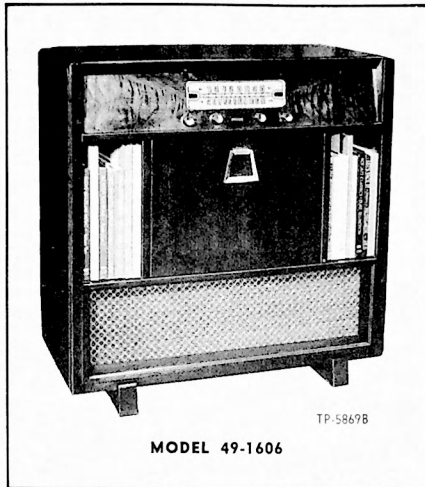


# PHILCO RADIO-PHONOGRAPH MODEL 49-1606



## SPECIFICATIONS

CABINET	Wood console, mahogany and blonde walnut
CIRCUIT	Seven tube superheterodyne plus rectifiers
<b>FREQUENCY RANGES</b>	
Broadcast	540—1620 kc.
FM	88—108 mc.
AUDIO OUTPUT	5 watts
OPERATING VOLTAGE	105—125 volts, 60 cycles, a.c.
<b>POWER CONSUMPTION</b>	
Radio	65 watts
Phonograph	85 watts
AERIALS	Built-in, low-impedance loop for broadcast; line-cord aerial for FM
<b>INTERMEDIATE FREQUENCY</b>	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (7)	12AU6, 12AU7, 14F8, 6BJ6(2), 19T8, 50C6G, selenium rectifier (2)
PHONOGRAPH	Philco Automatic Record Changer Model M-9. (For service information, refer to Page 493)

## SYMBOLIZATION

The components in the radio circuit are symbolized according to the types of parts and the sections of the radio in which the parts are located. The prefix letter of the symbol designates the type of part as follows:

C—condenser	LS—loud-speaker	W—line cord
I—pilot lamp	R—resistor	WS—wafer switch
L—choke or coil	S—switch	Z—electrical assembly
LA—loop aerial	T—transformer	

The number of the symbol designates the section in which the part is located, as follows:

- 100-series components are in Section 1—the power supply.
- 200-series components are in Section 2—the audio circuits.
- 300-series components are in Section 3—the i-f, detector, and a-v-c circuits.
- 400-series components are in Section 4—the r-f and converter circuits.

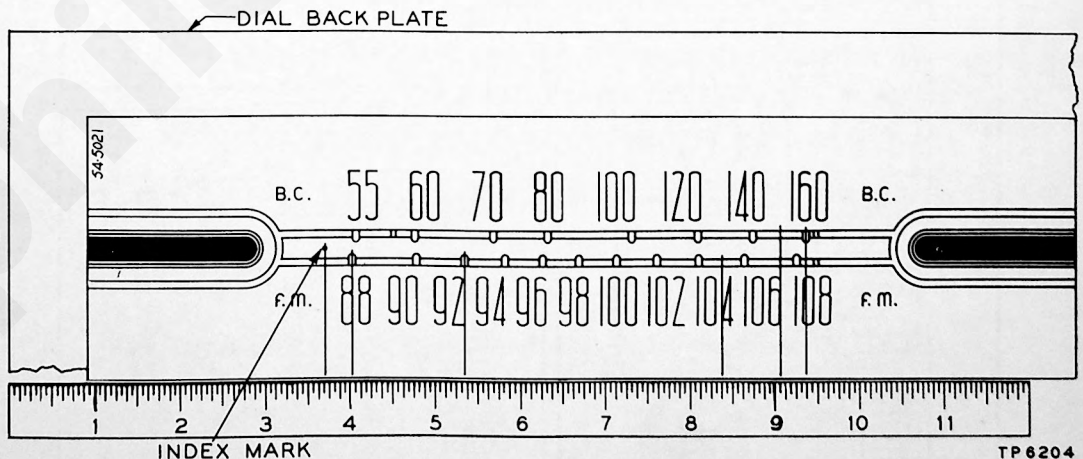


Figure 1. Dial-Backplate Calibration Measurements

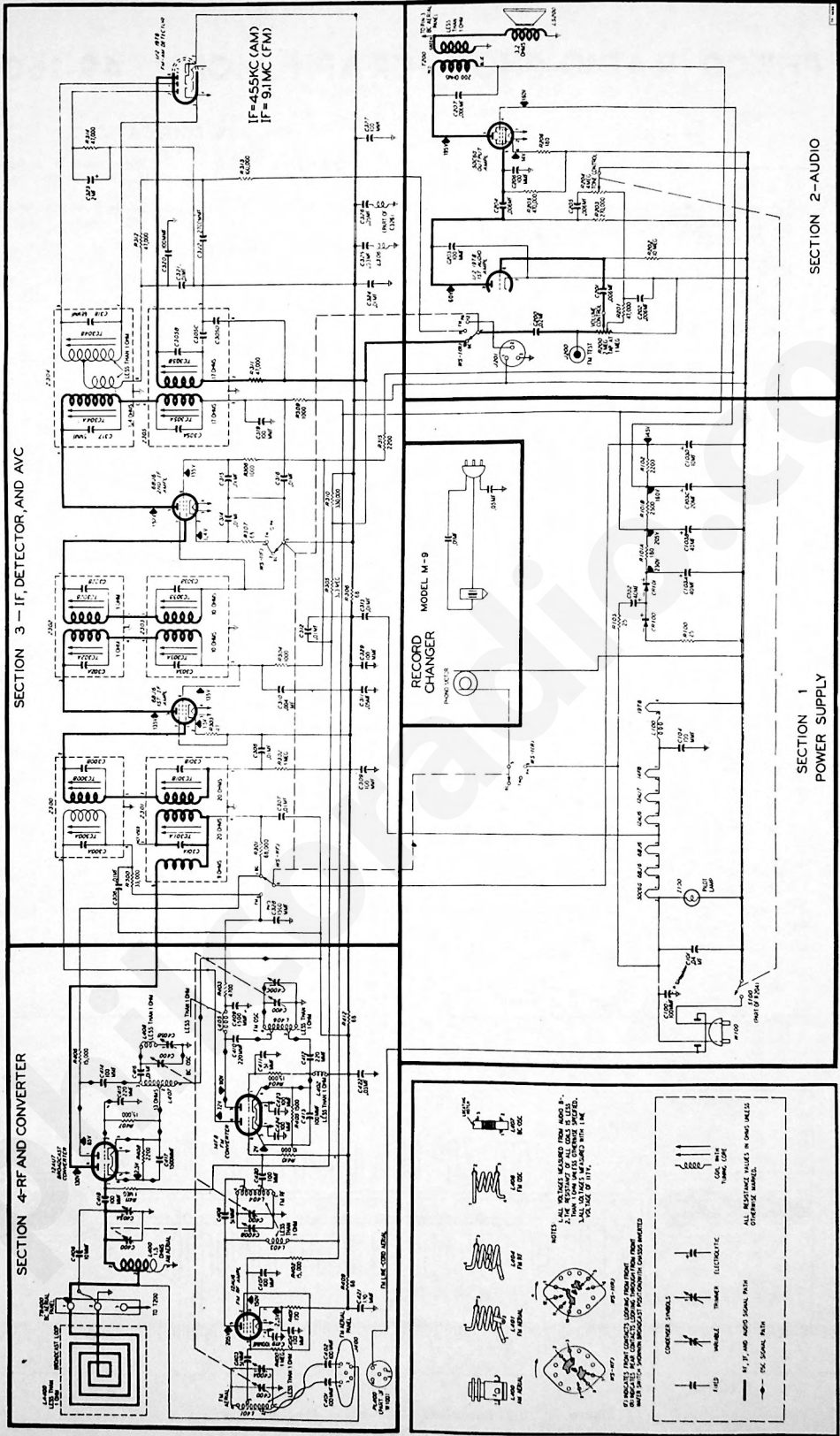


Figure 2. Philco Radio-Phonograph Model 49-1606, Sectionalized Schematic Diagram.

**NOTES:**

- ALL VALUES BALANCED FROM AND TO GROUND UNLESS OTHERWISE SPECIFIED.
- ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.

**CONNECTIONS:**

- RESISTOR: RESISTOR VALUE IN OHMS UNLESS OTHERWISE SPECIFIED
- VARIABLE: VARIABLE CAPACITOR
- FIXED: FIXED CAPACITOR
- ELECTROLYTIC: ELECTROLYTIC CAPACITOR
- TRIMMER: TRIMMER CAPACITOR
- INDUCTOR: INDUCTOR VALUE IN OHMS UNLESS OTHERWISE SPECIFIED
- COIL: COIL VALUE IN OHMS UNLESS OTHERWISE SPECIFIED
- TRANSFORMER: TRANSFORMER VALUE IN OHMS UNLESS OTHERWISE SPECIFIED
- SLIDER: SLIDER
- SWITCH: SWITCH
- RELAY: RELAY
- SOLENOID: SOLENOID
- SPRING: SPRING
- WIRE: WIRE
- GROUND: GROUND

**ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.**

## AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be completed before the FM alignment is made.

**DIAL POINTER**—Calibration and pointer-index measurements are shown in figure 1. With tuning gang fully meshed, set pointer to index marker.

**OUTPUT METER**—Connect between terminal 3 of aerial terminal board TB400 and chassis.

**AM R-F SIGNAL GENERATOR**—Connect as indicated in chart. Use modulated output.

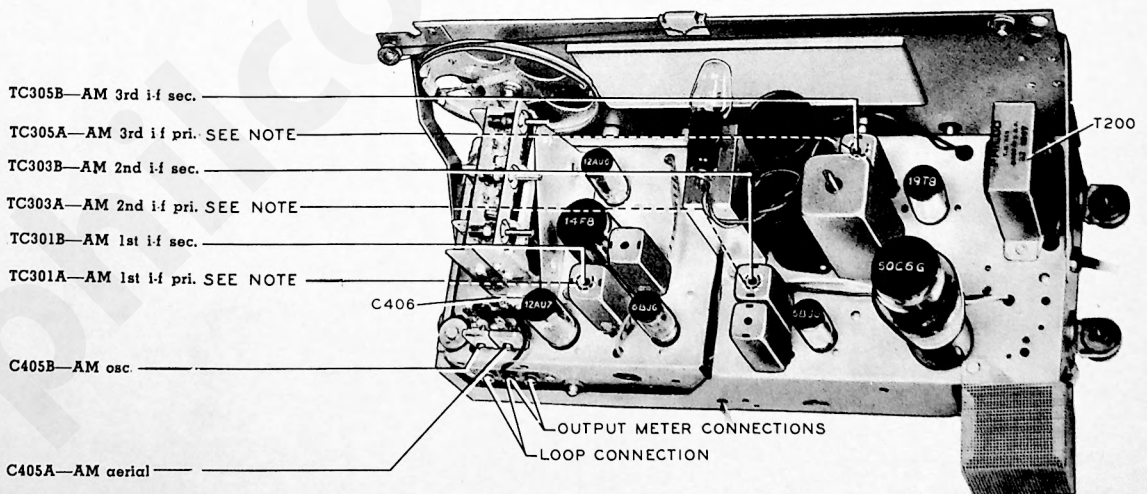
**RADIO CONTROLS**—Set volume control to maximum, turn tone control fully counterclockwise, and set band switch to broadcast position.

**OUTPUT LEVEL**—During alignment, adjust signal-generator output to maintain output-meter indication below 1.25 volts.

## AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B-; output lead through .1-mf. condenser to terminal of TB400.	455 kc.	540 kc.	Adjust tuning cores once only, in order given, for maximum output.	TC305B—AM 3rd i-f sec. TC305A—AM 3rd i-f pri. TC303B—AM 2nd i-f sec. TC303A—AM 2nd i-f pri. TC301B—AM 1st i-f sec. TC301A—AM 1st i-f pri.
2	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C405B—AM osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C405A—AM aerial

**RADIATING LOOP:** Make up a 6-to-8 turn, 6-inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop aerial.



NOTE: TC301A, TC303A, AND TC305A ARE LOCATED ON UNDERSIDE OF CHASSIS.

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Figure 3. Top View, Showing AM Trimmer Locations

# FM ALIGNMENT PROCEDURE

## Make AM Alignment First

OUTPUT METER—Connect between terminal 3 of aerial terminal board TB400 and chassis.

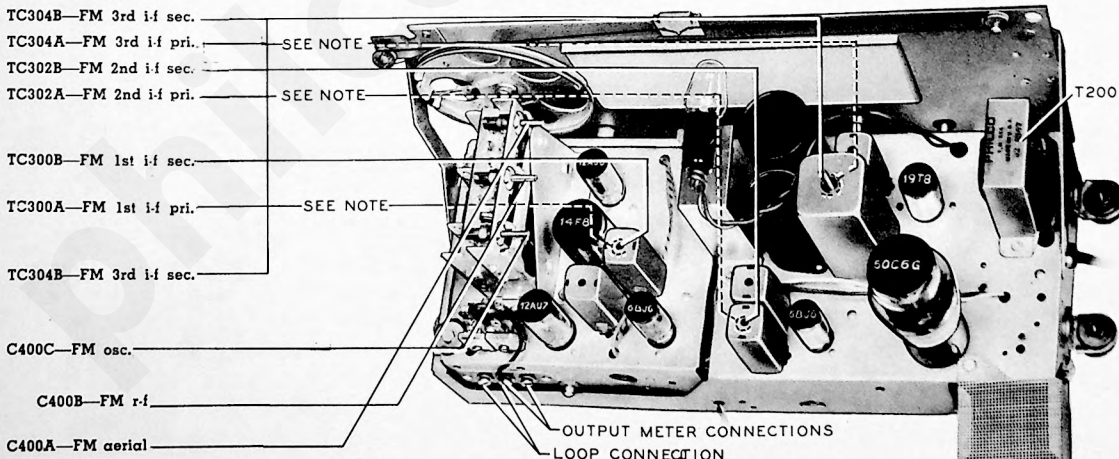
ALIGNMENT INDICATOR—Connect negative lead of 20,000-ohms-per-volt meter to pin 2 of 19T8 tube; connect positive lead to B-. Use 10-volt range.

AM R-F SIGNAL GENERATOR—Generator must have sufficient output to give a reading of 8.5 volts on alignment indicator. Connect ground lead to B-; connect output lead as indicated in chart. Use modulated output.

RADIO CONTROLS—Set volume control to maximum, turn tone control fully counterclockwise, and set band switch to FM position. Allow radio and signal generator to operate for at least 15 minutes before making alignment.

R-F-COIL—NOTE: Check resonance of coils L401, L404, and L406 by inserting each end of a powdered-iron tuning core, such as Philco Part No. 56-6100, into the coils. If the signal strength increases when the iron end is inserted, compress the turns slightly. If the signal strength increases when the brass end is inserted, spread the turns slightly. If the signal strength decreases when either the iron or the brass end is inserted, no further adjustment is necessary. Do not spread or compress turns of coil excessively; only a small change is required at these high frequencies.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B-; output lead through .1-mf. condenser to pin 1 of 6B76 (1st i-f amplifier).	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on alignment indicator. Attenuate signal generator to maintain 10-volt reading. Repeat until no further improvement is noted. After this step, do not touch any of these tuning cores except as directed in step 3.	TC304B—FM 3rd i-f sec. TC304A—FM 3rd i-f pri. TC302B—FM 2nd i-f sec. TC302A—FM 2nd i-f pri.
2	Output lead through .1-mf. condenser to pin 8 of 14F8.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on alignment indicator. Attenuate signal generator to maintain 10-volt reading. Repeat until no further improvement is noted. After this step, do not touch these tuning cores.	TC300B—FM 1st i-f sec. TC300A—FM 1st i-f pri.
3	Same as step 2.	9.1 mc.	88 mc.	Adjust tuning core for minimum reading on output meter. This adjustment is critical; repeat to make sure it is correct.	TC304B—FM 3rd i-f sec.
4	Output lead to terminal 2 of J400.	105 mc.	105 mc.	Adjust trimmer for maximum reading on alignment indicator.	C400C—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Adjust trimmer for maximum reading on alignment indicator while rocking tuning control.	C400B—FM r-f
6	Same as step 4.	105 mc.	105 mc.	Adjust trimmer for maximum reading on alignment indicator.	C400A—FM aerial
7	Same as step 4.	92 mc.	92 mc.	Adjust coil for maximum (see r-f coil note).	L406—FM osc. coil
8	Same as step 4.	92 mc.	92 mc.	Adjust coil for maximum (see r-f coil note).	L404—FM r-f coil
9	Same as step 4.	92 mc.	92 mc.	Adjust coil for maximum (see r-f coil note).	L401—FM aerial coil
10	Repeat steps 4 through 9 until no further increase is obtained.				



NOTE: TC300A, TC302A AND TC304B ARE LOCATED ON UNDERSIDE OF CHASSIS.

Figure 4. Top View, Showing FM Trimmer Locations

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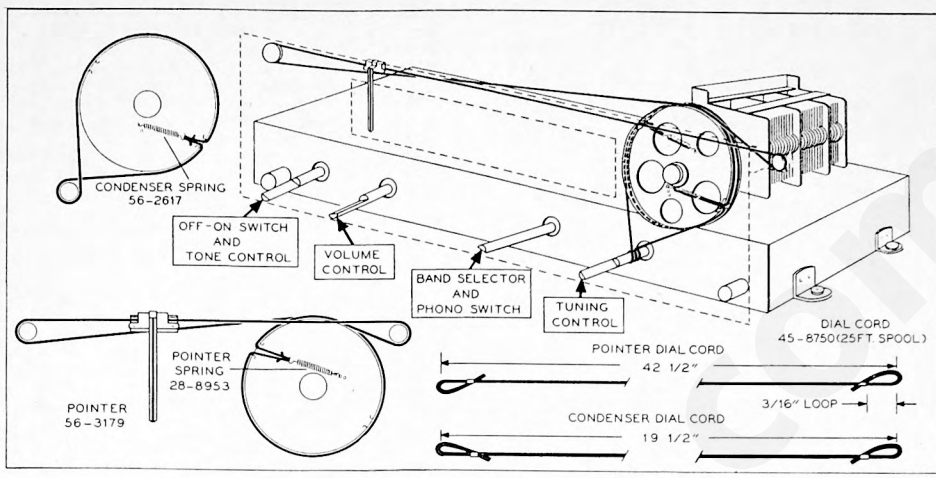


Figure 5. Drive-Cord Installation Details

## REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (\*) indicate general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and replacement parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

### SECTION 1 POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line by-pass, 100 mmf.	62-110009001*
C101	Condenser, line by-pass, .04 mf.	45-3500-2
C102	Condenser, electrolytic, filter, 40 mf., 200v	30-2568-28
C103	Condenser, electrolytic, 4-section	30-2568-24
C103A	Condenser, filter, 40 mf., 250v	Part of C106
C103B	Condenser, filter, 40 mf., 250v	Part of C106
C103C	Condenser, filter, 20 mf., 250v	Part of C106
C103D	Condenser, filter, 10 mf., 250v	Part of C106
C104	Condenser, r-f by-pass, 100 mmf.	62-110009001*
CR100	Rectifier, selenium, dry disc	34-8003-2
CR101	Rectifier, selenium, dry disc	34-8003-2
I100	Lamp, pilot	34-2605*
L100	Choke, filament, 100 microhenries	32-4143-4
R101	Resistor, 2-section filter	33-3435-23
R101A	Resistor, filter, 180 ohms	Part of R101
R101B	Resistor, filter, 3200 ohms	Part of R101
R102	Resistor, filter, 10,000 ohms	66-3104340
R103	Resistor, current limiting, 50 ohms, 7w	33-1335-84
S100	Switch, on-off	Part of R204
W100	Line cord and plug	L2183*
WS-1 (R)	Switch-wafer section	Part of 42-1874†

### SECTION 2 AUDIO CIRCUITS

C200	Condenser, d-c blocking, .02 mf.	61-0108*
C201	Condenser, d-c blocking, .006 mf.	45-3500-7*
C202	Condenser, bass compensation, .006 mf.	45-3500-7*
C203	Condenser, by-pass, 100 mmf.	62-110009001*
C204	Condenser, d-c blocking, .006 mf.	45-3500-7*
C205	Condenser, tone compensation, .006 mf.	45-3500-7*
C206	Condenser, by-pass, 100 mmf.	62-110009001*
C207	Condenser, tone compensation, .006 mf.	45-3500-7*
C208	Condenser, 51 mmf.	30-1224-2
C209	Condenser, suppressor, 220 mmf.	62-122001001
C210	Condenser, bypass, 100 mmf.	62-110009001
J200	Socket, FM test	27-6180
J201	Socket, phono input	27-6126
LS200	Speaker	36-1610-2
R200	Volume control, 2 megohms (tap at 1 megohm)	33-5535-17

### SECTION 2 (Continued) AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R201	Resistor, bass compensation, 47,000 ohms	66-3473340*
R202	Resistor, grid return, 10 megohms	66-6103340*
R203	Resistor, plate load, 270,000 ohms	66-4273340*
R204	Tone control (with on-off switch), 4 megohms	33-5538-34
R205	Resistor, grid return, 470,000 ohms	66-4473340*
R206	Resistor, cathode bias, 220 ohms	66-1228340
T200	Transformer, audio output	32-8367-1
WS-1 (R)	Switch-wafer section	Part of 42-1874†

### SECTION 3 I-F, DETECTOR, AND A-V-C CIRCUITS

C300A	Condenser, shunt	Part of Z300
C300B	Condenser, shunt	Part of Z300
C301A	Condenser, shunt	Part of Z301
C301B	Condenser, shunt	Part of Z301
C302A	Condenser, shunt	Part of Z302
C302B	Condenser, shunt	Part of Z302
C303A	Condenser, shunt	Part of Z303
C303B	Condenser, shunt	Part of Z303
C305A	Condenser, shunt	Part of Z305
C305B	Condenser, shunt	Part of Z305
C305C	Condenser, i-f filter	Part of Z305
C305D	Condenser, i-f filter	Part of Z305
C306	Condenser, plate decoupling (FM), .01 mf.	61-0120*
C307	Condenser, plate decoupling (AM), .01 mf.	61-0120*
C308	Condenser, a-v-c by-pass, .01 mf.	61-0120*
C309	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C310	Condenser, plate decoupling, .004 mf.	61-0179*
C311	Condenser, r-f by-pass, .05 mf.	61-0122*
C312	Condenser, a-v-c filter, .01 mf.	61-0120*
C313	Condenser, r-f by-pass, .01 mf.	61-0120*
C314	Condenser, cathode by-pass, .01 mf.	61-0120*
C315	Condenser, screen by-pass, .01 mf.	61-0120*
C316	Condenser, plate decoupling, .01 mf.	61-0120*
C317	Condenser, i-f trimmer, fixed, 5 mmf.	Part of Z304
C318	Condenser, i-f trimmer, fixed, 68 mmf.	Part of Z304
C319	Condenser, plate decoupling, 100 mmf.	62-110009001*
C321	Condenser, compensating, .01 mf.	61-0120*
C322	Condenser, decoupling, 2700 mmf.	60-20275404*

SECTION 3 (Continued)

I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No
C323	Condenser, electrolytic, FM-detector filter, 2 mf., 50v	30-2417-7
C324	Condenser, r-f by-pass, .01 mf.	61-0120*
C325	Condenser, tuned i-f by-pass, .03 mf.	45-3500-1*
C326	Condenser, tuned i-f by-pass, .05 mf.	61-0170*
C327	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C328	Condenser, r-f by-pass, 1500 mmf.	62-215001011
C329	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C330	Condenser, by-pass, .01 mf.	61-0120
C331	Condenser, by-pass, .01 mf.	61-0120
C332	Condenser, 2.2 mf.	30-1221-4
C333	Condenser, by-pass, 100 mf.	62-110009001
C334	Condenser, r-f by-pass, 100 mmf.	62-110009001
C335	Condenser, r-f by-pass, 100 mmf.	62-110009001
C336	Condenser, r-f by-pass, 100 mmf.	62-110009001
L306	Coil, tuned i-f by-pass	32-4061-2
R300	Resistor, plate decoupling, 10,000 ohms	66-3108340*
R301	Resistor, plate decoupling, 10,000 ohms	66-3108340*
R302	Resistor, grid return, 1 megohm	66-5103340*
R303	Resistor, cathode bias, 47 ohms	66-0473340*
R304	Resistor, plate decoupling, 1000 ohms	66-2103340*
R305	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R306	Resistor, isolating, 68 ohms	66-0683340*
R307	Resistor, cathode bias, 68 ohms	66-0683340*
R308	Resistor, screen dropping, 10,000 ohms	66-3108340*
R309	Resistor, plate decoupling, 1000 ohms	66-2103340*
R310	Resistor, a-v-c return, 330,000 ohms	66-4333340*
R311	Resistor, diode load, 47,000 ohms	66-3473340*
R312	Resistor, isolating, 47,000 ohms	66-3473340*
R313	Resistor, isolating, 100,000 ohms	66-4103340*
R314	Resistor, FM-detector load, 47,000 ohms	66-3473340*
TC300A	Tuning core	Part of Z300
TC300B	Tuning core	Part of Z300
TC301A	Tuning core	Part of Z301
TC301B	Tuning core	Part of Z301
TC302A	Tuning core	Part of Z302
TC302B	Tuning core	Part of Z302
TC303A	Tuning core	Part of Z303
TC303B	Tuning core	Part of Z303
TC304A	Tuning core	Part of Z304
TC304B	Tuning core	Part of Z304
TC305A	Tuning core	Part of Z305
TC305B	Tuning core	Part of Z305
WS-1 (F)	Switch-wafer section	Part of 42-1874†
Z300	Transformer, FM 1st i-f	32-4372
Z301	Transformer, AM 1st i-f	32-4258
Z302	Transformer, FM 2nd i-f	32-4372-1
Z303	Transformer, AM 2nd i-f	32-4160-3
Z304	Transformer, FM 3rd i-f	32-4261-1
Z305	Transformer, AM 3rd i-f	32-4240-2

SECTION 4

R-F AND CONVERTER CIRCUITS

C400	Condenser, tuning gang (3-section FM, 2-section AM)	31-2724-7
C400A	Condenser, trimmer, FM aerial	Part of C400
C400B	Condenser, trimmer, FM r-f	Part of C400
C400C	Condenser, trimmer, FM osc.	Part of C400
C401	Condenser, aerial coupling (FM), 100 mmf.	62-110009001*
C402	Condenser, aerial coupling (FM), 100 mmf.	62-110009001*
C403	Condenser, grid blocking, 51 mmf.	30-1224-2*
C404	Condenser, cathode by-pass, 100 mmf.	62-110009001*
C405	Condenser, trimmer assembly, 2-section	31-6476-18
C405A	Condenser, trimmer, AM aerial	Part of C405
C405B	Condenser, trimmer, AM osc.	Part of C405
C406	Condenser, isolating, 10 mmf.	62-010009001
C407	Condenser, screen by-pass, 100 mmf.	62-110009001*
C408	Condenser, blocking, 51 mmf.	30-1224-2*
C409	Condenser, by-pass, 1500 mmf.	62-215001011
C410	Condenser, blocking, 220 mmf.	62-122001001*
C411	Condenser, by-pass, 51 mmf.	30-1224-2*
C412	Condenser, blocking, 220 mmf.	62-122001001*
C413	Condenser, cathode by-pass, 100 mmf.	62-110009001*
C414	Condenser, blocking, 100 mmf.	62-110009001*
C415	Condenser, by-pass, 220 mmf.	66-122001001*
C416	Condenser, isolating, .01 mf.	61-0120*
C417	Condenser, cathode by-pass, 1500 mmf.	62-215001011

SECTION 4 (Continued)

R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No
C418	Condenser, d-c blocking, 100 mmf.	62-110009001*
C419	Condenser, FM r-f by-pass, 100 mmf.	62-110009001*
C420	Condenser, d-c blocking, 220 mmf.	62-122001001*
C421	Condenser, r-f by-pass, 100 mmf.	62-110009001*
C422	Condenser, r-f by-pass, .03 mf.	45-3500-1*
C423	Condenser, FM r-f by-pass, 100 mmf.	62-110009001*
C424	Condenser, FM r-f by-pass, 100 mmf.	62-110009001*
J400	Socket, FM aerial	27-6214-1
L400	Coil, AM aerial	32-4033-1
L401	Coil, FM aerial	32-4158-1
L402	Coil, r-f isolating (FM)	32-4089-3
L403	Coil, FM r-f plate load	32-4061-2
L404	Coil, FM r-f	32-4159-1
L405	Coil, FM osc. plate load	32-4061-2
L406	Coil, FM osc.	32-4018-5
L407	Coil, AM osc.	32-4221-1
L408	Coil, r-f isolating	32-4061-2
L409	Coil, r-f isolating	32-4061-2
L410	R-f choke	32-4143-4
LA400	Loop aerial	76-3583-9
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, cathode bias, 100 ohms	66-1103340*
R402	Resistor, screen dropping, 15,000 ohms	66-3153340*
R403	Resistor, plate decoupling, 10,000 ohms	66-3108340*
R404	Resistor, grid return, 15,000 ohms	66-3153340*
R405	Resistor, cathode bias, 1500 ohms	66-2153340*
R406	Resistor, plate load, 33,000 ohms	66-3383340*
R407	Resistor, grid return, 15,000 ohms	66-3153340*
R408	Resistor, cathode bias, 15,000 ohms	66-2153340*
R409	Resistor, isolating, 68 ohms	66-0683340*
R410	Resistor, grid return, 10,000 ohms	66-3103340*
R411	Resistor, grid return, 1 megohm	66-5103340*
FB400	Terminal board, aerial	38-9942

MISCELLANEOUS

Description	Service Part No
Bracket-and-clip assembly, pilot lamp	76-3919
Cabinet (less scale)	
M	10725A
L	10725D
Back	54-7671
Baffle, speaker	219136
Baffle-and-cloth assembly	
M	40-7562
L	40-7562-1
Bezel	56-5855
Bin mechanism (L.H.)	76-3223-5
Bin mechanism (R.H.)	76-3223-6
Dome (4 required)	45-6190
Door, drop	
M	45-6459
L	45-6468
Door pull	
M	56-4420
L	56-4420-2
Frame, changer mounting	76-4104
Grommet, changer mounting	54-4313
Hinge (pair)	56-4066
Instrument panel	
M	45-6464
L	45-6493
Scale	54-5021
Scale strap	56-2234-2
Spring, bin mechanism (2 required)	56-4978
Spring, changer mounting (6 required)	56-3043FA15
Knobs (4)	54-4376
Dial-backplate assembly	76-3918
Drive cord (25-ft. spool)	45-8750*
Fastener, snap (diffusing panel)	28-4342FA3
Panel, diffusing	54-7593
Pointer	56-5630-2
Spring, diffusing panel (2 required)	56-3841
Spring, gang	56-2617
Spring, pointer	28-8953
Shaft, drive (radio)	76-3479-1
Bushing (2 required)	54-7512
Socket assembly, pilot lamp	27-6233
Socket, miniature (6B76)	27-6226
Socket, miniature (18T8)	27-6203-5
Socket, octal (50C6G)	27-6174-4
Switch and Socket Assembly or switch (band switch), M-15 record player	45-1594-1

†42-1874 is a single-section wafer switch (band switch).