Philco Radio & Television Corp.

	Model: 16	Chassis:	Year: Pre October 1936
	Power:	Circuit:	IF:
	Tubes:		
	Bands:		

Resources
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Riders Volume 4 - PHILCO 4-4
Riders Volume 4 - PHILCO 4-5
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PHILCO RADIO & TELEVISION CORP.

MODEL 16
Schematic, Voltage Data

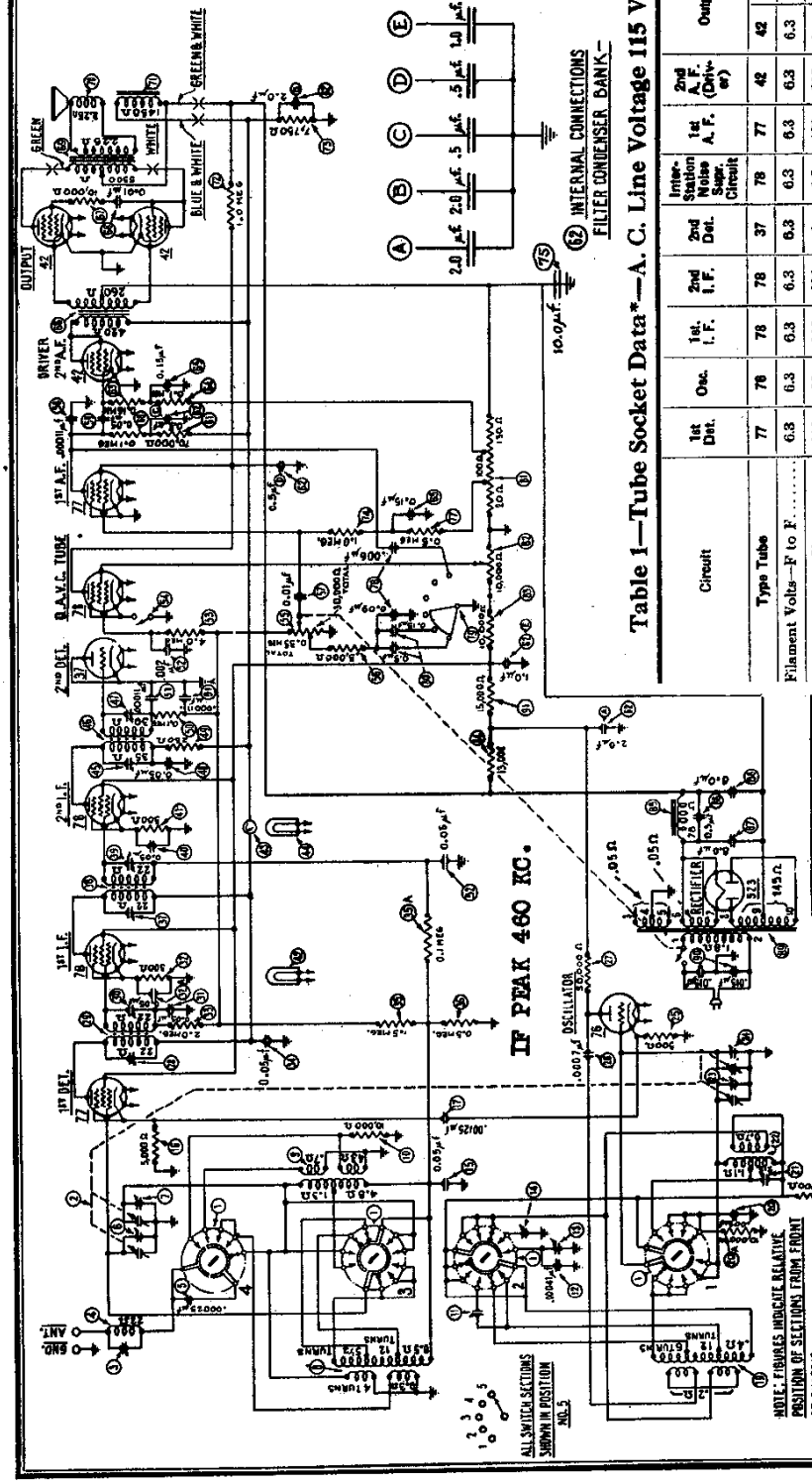


Table 1—Tube Socket Data*—A. C. Line Voltage 115 Volts

Circuit	1st Det.	Osc.	1st I. F.	2nd I. F.	2nd Det.	Inter-Station Noise Supr. Circuit	1st A. F.	2nd A. F. (Driver)	Output		Rectifier
Type Tube	77	78	78	78	37	78	77	42	42	42	5-Z-3
Filament Volts—F to F	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	4.7
Plate Volts—P to K	220	53	225	230	0	1.8	130	220	340	340	400
Screen Grid Volts—SG to K	80	—	80	80	—	1.8	1.8	220	340	340	—
Control Grid Volts—CG to K	1.6	6.4	0	0	.2	1.6	.4	.6	34	34	—
Cathode Volts—K to F	4.2	1.9	2.2	2.5	0	0	0	0	0	0	—

* All of the above readings were taken from the underside of the chassis, using test prods and leads, with a suitable A. C. voltmeter for filament voltages, and a high-resistance multi-range D. C. voltmeter for other readings. The *Philco Model 030 All-Purpose Set Tester* is highly recommended for this use. Volume control set at maximum and station selector turned to low frequency end; interstation noise suppression circuit potentiometer turned all the way to the right; and toggle switch (interstation noise suppression circuit) in "ON" ("S") position. Readings taken with a ping-in adapter will NOT be satisfactory.

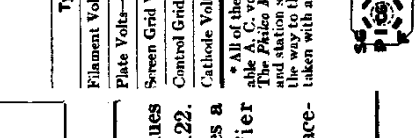


Table 2—Power Transformer Data

Terminal	A. C. Volts	Circuit	Color
1—2	105—125	Primary	White
3—5	6.3	Filament	Black
6—7	5.0	Filament of 5-Z-3	Blue
8—10	800	Plates of 5-Z-3	Yellow
4	—	Center Tap of 3—5	Black—Yellow Tracer
9	—	Center Tap of 8—10	Yellow—Green Tracer

NOTE—These values are for Model 16-122. Model 16-121 uses a Type 80 Rectifier Tube. See Note at end of Replacement Parts List.

MODEL 16
Chassis view
Sockey layout

PHILCO RADIO & TELEVISION CORP.

THE PHILCO RADIO MODEL 16 is an eleven-tube superheterodyne broadcast and short-wave receiver, operating upon alternating current and employing the high-efficiency 6.3 volt tubes, automatic interstation noise suppression, and a frequency (wave-band) coverage that permits reception of the short-wave (high-frequency) broadcast programs. The same superheterodyne circuit is used for all reception. The Receiver is equipped with a five-point wave-band switch. The ranges are—

(1) 520 K. C. to 1500 K. C.
(2) 1.5 M. C. to 4.0 M. C.
(3) 3.2 M. C. to 6.0 M. C.
(4) 5.8 M. C. to 12.0 M. C.
(5) 11.0 M. C. to 23.0 M. C.

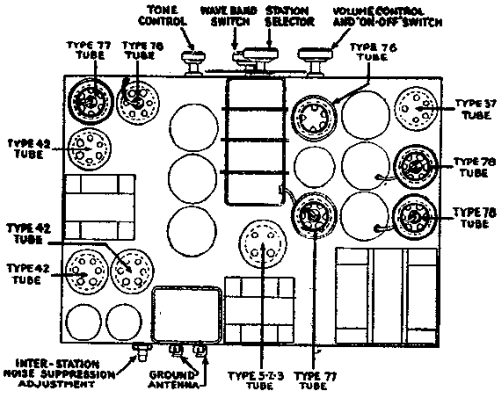


Fig. 1—Top View of Chassis, Showing Tube Locations and Major Parts

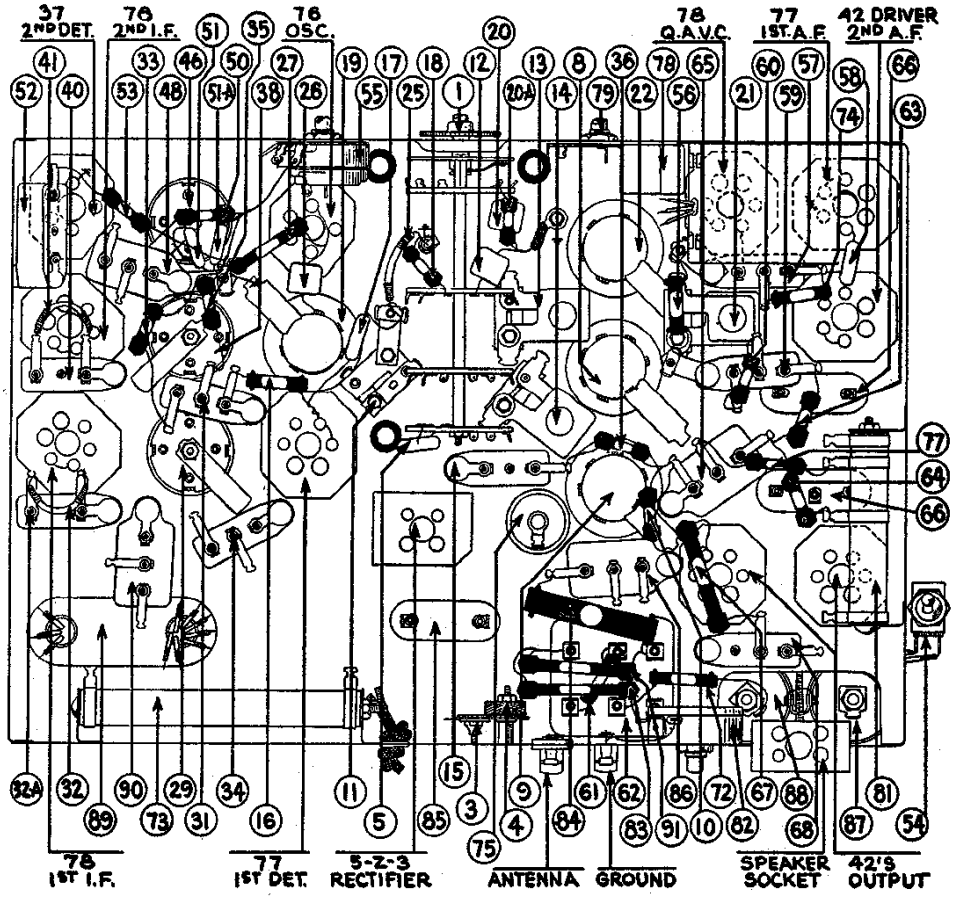


Fig. 3—Bottom View of Chassis, Showing Parts

The Receiver employs a Philco Type 77 tube for first detector, a Type 76 for oscillator, a Type 78 for first I. F., a Type 78 for second I. F., and a Type 37 for second detector. The automatic interstation noise suppression circuit uses a Type 78, the first A. F., a Type 77. The driver (second A. F.) is a Type 42; the class "A" amplification is accomplished with two Type 42 tubes as triodes; the rectifier is a Type 5-Z-3. The intermediate frequency is 460 kilocycles. The power consumption of Model 16-122 is 130 watts; of Model 16-121, 120 watts.

MODEL 16
Parts List

PHILCO RADIO & TELEVISION CORP.

No. on Figs.	Description	Part No.	List Price
①	Wave Band Switch	42-1037	....
②	Tuning Condenser Assembly	31-1039	....
③	Compensating Condenser (Wave-trap)	38-5199	....
④	Inductance (Wave-trap)	5858	.16
⑤	Condenser		
⑥	Compensating Condenser (Ant.; H. F.; Part of ②)	.....	....
⑦	Compensating Condenser (Ant.; Broadcast and Police; Part of ②)	.....	....
⑧	Antenna Transformer (H. F. Bands)	32-1183	....
⑨	Antenna Transformer (B'dc't & Police B'ds)	32-1182	....
⑩	Resistor (Brown-Black-Orange)	4412	.20
⑪	Compensating Condenser (Range 3)	04000-V	.16
⑫	Condenser	30-1000	.20
⑬	Compensating Condenser (Range 2; series)	04000-R	.35
⑭	Compensating Condenser (Range 1; series)	04000-R	.35
⑮	Condenser	3615-L	.16
⑯	Resistor (Green-Black-Red)	5310	.20
⑰	Condenser	5886	.25
⑱	Resistor (Brown-Black-Orange)	4412	.20
⑲	Oscillator Coil (H. F.)	32-1185	....
⑳	Condenser	7301	.35
⑳a	Resistor (Brown-Black-Orange)	4412	.20
㉑	Compensating Condenser (Range 1; Shunt)	0-4000-A	.12
㉒	Oscillator Coil (Broadcast and Police)	32-1184	....
㉓	Compensating Condenser (Osc.; H. F.; Part of ②)	.....	....
㉔	Compensating Condenser (Osc.; Police; Part of ②)	.....	....
㉕	Resistor (Flexible Wire-wound; Green-Black-Brown)	6977	.20
㉖	Condenser	5863	.18
㉗	Resistor (Green-Brown-Orange)	4237	.25
㉘	Compensating Cond'ser (1st, I. F. Primary)	31-6002	....
㉙	1st, I. F. Transformer	32-1186	....
㉚	Compensating Cond'r (1st, I. F. Secondary)	Common with ㉘	....
㉛	Condenser	3615-AB	.20
㉜	Resistor (Flexible Wire-wound; Orange-Black-Brown)	33-3010	.15
㉜a	Condenser	3615-AT	.20
㉝	Resistor (Red-Black-Green)	5872	.20
㉞	Condenser	3615-D	.18
㉟	Resistor (Brown-Green-Green)	7009	.20
㉟a	Resistor (White-White-Orange)	4411	.20
㊱	Resistor (Yellow-White-Yellow)	4517	.20
㊲	Compensating Cond'ser (2d, I. F. Primary)	31-6002	....
㊳	2d, I. F. Transformer	32-1186	....
㊴	Compensating Cond'r (2d, I. F. Secondary)	Common with ㊲	....
㊵	Condenser	3615-AT	.20
㊶	Resistor (Flexible Wire-wound; Green-Black-Brown)	6977	.20
㊷	Pilot Lamp (Station Selector)	6608	.12
㊸	Shadow Tuning Meter	6497	2.25
㊹	Pilot Lamp (Shadow Tuning Meter; Part of ㊸)	.....	....

No. on Figs.	Description	Part No.	List Price
㊺	Compensating Cond'ser (3d, I. F. Primary)	31-6003	....
㊻	3d, I. F. Transformer	32-1188	....
㊼	Compensating Cond'r (3d, I. F. Secondary)	Common with ㊺	....
㊽	Condenser	3615-AS	.25
㊾	Resistor (Part of ㊽)	.....	....
㊿	Resistor (White-White-Orange)	4411	.20
(51)	Condenser	4519	.18
(51)a	Condenser	4519	.18
(52)	Condenser (Double)	7296-G	....
(53)	Resistor (Yellow-Black-Green)	6010	.20
(54)	Switch (Toggle); Interstation Noise Suppression Circuit	42-1036	.40
(55)	Volume Control and "On-Off" Switch	33-5013	1.00
(56)	Resistor (Green-Black-Red)	5310	.20
(57)	Condenser	3903-J	.20
(58)	Condenser	4519	.18
(59)	Condenser	3615-AD	.20
(60)	Resistor (White-White-Orange)	4411	.20
(61)	Resistor (Violet-Black-Orange)	5385	.20
(62)	Filter Condenser Bank	30-4026	3.00
(63)	Resistor (Brown-Blue-Yellow)	5331	.20
(64)	Resistor (White-White-Orange)	4411	.20
(65)	Condenser (Double)	6287-J	....
(66)	Input Transformer	32-7057	2.25
(67)	Resistor (Brown-Black-Orange)	3524	.20
(68)	Condenser	3903-F	.15
(69)	Output Transformer	32-7052	....
(70)	Voice Coil and Cone Assembly	36-3061	.75
(71)	Speaker Field, Assembled with Pot (U-2)	36-3088	....
(72)	Resistor (Brown-Black-Green)	4409	.20
(73)	Resistor (Wire-wound)	33-3020	.30
(74)	Resistor (Brown-Black-Green)	4409	.20
(75)	Condenser (Electrolytic)	30-2003	.70
(77)	Resistor (Yellow-White-Yellow)	4517	.20
(78)	Condenser (Internal to (79))	.....	....
(79)	Tone Control	30-4033	....
(80)	Condensers (External to (79))	06713	.45
(82)	Voltage Divider Resistor (Wire-wound)	33-3021	.16
(82)	Potentiometer (Interstation Noise Suppression Circuit)	33-5015	.80
(83)	Resistor (Brown-Black-Orange)	3524	.20
(84)	Resistor (Brown-Orange-Orange)	6450	.35
(85)	Filter Choke	32-7056	1.85
(86)	Condenser	6287-F	.12
(87)	Condenser (Electrolytic)	30-2011	1.25
(88)	Condenser (Electrolytic)	30-2011	1.25
(89)	Power Transformer (50–60 ~)	32-7058	5.00
(90)	Condenser (Double)	3793-E	.20
(91)	Resistor (Brown-Green-Orange)	5718	.40
	Tube Shield	28-1107	.10
	Four-prong Socket	7545	.08
	Five-prong Socket	7546	.10
	Six-prong Socket	7547	.10
	Knob (Large)	03063	.08
	Knob (Small)	03064	.06

NOTE.—Model 16-121 uses a Type 80 tube in lieu of 5-Z-3. Parts used in the 16-121 chassis that differ from the 16-122 parts above listed are:

July, 1933

(89)	Power Transformer (50–60 ~)	32-7080	....
(87)	Condenser (Electrolytic) (8.0 Mfd.)	6706	1.50
(88)	Condenser (Electrolytic) (8.0 Mfd.)	7464	1.25
	Speaker	K-17	....
	Speaker Socket	7084	....
	Speaker Cable	L1632	....

Effective December 20th, the shadowmeter used on Model 16 will be part No. 45-2028 instead of the No. 6497 previously used. The new shadowmeter gives a somewhat better deflection when tuning.

A change which eliminates a long lead, separates two capacities, and gives improved results, is effective with Run Number 8, in which By-pass Condenser (52) (.05-.002), Part No. 7296-G is superseded by By-pass Condenser, (.002), Part No. 7296-F; connection between Condenser (58) and 2nd, I. F. Transformer (38) is removed, and Condenser (Tubular) (.05) Part No. 30-4020 inserted between the secondary of (38) and ground at Condenser (31). A 1-inch length of Part No. L-1228 Spaghetti is used to protect one end of Condenser Part No. 30-4020 from grounding.

Better results,—mechanically,—are gotten when, in the Run, Condenser (12) (.00041) (Yellow-Orange), Part No. 30-1000, is superseded by Condenser (.00041) (Yellow-Orange-Green). Part No. 30-1027.

November 15, 1933

MODEL 16
Adjustment

PHILCO RADIO & TELEVISION CORP.

ADJUSTING MODEL 16

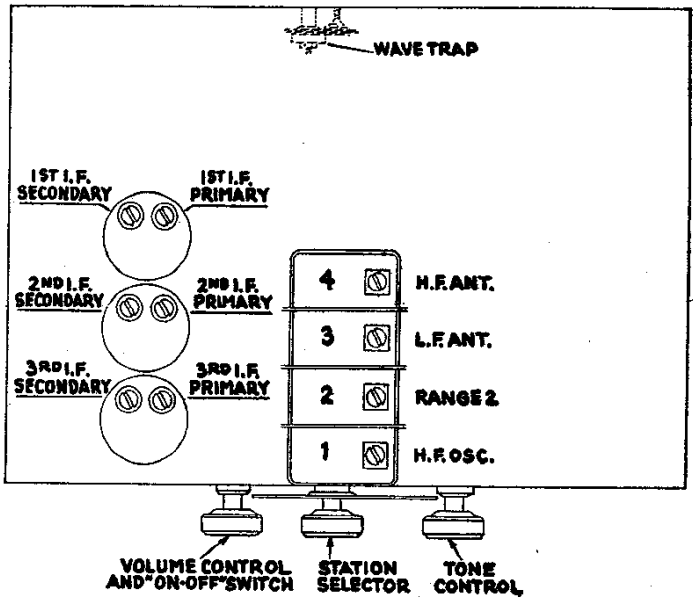


Fig. 1—Position of Compensating Condensers

NOTE: DO NOT ATTEMPT TO ADJUST the compensating condensers mounted upon sections 3 and 4 of the tuning condenser of Model 16. These compensating condensers are carefully adjusted, and sealed at the factory.

The compensating condensers of the Model 16 All-Wave Receiver are adjusted in essentially the same manner as detailed in Service Bulletin No. 120-C. The ability of the Model 16 to cover the higher frequencies up to 23 megacycles requires the use of a signal generator which will supply a suitable frequency, with its harmonics, to cover the adjustment throughout the short wave bands.

The Philco Model 091 signal generator is recommended for the higher frequencies. It supplies an accurate and constant 3600 kilocycle (3.6 megacycle) signal, whose harmonics include the necessary high frequencies.

The Philco Model 048 All-Purpose Set Tester is recommended for the adjustment of the I. F. compensating condensers, and for *any* adjustments requiring the use of a signal generator supplying frequencies between the limits of 105 kilocycles and 2000 kilocycles.

The Model 16 is adjusted as follows:

ADJUSTMENT OF THE I. F.

Connect the signal generator and receiver in the manner described in Philco Service Bulletin No. 120-C. (NOTE: The output terminals of the signal generator are connected to the grid cap of the first detector tube,—after removing the grid clip,—and to the "GND." terminal of the receiver. The output meter is connected to the primary terminals of the output transformer). The intermediate frequency of Model 16 is 460 K. C. Adjust each of the I. F. compensating condensers in turn, to give maximum response in the output of the receiver. The location of the I. F. compensating condensers is shown in Fig. 1. They are reached from the top of the receiver chassis.

WAVE TRAP ADJUSTMENT

Replace the grid clip on the first detector tube. Connect the output of the signal generator to the antenna and ground terminals of the receiver. Adjust the wave-band switch of the receiver to the broadcast band (520-1500 K. C.) (Range 1) and the station selector to the low frequency (520 K. C.) end. Adjust the wave-trap condenser to give *minimum* response to a 460 K. C. signal from the signal generator. This adjustment is made from rear of chassis.

PHILCO RADIO & TELEVISION CORP.

ADJUSTMENT OF DIAL FREQUENCIES

In the procedure given herewith, the frequency ranges are referred to as follows:

Range 1	520 K. C.—1500 K. C.
Range 2	1.5 M. C.— 4.0 M. C.
Range 3	3.2 M. C.— 6.0 M. C.
Range 4	5.8 M. C.—12.0 M. C.
Range 5	11.0 M. C.—23.0 M. C.

The tuning condenser (four-gang) sections and their individual compensating condensers are shown in Figure 1. They are additionally referred to as numbered sections 1 to 4 inclusive, with 1 as the front section.

Do not attempt to adjust compensating condensers on sections 3 and 4.

The compensating condensers of "H. F. Osc." circuit and of "Range 2 (Police & Aircraft)", are located upon sections 1 and 2, respectively.

Connect the output terminals of the signal generator (Model 091) to the antenna and ground terminals of the receiver. Adjust the wave-band switch of the receiver to Range 4 and adjust the station selector to 10.8 megacycles. At this point the third harmonic of the 3.6 M. C. generator can be picked up. Adjust the "H. F. Osc." compensating condenser (located on section 1 of tuning condenser) to give maximum response in the output meter.

Next, the wave band switch is set upon Range 5, and the station selector placed at 21.6 megacycles.

If the signal from the signal generator is not picked up within a reasonable distance (approximately 100 K. C. either side) of the 21.6 M. C. position on the receiver station selector dial, it will be necessary to re-adjust the 10.8 M. C. compensating condenser to care for the 21.6 M. C. signal. Such adjustment causes a slight error in the 10.8 M. C. setting. The error at the two points (10.8 and 21.6 M. C.) must be split in proportion to the frequencies. Care should be taken not to mistake the image of 21.6 M. C., which also can be heard at approximately 20.7 M. C.

Next, the adjustment should be made at 5.2 M. C. on Range 3. At this point the second harmonic of the oscillator circuit in the receiver beats with the third harmonic of the 3.6 megacycle crystal in the 091 signal generator. This adjustment is accomplished by means of the "Range 3" compensating condenser (⑪ in Service Bulletin No. 165), mounted under the chassis, and reached from beneath.

Following this, adjustment at 3.6 M. C. on Range 2 should be made. The "Antenna" connection between the signal generator and the receiver must be removed for this adjustment, as the output of the signal generator is too great otherwise.

This adjustment is made with the compensating condenser ("Range 2: Police & Aircraft") mounted on section 2 of the tuning condenser.

Next in sequence, the station selector is set at 1.57 megacycles (Range 2), by approximating the correct position on the dial. The second harmonic of the receiver oscillator beats with the fundamental frequency of the 3.6 megacycle crystal in the signal generator. Normally, it is necessary to replace the "antenna" connection between the signal generator and the receiver, for this test. Adjustment is accomplished by means of "Range 2, series", compensating condenser (⑩ in Service Bulletin No. 165), reached from the underside of the chassis.

Next, adjustment of the "Range 1, Shunt," compensating condenser (⑨ in Service Bulletin No. 165) is made at 1400 kilocycles (Range 1), by means of the signal generator in the Model 048 All-Purpose Set Tester, or by using the eighth harmonic of a signal generator producing a 175 kilocycle frequency. This compensating condenser is reached from underside of chassis.

The next step is the adjustment of the "Range 1, Series," compensating condenser (⑧ in Service Bulletin No. 165), by placing the wave band switch on Range 1, and the station selector at 520 kilocycles. Use the signal generator in Model 048 Set Tester, with setting of 520 K. C., or the second harmonic of a signal generator giving a frequency of 260 kilocycles.

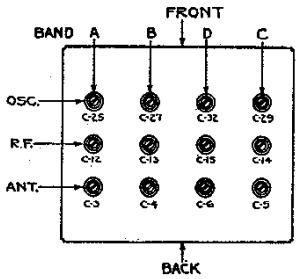
For proper adjustment of the Model 16 receiver, the procedure must be followed in the sequence given.

The adjustment should *not* be undertaken without full information and proper equipment. Your distributor can supply both.

August, 1933
Printed in U. S. A.

Stromberg-Carlson 68, 68-X

Since Volume V of Rider's Manual has gone to press, we have learned of the production of what is known as the Stromberg-Carlson 68-X. Basically, this receiver is the same as the model 68, which is shown in Rider's Volume V, pages 5-5 to 5-10, inclusive. However, the X models, which can be identified by an "X" following the serial number, incorporate certain changes. First, the secondary winding of the oscillator band A transformer contains a .00045-mfd. fixed condenser in shunt with the series trimmer, or in shunt with C-26.



VIEW OF BOTTOM OF CHASSIS SHOWING HOLES FOR ADJUSTING SHUNT ALIGNING CAPACITORS.

Second, a 10,000-ohm fixed resistor is inserted into the common lead joining the band B and band C secondary windings in the r-f. tube grid circuit. Third, a fixed condenser has been added between the common lead connecting the band A and band B secondaries of the r-f. input transformer, and ground. Fourth, the fixed condenser C-24, located between the common lead joining all of the oscillator primary windings and ground has been changed from .1 mfd. to .05 mfd. The location of the twelve shunt aligning condensers is shown in the accompanying illustration. The numbers correspond to the designating numbers shown upon the schematic and selector chassis wiring.

●

Sears-Roebuck 1857

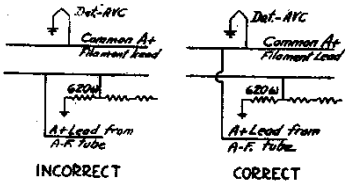
A unique form of volume control is used in this receiver and we feel that it deserves mention. The schematic is shown upon pages 5-47 in the various issues of Rider's Manual Volume V. The output i-f. transformer is equipped with variable coupling between the primary and secondary windings. The variation in signal transfer between these two windings, as a consequence of the change in coupling, is the volume control. Incidently, the i-f. coupling unit, employed between the i-f. amplifier tube and the demodulator or second detector, is resistance-capacity coupling. Only the input and output i-f. coupling units are of the transformer variety.

Certain instructions pertaining to the increase of "high" audio response has been furnished by the manufacturer. Connect a 15-mmfd. condenser between the plate terminal of the input i-f. transformer primary and the grid terminal of the input i-f. transformer secondary. This condenser can be mounted inside the i-f. transformer shield can, atop of the Isolantite base. It will be necessary to re-peak the i-f. transformer at 175 kc.

●

Sentinel Model 7700, 7732, 7735, 7741

An error is acknowledged in the schematic of this receiver as shown upon page Sentinel 5-35 in Rider's Manual. The A plus lead is connected to the grid circuit instead of to the common filament lead. The diagram as shown and as correct appears below.



Correction in filament circuit of Sentinel 7700, 7732, etc.

●

Philco Model 16 (Codes 126, 127)

Starting January 10th the Shadowmeter shunt resistor, number 78, was changed from part No. 5310, which has a value of 5000 ohms, to part No. 7775, which has a value of 2500 ohms. This prevents the shadow from becoming too wide. Please note that this change will *not* be made in the model of 16 Code 125 receivers. However, it will be made in Model 500, Code 122 and Model 501, Code 122.

●

Philco Model 34

Starting with run No. 4, an r-f. choke, part No. 32-1514 is added, connected in the 135-volt B battery lead, between the points where diagram parts No. 37 and 45 join it. This prevents oscillation in the i-f. stage. For schematic see Rider's Volume V, Philco page 5-21.

●

Philco Model 144

Starting with run No. 3, the following change was made to improve stability:

The 0.25-mf. section of diagram part No. 26 bypass, which has been used as cathode bypass on the 6A7 tube, is now used as cathode bypass on the first 78 i-f. tube. A 0.25-mf. tubular condenser part (part No. 30-4146) is added, as bypass for the 6A7 cathode.

The cathode bypass on the 78 first i-f. tube previous to this change was a 0.5-mf. tubular condenser (in Code 125); in code 121 it was a section of the diagram part No. 26 bypass block, as shown in the schematic on page Philco 5-41 in Rider's Volume V.

These changes also apply to Model 506, code 122, Radio Phonograph.

A change was also made in the shadowmeter circuit to improve its operation. Referring to the schematic, the upper end of the shadowmeter is no longer connected to the diagram part No. 65 resistor, but only to diagram part No. 33 second i-f. transformer primary and also to the primary of diagram part No. 28 first i-f. transformer. The lead from diagram part No. 52 now goes to lower end of shadowmeter only. A connection must then be made from the lower end of resistor No. 65 to the junction of diagram parts No. 52, 46 resistor and 42 condenser, to complete the circuit.

The shadowmeter used will now be part No. 45-2028 and an 8000-ohm resistor (part No. 33-1114) will be connected across it to prevent too wide a shadow.

●

Detrola "Roadmaster"

The i-f. peak of this receiver, shown on page Detrola 5-2 in Rider's Manual, Volume V, is 456 kc. Please make this addition to your manuals.

●

Sparton Model 35

The i-f. peak of this receiver is 172.5 kc. Please make a note of this on the schematic diagram, which will be found on page 3-5 of Rider's Volume III, and on page 2245 of the Radiotron-Complete edition.

●

Sparton Model 36

To protect the life of the vibrator in the Sparton model 36 auto radio receiver, add a 0.01 mfd condenser, rated at 1,600 volts, across the secondary winding of the power transformer in the eliminator unit.

●

Oscillation in Sparton 65, 66

In case the metal braid shielding on the control-grid lead to either of the type 78 tubes becomes pushed down on the leads, these receivers may oscillate or otherwise operate improperly. This shielding may be pushed down accidentally when removing or installing the tube packing or changing tubes. Therefore, always pull these shields up to their full length in case of oscillation in these models. Sparton models 65 and 66 are shown upon Sparton page 5-7, 5-8, and 5-9 in Rider's Volume V.

MODEL 16,16A-122, 16A-123
Changes

PHILCO RADIO & TELEVISION CORP.

Model 16

Effective with current production, Toggle Switch (Interstation Noise Suppression Circuit) ㊽, Part No. 42-1036, is superseded by Toggle Switch Part No. 3253, and two Part No. 9618 leads, in Model 16-123; by Toggle Switch Part No. 3253, one Part No. 9616 lead and one Part No. 9617 lead, in Model 16-121 and 16-122. The joint at the switch is protected by two pieces of sleeving. The *list* price of Switch, Part No. 3253, is 40 cents.

Effective with current production, Knob Part No. 03063 will be used upon Wave-Band Switch ①, in lieu of knob Part No. 03064, upon Models 16-121, 16-122 and 16-123. Tuning Condenser Assembly ② will use Knob Part No. 42-4025, Volume Control and "On-Off" Switch ㊽ will use Knob Part No. 03064, and Tone Control ㊾ will use Knob Part No. 03064.

Model 16

Refer to Service Bulletin No. 165

Effective with Run Number 3, the following substitutions were made in the by-pass condensers:

㊼-A Part No. 3615-AT superseded by Part No. 3615-BK, *list* price, $0.16
㊹ Part No. 3615-D superseded by Part No. 3615-BL, *list* price, 0.16
㊻ Part No. 3615-AT superseded by Part No. 3615-BK, *list* price, 0.16

NOTE: The electrical values of these condensers remain the same.

Effective with Run Number 2, Resistor ㊱ Part No. 6977 (500 ohms) (Green-Black-Brown) is superseded by Resistor Part No. 33-3010 (300 ohms) (Orange-Black-Brown). Both are flexible wire-wound. The *list* price of Part No. 33-3010 is $0.15.

The large knob now used upon Tuning Condenser Assembly ② bears Part No. 27-4025, instead o 42-4025. Make this correction to Service Bulletin No. 170; Page 2, line 5.

The following additional *list* prices should be included in the Replacement Parts list:

No. on Figures	Description	Part No.	List Price
⑤ ④	Wave Trap Assembly	38-5199	$0.30
③	Antenna Transformer (B'dc'st & Police Bands)	32-1182	.60
㊻	Condenser (Double)	6287-J	.30
㉑	Speaker Field, Assembled with Pot, (U-2)	36-3088	6.75

(NOTE: The above four list prices are effective September 15, 1933).

This additional *list* price should be included in the Replacement Parts list:

No. on Figs.	Description	Part No.	List Price
㊷	Condenser (Double)	7296-G	$0.19

Note: The above list price is effective September 15, 1933.

Models 16A-122 *and* 16A-123

(25 cycle sets)

Effective December 14, 1933, all production on these models will have the first electrolytic condenser ㊼, part No. 30-2014 superseded by part No. 30-2067, no change in connections. (No. 30-2014 is 8 mfd. 500 volt, and 30-2067 is 10 mfd. 15 volt.)

The following additional *list* prices should be included in the Replacement Parts list:

No. ON FIGURES	DESCRIPTION	PART No.	LIST PRICE
①	Wave Band Switch	42-1037	$2.75
②	Tuning Condenser Assembly	31-1039	.40
㊼	Compensating Condenser (2nd. I. F. Pri.)	31-6002	.35
㊻	Compensating Condenser (3rd. I. F. Pri.)	31-6003	.35
㊿	Output Transformer	32-7052	1.50

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Models 16 and 17

Change in Volume Control Circuit

The change in the volume control circuits of Models 16 and 17, outlined in this bulletin, is recommended in EVERY case where rotation of the volume control is accompanied by noise—traceable to the control.

PRODUCTION BEGINNING WITH RUN No. 4 FOR MODEL 16 SERIES, AND RUN No. 4 FOR MODEL 17 SERIES, **INCLUDE** THESE CHANGES.

Model 16

1. The Volume Control and "On-Off" Switch ⑯ is replaced by Volume Control and "On-Off" Switch, Part No. 33-5022, having an overall value of 2 megohms. The movable element of the Volume Control goes to ⑰ as heretofore; the tap to the resistor ⑱ mentioned under (2) below; the end nearest tap, to ground; and the opposite end to the .01 mfd. condenser mentioned in (3).

2. Resistor ⑱ (Green-Black-Red) is replaced by Resistor (Orange-Red-Orange), (32,000 ohms), Part No. 5279.

3. A resistor (Orange-Orange-Yellow) (330,000 ohms), Part No. 6046, is *added,* with one side grounded to frame; the other joining the original circuit at ⑱ and ⑲; this same point (high side of 330,000 ohm resistor) connected through a .01 mfd. condenser, Part No. 3903-J, (*added*), to the high side of the Volume Control.

4. Tone Control ⑦⑨ is replaced by Tone Control, Part No. 30-4069, inclosing a .09 mfd. and a .003 mfd. condenser, with two .025 mfd. condensers in a single external housing, Part No. 7653-C, which replaces the two external condensers ⑧⑨ in metal container. The .09 mfd. condenser is on the first tap of the tone control; one of the .025's is on the second tap, while the third tap is permanently connected to ground through the other .025 mfd. The "fourth" tap of the tone control (previously connected through the .006 mfd. condenser) is connected to the .003 mfd. condenser, connecting to the original circuit at the plate of the first A. F. tube (type 77) and to ⑱.

5. It is essential that A. C. shielded cable (Part No. L-1655) be used to connect the "On-Off" switch. The cable is a special two-conductor shielded and braided conductor. The shield of this cable is brought out at one end and tied to ground. This cable should be kept as close as possible to the chassis frame. At the power transformer ⑧⑧ one lead of the shielded cable is connected to the external A. C. cable. In order that the other lead may be connected to the primary lead of the power transformer, it is necessary to use a stand-off insulator (Part No. 03103). This insulator may be mounted at any convenient place.

Model 17

1. The Volume Control and "On-Off" Switch ⑯ is replaced by Volume Control and "On-Off" Switch (Part No. 33-5023), having an overall value of 2 megohms. The movable element goes to ⑰ as heretofore; the tap to the resistor ⑱ mentioned under (2) below; the end nearest tap, to ground; and the opposite end to the .01 mfd. condenser mentioned in (3)

2. Resistor ⑱ (Green-Black-Red) is replaced by resistor (Red-Green-Orange) (25,000 ohms), Part No. 4516.

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3. A resistor (Violet-Black-Orange) (70,000 ohms), Part No. 5385 is *added*, with one side grounded to frame; the other joining the original circuit at ㊽ and ㊾; this same point (high side of 70,000-ohm resistor) connected through a .01 mfd. condenser (Part No. 3903-J) (*added*) to the high side of the volume control.

4. Tone Control ㊿ is replaced by Tone Control, Part No. 30-4070, inclosing a .09 mfd. and a .003 mfd. condenser, with two .025 mfd. condensers in a single external housing, Part No. 7653-C, which replaces the two external condensers ㊹ in metal container. The .09 mfd. condenser is on the first tap of the tone control; one of the .025 mfd. condensers is on the second tap, while the third tap is permanently grounded through the other .025 mfd. condenser. The "fourth" tap of the tone control (previously connected through the .006 mfd. condenser) is connected to the .003 condenser, connecting to the original circuit at the plate of the first A. F. tube (type 77), and to ㊻.

5. It is essential that A. C. shielded cable (Part No. L-1655) be used to connect the "On-Off" switch. This cable is a special two-conductor shielded and braided conductor. The shield of this cable is brought out at one end and tied to ground. This cable should be kept as close as possible to the chassis frame. At the power transformer ㊽ one lead is connected to the external A. C. cable. In order that the other lead may be connected to the primary lead of the power transformer, it is necessary to use a stand-off insulator (Part No. 03103). This insulator may be mounted at any convenient place.

Production to *include* the change will be Run No. 5 for both models, instead of Run No. 4.

Model 16 ——— **Model 17**

An error occurs in the designation of Part No. 7084, as Speaker Socket of Code 121 (Models 16 and 17). Part No. 7084 is Speaker Socket *Hole Cover* and has a *list* price of 75 cents per hundred, as shown in Bulletin 170, under Model 16-121-122. The Code 121 of Models 16 and 17 does not have a Speaker Socket. Part No. 7084 covers (in Code 121) the opening which accommodates Speaker Socket Part No. 4957 in Code 122.

This correction should be made to Bulletin No. 161, bottom of second page, under NOTE; to Bulletin No. 165, bottom of fourth page, under NOTE; and to Bulletin No. 170, as noted above.

MODELS 16,18-124, 29(123-TX) 29,45

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Model 16

Changes

Starting with run No. 14, all type Model 16 will use a different type tone control. This will be Part No. 30-4168 which replaces 30-4069 formerly used. Condenser 7653-C (㊽ on wiring diagram in Bulletin 165-B) is replaced by 3615-L.

The new tone control has fixed bass compensation, effective on all four positions, which helps subdue background noise and thus favorably affects short-wave reception.

Starting with Run No. 15, a No. 30-4125 tubular condenser, .006 mfd, will be added, connected between the plate of the 77 tube and the tone control. This gives a smoother variation in control and prevents too great a change in tone from one step to another.

Starting with Run No. 16, the tone control used on Model 16 will be part No. 30-4204, which replaces 30-4168. (See June 1st change notices.) At the same time, condenser 3615-L replaces 3615-J, and external tone control condenser 30-4125 is removed. This latter condenser is now built in as part of the new tone control, thus simplifying assembly of the set.

Model 18-124

Starting with Run No. 4, Resistor ㉙ on wiring diagram of Model 18-124 will be Part No. 5837 (1000 ohms) instead of No. 7775 (2500 ohms). There is a slight change in the antenna and oscillator transformers, the new ones being identified by a red paint mark on the bracket. No change in part number. Change to increase sensitivity.

Model 29 (Code 123-TX)

The differences between regular Model 29 and the TX type are that the latter has the following parts added:

Output transformer	**32-7256**
Speaker switch (toggle)	**3116**
Speaker	**Type P-22**

Model 29-TX also includes a furniture-type speaker, HR-2, which is connected to the receiver by a 25-foot cable and plug assembly, part No. 36-3327, attached to the speaker cabinet.

The A. C. cord on 29-TX is a flat cable and contains an extra wire, which is for use as an antenna lead by connecting the antenna to the binding post mounted on the side of the special flat A. C. plug used. However, the antenna *may* be connected to the regular antenna clip terminal on the receiver chassis if desired and more convenient.

The part number of this special cable and plug assembly is 41-3104.

Model 29

Effective July 1st, condenser ㊹ in wiring diagram of Model 29 is changed from 4989 AM, (.09 mfd.) to 3615 AW (.05 mfd.). This improves the fixed bass compensation used in this model.

Starting with Run No. 8, the cathode resistor (㉙ in wiring diagram of Model 29) will be changed from Part No. 6977 (500 ohms) to 33-3016 (400 ohms). This will prevent variation in performance of sets due to considerable variation in 6A7 tubes.

Starting with Run No. 9, electrolytic condenser ㊶ (on wiring diagram) will be a Part No. 30-2026 instead of 30-2020. The new type is of a higher working voltage.

Models 29 & 45

Effective July 1st, a new wave-trap will be used in this model. Part ① on wiring diagram of Model 29 is changed from Part No. 38-5199 to 38-5995. The new wave trap uses an improved construction which facilitates production.

Effective July 1st, mica condenser ㊱ on wiring diagram of Model 29 was changed from Part No. 7301 to 30-1028. No change in capacity; change to facilitate wiring only.