C.
Eugene Finz—W9GHQ—Mandan, N. Dak.
Edgar Marshall—YV4AO—Maracay, Venezuela.
James Greenfield—W8RRS—Corning, N. Y.
R. W. Thompson—W2KPD—Lynbrook, L.I., N.Y.
Ernest Bagel—W9YKH—Milwaukee, Wis.

NATIONAL RADIO NEWS

FROM N.R.I. TRAINING HEADQUARTERS

Vol. 8 No. 3

June-July, 1938

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
S. M. ARMSTRONG, MANAGING EDITOR

NATIONAL RADIO NEWS accepts no paid advertising. Articles referring to products of manufacturers, wholesalers, etc., are included for readers' information only, and we assume no responsibility for these companies or their products.

Index