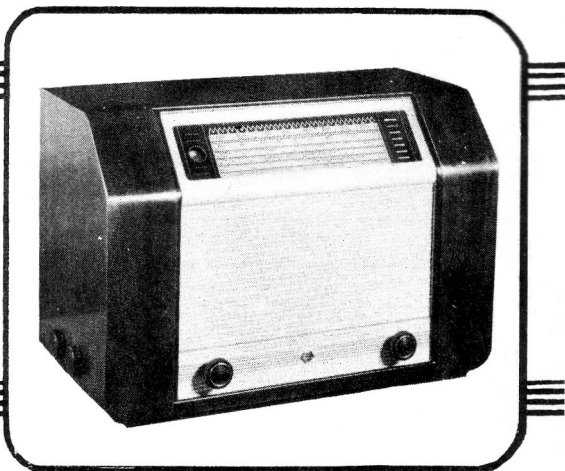




PHILIPS

SERVICE NOTES

RADIO RECEIVER CM60A



SPECIFICATIONS

MODEL CM60A: Is an eight tube superheterodyne receiver (including Tuning Indicator) designed for operation on A.C. lines only. Five tuning ranges cover from 13.5 to 560 meters, 22.1 Mc to 535 kc with bandspread on three short wave ranges.

PHILIPS TUBES: R.F. Amplifier 6SG7, Converter 6SA7, I.F. Amplifier 6SK7GT, 2nd Detector, A.V.C. & 1st A.F. Amplifier 6SQ7GT, 2nd A.F. Amplifier 6SQ7GT, Audio Output 6V6GT, Rectifier 5Y3GT, Tuning Indicator 6U5/6G5.

RANGE SWITCH POSITIONS & TUNING RANGE:

- 1st—Phonograph Position
- 2nd—560-170 m,—535-1750 kc (Special)
- 3rd—560-170 m,—535-1750 kc (Normal)
- 4th—123-40 m,—2.45-7.6 Mc
- 5th—32.5—28.8 m,—9.22—10.41 Mc Bandspread
- 6th—29.0—24.6 m,—10.32—12.17 Mc Bandspread
- 7th—20.5—13.5 m,—14.6—22.1 Mc Bandspread

INTERMEDIATE FREQUENCY: 455 kc.

AUDIO OUTPUT: 3.5 watts.

LOUDSPEAKER: Is an eight inch permanent magnet dynamic with a voice coil D.C. resistance of 2.9 ohms.

ANTENNA & GROUND: For optimum results an outside antenna is necessary. A secure ground connection should be made to a cold water pipe or to a grounding plate buried in damp ground.

CONTROLS: Left end to right end. (Looking at front)

1. Tone Control
2. Volume Control and "On-Off" switch
3. Performance switch
4. Wave Range and Phonograph Switch
5. Tuning Control

PHONOGRAPH CONNECTION: A connector is supplied to connect a pickup to the receiver. The circuit is designed to operate with a crystal or other high impedance pickup.

EXTERNAL SPEAKER CONNECTION: A connector is supplied for an extension speaker of the permanent magnet type having a voice coil D.C. resistance of not less than 6 ohms.

DIAL ILLUMINATION: The dial pointer on this receiver is a glass rod which focuses light on the dial scale. It is important when replacing dial lamps that the correct type is used.

The upper dial light uses a 6-8 volt, 0.4 amp green bulb.

The lower dial light uses a 6-8 volt, 0.4 amp red bulb.

The range indicator dial light uses a 6-8 volt, 0.25 amp green bulb.

LINE VOLTAGE: 115 Volts, 50 to 60 cycles

POWER CONSUMPTION: watts maximum

CABINET DIMENSIONS:

- Width—21½ inches.
- Height—14¾ inches.
- Depth—10⅞ inches.

WEIGHT: Net—34¼ pounds.

Gross—44 pounds.

SERVICE DATA

WAVE RANGE SWITCH: The schematic diagram shows each section of this switch in a straight line form. The short stator contacts are represented as solid squares; the long contacts as solid rectangles and the rotor contacts as bars. All sections are shown in the counter clockwise (1st or phonograph) position.

As the switch rotates clockwise, the rotor contacts move downwards through the remaining Range Switch Positions as listed above. The exact location of each stator contact on its wafer is shown on a front view drawing of a switch wafer on the schematic diagram.

TO REMOVE CHASSIS

1. Disconnect plug from line socket.
2. Remove antenna and ground connections.
3. Remove back cover and control knobs.
4. Disconnect the drive cord from the dial pointer.
5. Remove the tuning indicator from the bracket.
6. Disconnect the speaker cable plug from the chassis.
7. Remove the screw securing the top bracket to the inside of the cabinet.
8. Remove the chassis mounting screws through the bottom of cabinet.

TUBE SOCKET VOLTAGES

PIN	6SG7	6SA7	6SK7	6SQ7 Detector	6SQ7 2nd A.F.	6V6	5Y3	6U5
1	—	—	—	—	—	—	—	6.3 ac
2	—	—	—	—	—	—	305	21
3	—	245	—	1.25	13.2	260	—	*
4	*	95	*	—	—	245	300 ac	245
5	—	—	3	—	—	—	—	—
6	105	—	100	140	160	—	300 ac	—
7	6.3 ac	6.3 ac	6.3 ac	6.3 ac	6.3 ac	6.3 ac	—	—
8	245	*	225	—	—	11	305	—

Note: * Bias obtained from AVC system.

Values specified obtained by using a 20,000 ohm per volt voltmeter.

All voltages measured to chassis.

All voltages are D.C. positive except where noted.

All tubes must be in their sockets during test.

Readings may vary plus or minus 10% due to mains voltage fluctuations.

ALIGNMENT OF RECEIVER

All adjustments may be made with the receiver in the cabinet. Turn the volume control to the full clockwise position for maximum output and the tone control to the extreme counterclockwise position. Set the performance switch to the left position indicated

by the red dial light. With the variable capacitor fully closed, adjust the dial pointer on the beginning of the dial scale to the left of the 550 kc calibration mark.

Equipment Required

OUTPUT INDICATOR: A high resistance A.C. voltmeter and an output transformer.

SIGNAL GENERATOR: A Generator capable of supplying modulated signals between 455 kc and 22 Mc.

Equipment Connections and Alignment Procedure

OUTPUT INDICATOR: Connect the A.C. voltmeter to the external loudspeaker connection located in the rear of the receiver. During the alignment, keep the output below 1.25 A.C. volts across this jack. If the meter used does not satisfactorily indicate 1.25 volts, connect the secondary of an output transformer to the external speaker connection and connect the A.C. voltmeter across the primary. When using the latter method, the maximum output reading should be kept below 30 A.C. volts. When the output indication increases, regulate the signal generator attenuator

to restore the original indication.

SIGNAL GENERATOR: Connect the ground lead of the signal generator to the "ground" jack in the rear of the receiver and the output lead to the points indicated in the chart below, in series with the specified resistor or capacitor.

DRUM SCALE DIVISIONS

Band Switch Position	Frequency	Drum Scale Reading
2 & 3 Broadcast	570 kc	10.6
	1000 kc	58.4
	1600 kc	88.9
4 Short Wave	2.9 Mc	22.9
	5.0 Mc	65.1
	7.0 Mc	88.4
7 Bandsread	15.2 Mc	25.9
	21.5 Mc	90.9
6 Bandsread	11.6 Mc	73.7
5 Bandsread	9.6 Mc	46.8

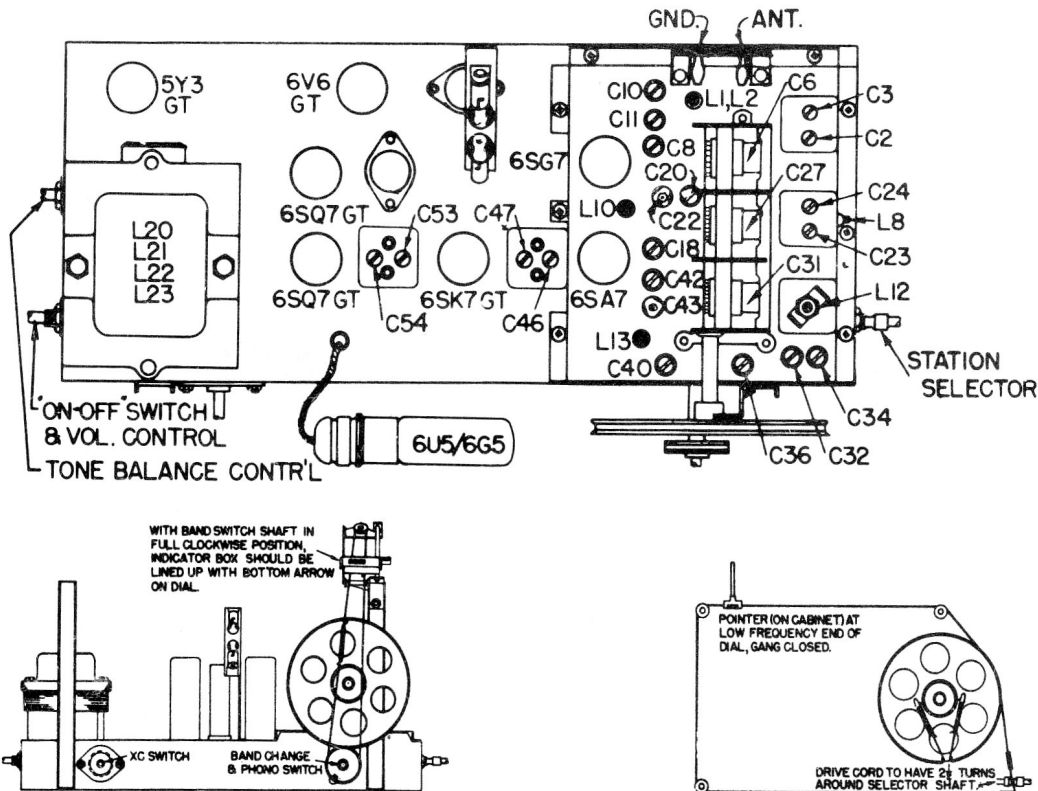
Zero on drum scale corresponds to gang condenser fully closed.

IMAGE FREQUENCY

When the receiver is properly aligned, the maximum output corresponding to the image frequency should occur when the receiver is tuned to a frequency approximately 900 kc lower than

the signal frequency. It may be necessary to increase the value of input signal when it is desired to make this test.

ALIGNMENT PROCEDURE



ALIGNMENT PROCEDURE

SIGNAL GENERATOR			RECEIVER			
Operation Steps	Output Connections to Receiver	Frequency	Range Switch	Tuning Capacitor	See Notes	Adjust in stated order for Maximum Output
1	To 6SK7GT Control Grid (4) Through .05 mfd. Capacitor	455 kc	Pos. 3	Min.		2nd I.F. Trimmers C54, C53.
2	To Stator C27 Through .05 mfd. Capacitor	455 kc	Pos. 3	Min.	A	1st I.F. Trimmers C47, C46.
3	To Antenna Contact Through 200 mmfd. Capacitor	570 kc	Pos. 3	570 kc		Broadcast Padder C34 BC-RF Coil L8
4	To Antenna Contact Through 200 mmfd. Capacitor	1600 kc	Pos. 3	1600 kc	B	BC-Osc. Trimmer C32 BC-RF Trimmer C23 BC-Ant. Trimmer C2
5	To Antenna Contact Through 400 ohms Resistance	7.0 Mc	Pos. 4	7.0 Mc	C	SW-Osc. Trimmer C36 SW-RF Trimmer C24 SW-Ant. Trimmer C3
6	To Antenna Contact Through 400 ohms Resistance	2.9 Mc	Pos. 4	2.9 Mc	D	SW-Osc. Coil L12
7	To Antenna Contact Through 400 ohms Resistance	21.5 Mc	Pos. 7	21.5 Mc	C	BS-Osc. Trimmer C43
8	To Antenna Contact Through 400 ohms Resistance	15.2 Mc	Pos. 7	15.2 Mc	D	BS-Osc. Coil L13
9	To Antenna Contact Through 400 ohms Resistance	21.5 Mc	Pos. 7	21.5 Mc	E	BS-RF Trimmer C22 BS-Ant. Trimmer C11
10	To Antenna Contact Through 400 ohms Resistance	15.2 Mc	Pos. 7	15.2 Mc	F	BS-RF Coil L10 BS-Ant. Coil L2
11	To Antenna Contact Through 400 ohms Resistance	11.6 Mc	Pos. 6	11.6 Mc	C	BS-Osc. Trimmer C42 BS-RF Trimmer C20 BS-Ant. Trimmer C10
12	To Antenna Contact Through 400 ohms Resistance	9.6 Mc	Pos. 5	9.6 Mc	C	BS-Osc. Trimmer C40 BS-RF Trimmer C18 BS-Ant. Trimmer C8

ALIGNMENT NOTES

Note "A"—After step 2 has been completed, do not make any further adjustments to the 2nd I.F. Trimmers C54 and C53.

Note "B"—After operation 4 has been completed, return to 570 kc and repeat operation 3, then repeat operation 4.

Note "C"—Unscrew oscillator trimmer capacitor to minimum capacity (counter clockwise). Turn adjustment clockwise until first output peak is obtained. Make adjustments using this peak.

Note "D"—Check high frequency end of dial for accuracy, adjust oscillator trimmer slightly if necessary.

Note "E"—Rock tuning capacitor while adjusting antenna trimmer for maximum output.

Note "F"—Repeat operation 9.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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The top diagram illustrates the front panel area of the radio receiver. It features a variety of electronic components, including resistors (R1 through R42), capacitors (C1 through C68), and inductors (L1 through L9). A large transformer, labeled L19, is centrally located. The components are interconnected by a network of wires, and the layout is organized to fit within the chassis. A vacuum tube socket, labeled S1, is visible on the left side.

The bottom diagram shows the rear panel area, which is dedicated to the power supply section. It includes a large power transformer, labeled L20, and several vacuum tubes: 6U5/6G5, 6SK7 GT, 6SQ7 GT, 6V6 GT, and 5Y3 GT. The diagram also shows various capacitors (C1 through C55) and resistors (R1 through R16) used in the power supply circuit. The layout is designed to ensure proper ventilation and electrical isolation for the high-voltage components.

FOR DEPENDABLE REPAIRS, USE ONLY GENUINE PHILIPS REPLACEMENT PARTS. When ordering always give description and code number and model of receiver.

CAPACITORS							
			Code No.				
C2, C23	1.6-18 mmf.	Trimmer	511-015	C33	500 mmf. $\pm 5\%$	Silver Mica	513-001
C3, C24, } C32, C36 }	3-35 mmf.	Trimmer	511-004	C34	10-160 mmf.	Trimmer	511-005
C4, C26	150 mmf. $\pm 5\%$	Silver Mica	513-003	C35	2340 mmf. $\pm 3\%$	Silver Mica	513-009
C5, C25	10 mmf.	Silver Mica	513-011	C37, C41	150 mmf. $\pm 5\%$	Ceramicon	514-001
C6, C27, C31	10.3-492.7 mmf.	3-Gang Tuning	510-006	C38	15 mmf.	Ceramicon	514-002
C7, C17	200 mmf.	Silver Mica	513-006	C39	200 mmf.	Ceramicon	514-003
C8, C10, C18, } C20, C40, C42 }	10-160 mmf.	Trimmer	511-008	C44	15 mmf.	Silver Mica	513-014
C9, C19	150 mmf.	Silver Mica	513-004	C45, C48	75 mmf.	Silver Mica	513-007
C11	4-70 mmf.	Trimmer	511-010	C46, C47, } C53, C54 }	7-45 mmf.	Dual Trimmer	511-011
C12, C16, C28, } C29, C60, C65, } C66 }	100 mmf.	Mica	512-001	C50	0.1 mfd.	200 V.	515-210
C13, C49	.05 mfd.	400 V.	515-405	C51, C56, } C61, C73 }	.01. mfd.	600 V.	515-614
C15, C30, C57	.05 mfd.	600 V.	515-619	C52, C55	140 mmf. $\pm 5\%$	Silver Mica	513-008
C22, C43	3-30 mmf.	Trimmer	511 014	C58, C59	50 mmf.	Mica	512-011
				C62, C80	200 mmf.	Mica	512-006
				C63, C74, C78	25 mfd.	25 V.	516-003
				C64	4 mfd.	350 V.	516-010
				C67	400 mmf.	Mica	512-009

REPLACEMENT PARTS

CAPACITORS—Cont.

C68	500 mmf.	Mica	Code No.
C69	2000 mmf.	Mica	512-021
C70	1000 mmf.	Mica	512-020
C71 C72	.05 mfd.	400 V.	515-410
C75	20-20 mfd.	450 V.	516-008
C76	40 mfd.	450 V.	516-009
C77	.005 mfd.	600 V.	515-612
C79	10 mmf.	Mica	512-018

RESISTORS

R3, R7, R16, R40	1 Megohm	½ watt	501-010
R4, R8	68 ohms	½ watt	501-507
R6	39000 ohms	1 watt	502-015
R9, R19	3.3 Megohms	½ watt	501-046
R10	22,000 ohms	½ watt	501-002
R11	47,000 ohms	½ watt	501-020
R12, R37	470,000 ohms	½ watt	501-004
R13	15,000 ohms	2 watt	503-001
R14	1000 ohms	½ watt	501-037
R15	390 ohms	½ watt	501-047
R17	68,000 ohms	½ watt	501-032
R18	3300 ohms	½ watt	501-025
R20	2.2 Megohms	½ watt	501-006
R21, R26, R33	220,000 ohms	½ watt	501-018
R22, R24	270,000 ohms	½ watt	501-016
R23	3900 ohms	½ watt	501-017
R25	500,000 ohms	Volume Control	505-003
R27	68,000 ohms	½ watt	501-009
R28	680,000 ohms	½ watt	501-038
R29	330,000 ohms	½ watt	501-044
R30, R31	2200 ohms	½ watt	501-039
R32	1200 ohms	½ watt	501-035
R34	100,000 ohms	Dual Tone }	506-010
R35	25,000 ohms	Control }	
R36	10,000 ohms	½ watt	501-023
R38	270 ohms	1 watt	502-011
R39	680 ohms	2 watt	503-002
R42	2200 ohms	½ watt	501-027

TRANSFORMERS & COILS

L1, L2	B.S. Ant. Coil Assembly	070-056
L3, L4, L5, L6	B.C. & S.W. Ant. Transf. Assembly	060-023
L7	R.F. Plate Choke Assembly	070-062
L8, L9	B.C. & S.W. R.F. Transf. Assembly	060-024
L10	B.S. - R.F. Coil Assembly	070-055
L11, L12	B.C. & S.W. Osc. Transf. Assembly	060-025
L13	B.S. Osc. Coil Assembly	070-054
L14, L15, L16	1st. I.F. Transformer	060-015
L17, L18	2nd. I.F. Transformer	060-016
L19	Filter Choke Assembly 30 H.	050-028
L20, L21, L22, L23	Power Transformer	050-012
L24, L25, L26	Output Transformer	050-025

MISCELLANEOUS

	Code No.
Antenna—Ground Plate	120-094
Antenna—Ground Banana Plugs	571-113
Back Cover	303-059
Back Cover Retaining Clip	300-245
Cabinet	030-034
Dial Glass, Standard Scale	331-016
Dial Lamp 6-8V. .25 amp. Green	643-005
Dial Lamp 6-8V. .4 amp. Green	643-006
Dial Lamp 6-8V. .4 amp. Red	643-007
Dial Lamp Holder Assembly (Range Indicator)	110-118
Dial Lamp Socket Assembly (Range Indicator)	570-106
Dial Lamp Socket Assembly (Green)	570-107
Dial Lamp Socket Assembly (Red)	570-108
Dial Pointer & Slider Assembly (Glass)	120-187
Dial Drive Cord 3 yards	595-002
Dial Drive Cord Pulley	310-010
Dial Drive Cord Spring	310-052
Iron Core Adjustment for L1, L2, L10, L13	609-003
Knob—(Side) Volume, Tone, Tuning	572-015
Knob—(Front) Performance & Range Switches	572-016
Knob—Set Screw	524-503
Line Cord & Plug	100-003
Line Switch S.P.S.T. on Volume Control Part of	505-003
Performance Switch, Section 1 Brown	080-035
Performance Switch, Section 2 Black	080-036
Performance Switch Clicker Plate & Shaft Assembly	080-038
Phonograph Connector, Male	571-107
Phonograph Connector, Female	571-128
Phonograph Switch	080-033
Phonograph Switch Link Assembly	110-111
Phonograph Switch Extension Spring	310-076
Range Switch, Section 1 Blue	080-027
Range Switch, Section 2 Green	080-028
Range Switch, Section 3 Yellow	080-029
Range Switch, Section 4 Orange	080-030
Range Switch, Section 5 Red	080-031
Range Switch, Section 6 White	080-032
Range Switch Clicker Plate & Shaft Assembly	080-037
Range Switch Drum & Hub Assembly	110-116
Range Switch Drum & Hub Set Screw	524-502
Range Switch Drive Cord Spring	310-082
Speaker, 8 inch P.M.	041-019
Speaker Grille	627-005
Speaker Plug	571-118
Speaker Socket	571-119
Speaker Socket Contacts	571-105
Tube Grid-Plate Shield Assembly	120-021
Tube Socket Octal	570-004
Tube Socket 6-Prong	570-006
Tuning Drum & Scale Assembly	120-127
Tuning Shaft	310-080
Tuning Indicator Mounting Clip	300-152
Tuning Indicator Thumb Screw	525-006
Tuning Indicator Socket & Cable Assembly	120-125