PHILCO SERVICEMAN

Copyright 1938 By Philco Radio & Television Corporation

RADIO · MANUFACTURERS · SERVICE · NEWS

MAY, 1938

EDITORIAL

Speedy Service

SPEED of service is one of the most essential factors in modern business. The radio dealer who can offer his customers fast, courteous, quality service is in an advantageous position.

Having the necessary fast-moving replacement parts and tubes available at a moment's notice is a prime requisite for such service. The dealer or serviceman who carries a limited stock of the more commonly used replacement items certainly has the jump on the man who buys on a hand-to-mouth basis and must make costly trips to the jobber's parts store or wait several days for mail delivery. Your time is valuable, and it can be spent far more profitably to you in going out after new business than in going to the parts store dozens of times each month to pick up one or two items on each visit.

Most dealers and servicemen can anticipate with a fair degree of accuracy the approximate types and quantities of frequently used replacement parts and tubes they will require over a given period. Often a considerable saving in purchase price can be effected by such thoughtful buying in quantities or assortments. The time which is saved by having such items in stock means so much more money in your pocket. The important thing is that you are in a position to give fast service. Modern business moves fast because of keen competition. The business man who can best meet these modern demands of the trade will get the biggest share of the profits.

Tremendous Enthusiasm Greets R.M.S.-N.R.I. Announcement

Big Educational Program Clicks From Very Beginning

"AGAIN PHILCO has come through for the serviceman," writes one of the R. M. S. members, "and again thanks and congratulations to Radio Manufacturers Service."

Never, since the original formation of R. M. S. several years ago, has the industry responded with such enthusiasm as it has to the announcement of the special radio training course from National Radio Institute sponsored by Radio Manufacturers Service. Hundreds of congratulatory messages have been received from all parts of the country — from servicemen, dealers, jobbers and trade journal editors. N. R. I. reports enrollments are coming in faster than ever anticipated.

Such a mammoth plan for helping the individual serviceman to become a better serviceman has never before been attempted. Only R. M. S., through its consistently sincere efforts to help the service industry and the resulting sincere co-operation which has been extended by the thousands of members, could make possible such a tremendous program.

PHILCO is not going into the business of selling radio training courses. That is the job of National Radio Institute and other good schools which offer such training. PHILCO'S job is to furnish the best radio set our engineers know how to design and to sell as many of these sets as our thousands of loyal PHILCO dealers know how to sell. But radio is a fast-moving, progressive industry. The modern radio set is a highly complicated instrument; the radio of tomorrow is going to be even more complicated, and television in the not too distant future will afford technical problems which are scarcely dreamed of today. All of this means that if the service industry, as we know it today, is going to survive, it must keep pace technically with the other branches of radio design and manufacture.

Radio Manufacturers Service makes it possible for the man who feels a need for more sound training in basic radio theory and practice to obtain such training through N. R. I. at about one-half the cost of the usual course. "Study, Learn and Earn" is an excellent rule for the serviceman to follow.

PHILCO PARTS

the highest quality it is possible to build, are

NOT EXPENSIVE

Look at these examples:

	PHILCO	COMPETITIVE
Volume Controls . .	$1.00	$1.45
Speaker Cones . . .	1.40	2.00
Dials	1.00	1.50

and countless others

NEW AUTO RADIO HINGE AERIAL DEVELOPED

Novel Mounting Shortens Installation Time

PHILCO announces an addition to the line of matched and tuned Auto Radio Aerials. The new aerial is the "hinge" type; that is, it mounts on the auto door hinge. The method of mounting is the most satisfactory yet developed for a hinge aerial. The lead-in is of a special type so that the combination of the aerial and lead-in provides an exact matched and tuned aerial for the new PHILCO Auto Radios, just the same as the new PHILCO Cowl, Under-Car and Car-Top Aerials.

Two Section Telescopic

The new PHILCO Hinge Aerial is a two-section, telescopic rod and is rustproof. The length closed is 29 inches and extended is 48 inches. The lead-in is designed so that the antenna and lead-in are exactly matched to the PHILCO Auto Radios. Each aerial is individually packed in a carton satisfactory for reshipping.

Matched and Tuned

This aerial, like the other new PHILCO aerials, is especially tuned to the PHILCO radios, yet it is entirely satisfactory for any other make of radio. It will match other makes as well as the other aerials which might be used with them, and it has the great advantage of being a real quality, sturdy, rustproof rod.

The part number of the new PHILCO Hinge Aerial is 45-2685, and the list price is $2.50.

If you want more information or if you have any questions regarding the special R.M.S.-N.R.I. course in Radio Theory and Practice, do not hesitate to write to Philco or direct to National Radio Institute.

New PHILCO *Hinge Aerial Priced at Only $2.50 List.*

Reports Signal Generator "On the Button" After 15,000 Miles

JOHN D. HICKS, who travels the entire Central and South American territory for the PHILCO Export Parts and Service Division, sent us an interesting report from Rio de Janeiro, Brazil, concerning his PHILCO Model 077 Signal Generator. We quote below from Mr. Hicks' letter:

> "I believe that you will be interested in the following information concerning the history of my 077-026A. In Havana on December 22nd, I adjusted the calibration of my 077 by the use of a crystal oscillator. In Rio, almost three months and 15,000 miles later (constant traveling), I again checked it against a crystal standard, and a beat frequency oscillator resulted + 1 K.C. at 18 megacycles. As you know, I carry it in a soft 'near-leather' zipper bag, and it has received ordinary baggage treatment in the hands of baggage handlers. Pan-American Airways was good enough to get it in the river for me on one occasion. As a result, the brass front turned green, the corners are bent in, and half of the screw heads have snapped off, but it still works right on the 'button.' I am highly pleased with it."

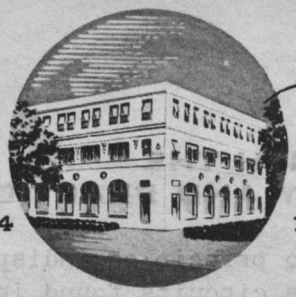
Political Campaigns Bring Amplifier Sales

THE Model 905 Amplifier is ideally suited for political meetings of all kinds. As there are many political campaigns getting under way in all parts of the country right now, dealers and servicemen will find a ready market for the Model 905 Amplifiers to political clubs and organizations.

It is essential today to use an amplifier for political meetings. Instead of renting an amplifier of unknown characteristics at each stop, as many candidates do, a Model 905 can be carried with them on their trips with less trouble than a handbag, and the talks will be presented better because the candidate is accustomed to using his own amplifier and knows how to get the best results from it.

These men have all had embarrassing situations due to amplifier failures and poor quality from amplifiers which they have been given to use in different parts of their district. The low price of the 905 Amplifier makes it possible for them to have a high-quality unit and be sure of getting their story over the way they want to at every meeting.

Contact all candidates as well as all political groups as quickly as possible and give them a demonstration of the PHILCO Model 905 Amplifier.



National Radio Institute

ESTABLISHED 1914 — 16TH AND U STS., N.W. WASHINGTON, D.C.

Dear Sir:

There are no two ways about it -- you will either forge ahead or be forced out of Radio.

Each month new circuits and new gadgets are making receivers more and more complicated -- are making Radio servicing a whirlpool of new problems.

Each month hundreds of freshly-trained men, right up on their toes in Radio theory and modern servicing techniques, plunge into the whirlpool with a determination to get their share of the servicing business. Each month hundreds of old-timers get pushed out.

Certainly you recognize this threat to your future. Look in the classified section of your telephone directory and count your new competitors; check up on a few of your old customers and see how many have swung over to newcomers.

Take a good look at the circuit diagram of a modern all-wave, high-fidelity receiver with AFC and all other circuit refinements -- if it's Greek to you, beware!

Recently Philco sent you a booklet -- "How to Make and Keep Radio Servicing Profitable" -- which gave the solution to your problem.

Did you read this booklet carefully? Could you answer all of the questions about Radio servicing problems on pages 7 through 15? Did you read about the special NRI-RMS Course in Radio Theory and Practice which completely modernizes your knowledge of Radio and places you on a par with any and all competitors?

And did you notice all this can be accomplished in a short time, right in your own home, without interfering with your work, for as little as $5 a month?

Radio servicing is a profession, and you, like a doctor, a lawyer, or an engineer, are a professional man. These other men study to keep in step with progress -- you should too!

Enroll today for this Philco-sponsored N.R.I.-prepared Radio Course. This Course is the best possible insurance that your Radio servicing will be profitable in the future. Send the enclosed enrollment blank NOW.

If there are any questions you would like to ask about this Course or about any of the text books in it, just jot them down NOW on the back of this sheet, and mail it to us in the postage free envelope enclosed with the booklet. You will get a complete reply to each and every question by return mail.

Cordially yours,

FFT

NATIONAL RADIO INSTITUTE

HERE IS WHAT YOU GET WITH THE NRI-RMS COURSE IN RADIO THEORY AND PRACTICE

FORTY N.R.I. TEXT BOOKS covering the underlying Radio principles indispensable to an expert serviceman, analyzing completely various circuits found in modern Radio receivers; presenting new and tested service techniques efficient and effective on absolutely any modern receiver. There are just enough books on elementary Radio to refresh your memory and make it easier to master the advanced books.

These text books contain over 1,200 pages of instruction material, supplemented by more than 1,400 illustrations and circuit diagrams.

COMPLETE AND PERSONAL EXAMINATION SERVICE ON EACH STUDY TEXT. The world's finest Radio instructors will grade your answers, coaching you personally when necessary. Your graded answers for each lesson and set of Model Answers for that same lesson go back to you by first class mail.

PERSONAL CONSULTATION SERVICE on any problem connected with your studies or your regular Radio work. Many N.R.I. graduates say that this service alone is worth the price of the entire regular Course.

CERTIFICATE OF ACHIEVEMENT, awarded jointly by Radio Manufacturers Service Headquarters and the National Radio Institute when you graduate.

PHILCO MODEL 044 AUDIO SIGNAL GENERATOR, an invaluable instrument for modern Radio servicing. This instrument alone has a List Price of $37.75.

* * * * * * * * * * * * * * * *

IMPORTANT: You do not have to be an R.M.S. member to take this Course. You can enroll now, and apply for R.M.S. membership (there's no charge to join) some time before you graduate.

If you have any questions about this Course, jot them down here, now, and mail this sheet to National Radio Institute, Washington, D. C., for a prompt reply.

☐ Send me a copy of the 32-page book "How to Make and Keep Radio Servicing Profitable." I did not receive one (or misplaced it).

Name:.....

Address:.....

.....

You Get This

PHILCO
Audio Signal Generator

This is a high quality instrument designed by the Philco Radio engineers and recommended for Servicemen by Philco. The list price is $37.75.

If you pay cash in full or $30 upon enrollment, you get it at once. It is sent express charges collect. If you choose Plan A and want this $37.75 instrument before you pay in full, we will send it any time you make an advance payment of $20. *This $20 is not an extra charge, but will be deducted from your balance; your payments to be made every month as usual.*

ENROLLMENT BLANK

SPECIAL COURSE IN RADIO THEORY AND PRACTICE FOR SERVICEMEN

National Radio Institute
16th & U Sts. N. W.
Washington, D. C.

Date.....

Gentlemen:

Enroll me for your Special Course in Radio Theory and Practice for Servicemen. I am to receive the Philco Audio Signal Generator Model 044, the Instruction Material and every Privilege of this Special Course as set forth in your catalog. I am to have up to 1½ years to finish.

Should I want an instrument other than the 044 Signal Generator, I understand I can get any higher priced Philco Servicing Instrument by paying only 50% of the difference between the list price of the 044 Signal Generator and the list price of the other instrument. I agree to follow your plan of teaching and pay according to the plan checked:

☐ A $2.50 herewith and $5 every 30 days until I pay $67.50.

☐ B $60 in full herewith. *(If you prefer, send $30 now and $30 in 60 days.)* You save $7.50.

(Students in Canada and foreign countries assume the payment of customs duties and any differences in exchange money rates.)

Name.....
(Sign with ink, please.)

Address.....

City..... State.....

Remit by check, draft or money order payable to the National Radio Institute.

EB21-36

LITHO. IN U. S. A.

ULTRA-HIGH FREQUENCY OSCILLATORS

Such as Used in Television Transmitters

(Reprinted from Lesson 21 FR-2 of the Special R.M.S.-N.R.I. Course)

OSCILLATORS which must generate very high radio frequencies with very low-frequency drift introduce many special problems. To be sure, crystal oscillators can be used with one or more special harmonic-producing R.F. amplifiers, which are adjusted to double and redouble the oscillator frequency until the desired ultra-high frequency (u.h.f.) is obtained. A single amplifier operated with a C bias greater than the plate current cut-off value will, if excited with a signal of some definite frequency, produce in its plate circuit the second, fourth, sixth, eighth, etc., harmonics of this input frequency, the second harmonic being the strongest. By using other similar amplifiers, each tuned to the second harmonic of the preceding stage, the original frequency produced by a crystal oscillator can be doubled many times, but there are serious drawbacks to this doubling method. When the crystal frequency is 5000 K.C. (the practical maximum operating frequency of a quartz crystal), and frequencies of the order of 100,000 K.C. are desired (such as for television purposes), it is expensive as well as difficult to build frequency doublers which will operate satisfactorily at such high frequencies.

Acorn-type tubes are used extensively with very high Q tank circuits for low-power, self-excited u.h.f. oscillators. The tank coils are wound with stiff, solid wire which requires no supporting form, thus keeping the distributed capacity and the losses of the coil at a minimum. Midget tuning condensers can be used, but often the required tank capacity is obtained by varying the spacing of the coil turns. This form of u.h.f. oscillator is used in television receivers.

When the mid-tap of the tank coil in a self-excited u.h.f. oscillator is grounded as in Fig. 11A, the coil ends are alternately positive and negative;* when one end of the coil is grounded, as in Fig. 11B, the other end likewise changes in polarity. The distribution of voltage is sinusoidal, hence Fig. 11A shows half-wave ($\lambda/2$) and Fig. 11B shows quarter wave ($\lambda/4$) voltage distribution. This does not necessarily mean that the coil itself is a half or quarter wave length long in physical size; the physical and electrical lengths of the coil can be made the same, however, by using straight metal wires or pipes, as shown in Fig. 11C. Here pipes 1 and 2 are separated from one to four inches by air. When very high-frequency, low-wave-length circuits are desired, simple pipes are used without tuning condensers.

For high-power u.h.f. oscillators, coils are made of copper tubing; sometimes two straight copper pipes side by side or one inside the other are used to provide the required inductance and capacitance. A single turn of tubing or even less is generally sufficient. Push-push tube circuits like that shown in Fig. 12A are customarily used; to get close grid-to-plate coupling (unity coupling), the grid wire is run inside the length of copper tubing which connects the plates together. Notice how electrode voltages are fed to the mid-points of the plate and grid loops or coils.

The circuit shown in Fig. 12B is a tuned-grid, tuned-plate oscillator (essentially the same as the fundamental Armstrong circuit shown in Fig. 6H), but using parallel pipes which may or may not be concentric. So-called quarter wave-length lines are used to tune the grid and plate circuits. Since the grid tank circuit governs the frequency, it should be mechanically designed so that temperature changes do not affect its physical length. The plate-tuned line can be replaced with a coil and condenser (or coil alone) to conserve space, for it merely needs to be tuned slightly inductive.

Fig. 12C is the ultra-audion circuit shown in Fig. 6F with parallel lines substituted for a coil-condenser tank circuit; whereas the grid and plate in Fig. 12B were tapped along the line, and the filament was connected to the end of the line, in Fig. 12C the grid and plate are tapped opposite each other along the line. The latter method gives twice the A.C. tank voltage. The taps are made variable so a better impedance match can be obtained, giving the better circuit efficiency and stability. Points 1 and 2 in either circuit are load-coupling points and are usually variable as to position.

The three circuits in Fig. 12 are widely used in television transmitters where high power and good frequency stability are required. They will operate at from 50 to 200 megacycles, the higher frequencies generally being used to relay a program from a pick-up point to a main studio or from studio to transmitter. Amateurs use these circuits for communication in the 5-meter (56-megacycle) band. Air-core coils and midget variable condensers are preferred in television receivers, although lines are occasionally used where space permits.

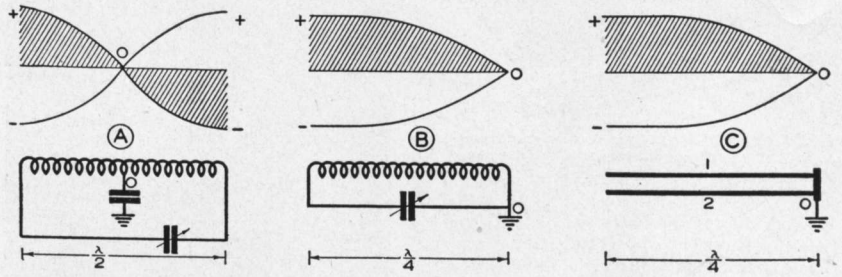


Fig. 11. The curves shown here give the voltage distribution across: A, the coil of an oscillator tank circuit when the coil mid-tap is grounded through an R.F. by-pass condenser; B, the coil of an oscillator tank circuit when one end of the coil is grounded; C, one of the pipes in an u.h.f. tank circuit using two parallel or concentric metal pipes. In each case, the horizontal reference line represents ground potential or zero voltage; in each case the curve surrounding a shaded area represents conditions for that half of a cycle when the left-hand end of the tank coil is positive, and the other curve (the minus curve) portrays conditions for the other half of the cycle. The curves at C are for one pipe (No. 1) only; curves for the other pipe would have exactly the same shape but opposite polarity.

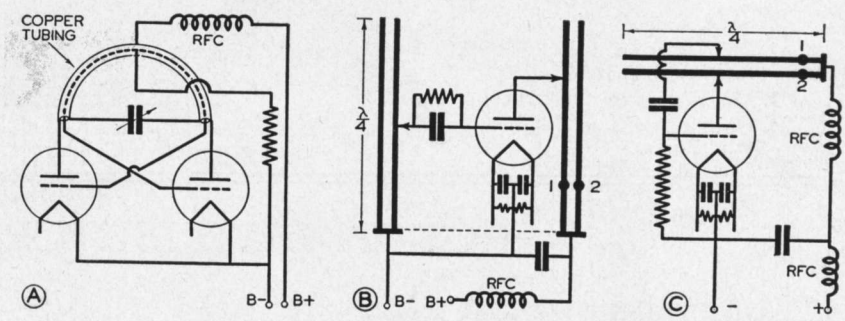


Fig. 12. Three high-power, ultra-high frequency oscillator circuits which are widely used in television transmitters.

* The coil tap can be grounded directly or through a condenser; either procedure places the coil tap at zero A.C. potential with respect to ground.

Marine Emergency Loud-Speaker Equipment Installed on Passenger Vessels

Most Rigid Specifications Met by Philco Engineers

PHILCO has built many high-power amplifier jobs for various ships equipped with marine emergency loud-speaker systems. These installations are sold through the International Business Machines Corporation.

Federal law now requires passenger ships of United States registry to be equipped with loud-speaker systems for emergency use at sea. We quote below from the rules and regulations of the

Fig. 1. Front of control panel showing all operating controls which are regulated by the officer on the bridge.

United States Department of Commerce, Bureau of Navigation and Steamboat Inspection:

"All passenger vessels on which lifeboats are stowed more than 100 feet from the navigating bridge shall be equipped with a loud-speaker system which shall enable an officer on the bridge to broadcast, separately or collectively, to the following locations:

1. Lifeboat stations (port and starboard).
2. Embarkation deck (port and starboard).
3. Main quarters for crew.
4. Public spaces as required by the Bureau.

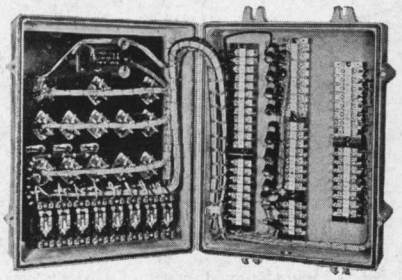


Fig. 2. Back of control panel showing massive relay system employed for remote control.

"The entire loud-speaker system shall be controlled from a single location on the bridge. It shall be maintained in an efficient condition at all times and, when the vessel is under way, shall always be supplied with power and ready for immediate use. The system shall be equipped with a call or attention signal, which shall be a distinctive note of about 1500 cycles frequency.

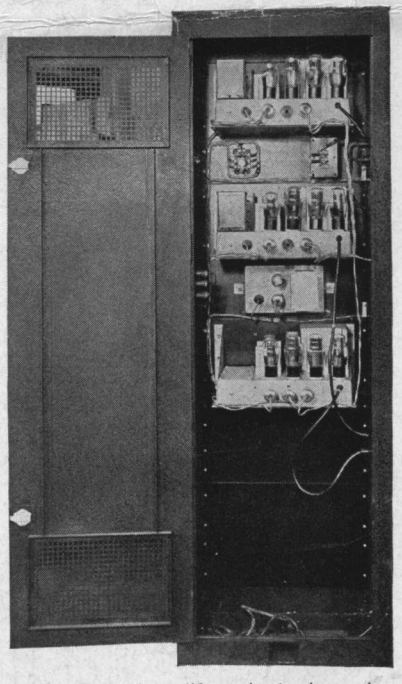


Fig. 3. Back of amplifier unit showing various power amplifier assemblies.

An automatic switching arrangement shall be provided which will transfer the system to the emergency power supply in event of the failure of the regular power supply. The system shall be so installed as to minimize extensive damage by fire or collision."

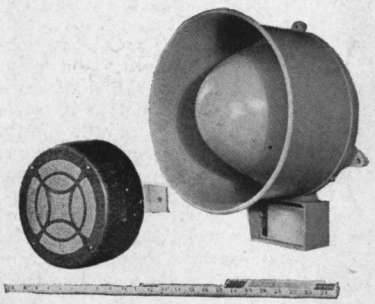


Fig. 4. Speakers used for installation throughout the ship. The small speaker to the left is for inside installation, and the larger speaker at the right is the weatherproof outside type.

PHILCO has already supplied installations for the following ships:

UNITED FRUIT LINE

Name of Ship	*Name of Ship*
Santa Marta	Quirigua
Ulua	Peten
Toloa	Veragua
S.S. Sixaola	Chiriqui
Talamanca	Antiqua

GRACE LINE, INC.

Name of Ship	*Name of Ship*
Santa Barbara	Santa Rosa
Santa Maria	Santa Ellena
Santa Clara	Santa Inez
Santa Lucia	Santa Rita
Santa Paula	

NORTHLAND TRANSPORTATION COMPANY

Name of Ship	*Name of Ship*
S.S. North Sea	S.S. Cristobal
S.S. Ancon	

PACIFIC AMERICAN FISHERIES COMPANY OF BELLINGHAM, WASHINGTON

Name of Ship
S.S. North King

P. & O. STEAMSHIP COMPANY

Name of Ship	*Name of Ship*
S.S. Florida	S.S. Cuba

ROSKIN DISTRIBUTORS, Inc.

1113 Commonwealth Ave. Boston, Mass.

C. H. MORSE, Service Manager

PRINTED IN U. S. A.