

# Engineering Data

## Stromberg-Carlson No. 160 Radio Receiver

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY  
Rochester, New York

### ELECTRICAL SPECIFICATIONS

Type of Circuit	-----	Superheterodyne
Tuning Ranges	-----	X—145 to 370 Kc.; A—530 to 1700 Kc.; B—1700 to 5600 Kc.; C—5600 to 18,000 Kc.; D—18,000 to 60,000 Kc.
Number and Types of Tubes	-----	4 No. 6K7, 1 No. 6A8, 2 No. 6J7, 2 No. 6H6, 1 No. 6F6, 2 No. 6L6, 1 No. 6E5, 1 No. 5Z3
Power Supply Voltage	-----	105 to 125 Volts
Power Supply Frequency	-----	25 to 60 Cycles and 50 to 60 Cycles
Input Power Rating—	-----	
No. 160-L	-----	170 Watts
No. 160-P	-----	214 Watts
Frequency of Intermediate Amplifier	-----	465 Kilocycles

### APPARATUS SPECIFICATIONS

No. 160-L	-----	50 to 60 Cycles; P-26637 Chassis Assembly; P-26170 Loud Speaker
No. 160-LB	-----	25 to 60 Cycles; P-26638 Chassis Assembly; P-26170 Loud Speaker
No. 160-P	-----	60 Cycles Only; P-26639 Chassis Assembly; P-26170 Loud Speaker; P-26728 Phonograph Unit
No. 160-PB	-----	25 Cycles Only; P-26640 Chassis Assembly; P-26170 Loud Speaker; P-26729 Phonograph Unit

### CIRCUIT DESCRIPTION

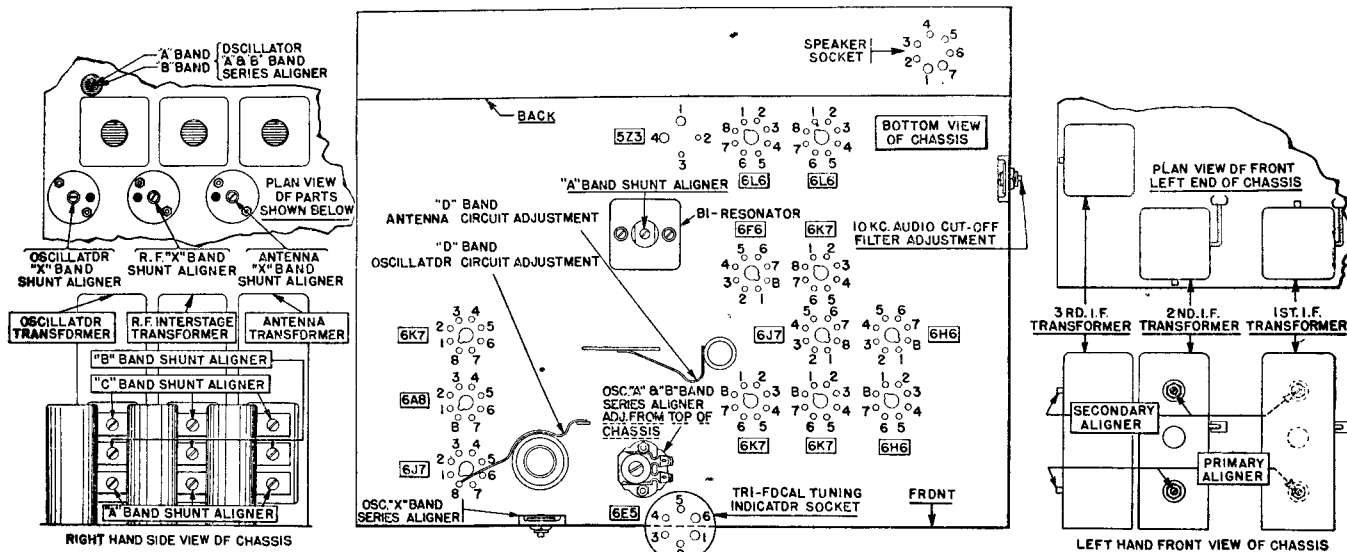
The No. 160 Radio Receiver is a fourteen tube, "Adjustable High Fidelity" receiver employing metal tubes, including the new "Beam" power tubes. There are five tuning ranges in this receiver, one of which is the Ultra-Short Wave range. This range is also referred to as the Ultra-High Frequency (U. H. F.) range and also as the "D" band. This receiver uses a Carpinchoe high fidelity dynamic speaker, and has incorporated in it the exclusive "Patent Applied for", Stromberg-Carlson "Tri-Focal" tuning system and the exclusive Stromberg-Carlson Acoustical Laboratories' revolutionary new development, the "Acoustical Labyrinth". This new device extends the bass response, provides reproduction only from the front of the cabinet, and eliminates all cabinet resonance. Audio reproduction is further improved in this receiver by employing sound diffusing vanes in front of the loud speaker opening which distribute the higher pitched tones, thereby providing excellent reproduction in all parts of the room by spreading out these directional frequencies.

This receiver is also equipped with an "automatic tone control" circuit, which operates automatically to reduce the high frequency noise which is present when the receiver is tuned to weak signals. The tube which operates in this automatic tone control circuit is indicated on the schematic wiring diagram.

In addition to the above features, the No. 160-P Receiver is furnished with a highly efficient "Automatic Record Changer" Phonograph Unit, which is equipped with an entirely new type of pick-up suspension device.

Maximum selectivity between adjacent stations located in the standard broadcast band is obtained by the use of an additional tuned radio frequency ("Bi-resonator") circuit. When either the "X", "B", "C", or "D" ranges are in operation, this additional tuned radio frequency circuit is automatically cut out of the receiver circuit. Adjustable high fidelity is obtained from this receiver by means of the variable band width, intermediate frequency transformers which are used in the two intermediate amplifier stages.

The various tubes are used in this receiver as follows: One No. 6K7 tube is used in the R. F. Amplifier, one No. 6K7 tube is used in the First I. F. Amplifier, another No. 6K7 tube is used in the Second I. F. Amplifier, and the remaining No. 6K7 tube is used in the Audio Amplifier. The No. 6A8 tube is used as a Modulator tube, and one No. 6J7 tube is used as the Oscillator tube. The other No. 6J7 tube is used in the Automatic Tone Control circuit. One No. 6H6 tube is used as the Demodulator tube, and the other No. 6H6 tube is used as the Automatic Volume Control tube. The No. 6F6 tube is used as the Audio Driver tube. The two No. 6L6 tubes are used in the Audio Power Output Stage. The No. 6E5 tube is used as the Indicator of the Tri-Focal Tuning System, and the No. 5Z3 tube is the Rectifier tube of the power supply unit.



**Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.**

## NORMAL VOLTAGE READINGS

The various values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in operation when the measurements are made. Figure 1 shows the terminal layouts of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring the D. C. voltages. Voltage values shown are those obtained on the lowest possible scale of a meter having the following ranges: 0-2.5, 0-10, 0-100, 0-250, 0-500, 0-1000 volts except when an asterisk appears after any given voltage value in which case the 1000 volt scale was used.

TUBE	CIRCUIT	CAP	TERMINALS OF SOCKETS								Heater Voltages Between Heater Terminals	
			1	2	3	4	5	6	7	8	Socket Terminal Numbers	Volts
6K7	R. F. Amp.	0	0	0	+230	+82	+5.2	—	6.2	+5.2	2-7	6.2
6A8	Modulator	0	0	0	+230	+82	-40	+80	6.2	0	2-7	6.2
6J7	Oscillator	-75	0	0	+225	+125	0	0	6.2	0	2-7	6.2
6K7	1st I. F. Amp.	0	0	0	+230	+76	+5.3	+3	6.2	+5.3	2-7	6.2
6K7	2nd I. F. Amp.	0	0	0	+230	+76	+5.2	+2.2	6.2	+5.2	2-7	6.2
6H6	Demodulator	—	0	0	-.25	0	-.25	+3	6.2	0	2-7	6.2
6H6	A. V. C.	—	0	0	0	+5	0	0	6.2	+5	2-7	6.2
6J7	Auto. Tone Cont.	0	0	0	+40*	+20	+2.3	0	6.2	+2.3	2-7	6.2
6K7	1st Audio Amp.	0	0	0	+170*	+15*	+0.6	+78	6.2	+0.6	2-7	6.2
6F6	2nd Audio Amp.	—	0	0	+235	+235	0	—	6.2	+19	2-7	6.2
6L6's	Audio Output	—	0	0	+400	+250	0	0	6.2	+20	2-7	6.2
6E5	Tuning Ind.	—	6.2	+10*	+5	+230	+4.8	0			1-6	6.2
5Z3	Rectifier	—	+410	400	400	+410					1-4	4.8

Voltage across vernier dial pilot lamp 5.3 volts. Receiver tuned to 1000 Kc., no signal.  
A. C. voltages are indicated by italics.

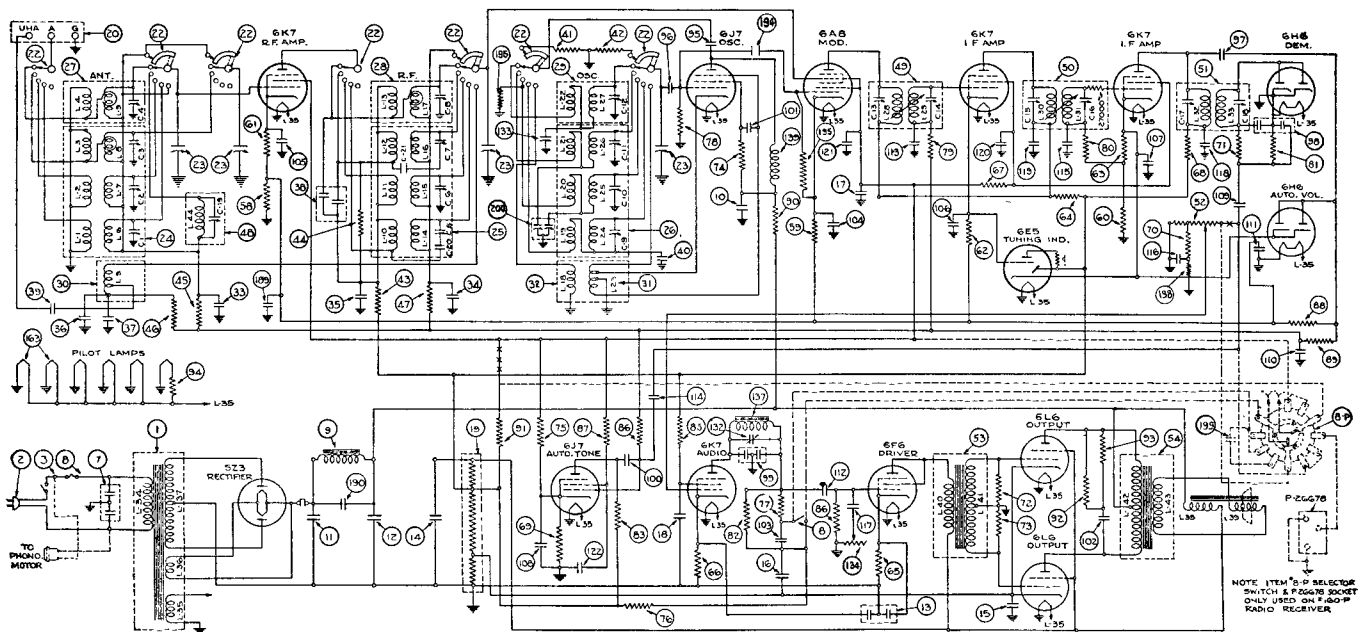


Fig. 2. Schematic Circuit of Receiver.

## ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on this receiver, and ordinarily no readjustments are necessary. However, should it become necessary to make any readjustments, this alignment procedure should be carefully followed.

In making any alignment adjustments always adjust the signal generator's output to the minimum value where a good alignment may still be obtained. Never attempt to make any alignment adjustments using a strong signal.

Figure 1 shows the location of all the aligning capacitors used in this receiver.

### Intermediate Frequency Amplifier Adjustments

Because of the necessity of obtaining the proper shape of resonance curve of these stages in a high fidelity receiver, it is recommended that unless it is absolutely essential, these I. F. adjustments be untouched. In the factory these adjustments are made using a visual system which allows the operator to see the exact shape of the resonance curve. For this reason it is best to have these adjustments made at the factory. However, in the case where this cannot be done, the following procedure should be followed.

Operate the range switch of the receiver to the "A" range position. Set the tuning dial at its extreme low frequency position, and operate the "Tone-Fidelity" control knob so that the receiver is adjusted for the standard fidelity position as indicated by the fidelity indicator located on the front panel of the receiver. Never attempt to align the I. F. circuits of this receiver with the "Tone-Fidelity" control set at any position other than the standard fidelity. The I. F. circuits may then be checked for alignment by adjusting the aligning capacitors in the exact order as follows:

1. Secondary of 3rd I. F. Trans. (Capacitor C-18).
2. Primary of 3rd I. F. Trans. (Capacitor C-17).
3. Secondary of 2nd I. F. Trans. (Capacitor C-16).
4. Primary of 2nd I. F. Trans. (Capacitor C-15).
5. Secondary of 1st I. F. Trans. (Capacitor C-14).
6. Primary of 1st I. F. Trans. (Capacitor C-13).

### Radio Frequency Adjustments

The alignment of the radio frequency circuits for the various ranges in this receiver should be very carefully made in the order and at the frequencies specified.

It will be noted that no instructions are given for aligning the receiver at other than two frequencies for any range. Each receiver is given an exacting check for "tracking" at various frequencies in each range before leaving the factory. It is felt by the manufacturers that should any receiver through accident require a check on the "tracking", it should be returned to the factory, where this may be easily and accurately done.

### Alignment of Long-Wave-Weather Range (Also Referred to as "X" Band) Circuits

1. Oscillator's "X" Band Shunt Aligning Capacitor at 350 Kilocycles (Capacitor C-12).
2. R. F. Interstage "X" Band Shunt Aligning Capacitor at 350 Kilocycles (Capacitor C-8).
3. Antenna "X" Band Shunt Aligning Capacitor at 350 Kilocycles (Capacitor C-4).
4. Oscillator "X" Band Series Aligning Capacitor at 150 Kilocycles (Capacitor Item 133). When operation No. 4 has been completed repeat operations 1, 2, and 3 again and in the exact order given.

### Alignment of Standard Broadcast Range (Also Referred to as "A" Band) Circuits

1. Oscillator's "A" Band Shunt Aligning Capacitor at 1500 Kilocycles (Capacitor C-11).
2. R. F. Interstage "A" Band Shunt Aligning Capacitor at 1500 Kilocycles (Capacitor C-7).
3. Antenna "A" Band Shunt Aligning Capacitor at 1500 Kilocycles (Capacitor C-3).
4. "A" Band, R. F. Bi-resonator Shunt Aligning Capacitor at 1500 Kilocycles (Capacitor C-19).
5. Oscillator "A" Band Series Aligning Capacitor at 600 Kilocycles (Capacitor with screw adjustment. Item 200). When operation No. 5 has been completed repeat operations 1, 2, 3, and 4 again and in the exact order given.

### Alignment of Amateur, Police, and Aircraft Range (Also Referred to as "B" Band) Circuits

1. Oscillator's "B" Band Shunt Aligning Capacitor at 5 Megacycles (Capacitor C-10).
2. R. F. Interstage "B" Band Shunt Aligning Capacitor at 5 Megacycles (Capacitor C-6).
3. Antenna "B" Band Shunt Aligning Capacitor at 5 Megacycles (Capacitor C-2).
4. Oscillator "B" Band Series Aligning Capacitor at 1.8 Megacycles (Capacitor with nut adjustment. Item 200). When operation No. 4 has been completed repeat operations 1, 2, and 3 again and in the exact order given.

### Alignment of Short-Wave-Foreign Range (Also Referred to as "C" Band) Circuits

1. Oscillator's "C" Band Shunt Aligning Capacitor at 16 Megacycles (Capacitor C-9).
2. R. F. Interstage "C" Band Shunt Aligning Capacitor at 16 Megacycles (Capacitor C-5).
3. Antenna "C" Band Shunt Aligning Capacitor at 16 Megacycles (Capacitor C-1).

### Alignment of Ultra Short-Wave Range (Also Referred to as "D" Band) Circuits

1. The only adjustment which it is necessary to make for bringing the "D" Band Oscillator's circuit into alignment is accomplished by bending the ground loop (shown in Figure 1 as "D" Band Oscillator Circuit Adjustment) either closer to the coil or farther away from the coil. This adjustment should be made with the signal generator set to a frequency of 20 megacycles.
2. The only adjustment which it is necessary to make for bringing the "D" Band Antenna's Circuit into alignment is accomplished by bending the grid lead loop (shown in Figure 1 as "D" Band Antenna Circuit Adjustment) so as to form either a smaller or larger loop. This adjustment should also be made with the signal generator set to a frequency of 20 megacycles.

### Adjustment of 10 Kilocycle Audio Cut-Off Filter

The adjustment of this filter is correctly made at the factory and no additional adjustment is required.

## REPLACEMENT PARTS

Item Number	Piece Number	Part	Item Number	Piece Number	Part
1	26687	Power Transformer (50 to 60 Cycles Chassis)	89	26369	Resistor, Type "E", 1 Megohm
1	26688	Power Transformer (25 to 60 Cycles Chassis)	90	26776	Resistor, Type "F", 12,000 Ohms
2	24268	Cord (Power Supply)	91	25526	Resistor, Type "F", 15,000 Ohms
8	23284	Fuse, 2 1/2 Amperes	92	26775	Resistor, Type "F", 20,000 Ohms
7	21535	Capacitor Assembly (2—.01 Mf. Capacitors)	93	26775	Resistor, Type "F", 20,000 Ohms
8	26061	Switch ("Off-On" and Bass Control)	94	26780	Resistor, Flexible, 8.5 Ohms (Pilot Lamp)
9	26704	Choke Assembly (Filter of Rectifier)	95	25487	Capacitor, Type "W", .001 Mf.
10	25788	Electrolytic Capacitor, 1 Mf., 450 Volts	96	24560	Capacitor, Type "O", 50 Mmf.
11	22757	Electrolytic Capacitor, 8 Mf., 500 Volts (50 to 60 Cycles Chassis)	97	24560	Capacitor, Type "O", 50 Mmf.
11	26510	Electrolytic Capacitor, 16 Mf., 500 Volts (25 to 60 Cycles Chassis)	98	26512	Capacitor, Type "W", 2—100 Mmf.
12	22757	Electrolytic Capacitor, 8 Mf., 500 Volts (50 to 60 Cycles Chassis)	99	26512	Capacitor, Type "W", 2—100 Mmf.
12	26510	Electrolytic Capacitor, 16 Mf., 500 Volts (25 to 60 Cycles Chassis)	100	24559	Capacitor, Type "O", 100 Mmf.
13	25498	Electrolytic Capacitor, (2—10 Mf.) 25 Volts	101	25535	Capacitor, Type 3L, .008 Mf.
14	26773	Electrolytic Capacitor, 16 Mf., 350 Volts	102	26932	Capacitor Assembly, .008 Mf.
15	26772	Electrolytic Capacitor, 12 Mf., 35 Volts	103	24481	Capacitor, Type "J", .004 Mf.
16	24580	Electrolytic Capacitor, 4 Mf., 450 Volts	104	24402	Capacitor Assembly, 1 Mf.
17	26693	Electrolytic Capacitor, 4 Mf., 350 Volts	105	24402	Capacitor Assembly, 1 Mf.
18	26693	Electrolytic Capacitor, 4 Mf., 350 Volts	106	24402	Capacitor Assembly, 1 Mf.
19	26737	Resistor, "B" Voltage Divider	107	24402	Capacitor Assembly, 1 Mf.
22	26746	Range Switch Assembly	108	24402	Capacitor Assembly, 1 Mf.
23	26444	Gang Tuning Capacitor Assembly	100	24405	Capacitor Assembly, .04 Mf.
24	26446	Coil Assembly, Antenna ("A", "B" and "C" Ranges)	110	24405	Capacitor Assembly, .04 Mf.
25	26447	Coil Assembly, R. F. ("A", "B" and "C" Ranges)	111	24405	Capacitor Assembly, .04 Mf.
26	26448	Coil Assembly, Oscillator ("A", "B" and "C" Ranges)	112	24405	Capacitor Assembly, .04 Mf.
27	26507	Coil Assembly, Antenna ("X" Range)	113	24405	Capacitor Assembly, .04 Mf.
28	26508	Coil Assembly, R. F. ("X" Range)	114	24405	Capacitor Assembly, .04 Mf.
29	26500	Coil Assembly, Oscillator ("X" Range)	115	24405	Capacitor Assembly, .04 Mf.
30	26758	Coil Assembly, Antenna ("D" Range)	116	25149	Capacitor Assembly, .01 Mf.
31	26765	Oscillator Secondary Coil ("D" Range)	117	24994	Capacitor Assembly, .05 Mf.
32	26787	Oscillator Primary Coil ("D" Range)	118	24904	Capacitor Assembly, .05 Mf.
33	24405	Capacitor Assembly, .04 Mf.	119	24994	Capacitor Assembly, .05 Mf.
34	24405	Capacitor Assembly, .04 Mf.	120	24994	Capacitor Assembly, .05 Mf.
35	24904	Capacitor Assembly, .05 Mf.	121	24994	Capacitor Assembly, .05 Mf.
36	24637	Capacitor, Type "W", .0017 Mf.	122	24904	Capacitor Assembly, .05 Mf.
37	24637	Capacitor, Type "W", .0017 Mf.	132	26568	Adjustable Capacitor (High Frequency Cut-Off Filter)
38	26513	Capacitor (2—200 Mmf.)	133	26569	Capacitor (Oscillator Series Aligner, "X" Range)
39	24559	Capacitor, Type "O", 100 Mmf.	134	26485	Potentiometer and Bracket Assembly (Tone Control and High Fidelity)
40	26944	Capacitor, Type "W", .004 Mf.	137	26515	Coil Assembly (High Frequency Cut-Off Filter)
41	26321	Resistor, Type "E", 100 Ohms	138	26497	Cable Assembly, Tri-Focal Indicator
42	26321	Resistor, Type "E", 100 Ohms	139	25814	Choke Assembly, 5 Millihenrys
43	26333	Resistor, Type "E", 1000 Ohms	149	26519	Drive Disc Assembly
44	26353	Resistor, Type "E", 47,000 Ohms	141	26570	Dial Bracket Assembly
45	26357	Resistor, Type "E", 1 Megohm	142	26534	Bar Assembly (Pulley)
46	26357	Resistor, Type "E", 1 Megohm	143	26211	Pulley
47	26357	Resistor, Type "E", 1 Megohm	144	26518	Gear Assembly
48	26474	Coil Assembly (Bi-Resonator)	145	26220	Drive Shaft Assembly
49	26481	1st I. F. Transformer	146	26520	Dial Assembly (Vernier)
50	26482	2nd I. F. Transformer	147	26604	Dial Assembly (Main)
51	26243	3rd I. F. Transformer	148	26672	Drive Cord Assembly (Volume Indicator Disc)
52	26077	Potentiometer (Volume Control)	149	26673	Drive Cord Assembly (Fidelity Indicator Disc)
53	26706	Transformer Assembly, Audio Input	150	26683	Cord Assembly (Dial Elevator)
54	26708	Transformer Assembly, Audio Output	151	26226	Spring
55	22988	Socket, 4 Prong	152	26555	Volume Indicator Disc Assembly
56	23517	Socket, 5 Prong	153	26698	Fidelity Indicator Disc Assembly
57	25539	Socket, 8 Prong	154	26572	Bracket Assembly
58	26324	Resistor, Type "E", 180 Ohms	155	26682	Reel Assembly (Range Switch)
59	26326	Resistor, Type "E", 270 Ohms	156	26667	Reel Assembly (Tone-Fidelity Control)
60	26328	Resistor, Type "E", 390 Ohms	157	26666	Reel Assembly (Volume Control)
61	26328	Resistor, Type "E", 390 Ohms	160	26580	Front Dial Plate Assembly
62	26330	Resistor, Type "E", 560 Ohms	161	26147	Lamp Socket
63	26330	Resistor, Type "E", 560 Ohms	162	26257	Lamp Shades
64	26330	Resistor, Type "E", 560 Ohms	163	26287	Pilot Lamp
65	26333	Resistor, Type "E", 1000 Ohms	166	26692	Lamp Socket Assembly
66	26338	Resistor, Type "E", 2700 Ohms	189	24207	Electrolytic Capacitor, 12 Mf., 25 Volts
67	26333	Resistor, Type "E", 1000 Ohms	104	24560	Capacitor, Type "O", 50 Mmf.
68	26333	Resistor, Type "E", 1000 Ohms	195	26357	Resistor, Type "E", 1 Megohm
69	26331	Resistor, Type "E", 680 Ohms	196	26341	Resistor, Type "E", 4700 Ohms
70	26341	Resistor, Type "E", 4700 Ohms	198	26345	Resistor, Type "E", 10,000 Ohms
71	26345	Resistor, Type "E", 10,000 Ohms	199	27020	Capacitor Assembly, .015 Mf.
72	26345	Resistor, Type "E", 10,000 Ohms	200	26564	Capacitor Assembly, Series Aligners ("A" and "B" Ranges)
73	26345	Resistor, Type "E", 10,000 Ohms			
74	26349	Resistor, Type "E", 22,000 Ohms			
75	26350	Resistor, Type "E", 27,000 Ohms			
76	26353	Resistor, Type "E", 47,000 Ohms			
77	26356	Resistor, Type "E", 82,000 Ohms			
78	26353	Resistor, Type "E", 47,000 Ohms			
79	26357	Resistor, Type "E", 1 Megohm			
80	26357	Resistor, Type "E", 1 Megohm			
81	26357	Resistor, Type "E", 1 Megohm			
82	26362	Resistor, Type "E", .27 Megohm			
83	26365	Resistor, Type "E", .47 Megohm			
84	26365	Resistor, Type "E", .47 Megohm			
85	26369	Resistor, Type "E", 1 Megohm			
86	26369	Resistor, Type "E", 1 Megohm			
87	26369	Resistor, Type "E", 1 Megohm			
88	26369	Resistor, Type "E", 1 Megohm			

### MISCELLANEOUS PARTS

Piece Number	Part
26250	Cone Assembly (For P-26170 Speaker)
26043	Plug (For Loud Speaker Cable)
26369	Resistor, Type "E", 1 Megohm (Used at Socket of No. 6E5 Tube)
26302	Knob (For "Volume" Control)
26299	Knob (For "Tone Fidelity" Control)
26305	Knob (For "Stations" Selector Control Shaft)
26306	Knob (For "Vernier" Stations Selector Control Shaft)
26301	Knob (For "Range" Switch)
26300	Knob (For "Off-On-Bass" Control)
26391	Knob (For "Off-On-Bass-Phono" Control. Used only on No. 160-P Receivers)

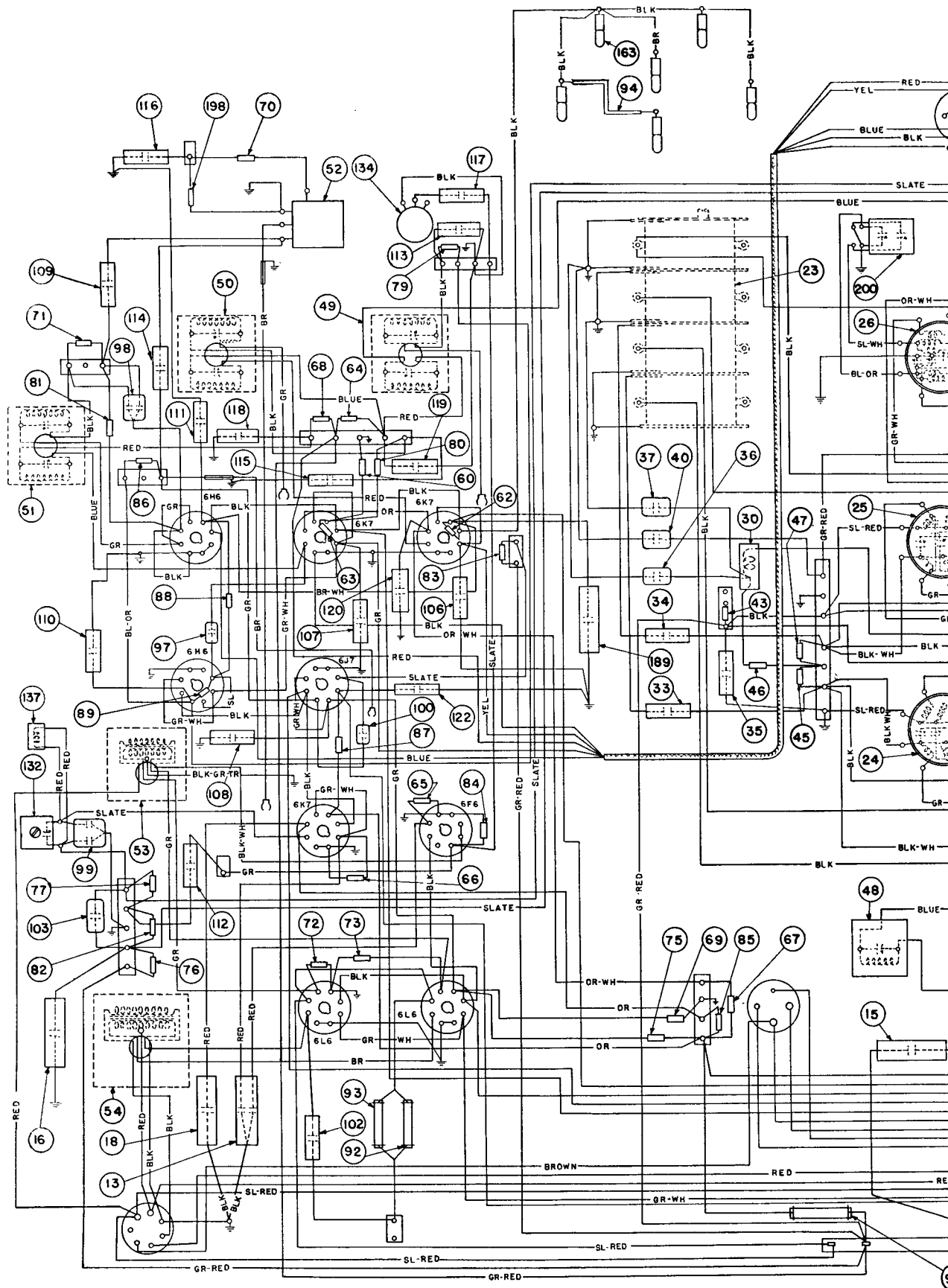


Fig. 3. Wiring Diagram of C



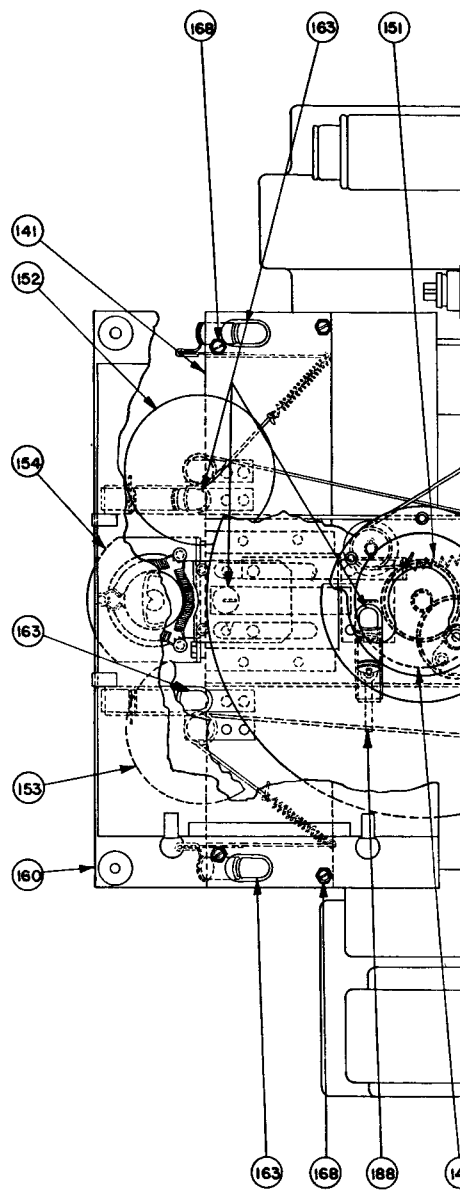
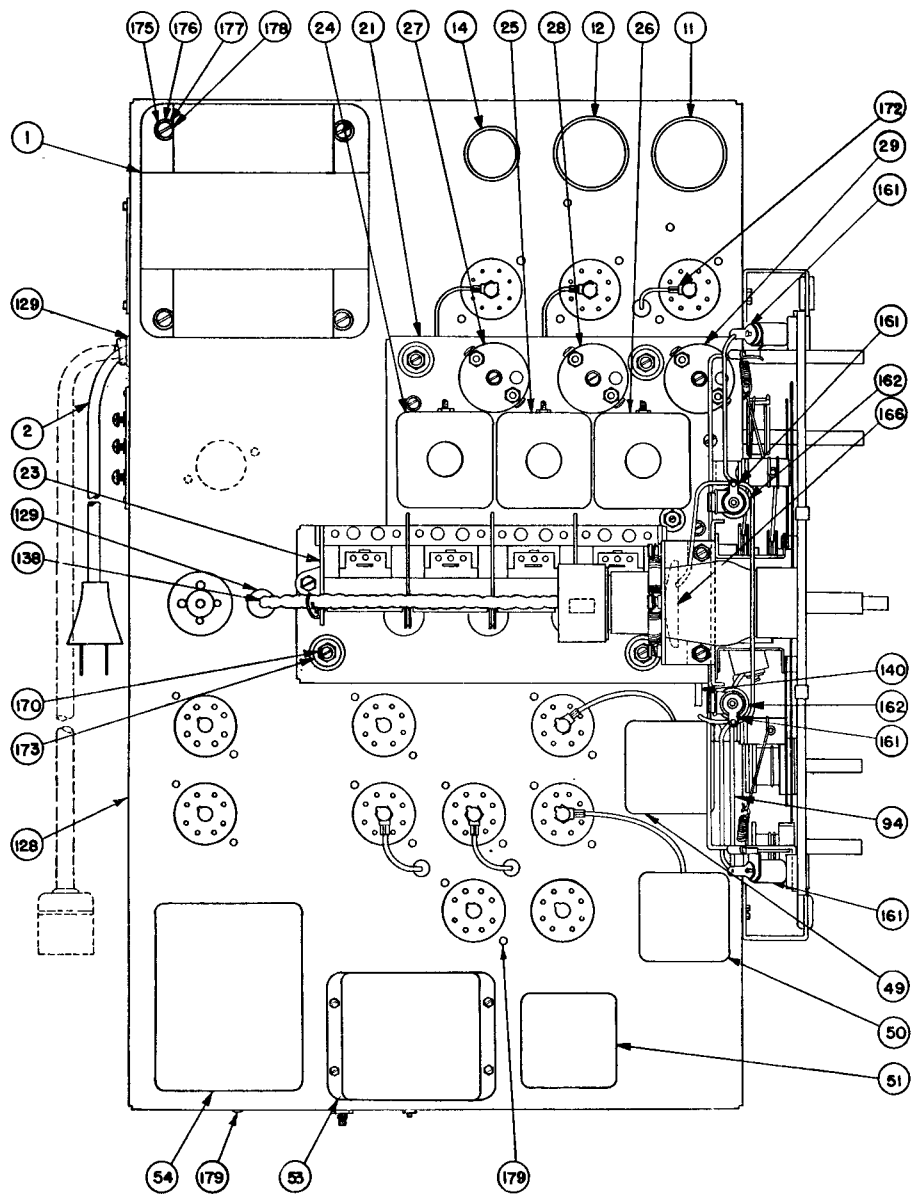


Fig. 4. Chassis

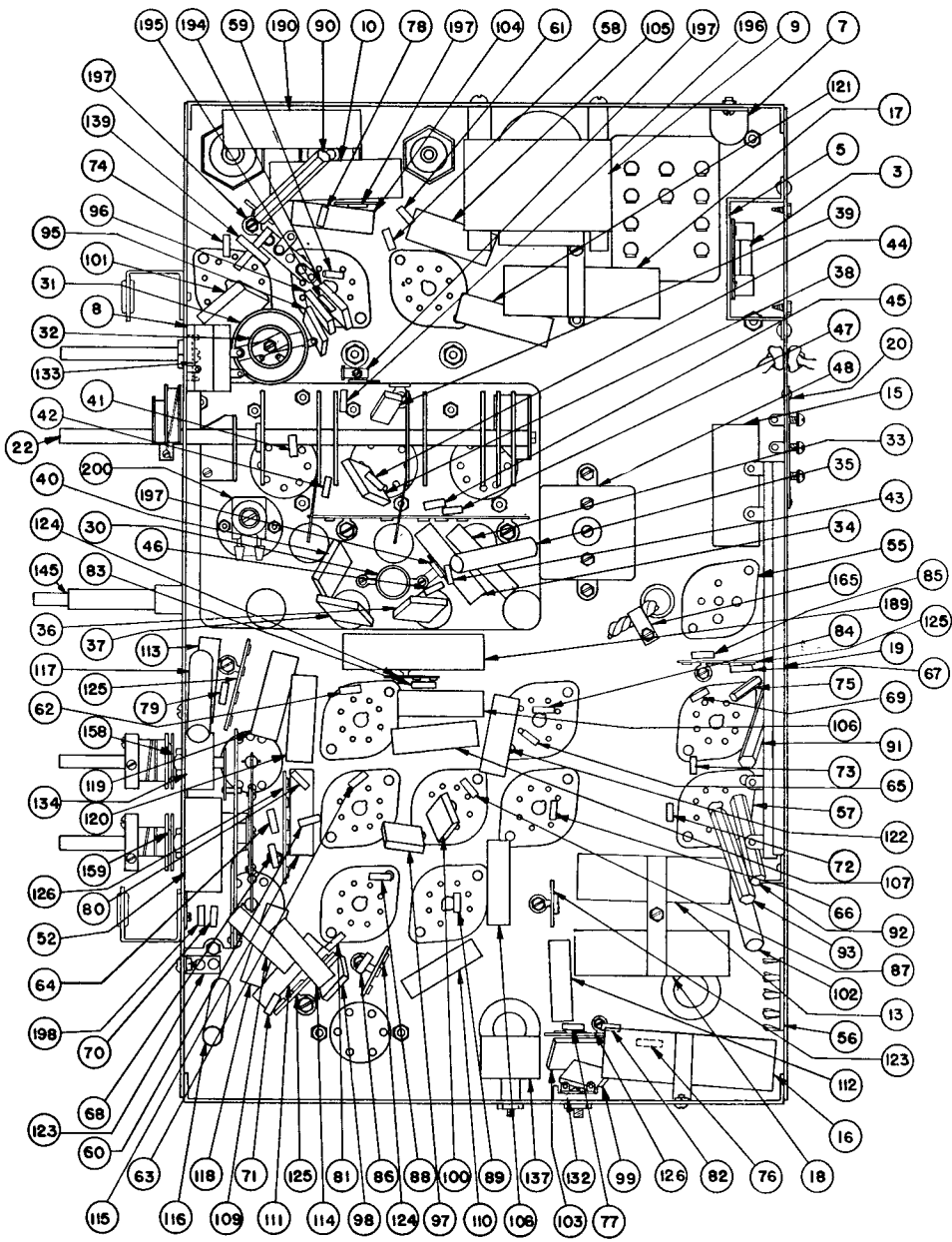
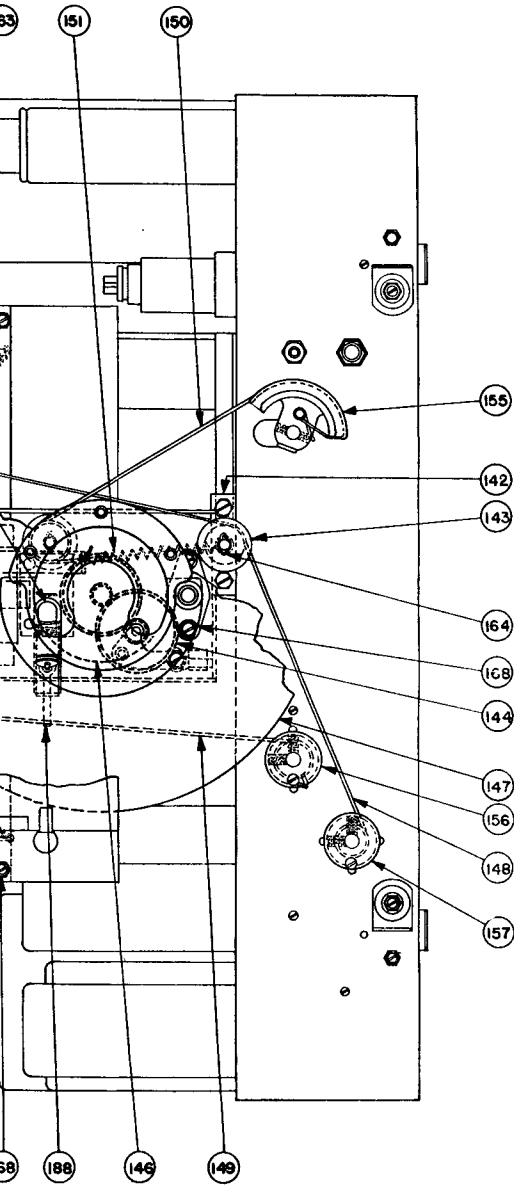


Fig. 4. Chassis Assembly.