

PHILCO SERVICEMAN

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RADIO · MANUFACTURERS · SERVICE · NEWS

SEPTEMBER, 1936



SERVICING NEW PHILCO R. F. UNITS

THE evolution of multi-band receivers brought new problems to the serviceman. Multi-band sets, wired in the conventional manner, were increasingly difficult to build and service owing to the number of parts used in making the R.F. cover the desired tuning bands.

Circuit diagrams had reached a stage where the switch and coil connections taxed the ability of even those men with

mechanical-drawing training. PHILCO started out deliberately this year to untangle both the assembly of the receivers and the service information in such a way as to improve the performance of the set and make its servicing a more straightforward, sure operation.

Radio service authorities agree that it is necessary to break a wiring diagram down into stages. The new PHILCO sets

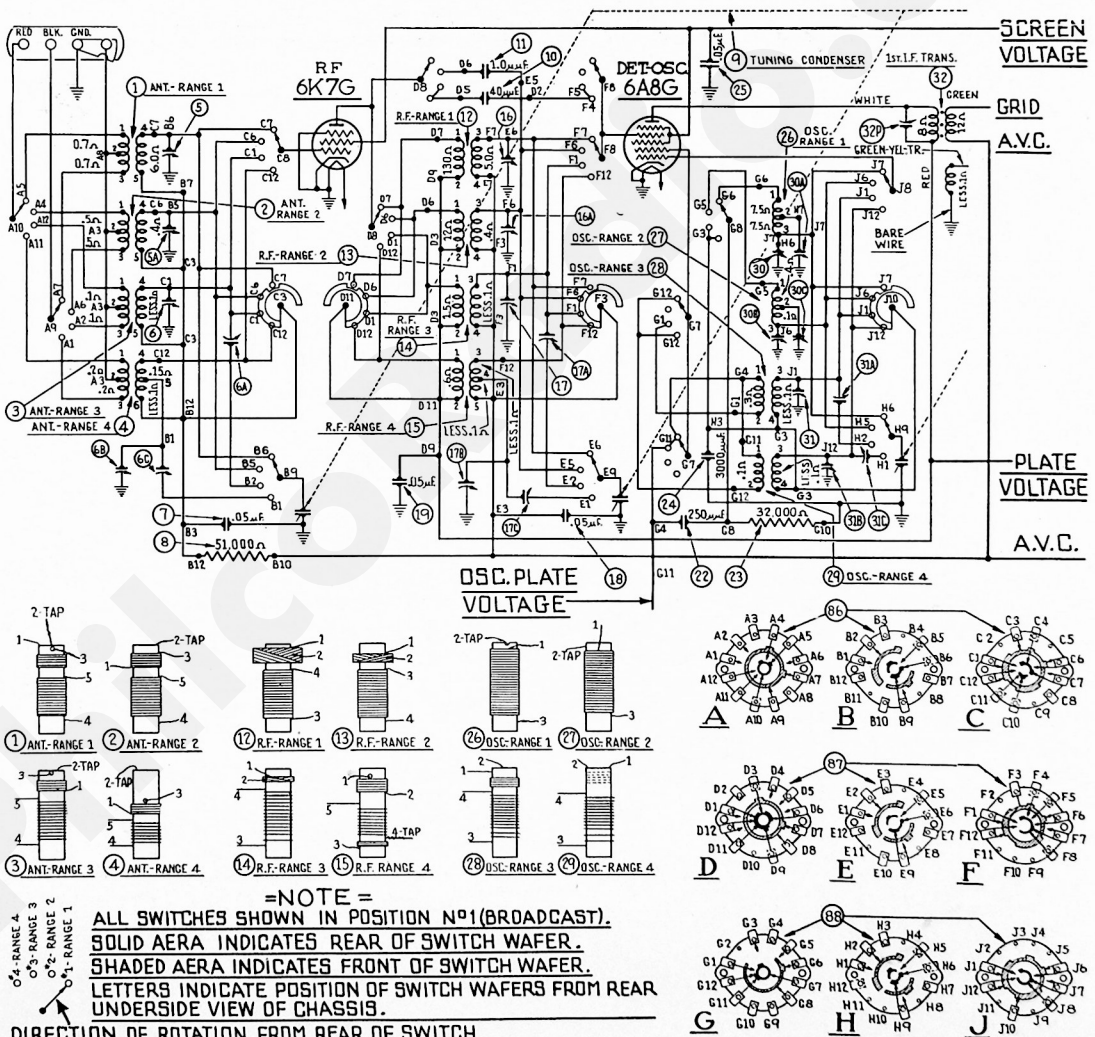


FIG. 1

are built with each stage of the R.F. unit as an individual section which may be removed complete with its coils, switches and padders for repair or the replacement of parts. These stages are arranged with the coils for each band mounted around the control switch. Leads are shorter and efficiency greatly increased. Each section of the R.F. unit is a complete portion of the radio circuit which can be removed for servicing.

This has three distinct advantages to servicemen—

1. All parts used on all bands grouped together in one section.
2. Trouble in any stage can be found by using the PHILCO 099 Tester.
3. Improved schematics also grouped as stages for comparison with set.

In the illustration, Fig. 2, note the elimination of long leads between coil and control switches and the location of padders, arranged for easy access from the bottom of the set.

Servicing these stages presents no new radio problems, but it does require methods of testing which differ from those used in earlier receiver work.

The equipment necessary is a signal generator and circuit tester. The PHILCO Model 088 Signal Generator and Model 025 Circuit Tester are ideal for this purpose.

Modern service methods require the separation of R.F. circuits into stages. We have reproduced (Fig. 1) the R.F. diagram part of the service manual on Model 37-660, a four-band set. Note that there are four coils drawn under the part of the circuit labeled "Antenna." These are the coils in the Antenna Stage of the receiver. There are also four coils in the R.F. Stage, Nos. (12), (13), (14) and (15) in the diagram. Likewise there are four windings in the Oscillator Stage, Nos. (26), (27), (28) and (29) in the diagram. Fig. 3 is a photograph of this complete Oscillator Stage.

All sections of the wave band switch are labeled with a letter identifying the wafer. The contacts on the wafer to which the lead wires of the diagram are connected are numbered. Note that the diagram includes a drawing of each wafer of the wave band switch with the contacts numbered clockwise around the switch. Each lead in the wiring diagram is identified by the letter of the wafer and the contact

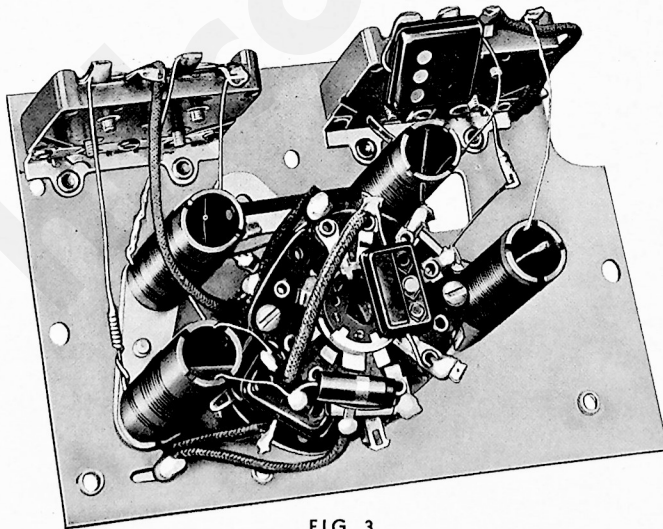


FIG. 3

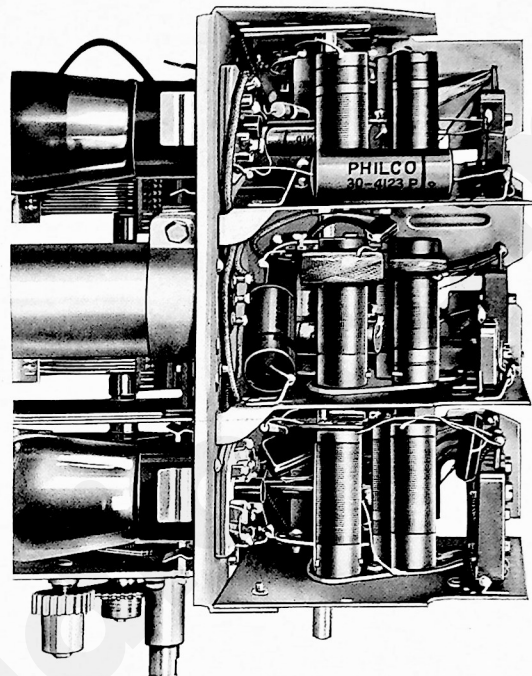


FIG. 2

number of the switch to which it is soldered. It is possible to follow the circuit through the switch by referring to the wiring diagram and the switch drawing which is on the diagram.

There is also a drawing of the coils at the lower left-hand corner of the circuit diagram which numbers the wire leads of the coils. The schematic diagram numbers the coil wires in accordance with this layout. In addition, the resistance of each section of the coil is given in ohms on the circuit diagram.

Locating Trouble

If it is found in testing a receiver which fails to perform properly that a normal I.F. signal is obtained when the signal generator is connected to the control grid of the detector oscillator, trouble in the R.F. unit will be indicated. The stage of the R.F. unit which is at fault can be quickly determined, using the signal generator by the following procedure:

Oscillator Stage: Connect the signal generator through a small condenser (.1 mfd.) to the control grid of the detector oscillator tube, leaving the control grid cap in place on the tube. Adjust both the signal generator and the dial of the chassis to the same frequency. If no response to this test can be obtained on any of the various tuning ranges, the detector oscillator tube and the voltage on grids 1 and 2 of this tube should be checked. If the set is inoperative on only one tuning range, the continuity of the oscillator coil for that particular range and the range switch connections in the oscillator section should be checked with the diagram in the service bulletin.

R.F. Stage: If the signal generator test from the control grid of the detector oscillator showed normal operation on all tuning ranges, connect the signal generator antenna lead to the control grid of the R.F. tube, again setting both the signal generator and the dial on the chassis to the same frequency. If no signal is obtained on any of the tuning ranges, check first the R.F. tube and then the plate and screen voltages at the socket. If only one band is inoperative, test the continuity of the R.F. coil for that particular band and the switch connections in the R.F. stage.

Antenna Stage: If, in the preceding tests, normal amplification of the signal was obtained from both the detector oscillator and R.F. tube grids, the signal generator antenna lead should next be transferred to the red transmission-line terminal at the back of the chassis. Poor response on all bands will indicate an open connection between the terminal board and the antenna section of the range switch, while the lack of response on one band only will indicate an open circuit in the coil or switch connections for that particular range.

Removing and Testing Stages

When access to the faulty part of any R.F. unit for further testing or for replacement requires the removal of the stage from the R.F. unit, the following procedure should be used:

(NOTE) Before an R.F. Stage can be serviced, it is necessary to remove the tuning dial and the range indicator mask and lever arm.

1. Remove the rubber-insulated mounting bolt at the rear of the R.F. Unit.
2. Raise the R.F. Unit at the back and press it forward slightly so that the side mounting studs are released.
3. Raise the front end of the R.F. Unit approximately one-half inch.
4. Remove the drive screws from the front of the R.F. Unit which hold the wave band switch index plate.
5. Having released the index plate, the wave band switch shaft now may be withdrawn from the Unit (it slides out the front end of the unit).
6. Remove the volume-control shaft (a small spring clip on the inside of the chassis fastens the shaft to the chassis). When the clip is removed, the shaft may be withdrawn from the front of the sub-base.
7. Remove tube shields and tubes which are opposite to the desired section of the gang condenser.
8. Unsolder the lead to ground and to the stator plates of the tuning condenser, which come through the sub-base from the stage you want to remove.
9. Release the ground braid which is soldered between the stage shield plate and the sub-base of the R.F. Unit.
10. Loosen (do not remove) the drive screw which holds the stage shield plate (see Fig. 3) in the unit.
11. Remove the stage from the Unit by sliding it slightly towards the rear of the R.F. Unit. It will then be released from the drive screw and may be lifted out of the Unit for inspection, repair or the replacement of parts.

With the stage removed, parts are readily accessible for resistance measurements, switch contacts can be examined and any trouble corrected readily.

Coil leads will be found to be direct and extremely short. It will require careful work to prevent damage to other circuits not affected by the trouble you are attempting to clear.

Primary and secondary resistances may be read directly on the coil. Resistors and coils may be checked, switch contacts inspected and all circuits tested in the usual manner, except that the complete circuit is entirely accessible instead of being mixed up with other portions of the set, as in conventional receivers.

Unit construction is a new method of building radio sets. The opportunity to remove stages complete for servicing combined with the new circuit diagrams designed for clarity will be of real help to servicemen.

EDITORIAL

Planning for Success

THIS issue of the PHILCO SERVICEMAN introduces a new feature—"Planned Testing of Radio Chassis." The particular article this month deals with our recommended method of checking one of the new-type PHILCO American and Foreign Receivers (Model 37-660), having the new Unit Construction design.

As you read through the description of the method to be followed in this check you can readily see that the whole procedure has been planned systematically, each step following in proper logical sequence and having a definite ultimate purpose—the elimination of each possible source of trouble in turn.

This systematic plan or procedure can be successfully applied to many other things besides testing radio chassis. It applies especially to the very next in importance to successful radio-set testing—namely, the scientific development and increase of your servicing business.

You know that every successful business today, whether retail, wholesale or manufacturing, could only have been developed with the aid of a well-planned advertising campaign coupled with capable, properly worked-out management of office, sales and other related departments. A radio service business, however small or large, is no different in this respect. At the beginning of each season—and the time to start for the 1936-37 radio season is RIGHT NOW—every dealer or serviceman should sit down with himself or his partner and map out a definite campaign for promotion of business so as to obtain the maximum available service work in his neighborhood.

An exceptionally complete, attractive and inexpensive assortment of sales-promotional material is available to R.M.S. members this season. If you have not yet done so, stop in at your distributors, look it over, make your selections and then PLAN your campaign for success.

PHILCO—WORLD'S LARGEST RADIO PARTS SUPPLIER

A STORY of keen interest to every radio dealer and serviceman is found back of the quality which is built into PHILCO parts. PHILCO supplies high-quality parts, not only because of a desire to produce better parts than anyone else, but because there is a real need and an absolute necessity for this quality. If any one part in a PHILCO radio set fails, it means that the entire receiver is out of operation and that it is being condemned by the customer.

There is a big responsibility on the part of PHILCO, having almost 8,000,000 radio sets in use, and the interests of the millions of PHILCO owners must be protected. The reputation which has been built for quality in these radio receivers is not going to be sacrificed in any of the parts which go to make up the sets. It is evident that the quality of a PHILCO part, for example, must of necessity be better than the part which is built by some manufacturer who sells only service replacement parts. There is the reputation of PHILCO radio to be considered; whereas, in the case of the replacement part manufacturer, there is only the reputation of a small part to be considered. PHILCO knows how the parts work in a radio set.

Experience and Knowledge Important Factors

Through years of experience in dealing with its radio-set customers, PHILCO is in a better position to know how well a part works in the set than is any manufacturer of separate parts.

Weekly Reports on Performance

PHILCO'S system, of weekly detailed service reports received from every PHILCO distributor throughout the world, gives its engineering department immediate and reliable information with regard to defects in radio sets and parts under actual service conditions. This invaluable information enables PHILCO engineers to redesign the parts, where necessary, to overcome the difficulties, and the improved parts are promptly made available to the serviceman.

The finest radio engineering organization in the world—the PHILCO Re-

search and Engineering Department—is responsible for this quality. A large portion of the Engineering Department is engaged in making tests of various kinds to determine the capabilities of parts which are used in PHILCO receivers. A life-test machine eight feet long and seven feet high is used for checking all types of parts which are subject to mechanical action or wear. Electrical parts, such as condensers and resistors, are also given humidity and voltage tests constantly to determine their capabilities from a life standpoint.

Serviceman Benefits by Philco's Knowledge

PHILCO, because it is the largest in the business and because of the elaborate system of field reports, has access to more information on actual results in operation and performance in a radio than any other supplier could possibly have. The serviceman obtains the benefits of this extensive experience in continuously higher quality parts at no extra cost. Nowhere in the entire radio industry is there such a flexible organization equipped with such a knowledge of parts as that which is found at PHILCO. The radio industry is constantly realizing the advantages of this organization.

New Method of Locating Intermittents

IN the PHILCO factory one of the standard tests on all chassis going through production is to strike the sides of the chassis with a rubber mallet. This mallet tends to loosen any intermittent contacts and remove small bits of solder or short pieces of wire that might remain in the chassis. It has been found in many cases that intermittents can be opened simply by striking the chassis with a mallet of this kind.

PHILCO has made available for servicemen and dealers a small wooden mallet, on the ends of which is cemented sponge rubber approximately ½ inch thick. This mallet can be used to advantage in locating troubles which might not otherwise be shown.

The part number is 45-2312, and the list price is \$1.00.

Questions and Answers

1. Q. Is there a detachable speaker cord on the new PHILCO models?

A. Yes, beginning with Model 640. The speaker cord is removable from the output transformer and is attached with pin jacks similar to those used on headphones. It is only necessary to loosen the screws in the cover plate over the terminals of the output transformer and then pull the speaker leads away from the transformer. When replacing the leads it will be necessary, of course, to remove the cover plate before inserting the pins in the jacks.

2. Q. Is the use of a good ground connection essential for the new PHILCO High-Efficiency Aerial?

A. Almost without exception, better results are obtained when a good ground connection is used. The hum level is greatly reduced, and the amount of noise is likewise decreased. In many installations where there is a high noise level near the lead-in, it is desirable to attach a ground connection from the ground terminal of the aerial transformer to an overflow pipe or some other grounded object on the roof of the building.

3. Q. Is there a small socket wrench available for removing the brass screws used to mount the coils in the new PHILCOS?

A. The new socket wrench, Part No. 45-2316, is now available at a list price of 40 cents. This socket is designed to fit the handle of the standard PHILCO Socket Wrench Kit.

4. Q. What is the cause of distortion with excessive bass over the medium volume range in the Model 680?

A. This condition is caused by a high-resistance short (between 3 and 20 megohms) in condenser No. 163 of the wiring diagram. PHILCO Service Bulletin No. 228. Replacement of this condenser will correct the distortion.

5. Q. Can the new Foreign Station Demonstrator be used satisfactorily for ultra-high-frequency transmitters and receivers used by amateurs and experimenters?

A. Yes. The PHILCO Foreign Station Demonstrator makes a highly satisfactory aerial for transceivers and many types of ultra-high-frequency transmitters and receivers. The fundamental frequency of the Foreign Station Demonstrator (without lead-in strap) as a quarter-wave antenna is 30 megacycles.

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