Philco Radio & Television Corp.

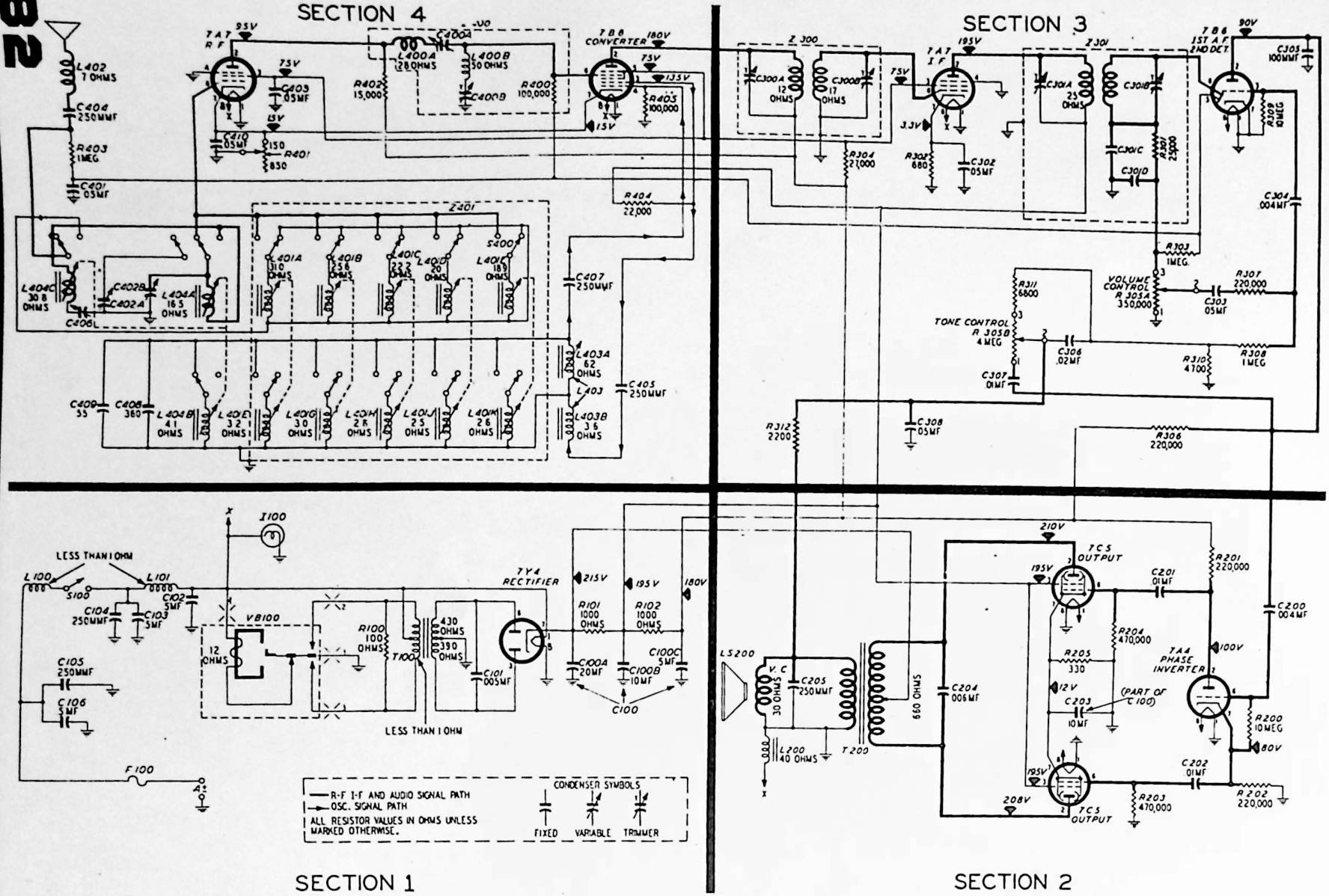
	Model: C4608	**Chassis:**	**Year:** Pre October 1936
	Power:	**Circuit:**	**IF:**
	Tubes:		
	Bands:		

Resources
Beitmans 1949 82
Riders 19 (XIX) PHILCO 19-1
Riders 19 (XIX) PHILCO 19-2
Riders 19 (XIX) PHILCO 19-3
Riders 19 (XIX) PHILCO 19-4
Riders 19 (XIX) PHILCO 19-5
Riders 19 (XIX) PHILCO 19-6
Riders 19 (XIX) PHILCO 19-7
Riders 19 (XIX) PHILCO 19-8
Riders 19 (XIX) PHILCO 19-9

MANUAL OF 1949 MOST-OFTEN-NEEDED RADIO DIAGRAMS

CHRYSLER-PHILCO AUTO RADIO, MODEL C4608

MOPAR MODEL 802



NOTE: All voltage, capacity, and resistance values shown are average. The voltages between B– (chassis) and other points indicated were measured with a 20,000 ohms-per-volt meter, with the volume control at minimum and the tuning control at 550 kc.

INTERMEDIATE FREQUENCY ..... **455 kc.**

PHILCO CORP.

MODEL C4608, Code 121;
Mopar MODEL 802,
Chrysler

CIRCUIT DESCRIPTION

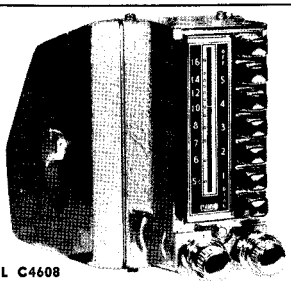
The circuit of the Model C4608 custom-built auto radio consists of a 7A7 r-f stage, a 7B8 converter, a 7A7 i-f stage, a 7B6 second detector and first audio, a 7A4 phase inverter, and two 7C5 tubes in push-pull in the output. The power supply is of the six-volt non-synchronous vibrator type, using a 7Y4 full-wave rectifier.

An unusually high signal-to-noise ratio is achieved in this set by the use of a permeability-tuned r-f stage, coupled to the converter by a band-pass r-f transformer. This transformer is designed to give maximum transfer of signals in the broadcast band, while greatly attenuating all other frequencies. Permeability tuning of both r-f and oscillator stages provides the best possible sensitivity, selectivity, and stability. Both push-button and manual tuning utilize this markedly superior method.

Automatic volume control is provided by filtering the rectified voltage from the diode section of the second detector-first audio tube, and applying it to the grids of the r-f and converter stages.

A feature of the audio system is the continuously variable tone control, which consists of an inverse feed-back circuit built around the first audio stage.

The phase-inverter stage provides push-pull drive for the output tubes, by means of equal load resistances in the plate and cathode circuits of the inverter tube. One signal is taken from the plate, and the other, equal in amplitude but opposite in phase, is taken from the cathode. The push-pull output stage delivers a full five watts of audio power through the output transformer to the electro-dynamic speaker.



MODEL C4608

SPECIFICATIONS

CIRCUIT	**Eight-tube, superheterodyne**
FREQUENCY RANGE	**540 to 1600 kc.**
INTERMEDIATE FREQUENCY	**455 kc.**
PHILCO TUBES	**7A4, 7A7 (2), 7B6, 7B8, 7C5 (2) 7Y4**
POWER INPUT	**6.3 volts, 9.2 amps.**
ANTENNA	**Retractable-tip, Philco Part No. 91-0484**

All components in the receiver circuit are symbolized and located as follows:

C—condenser	LS—loud speaker	T—transformer
I—pilot lamp	R—resistor	VB—vibrator
L—choke or coil	S—switch	Z—electrical assembly

100-series components are in section 1—the power supply.
200-series components are in section 2—the audio system.
300-series components are in section 3—the i-f and second detector.
400-series components are in section 4—the r-f and first detector.

PHILCO TROUBLE-SHOOTING PROCEDURE

In this manual, the circuit is divided into four sections, with a schematic and chassis layout, showing test points, for each section. The trouble-shooting procedure for each section is outlined in a chart. Tests indicated by a large asterisk (*) provide sectional master checks, making it possible to eliminate each section as a source of trouble without going through its entire test chart. Wherever trouble is found (indicated by failure to get a "Normal Indication" on any test) it should be isolated by voltage and resistance checks of the parts associated with the point under test, and remedied before testing further.

Before starting the trouble-shooting procedure, the following steps are recommended:

1. Before connecting the receiver to a source of power, inspect both sides of the chassis. Make sure that all tubes are securely in their sockets, and look for any broken or shorted connections, burned resistors, or other obvious sources of trouble.

2. Connect the receiver to the power source (6.3 volts, d. c.), and ascertain that all the tube filaments are lighted. If the 7Y4 rectifier is observed to be defective, check the filter condensers (C100 A, B, and C) for short circuits before inserting a new tube.

3. Turn the volume control fully on and set the sensitivity control (shown in Figure 9, page 6) at maximum. Connect an antenna or a signal generator to the antenna receptacle, and ascertain that the receiver definitely does not operate properly.

MODEL C4608, Code 121; PHILCO CORP.
Mopar MODEL 802,
Chrysler

TESTS TO ISOLATE TROUBLE WITHIN

SECTION 1

With the exception of the first, make all measurements for this section with a high-quality volt-ohmmeter, using the applicable d-c range. All voltages given in this manual are average, and were measured with the volume control set at minimum.

NOTE: If the vibrator (VB100) is found to be defective, check C101 and C100 for shorts before inserting a new vibrator.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
Ammeter (0-30 amps, d-c) in series with power source.	9.2 amps	Defective power-supply components (isolate by following tests)
A to B—	215 volts	Defective 7Y4, VB100, C100, C101, T100.
C to B—	195 volts	Open R101, leaky C100B, C100C.
D to B—	180 volts	Open R102, leaky C100C.

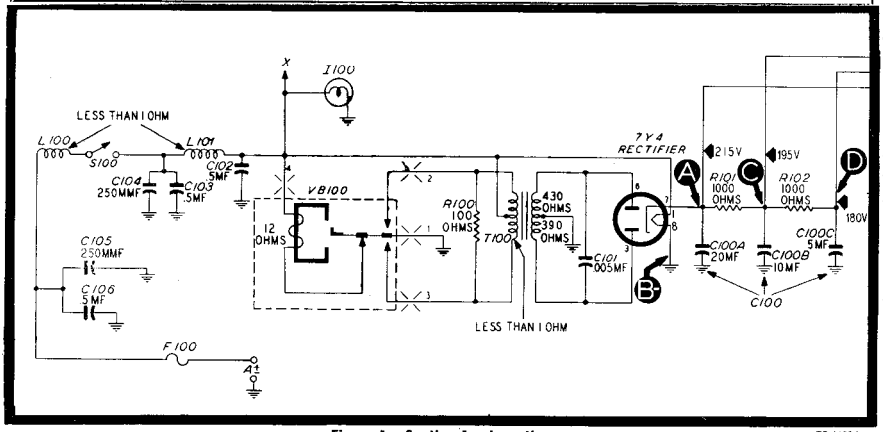


Figure 1. Section 1 schematic. TP-1623A

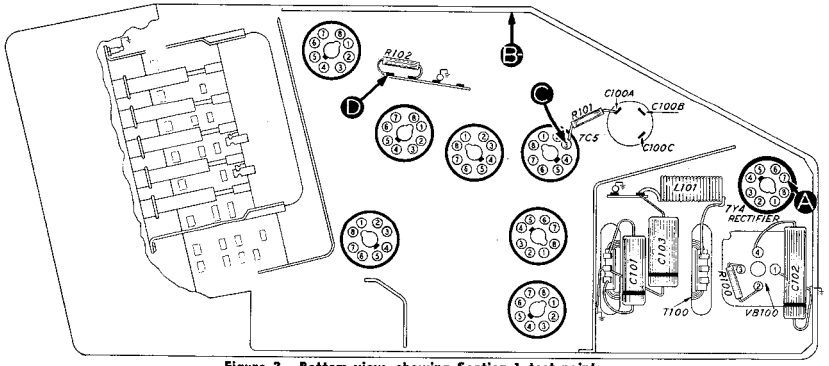


Figure 2. Bottom view, showing Section 1 test points. TP-1623E

Mopar MODEL 802, PHILCO CORP. MODEL C4608, Code 121;
Chrysler

TESTS TO ISOLATE TROUBLE WITHIN

SECTION 2

For all tests in this section, use an audio signal. Connect the generator output lead through a condenser (.01 to .25 mf.) to the test points indicated; connect the generator ground lead to the receiver chassis (B–). Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal on the first test.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
E to B– (Remove 7A4)	Loud, clear signal from speaker.	Defective 7C5, T200, LS200; open R205; leaky C201.
F to B– (7A4 removed)	Loud, clear signal, same as previous test.	Defective 7C5, T200; leaky C202.
G to B– (7A4 removed)	Loud, clear signal.	Open C201.
H to B– (7A4 removed)	Loud, clear signal.	Open C202.
J to B– (Replace 7A4)	Clear signal, louder than previous tests.	Defective 7A4, C200; open R202, R201.

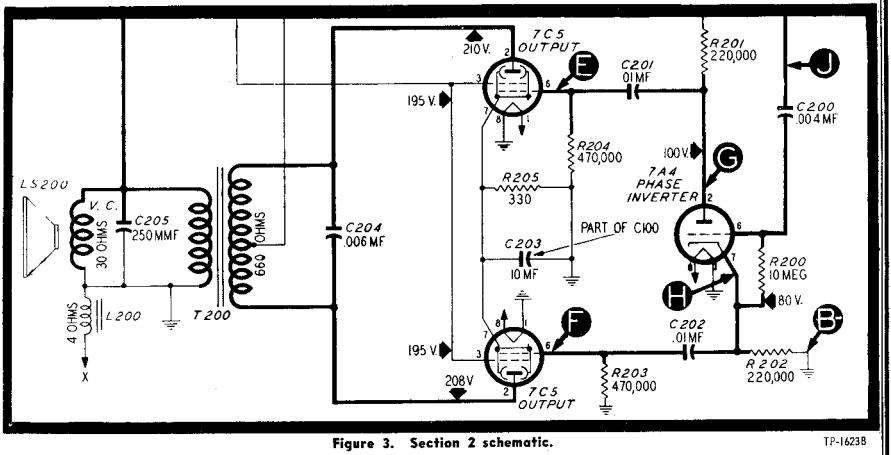


Figure 3. Section 2 schematic. TP-1623B

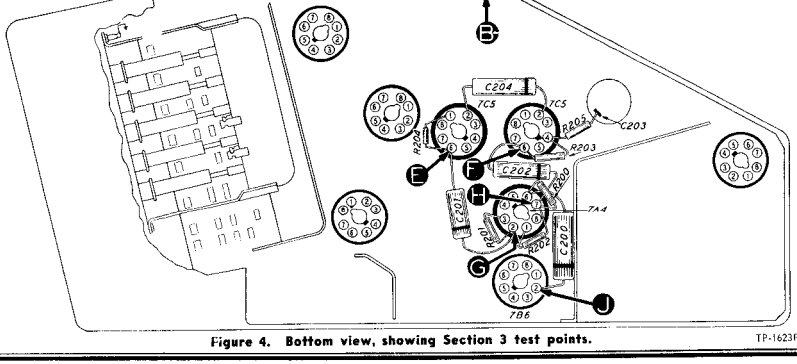


Figure 4. Bottom view, showing Section 3 test points. TP-1623F

MODEL C4608, Code 121; PHILCO CORP.
Mopar MODEL 802, **TESTS TO ISOLATE TROUBLE WITHIN**
Chrysler

SECTION 3

For the first two tests in this section, use an audio signal. For the last two, use a modulated 455-kc signal. Connect the signal-generator output lead through a condenser (.01 to .25 mf.) to the test points indicated; connect the generator ground lead to the receiver chassis (B–). Set the receiver volume control at maximum, and adjust the signal-generator output for a loud, clear signal on the first test.

TEST POINTS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
K to B– (audio sig.)	Loud, clear signal.	Defective 7B6; open R306, C304; shorted C305.
L to B– (audio sig.)	Loud, clear signal.	Open R307, C303; defective volume control (rotate through entire range for complete check.)
M to B– (455-kc. sig.)	Loud, clear signal.	Defective 7A7, Z301; open R302, R304; shorted C403 (see Section 4 for location.)
N to B– (455-kc. sig.)	Loud, clear signal.	Defective Z300.

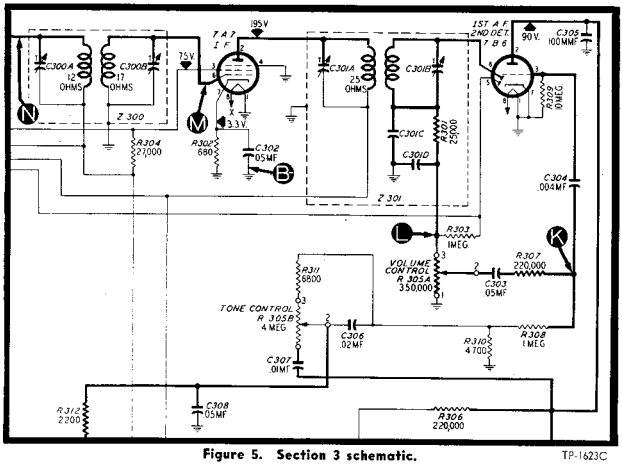


Figure 5. Section 3 schematic. TP-1623C

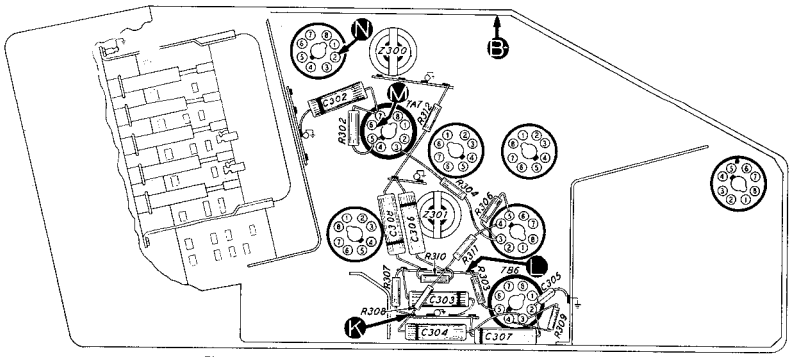


Figure 6. Bottom view, showing Section 3 test points. TP-1623G

PHILCO CORP.

MODEL C4608, Code 121;
Mopar MODEL 802,
Chrysler

SECTION 4

1. Attach the positive lead of a 20,000-ohms-per-volt meter to the receiver chassis, and the prod end of the negative lead through a 50,000-ohm resistor to point S. Set the meter on a 10-volt or similar range. Depress the "Dial" push-button, and rotate the tuning control through its entire range. Absence of voltage at any point indicates that the oscillator is not functioning. If so, check the components listed in the first test in the chart below.

2. Set the volume and sensitivity controls at maximum. Proceed through the chart tests below, connecting the signal-generator output lead through a condenser (.01 to .25 mf.) to the test points indicated. The "NORMAL INDICATION" in each test will be a loud, clear signal when the signal generator is tuned to the same frequency as the receiver.

TEST POINTS	PUSH-BUTTON SETTING	POSSIBLE CAUSE OF ABNORMAL INDICATION
P to B—	"DIAL"	Defective 7B8, L403, L404A, or push-button switch; open R404, C405, C407, C408, C409.
P to B—	pre-tuned, 1 to 5	Defective oscillator coils L401E to K, or push-button switches.
Q to B—	"DIAL"	Defective 7A7, Z400, L404A, L404C, or push-button switch; open R402, R401 (rotate R401 through its entire range for complete check.)
Q to B—	pre-tuned, 1 to 5	Defective r-f coils L401 A to E, or push-button switches.
R to B—	"DIAL"	Defective L402, C404, L404A, L404C, or push-button switch.
R to B—	pre-tuned, 1 to 5	Defective r-f coils L401A to E, or push-button switches.

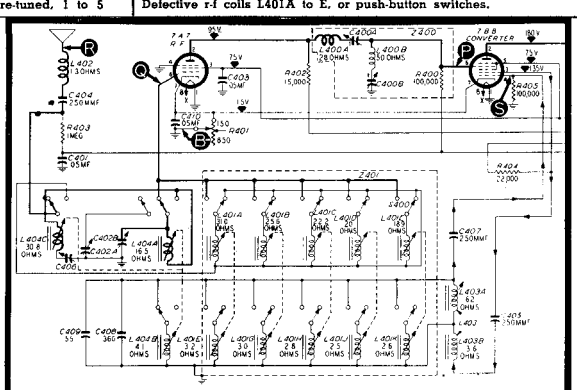


Figure 7. Section 4 schematic. TP-1623D

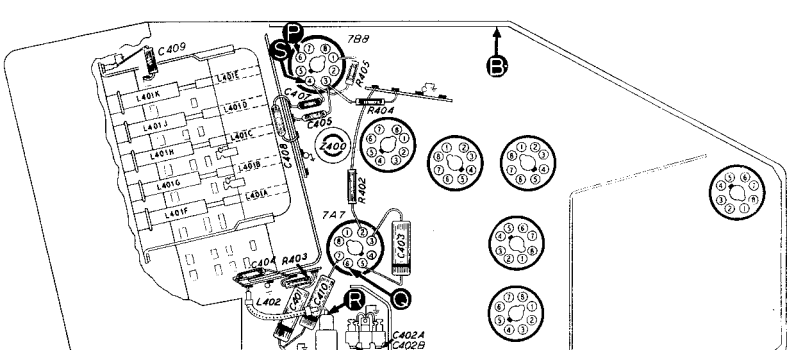


Figure 8. Bottom view, showing Section 4 test points. TP-1623H

ALIGNMENT PROCEDURE

CONNECT THE OUTPUT METER between the voice-coil lug on the speaker and ground.

CONNECT THE SIGNAL-GENERATOR output lead as follows: For the i-f alignment (the first step in the chart), connect through a 20-mmf. condenser to pin 6 of the 7B8 converter. For the r-f alignment (all steps after the first), connect through a 20-mmf. condenser in series with an antenna lead (Part No. 95-0181) to the antenna receptacle. If the antenna lead is not available, connect a 30-mmf. condenser from the antenna receptacle to ground.

CALIBRATE THE DIAL as follows: Turn the tuning control to its maximum clockwise position. The pointer should then be at 1600 kc. If not, insert a stiff rod 2¼" into the small hole on the left side of the control head, near the number 8 on the dial scale. Rotate the tuning control until the pointer mechanism is stopped by the rod, and continue rotating the control for a fraction of a turn, to slide the pointer mechanism a short distance along the drive cord. Repeat this operation until the pointer coincides with the 1600-kc. mark on the dial when the tuning control is fully clockwise.

SET THE RECEIVER CONTROLS as follows: Set the tone control at "VOICE" (maximum high position). Set the volume and sensitivity controls at maximum. Adjust the signal-generator output as alignment progresses to keep the meter needle near center scale.

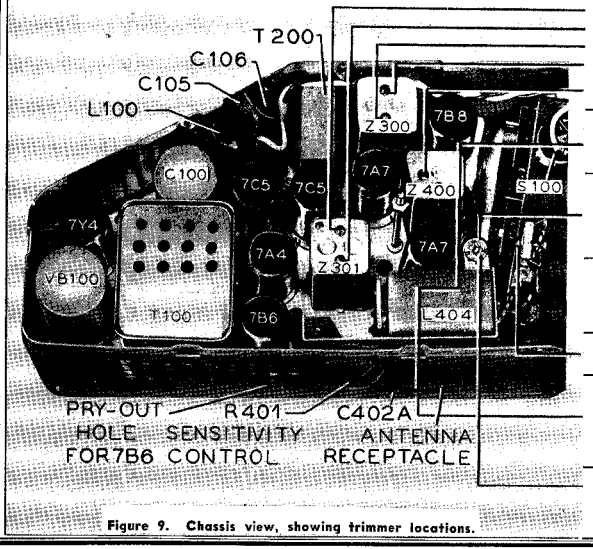


Figure 9. Chassis view, showing trimmer locations.

ADJUST IN ORDER	SPECIAL INSTRUCTIONS	DIAL SETTINGS SIG. GEN.	DIAL SETTINGS RECEIVER
C301B Max. C301A Max. C300B Max. C300A Max. C400B Min.	Ground pin 4 of the 7B8. Adjust the i-f trimmers for maximum in the order listed. Then adjust the i-f trap condenser (C400B) for minimum output.	455 kc.	1600 kc.
C402B Max.	Remove the ground from pin 4 of the 7B8. Adjust for maximum output.	1500 kc.	1500 kc.
L403A Max.	Adjust for overall maximum while rocking the tuning control.	580 kc.	580 kc.
	Tune the receiver for maximum output with the tuning control set at 550 kc.	550 kc.	550 kc. (approx.)
C408 Min.	Adjust for minimum output.	1460 kc.	550 kc.
C402B Max.	Adjust for maximum output. Final adjustment to be made after re-installing the set in the car.	1500 kc.	Tune in 1500 kc. signal
L403A Max.	Adjust for overall maximum while rocking the tuning control.	580 kc.	580 kc.

PHILCO CORP.

MODEL C4608, Code 121;
Mopar MODEL 802,
Chrysler

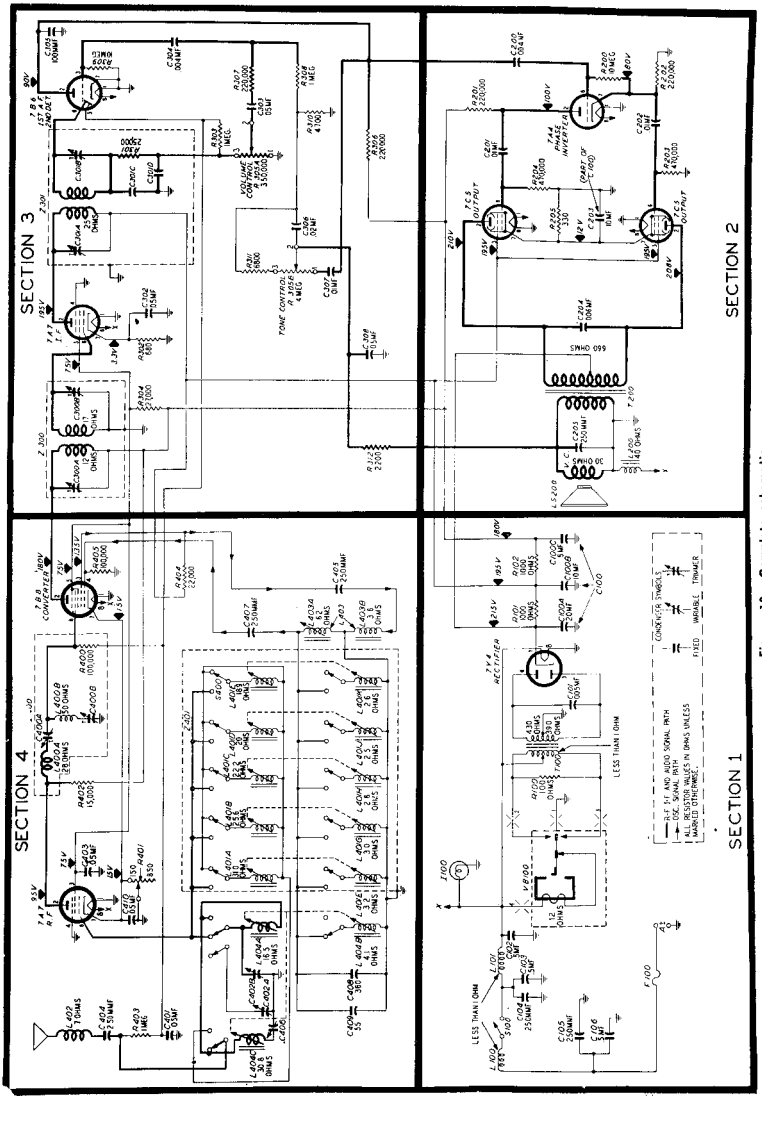


Figure 10. Complete schematic.

NOTE: All voltage, capacity, and resistance values shown are average. The voltages between B- (chassis) and other points indicated were measured with a 20,000 ohms-per-volt meter, with the volume control at minimum and the tuning control at 550 kc.

MODEL C4608, Code 121; PHILCO CORP. Mopar MODEL 802, Chrysler

REPLACEMENT PARTS LIST

NOTE: Parts marked with an asterisk (*) are general replacement items, and the numbers will not be identical with those used on factory assemblies. Use only the "Service Part No." shown in the parts list when ordering replacements.

SECTION 1

Reference	Description	Service Part No.
C100	Condenser, electrolytic	61-0150*
	C100A: condenser, 20 mf.	Part of C100
	C100B: condenser, 10 mf.	Part of C100
	C100C: condenser, 5 mf.	Part of C100
C101	Condenser, .005 mf.	61-0153*
C102	Condenser, .5 mf.	61-0134*
C103	Condenser, .5 mf.	61-0137*
C104	Condenser, 250 mmf.	60-10255007*
C105	Condenser, 250 mmf.	60-10255007*
C106	Condenser, .5 mf.	61-0137*
F100	Fuse	45-2559
I100	Lamp, pilot	34-2064*
L100	Choke, "A"	32-1644
L101	Choke, vibrator	65-0389
R100	Resistor, 100 ohms	66-1104340*
R101	Resistor, 1,000 ohms	66-2104340*
R102	Resistor, 1,000 ohms	66-2104340*
S100	Switch, on-off	67-0046*
T100	Transformer, power	65-0347*
VB100	Vibrator	83-0026*

SECTION 2

C200	Condenser, .004 mf.	61-0179*
C201	Condenser, .01 mf.	61-0120*
C202	Condenser, .01 mf.	61-0169*
C203	Condenser, 10 mf.	Part of C100
C204	Condenser, .006 mf.	61-0105*
C205	Condenser, 250 mmf.	60-10255007*
L200	Coil, field	Part of LS200
LS200	Speaker unit	73-0042*
	Replacement cone	91-0164
R200	Resistor, 10 megs.	66-6101540*
R201	Resistor, 220,000 ohms	66-4221540*
R202	Resistor, 220,000 ohms	66-4221540*
R203	Resistor, 470,000 ohms	66-4471540*
R204	Resistor, 470,000 ohms	66,4471540*
R205	Resistor, 330 ohms	66-1334340*
T200	Transformer, output	65-0363*

SECTION 3

C302	Condenser, .05 mf.	61-0101*
C303	Condenser, .05 mf.	61-0101*
C304	Condenser, .01 mf.	61-0179*
C305	Condenser, 100 mmf.	60-10145307*
C306	Condenser, .02 mf.	61-0154*
C307	Condenser, .01 mf.	60-10105007*
C308	Condenser, .05 mf.	61-0101*
R302	Resistor, 680 ohms	66-1683340*
R303	Resistor, 1 meg.	66-5101540*
R304	Resistor, 27,000 ohms	66-3274340*
R305	Control, volume	67-0040*
	R305A: control, volume, 350,000 ohms	Part of R305
	R305B: control, tone, .4 meg.	Part of R305
R306	Resistor, 220,000 ohms	66-4221540*
R307	Resistor, 220,000 ohms	66-4221540*
R308	Resistor, 1 meg.	66-5101540*
R309	Resistor, 10 megs.	66-6101540*
R310	Resistor, 470 ohms	66-2471340*
R311	Resistor, 6,800 ohms	66-2681540*
R312	Resistor, 2,200 ohms	66-2221540*
Z300	Transformer, 1st i-f	65-0365
	C300A: condenser, trimmer	Part of Z300
	C300B: condenser, trimmer	Part of Z300
Z301	Transformer, 2nd i-f	65-0366
	C301A: condenser, trimmer	Part of Z301
	C301B: condenser, trimmer	Part of Z301
	C301C: condenser	Part of Z301
	C301D: condenser	Part of Z301
	R301: resistor	Part of Z301

SECTION 4

C401	Condenser, .05 mf.	61-0101*
C402	Condenser, antenna assembly	77-0788
	C402A: condenser, trimmer	Part of C402
	C402B: condenser, trimmer	Part of C402
C403	Condenser, .05 mf.	61-0111*
C404	Condenser, 250 mmf.	60-10255007*
C405	Condenser, 250 mmf.	60-10255007*
C406	Condenser, trimmer	63-0069
C407	Condenser, 250 mmf.	60-10255007*
C408	Condenser, 360 mmf.	30-1220-13*
C409	Condenser, .05 mf.	61-0149*
C410	Condenser, .05 mf.	61-0101*
L402	Choke, antenna	65-0437
L403	Coil, oscillator shunt	65-0440
	Iron core and screw assembly	57-2325
	Mounting nut	218-1341
L404	Manual tuning unit assembly	77-0962
	Coil assembly, antenna	65-0449
	Coil assembly, oscillator	65-0439
	Coil, assembly, image trap	65-0382

SECTION 4 (Continued)

Reference	Description	Service Part No.
	Control, sensitivity, 1,000 ohms (R401)	67-0025*
	Core assembly, iron, image trap	77-0677
	Core, iron, antenna	57-1702
	Core, iron, oscillator	57-1703
	Guide assembly, core	77-0678
	Nut, backlash	57-1706
	Pin, hair	57-1868FA1
	Shaft, core guide	57-1672FA3
	Shaft, manual tuning	77-0767
	Spring, backlash nut	57-1705FA1
	Spring, coil retaining	57-1673
	Spring, core guide	57-1708
R401	Control, sensitivity (Part of L404)	67-0025*
R402	Resistor, 15,000 ohms	66-3153340*
R403	Resistor, 1 meg.	66-5101540*
R404	Resistor, 22,000 ohms	66-3223340*
R405	Resistor, 100,000 ohms	66-4101540*
Z400	Transformer, r-f and i-f wave trap	65-0421
	C400A: condenser, trimmer	Part of Z400
	C400B: condenser, trimmer	Part of Z400
	L400A: coil, r-f plate	Part of Z400
	L400B: coil, i-f trap	Part of Z400
	R400: resistor, 100,000 ohms	Part of Z400
Z401	Tuning unit assembly, push-button (complete)	77-0943
	Condenser, ceramicon	61-0149*
	Condenser, padder	63-0069
	Coupling, push-button link	57-1700
	S400: switch, push-button	Part of Z401

MISCELLANEOUS

Front housing assembly	77-0941FC64
Cover, tube side	77-0879
Cover, wiring side	57-2186FC64
Receptacle, antenna	57-0591FA3
Socket, tube	27-6151*
Socket, vibrator	27-6044*
Tuning unit	77-0943
Front, housing	57-2211FC64
Push-button assembly (Dodge)	76-1910
Push-button assembly (Plymouth, De Soto, Chrysler)	76-1851
Cord, pointer drive (25-foot spool)	45-1459
Core and key assembly, push-button (off)	76-1955
Core and key assembly, push-button No. 2	76-1956
Core and key assembly, push-button No. 3	76-1957
Core and key assembly, push-button No. 4	76-1958
Core and key assembly, push-button No. 5	76-1959
Core and key assembly, push-button No. 6	76-1960
Core and key assembly, push-button (dial)	76-1961
Cover, nut (Chrome)	57-1683FA8
Cover, push-button (MoPar, Dodge)	56-3386
Dial, glass (Dodge)	27-5898
Dial, glass (Plymouth, MoPar)	27-5897
Bezel (Dodge)	57-2220FA8
Bezel (Plymouth, De Soto, Chrysler)	57-2221FA8
Bracket, diffusing screen	57-2242FA3
Pointer, dial	55-1366
Screen, diffusing	55-1428
Socket assembly, pilot lamp	76-1678
Spring, dial mounting	57-2218FA1
Drum assembly, tone indicator	77-0914
Cord, tone drum drive (25-foot spool)	45-1459
Shaft assembly, color cup	76-1855
Spring, tone indicator color drum	57-1693
Washer, "U", tone drum shaft	28-5390FE12
Fuse lead assembly	77-0052
Contact	54-4344
Housing, fuse	56-3595FA3
Spring	56-3593FA1
Tube, insulating	54-7192
Washer, fibre	54-7191
Set mounting	
Bolt	IW16167FA3
Grille spacer	57-2358FA8
Knob, manual-volume	77-0688
Knob (nut cover)	57-1683FA8
Knob, tone	57-1682FA8
Nut	IW19996FA3
Shaft, tuning	57-2217FA3
Spacer	57-1042FA3
Washer	97-0073FA1
Washer	W417FA3
Speaker mounting	
Nut	IW19988FA3
Stud and bushing assembly	77-0400
Suppressor kit	
Braid, bonding	95-0073
Clip	56-6276
Condenser, generator	61-0156*
Condenser, ignition switch	61-0177*
Filter assembly, fuel guage	67-0050*
Suppressor, distributor	33-1196*

tionally, both sets are identical, but there have been several parts changes in Code 122 which, because of their effect upon the characteristics and adjustment of the set, definitely require the correct substitution. These changes involve the parts listed below.

In Code 122, the sensitivity control is replaced by a fixed resistor; also, the i-f transformers and wave trap are replaced by units which use permeability tuning instead of trimmer-condenser tuning.

Physically, the alignment procedure remains the same, except that the transformers are of the K type; therefore, the primary must be adjusted from the bottom of the can, while the secondary is adjusted from the top.

We suggest that you examine the list below and order the new parts. We feel that these parts may be required in the course of warranty service.

SECTION 1

Reference Symbol	Description	Service Part No. (Code 122)	Service Part No. (Code 121)
L101	Choke, vibrator	32-4170	65-0389

SECTION 2

C200	Condenser, grid blocking, .005 mf.	45-3502	61-0179
C201	Condenser, grid blocking, .01 mf.	61-0120	61-0105
C202	Condenser, grid blocking, .01 mf.	61-0120	61-0105
C204	Condenser, plate by-pass, .007 mf.	61-0127	61-0105
T200	Transformer, output	32-8316-1	65-0363

SECTION 3

Reference Symbol	Description	Service Part No. (Code 122)	Service Part No. (Code 121)
C304	Condenser, grid blocking, .005 mf.	45-3502	61-0179
C307	Condenser, tone compensation, .01 mf.	61-0120	61-0105
R302	Resistor, cathode bias, 470 ohms	66-1473340	61-1683340
Z300	Transformer, 1st i-f	32-4160	65-0365
Z301	Transformer, 2nd i-f	32-4161	65-0366

SECTION 4

L404	Manual-tuning-unit assembly	77-0666-2	77-0962
R401	Resistor, cathode bias, 220 ohms (replaces sensitivity control in Code 121)	66-1223340	67-0025
Z400	Transformer, r-f and i-f wave trap	32-4162	65-0421
Z401	Tuning-unit assembly, push-button (complete)	77-0657-1	77-0943

NOTE: On a small percentage of the first sets made, some difficulty may be encountered in keeping the i-f transformers aligned. If the radio is weak or the i-f transformers are far out of alignment, adjust the cores. If they seem to turn very easily, it will be necessary to replace the entire i-f transformer. This condition may occur only on some sets made prior to run #4, for Model C-4608, Code 122 only.