

PHILCO SERVICEMAN

• SERVICE • NEWS • FOR • PHILCO • DEALERS •

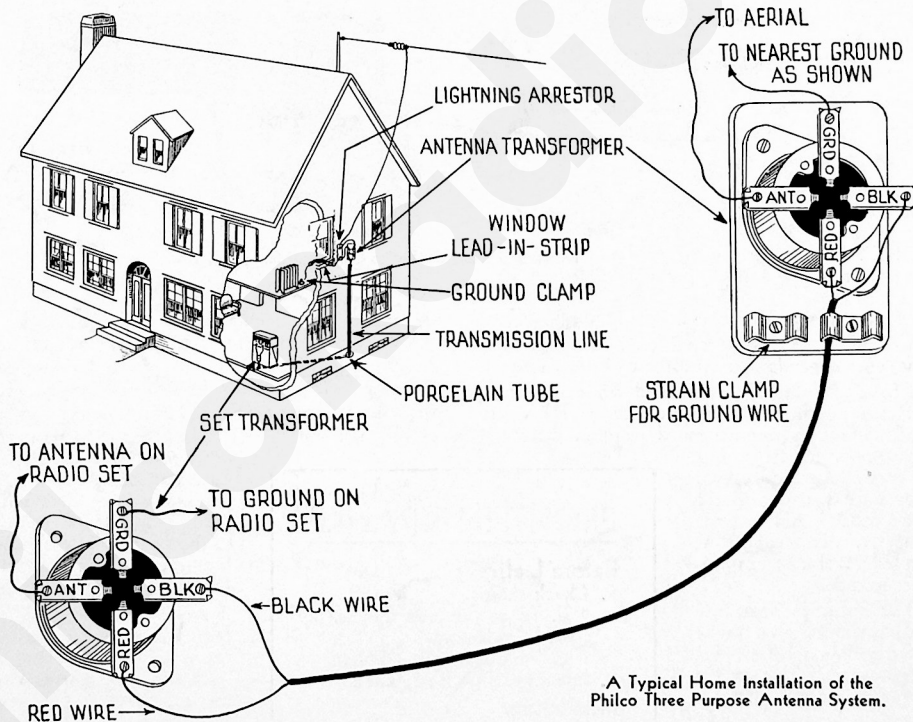
FEBRUARY, 1933

NEW ♦ DIFFERENT ♦ BETTER Philco Three Purpose Antenna System

Noise Elimination—Greater Distance—Multiple Set Operation

HERE is the latest triumph of the Philco Research Laboratories—the new Philco Three Purpose Antenna System—a complete high efficiency aerial system. You do not buy any extras; and you sell the

device until Philco had something to offer which was definitely better and which could be presented to Philco dealers as a real money maker rather than as an answer to a few scattered demands.



A Typical Home Installation of the Philco Three Purpose Antenna System.

system as a complete installation at \$10.00; the greatest feature of all—it works.

The Philco Three Purpose Antenna kit is new, it is different from other kits, and is of proven superiority. There have been many so-called static eliminating aerial kits placed on the market recently, and many claims have been made which later did not prove themselves. Philco's strict policy of quality merchandise would not permit the announcement of such a

Noiseless Reception and More Stations

The primary purpose of the Philco system is the reduction of noise (man-made static) which is picked up in the lead-in wire. This noise originates from electric wiring, various small motors and electrical appliances within the house, and from telephone lines and dials. Of equal importance, however, is the greatly increased efficiency of reception, and the fact that more stations will be heard. The sale of the Philco Three

(Continued on third page)

A New Resistor Indicator

THE Philco I.R.C. Resistor Indicator is a newly developed and extremely convenient device for the aid of the serviceman. It is a calibrated 100,000 ohm variable wire wound resistor, the most important uses of which are the determination of the value of defective resistors or of replacement resistors, and as a temporary voltage divider for tapping off fixed voltages from a supply.

The useful range of this resistor may be extended by adding fixed resistors of known value in series with the Philco I.R.C. Resistor Indicator. Thus by adding a 150,000 ohm fixed resistor in series, resistors up to 250,000 ohms may be checked. By adding 400,000 ohm fixed resistors in series, resistors up to 500,000 ohms may be checked, etc.

To Determine Replacement Values of Resistors

(a) Disconnect the burnt out or defective resistor from its circuit.

(b) Connect left and center binding posts of Philco I.R.C. Resistor Indicator in place of resistor whose value is to be determined.

(c) Voltmeter should be connected across circuit which voltage depends upon resistor to be replaced.

(d) Move test prod along exposed wires of Philco I.R.C. Resistor Indicator until voltmeter reads correct value of voltage as recommended by manufacturer. If you have no voltmeter, move the test prod along the Resistor Indicator until you obtain the best tone quality and volume from the set. This should be done on several stations to produce best results.

(e) The value of resistance indicated by the test prod on the scale of the Philco I.R.C. Resistor Indicator is the correct value of resistor required.

Be sure your set is turned on and tubes have heated up before reading voltage on voltmeter and resistance value on indicator. Also be sure that you start with the test prod at 100,000 ohms and gradually decrease the resistance until the proper resistance value is determined.

Use as a Calibrated Voltage Divider

(a) By connecting the two outside binding posts across a source of voltage, any desired voltage below that of the supply may be tapped off between the left hand and center binding posts. For example: If the Indicator is connected across a source of 110 volts, and the test prod is placed at the 50,000 mark, a voltage of $\frac{50,000}{100,000} \times 110$, or 55 volts may be obtained. In this way any fraction of the supply voltage may be tapped off.

(b) In the same way the proper values of a 100,000 ohm voltage divider may be determined experimentally. For example: Suppose it is desired to determine



Method of Using the Philco I.R.C. Resistance Indicator.

the values of a 100,000 ohm voltage divider for a power supply delivering 300 volts, with tap at 180 and 90 volts. Connect the two outer binding posts of Resistor Indicator across the 300 volt supply. Connect the left and center posts of Indicator across a voltmeter and the 180 volt circuit. Move test prod along the exposed wire of Resistor Indicator until voltmeter reads 180 volts. The resistance value indicated is the proper value for this part of the divider. In the same way the other portion of the divider for 90 volts may be determined.

Note: After determining the proper resistance value, replace the resistor with a unit of at least the same physical size as the resistor you are replacing and resistance value as determined. This will insure continued satisfactory service.

The Philco I.R.C. Resistor Indicator should be in the possession of every dealer and serviceman. It can be obtained from the service department at \$2.40 net dealer price (Philco part No. 8313).

PROFIT INSURANCE

Before Delivery

1. Check chassis.
 - a. Tubes and tube shields.
 - b. Pilot lamp.
 - c. Performance.

2. Inspect and polish cabinet.

Installation

1. Insist on good aerial and ground.
2. Loosen chassis hold down bolts.
3. Adjust shadow tuning.
4. Check performance.
5. Instruct owner by demonstrating correct tuning, automatic volume control and general operation.

ENROLLMENT APPLICATION

NATIONAL RADIO INSTITUTE
1536 U STREET NORTHWEST
WASHINGTON, D. C.

PROFESSIONAL SERVICEMEN'S COURSE

The Professional Servicemen's Course Includes:

1. Complete course of FIFTY-TWO Lesson Texts
2. Lesson grading service on all Lesson Texts
3. Series of TWELVE special Reference Books
4. EIGHT Service Manuals of diagrams and service data
5. Consultation Service on any problems pertaining to the Course
6. Subscription to "National Radio News" without extra cost
7. A Registration Certificate upon enrollment
8. A Diploma upon graduation
9. Two full years in which to complete the Course

National Radio Institute,
1536 You St., N. W.,
Washington, D. C.

Date

Gentlemen: Enroll me for your special PROFESSIONAL SERVICEMEN'S COURSE in Radio to start at once. It is understood that I am to receive all materials and services mentioned in the column to the left which is made a part of this agreement.

It is further understood that:

You are to make regular reports of my progress in the Course to my employer.

Under no circumstances whatever am I to be called upon for any payment other than the tuition fee stated below, which I agree to pay to your order as I have indicated below:

Check the Plan You Prefer

- \$6 herewith and \$5 every thirty days until I have paid \$66.
 \$60 herewith. (You may send \$30 herewith and \$30 in 30 days.)

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

With the above understanding, I agree to make my payments regularly, follow your plan of instruction, and confine your instruction service to my own use.

Your Name

(Must be written in ink)

Street and Number

(Address to which all instruction material is to be sent)

City State

Make check, draft, or money order payable to National Radio Institute.

SEND REPORTS TO

Name of Employer

(Please give title and initials)

Firm Name

Address

IMPORTANT

It is important that this enrollment be countersigned by the Distributor's Service Manager and the Distributor. When you have filled out the Enrollment Application, send it, with your remittance to *Your Philco Distributor*. He will execute the countersignatures and forward it to the National Radio Institute.

COUNTER-SIGNED

We certify that the man whose signature appears on the Enrollment Application above is entitled to the above special price on your Professional Servicemen's Course arranged with Philco Radio and Television Corp.

.....
(Distributor's Service Manager)

.....
(Distributor)

(OVER)

PRINTED IN U. S. A.

A Partial List of Subjects Covered in the 52 Lesson Texts and 20 Reference Books of THE PROFESSIONAL SERVICEMEN'S COURSE

What electricity is
 Electricity and magnetism
 What Radio waves are
 Energy conversion
 Radio symbols and diagrams
 How to read a graph
 Radio abbreviations
 Installation service
 Generation of electricity
 Practical Radio circuits
 Series and parallel circuits
 Elementary electrical measurements
 Servicing receivers in the home
 Trouble localization
 Proper service technique
 Resistance in Radio circuits
 Ohms and Kirchhoff's Laws
 Temperature effect on resistance
 Resistance in A.C. circuits
 Mutual induction and self-induction
 Magnetic coupling
 Induction
 Inductive reactance
 Radio coils
 Radio condensers
 Oscillatory circuits
 Damped waves and undamped waves
 Capacity measurements
 Capacitive reactance
 Parallel and series resonance
 Vacuum tube theory and practice
 The effect of plate voltage
 Filament temperature
 The effect of gas in a tube
 The grid as a control device
 Rectifying tubes
 Power tubes
 Screen grid tubes
 Pentode tubes
 Radio drafting and blueprint reading
 Radio transformers & methods of tuning
 Turns ratio
 Impedance in series circuits
 Reactance in parallel circuits
 How a triode amplifies
 The effect of grid voltage
 Current flow in the grid circuit
 Tube factors
 Cascade amplification
 Iron core and power transformers
 Magnetic circuits
 Magnetomotive force
 Reluctance
 Laws of magnetic circuits
 Eddy current losses
 Iron losses
 Distortion by hysteresis
 The diode rectifier
 Full and half wave rectification
 The filter unit
 The voltage divider
 The complete power pack
 Voltage supply methods
 The mercury arc rectifier
 Dry electrolytic rectifiers
 Mechanical rectifying systems
 Methods of obtaining C bias
 Bench servicing of power packs
 How to trace grid circuits
 Testing power pack parts
 The condenser block test
 How to bridge open resistors
 Sound and sound waves
 Microphones
 Sound reproducers
 Measurement of sound energy
 The decibel
 Beat Notes
 Audio amplifiers
 Types of coupling used
 Audio distortion
 Impedance matching
 Push-pull amplification
 Loftin-White amplifiers
 Power amplification
 Maximum undistorted power output
 The Radio frequency amplifier
 Sensitivity
 Selectivity
 Tuning circuits
 By-passing and choking
 R.F. coupling
 Preventing self-oscillation
 Detector tubes
 Modulation and de-modulation
 Various types of detection
 Regeneration and feed-back
 Secondary emission in S.G. tubes
 The S.G. tube as an audio amplifier
 The S.G. tube as a detector
 The power pentode
 Cross-modulation and distortion
 Variable mu tubes
 R.F. pentodes
 Testing vacuum tubes
 The mutual conductance test
 A laboratory tube checker
 Total emission tests
 Gas tests
 Mutual conductance bridges
 Emission meters
 Oscillation tests
 Practical R.F. circuits
 Fixed and tuned R.F. circuits
 R.F. choke coils
 Methods of controlling volume
 Wavetraps
 Analysis of R.F. amplification
 Methods of neutralization
 Shielding
 Vacuum tube as an oscillator
 Effect of coupling on oscillation
 Power efficiency
 Dynatron oscillators
 Heising modulation
 Audio oscillators
 Tuners and wave filters
 Effect of reflected values
 Selectivity and sensitivity
 R.F. band pass circuits
 Audio frequency filters
 Modern superheterodyne receiver
 Superheterodyne troubles & remedies
 Home acoustics
 Internal receiver noise
 How to locate and stop receiver hum
 External receiver noise
 Use of filters
 Construction of filters
 Receiver characteristics
 Sensitivity tests
 Selectivity tests
 Fidelity tests
 Photocells and glow lamps
 Loudspeakers
 Tube-to-speaker coupling devices
 Tone control
 Testing loudspeakers
 Repair notes for the Serviceman
 Current measuring devices
 Voltage measuring devices
 Capacity and frequency meters
 Resistance & inductance measurements
 The Wheatstone bridge
 Testing with meters at the work bench
 How to use a vacuum tube voltmeter
 How to calculate multipliers and shunts
 Tracing circuits with meters
 Testing receiver parts
 How to match R.F. coils
 Testing shielded coils
 Leakage tests
 Testing power supply parts
 Receiver refinements
 Remote control
 Automatic tuning
 Automatic volume control
 Visual tuning
 Phonograph pick-up
 Scratch filters
 Special Radio installations
 Building a portable receiver
 Automobile receivers
 Power amplifiers
 Public address systems
 Remote control devices
 S.W. receivers and transmitters
 All-wave receivers
 Practical short wave circuits
 Theory of radiation
 Ground and counterpoise systems
 Decibel measurements in A.F. stages
 Sources of audio distortion
 Power amplifier design
 Bench servicing of A.F. equipment
 Bench servicing of R.F. equipment
 The use of signal generators
 A modern transmitting installation
 Arithmetic in Radio
 Algebra in Radio
 Geometry in Radio
 Trigonometry in Radio

(OVER)

Philco Three Purpose Antenna System

(Continued from first page)

Purpose Antenna System is not limited, therefore to noisy locations. It can be used in any location and will provide greatly increased efficiency of reception. The third purpose of the system is to provide efficient operation of from two to four radio sets from a single antenna. All of these objects are accomplished in the installation of the complete system which includes all of the necessary parts for the best possible aerial job.

The equipment is complete in every detail, and its installation is comparatively simple. Actual tests have shown that the average serviceman can do the entire job, in the careful manner that the best installation should be handled, in less than two hours.

Method of Installation Important

The Philco system includes the complete aerial equipment of the usual installation, plus the special high efficiency, noise eliminating transmission line equipment. This latter includes the special Philco matched antenna transformer, the matched lead-in transmission line and the matched radio set transformer. Noise elimination and efficiency of reception are dependent upon mounting the antenna transformer at a point near the antenna and where there is available a good ground connection. The special transmission line from this point may be led, through the interference receiving area, to the radio set without picking up any noise or losing any efficiency.

A coil of 75 feet of special Philco 7 strand aerial wire is supplied with each kit, as well as the necessary insulators, lightning arrestor, lead-in strip, nail-on knobs, etc. The best aerial is a single horizontal stretch of approximately 50 to 75 feet. The wire should be as high as possible, should be removed as far as possible from any other wiring, and should be at right angles to such wiring; it should also be away from any large metal objects and should not touch the branches of a tree.

The lead-in wire, which is a continuation of the aerial wire, is brought down as directly as possible to the nearest available point where there is a ground connection. In the case of the average two-story house this point would be at a second floor bedroom or bathroom window where a ground connection could be

made to a radiator or water pipe. In the case of an apartment building, a good ground could be made to an overflow or vent pipe or to a tin roof if it is found that the roof is well grounded. **The important point is to get a good connection to a grounded mass as high above actual ground as possible.** At this point—outside the window in the case of the two-story house—the Philco matched antenna transformer is mounted. No advantage is gained by mounting the antenna transformer higher than this level of the ground connection. The aerial wire connects to the "aerial" terminal on the transformer, and the ground wire connects to the "ground" terminal.



SHIPPING PLATFORM—PHILCO—PHILADELPHIA

Philco Radio, from its beginning in the small parts manufacture, to its completion in the Shipping Department has gone through every stage of inspection, adjustment, and test to make it the finest radio on which every Philco dealer can stake his reputation.

Transmission Line Through Noise Area

To the other side of the aerial transformer, on the terminals marked "red and black" are attached the red and black wires of the Philco low impedance lead-in transmission line. This wire is a specially developed light twisted pair, weatherproof, easy to handle, and easy to install. This line is run from the antenna transformer to the radio set. In a home installation it would go down to a basement window, through the porcelain tube insulator into the basement, and up through a hole in the floor at a point convenient for connection to the radio set.

Permits Use of Long Transmission Line

A 50 foot coil of transmission line is furnished with the kit, but additional line in 100 foot coils is available at \$2.00 list (Philco part No. L-1556). Up to 400 feet can be used without affecting the sensitivity of the installation or without any increased noise pickup.

The Philco matched radio set transformer is mounted in the back of the radio cabinet. The red and black wires of the transmission line connect to the "red" and "black" terminals of the transformer, and the "aerial" and "ground" terminals of the transformer are then connected through two separate wires to the aerial and ground terminals of the radio chassis. The original ground wire at the radio set is not used.

This completes the installation, and the system is ready to operate as a high efficiency, noise eliminating aerial, offering quality performance such as the customer has never before experienced.

(Continued on fourth page)

Servicemen, Are You Following Technical Radio Development?

If you have followed the trend in Radio developments you know that Radio has gotten down to an art where details in design and installation are a very vital factor. Basic principles haven't changed . . . but the amount of basic details required by the careful technician is mounting. To follow the rapid changes in the art it is important that many servicemen get a new overall insight into fundamental Radio principles.

Recently we reviewed the Course in Radio theory and service technique put out by the National Radio Institute of Washington, D. C. We were so much impressed by its fundamental attack, its completeness, its up-to-date contents that we suggested a special course for Philco servicemen. The result is that they have prepared a Professional Servicemen's Course which we are able to offer to Philco servicemen at a

substantial reduction in price. It is, we believe, uniquely fitted to your needs.

This Course is arranged so you study the theoretical side of a Radio problem first, and then immediately following, learn its practical and service application. Thus theory and practice are presented from the very first texts. When you study the theory and design of modern superheterodyne receivers you immediately study how to service and repair them. The Course is complete in every modern detail and a very large part of it is devoted to Radio meters and instruments, and their use in bench and laboratory testing.

The attached enrollment blank of the National Radio Institute gives you the complete information on the new courses. Send in your application to the Service Department now.

Philco Three Purpose Antenna System

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Up to Four Radios on Single Aerial

When operating more than one radio set from a single aerial, it is only necessary to tap off parallel connections from the transmission line, using whatever additional length of this line is necessary, and to connect to another radio set transformer at the second set. These transformers are available separately at

\$.75 list (Philco part No. 32-1004).

Here is a real opportunity to cash in on some plus business. Every new radio sale you make, particularly the larger models, should have a Philco Three Purpose Antenna System. Every one of your old customers is a prospect. Remember—you make at least \$5.00 clear profit on every job you install.

QUESTIONS AND ANSWERS

1. Q. Can shadow tuning be installed on the earlier Model 71 Receivers which do not have this feature?

A. Yes. The Shadow Tuning Equipment Kit, Philco Part No. 8290 is available at \$2.50 list. This kit consists of the shadow tuning meter, the necessary mounting brackets and screws, and a new bezel plate for the cabinet. The installation is comparatively simple, and can be made within a short time. The only cabinet change which is necessary is recutting the instrument panel so as to take the larger bezel with the shadow tuning indicator.

2. Q. What is the best way to install the flat cable of the LZ X Models?

A. This cable in most cases will be placed under the rug and will run from the tuning unit of the LZ X to the speaker unit. When it is desired to place the cable around the wall or the base board a special Philco Mounting Bracket Kit, part No. 8256, should be used. This kit which is available at 25c list contains 20 special fibre brackets and 40 mounting tacks. The brackets are so designed as to hold the cable securely against the wall. Under no circumstances should ordinary tacks ever be used for fastening the cable to the wall or baseboard; the small wires within the cable will be damaged if this point is not carefully observed.

The cable when shipped from the factory is wrapped in cellophane. This enables the dealer to install the cable in the store for demonstration purposes, and to have a clean cable for final installation in the customer's home.

3. Q. Can additional lengths of this cable be readily obtained?

A. Yes. The Extension Cable, part No. L-1510, is available in 35 Ft. lengths at a list price of \$8.50. The cable is not color coded, but it is entirely possible to match the different wires by their respective positions within the cable and thus obtain the correct connections from the extension cable to the cable supplied with the receiver. The two cables can be neatly spliced, soldered, and taped together.

4. Q. What is the method of correcting "drifting" of the tuning condenser setting in the Model 15 when tuned to frequencies of 800 K.C. and above?

A. This condition can be corrected by increasing the tension of the flat spring located at one end of the tuning condenser shaft. This spring is held in position with a hex-head drive screw. It is only necessary to remove this screw, increase the tension of the spring by bending, and then replace the spring against the shaft.

5. Q. What is the difference between the new rectifier tube, type 12-Z-3 and the type 80 rectifier tube?

A. The new tube is a cathode type tube having a 12.6 volt filament. Rectification is obtained from plate to cathode rather than from plate to filament as in the 80 tube. By means of a resistance, the power line voltage is dropped sufficiently to light the filament of this tube—thus eliminating the necessity of a separate source of low voltage for lighting the filament.

JAMES S. REMICK COMPANY

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Sacramento, Cal.