Models 650, 650-A, 651, and 651-A

A-C Superheterodyne Radio Receivers

Specifications

Frequency Range:

Five: (1) Broadcast .54 to 1.71 mc.
(2) Shortwave 49 M. 5.8 to 6.3 mc.
(3) Shortwave 31 M. 9.2 to 9.8 mc.
(4) Shortwave 25 M. 11.4 to 12.05 mc.
(5) Shortwave 19 M. 14.9 to 15.45 mc.

I.F.:

470 kilocycles

Tubes:

Type	Position
6SA7	Converter
6SK7	I-F Amplifier
6SQ7	2nd Detector, AVC & 1st A.F. Amp.
6F6-G	Output
5Y4-G	Rectifier
6U5	Tuning Eye

Power Supply:

110-125 volts A-C
(650-651) 60 cycles
(650A-651A) 25-60 cycles

Power Output:

3.0 watts

A.V.C.:

Applied to 6SA7 Converter and 6SK7 I-F Amplifier.

Audio System:

First A-F section of type 6SQ7 resistance-capacitance coupled to 6F6-G output.

Antenna:

Built-in loop on rear cover for Broadcast. Special antenna mounted above chassis for Shortwave. Provision is also made for use of external antenna.

Controls:

Four (left to right)
1st—Volume Control
2nd—Wave Band Switch
3rd—Tuning Control
4th—Tone & On-Off Switch

Loudspeaker:

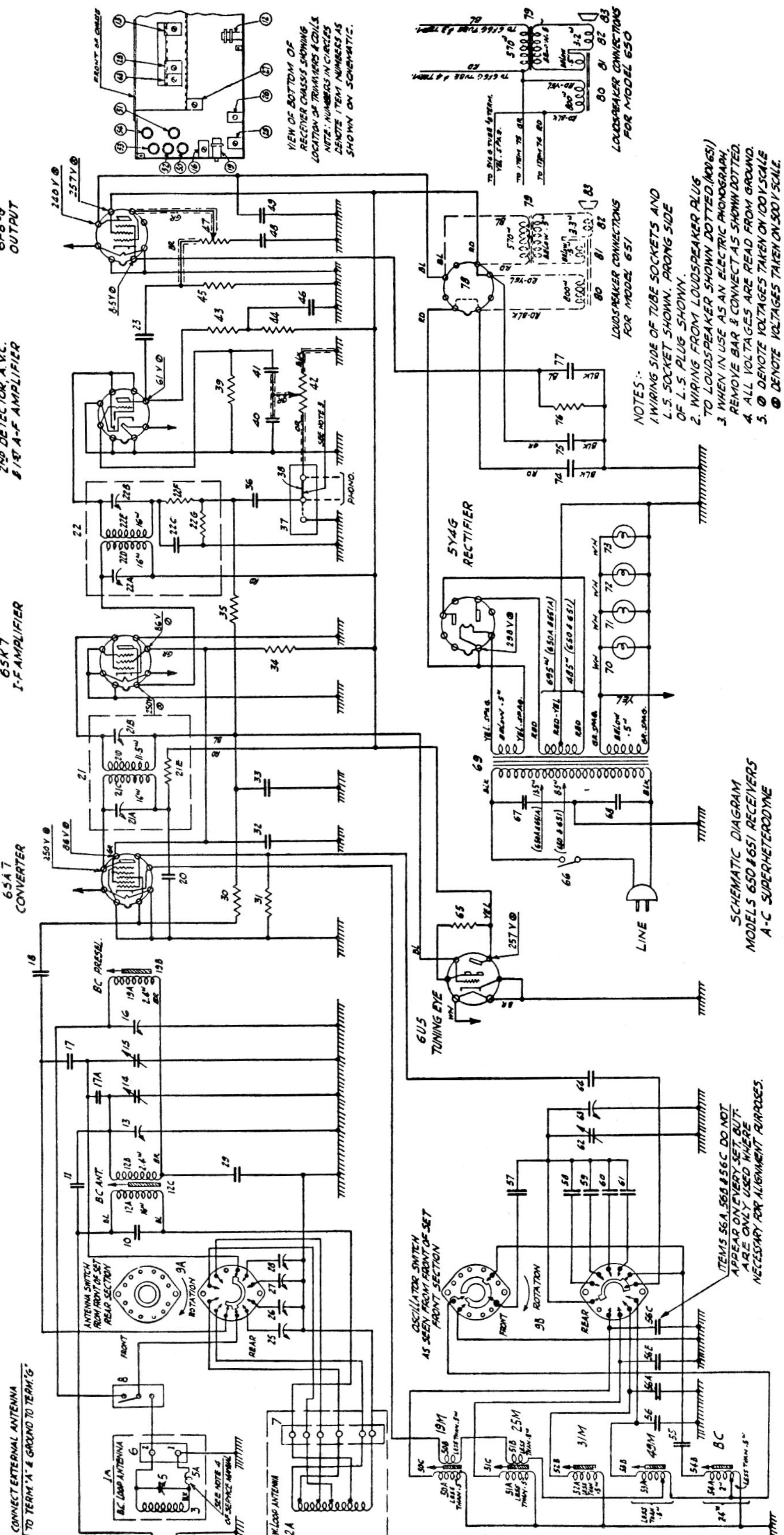
Model 650 and 650-A — 6″ E.D.
Model 651 and 651-A — 8″ E.D.

Automatic Tuning:

Six mechanically-operated pushbuttons for selection of stations.

Dimensions:

Chassis: (all models) 14⅛″ long, 6″ wide and 3-3/16″ high.
Cabinet: (650 and 650-A) 19½″ long, 11¾″ high and 9½″ deep.
Cabinet: (651 and 651-A) 37¾″ high, 27″ wide and 12″ deep.


CONNECT EXTERNAL ANTENNA TO TERM."A" & GROUND TO TERM."G"
BC LOOP ANTENNA
SEE NOTE 4 OF SERVICE MANUAL
SW. LOOP ANTENNA
ANTENNA SWITCH FROM FRONT OF SET REAR SECTION
ROTATION
BC ANT.
BC PRESEL.
6SA7 CONVERTER
6SK7 I-F AMPLIFIER
6SQ7 2ND DETECTOR, A.V.C. & 1ST A-F AMPLIFIER
6F6-G OUTPUT
PHONO.
SEE NOTE 3
VIEW OF BOTTOM OF RECEIVER CHASSIS SHOWING LOCATION OF TRIMMERS & COILS. NOTE: NUMBERS IN CIRCLES DENOTE ITEM NUMBERS AS SHOWN ON SCHEMATIC.
FRONT OF CHASSIS
OSCILLATOR SWITCH AS SEEN FROM FRONT OF SET FRONT SECTION
ITEMS 56A, 56B & 56C DO NOT APPEAR ON EVERY SET, BUT ARE ONLY USED WHERE NECESSARY FOR ALIGNMENT PURPOSES.
6U5 TUNING EYE
5Y4G RECTIFIER
LINE
SCHEMATIC DIAGRAM
MODELS 650 & 651 RECEIVERS
A-C SUPERHETERODYNE
LOUDSPEAKER CONNECTIONS FOR MODEL 651
LOUDSPEAKER CONNECTIONS FOR MODEL 650
NOTES:-
1. WIRING SIDE OF TUBE SOCKETS AND L.S. SOCKET SHOWN. PRONG SIDE OF L.S. PLUG SHOWN.
2. WIRING FROM LOUDSPEAKER PLUG TO LOUDSPEAKER SHOWN DOTTED.(MOD.651)
3. WHEN IN USE AS AN ELECTRIC PHONOGRAPH, REMOVE BAR & CONNECT AS SHOWN DOTTED.
4. ALL VOLTAGES ARE READ FROM GROUND.
5. ⊘ DENOTE VOLTAGES TAKEN ON 100 V SCALE
⊗ DENOTE VOLTAGES TAKEN ON 500 V SCALE.

REPLACEMENT PARTS LIST

Item	Description	Part No.
1A	Broadcast Loop Assy. (650 & 650A)	K-5824-1
	Broadcast Loop Assy. (651 & 651A)	K-5823-1
2A	Short Wave Loop Assembly	K-5624-2
3	Broadcast Loop (650 & 650-A)	K-5572-7
	Broadcast Loop (651 & 651-A)	K-5572-8
4	Terminal Strip (Antenna & Ground) Part Of	K-2986
5	Trimmer 1.5-10 mmf.	K-1458-5
5A	Loop Coil (650 & 650-A)	K-5990-1
	Loop Coil (651 & 651-A with trimmer on right side of loop, from rear)	K-5990-2
	Loop Coil (651 & 651-A with trimmer on left-side of loop, from rear)	K-5990-3
6	Terminal Strip (B.C. Loop)	K-3749-3
7	Terminal Strip (S. W. Loop)	K-5691-5
8	Loop Switch	K-4029-3
9A, 9B	Antenna Switch, Oscillator Switch — Complete Band Switch Assembly	K-5789-1
10	Capacitor, Mica: 100 mmf.	K-1611-2
11	Capacitor, Mica: 5 mmf. (Part of K-3831-7)	K-4235-1
12A, 12B, 12C	B.C. Ant. Trans. Primary, B.C. Ant. Trans. Secondary, B.C. Ant. Trans. Iron Core — Complete Assembly	K-3831-7
13	Trimmer 10-55 mmf. (B.C. Antenna)	K-1458-3
14	Tuning Gang (B.C. Antenna) 590 mmf. Part of	K-5787-1
15	Tuning Gang (B.C. Preselector & S.W. Ant.) 590 mmf. Part of	K-5787-1
16	Trimmer 3-25 mmf. (Preselector)	K-4793-3
17	Capacitor, Mica: 15 mmf.	K-1611-45
17A	Capacitor Coupling: 2 mmf.	K-5941
18	Capacitor, Mica: 1,000 mmf.	K-1611-23
19A, 19B	B.C. Preselector Coil, B.C. Preselector Coil Iron Core — Complete Assy.	K-5310-2
20	Capacitor: .1 mf. 400 volt	K-2228-9
21	1st I.F. Trans. Assembly Complete	K-4609-2
21A, 21B	1st I.F. Trimmers only	K-2134-6
21C, 21D	1st I.F. Coils only	K-4610
21E	Resistor: 1000 ohms, ½ watt	K-2226-16
22	2nd I.F. Trans. Assembly Complete.	K-4545-2
22A, 22B, 22C	2nd I.F. Trimmers Only	K-2932-1
22D, 22E	2nd I.F. Coils Only	K-4585
22F	Resistor, 50,000 ohms ½ watt	K-2226-6
22G	Resistor, ½ meg, ½ watt	K-2226-3
23	Capacitor: .02 mf. 400 volt	K-2228-7
25	Trimmer 3-25 mmf.	K-4793-3
26	Trimmer 3-25 mmf.	K-4793-3
27	Trimmer 3-25 mmf.	K-4793-3
28	Trimmer 3-25 mmf.	K-1458-6
29	Capacitor: .03 mf. 400 volt	K-2228-18
30	Resistor: ¼ meg. ½ watt	K-2226-4
31	Resistor: 20,000 ohms, ½ watt	K-2226-8
32	Capacitor:.1 mf. 400 volt	K-2228-9
33	Capacitor: .05 mf. 200 volt	K-2227-8
34	Resistor: 13,500 ohms, 2 watt	K-3352-11
35	Resistor: 2 meg. ½ watt	K-2226-1
36	Capacitor: .02 mf. 200 volt	K-2227-7
37	Terminal Strip (Phono Conns.) Part Of	K-2986
38	Metal Strap (Phono Conns.)	K-3291-3
39	Resistor: 10 meg. ½ watt	K-2226-74
40	Capacitor; Mica: 100 mmf.	K-1611-2
41	Capacitor; .02 mf. 200 volt	K-2227-7
42	Volume Control: 2 meg.	K-3858-8
43	Resistor: ¼ meg. ½ watt	K-2226-4
44	Resistor: 50,000 ohms, ½ watt	K-2226-6
45	Resistor: ¼ meg. ½ watt	K-2226-4
46	Capacitor: 1 mf. 400 volt	K-2228-9
47	Tone Control ¼ meg. (with switch)	K-5813-1
48	Capacitor .002 mf. 400 volt	K-2228-2
49	Capacitor .003 mf. 600 volt	K-5660-3
50A, 50B, 50C	19 M. Osc. Coil Secondary, 19 M. Osc. Coil Primary, 19 M. Osc. Coil Iron Core — Complete Assy.	K-5783
51A, 51B, 51C	25 M. Osc. Coil Secondary, 25 M. Osc. Coil Primary, 25 M. Osc. Coil Iron Core — Complete Assy.	K-5782
52A, 52B	31 M. Osc. Coil, 31 M. Osc. Coil Iron Core — Complete Assy.	K-5781
53A, 53B	49 M. Osc. Coil, 49 M. Osc. Coil Iron Core — Complete Assy.	K-5780
54A, 54B	B.C. Oscillator Coil, B.C. Osc. Coil Iron Core — Complete Assy.	K-5779
55	Capacitor, Mica: 550 mmf.	K-1611-43
56	Capacitor, Mica: 10 mmf.	K-1611-40
56A	Capacitor, Mica: 5 mmf.	K-1611-54
56B	Capacitor, Mica: 5 mmf.	K-1611-54
56C	Capacitor, Mica: 5 mmf.	K-1611-54
57	Capacitor, Mica: 250 mmf.	K-1611-14
58	Capacitor, Mica: 100 mmf.	K-1611-25
59	Capacitor, Mica: 90 mmf.	K-1611-48
60	Capacitor, Mica: 80 mmf.	K-1611-47
61	Capacitor, Mica: 60 mmf.	K-1611-46
62	Tuning Gang (Osc) 590 mmf. Part of	K-5787-1
63	Trimmer (Osc.) 10-55 mmf.	K-1458-3
64	Capacitor, Mica: 50 mmf.	K-1611-1
65	Resistor: 1 meg. ½ watt, Part of 6U5 Tuning Eye Socket	
66	On-off Switch Part of	K-5813-1
67, 68	Buffer Capacitor Double Unit, (Line Filters) .025 mf. — Complete Assy.	K-5073
69	Power Trans. 60 cy. (650 & 651)	K-3700-16
	Power Trans. 25 cy. (650A & 651A)	K-3700-15
70	Dial Lamp (6.3 volt)	K-2589-3
71	Dial Lamp (6.3 volt)	K-2589-3
72	Dial Lamp (6.3 volt)	K-2589-3
73	Dial Lamp (6.3 volt)	K-2589-3
74	Capacitor: 20 mf. 450 volt, Part Of.	K-5740-2
75	Capacitor: 20 mf. 400 volt, Part Of.	K-5740-2
76	Resistor, 500 ohms. ½ watt.	K-2226-18
77	Capacitor: 20 mf. 25 volt, Part Of.	K-5740-2
78	Speaker Socket (651 & 651A Only)	K-1924-1
	Speaker Plug (651 & 651A Only)	K-2678
79	Output Trans. Assy. (650 & 650A)	K-3873-6
	Output Trans. Assy. (651 & 651A)	K-4046-5
80	Loudspeaker Field 800 ohms (650 & 650-A) Part Of.	K-5785
	Loudspeaker Field 800 ohms (651 & 651-A) Part Of.	K-5733
81	Hum Coil (not replaceable) (650 & 650-A) Part Of.	K-5785
	Hum Coil (not replaceable) (651 & 651-A) Part Of.	K-5733
82	Voice Coil and Diaphragm (650 & 650-A)	K-5844
	Voice Coil and Diaphragm (651 & 651-A)	K-5992
83	Loudspeaker Assy. (650 & 650-A)	K-5785
	Loudspeaker Assy. (651 & 651-A)	K-5733

MISCELLANEOUS

Tube Socket	K-1924-1
Tuning Eye Socket	K-5803
Dial Scale	K-5773-2
Dial Indicator Assembly	K-5905
Cord (Small Pulley) 18" long (Order by feet)	K-4636
Cord (Large Pulley) 36" long (Order by feet)	K-5752
Pushbutton Rod	K-5995-2
Spring (small dial pulley)	K-3804-2
Spring (large dial pulley)	K-3790
Pulley (wood)	K-5717
Shaft, Sleeve, Clamp, "C" Washer — Tuning Mechanism	K-5664-2
	K-5665
	K-5666
	K-2895
Knob (Tuning and volume)	K-5176-1
Knob (Tone and On-Off)	K-5955-1
Knob (Band)	K-5955-2
Knob (Pushbutton)	K-5707
Standoff (Single Terminal)	K-2594-1
Dial Lamp Socket (11" leads)	K-5723-2
Dial Lamp Socket (19" leads)	K-5723-1
Station Names Sheet	K-5731
Rubber Grommet (Gang Mtg.)	K-2498-2

REALIGNING DETAILS

I.F. ALIGNMENT:

Connect the high generator lead to the 6SA7 grid through a 0.1 mf. capacitor. Connect the low side to ground. Set the generator to 470 kilocycles and adjust items 21A, 21B, 22A and 22B (on I-F Cans) for maximum output.

R.F. ALIGNMENT:

Note 1—See diagram on schematic for coil and trimmer locations.

B.C. BAND WITH EXTERNAL ANTENNA.

Set Ant. Switch to "Ext. Ant." and connect the high signal generator lead through a 100 mmf. capacitor to antenna terminal (A) on the rear of the chassis. Connect the low side to the ground terminal (G). Since the dial is fastened to the cabinet, it is necessary to use the alignment scale on dial frame. With the gang capacitor closed, check that the pointer is at 1" on the scale. Set the generator to 1600 kc. and the receiver to 5⅞ ins. Adjust the osc. trimmer, item 63, for maximum signal. Adjust antenna trimmer, item 13 and preselector trimmer, item 16, for maximum output while rocking the gang. Set the signal generator to 600 kc. and the receiver to 1⅞ inches. Adjust the oscillator iron core, item 54-B for maximum output. Adjust antenna and preselector iron cores, items 12C and 19B for maximum output. Recheck at 1600 kc.

B.C. BAND WITH LOOP

Set antenna switch to "Int. Ant." and locate generator leads near the receiver, but do not attach. Set the generator at 1000 kc. and receiver at 4⅜ inches and adjust B.C. loop trimmer, item 5, for maximum output.

Note 2—It is important to align the S.W. bands in the order shown below. If this order is changed, some of the short-wave bands will be completely out of alignment. If it is necessary to realign one of the bands, all of the bands of a higher frequency than the first one realigned, must be realigned also.

S.W. 49 M. BAND

Connect the generator through a 400-ohm resistor to antenna and ground terminals (A & G) on rear of receiver chassis. Set antenna switch to "Ext. Ant." Set the generator at 6.0 mc. and receiver at 3⅜ inches. Adjust iron core, (item 53-B) of 49 M coil for maximum signal. (See Note 3 below). Adjust antenna trimmer, (item 28), for maximum signal rocking the gang while doing so.

S.W. 31 M. BAND

Set the generator at 9.50 mc. and receiver at 3¾ inches and adjust iron core (item 52B) of 31 M. coil, for maximum signal. (See note 3 below). Adjust antenna trimmer, item 27, for maximum signal, rocking the gang while doing so.

S.W. 25 M. BAND

Set the generator at 11.70 mc. and receiver at 3½ inches and adjust iron core (item 51C) of 25 M. coil, for maximum signal. (See note 3 below). Adjust antenna trimmer, item 26, for maximum signal, rocking the gang while doing so.

S.W. 19 M. BAND

Set the generator at 15.20 mc. and receiver at 3$\frac{23}{32}$ inches and adjust iron core (item 50C) of 19 M. coil, for maximum signal. (See note 3 below). Set the generator at 15.45 mc. and tune in the signal. Adjust antenna trimmer, item 25, for maximum signal, rocking the gang while doing so.

Note 3—Check carefully for the correct peak. To do this adjust to aligned frequency for each band as described above, then turn generator to the approximate frequency as shown in table below and increase input. At this point a signal will be heard if the oscillator setting is correct. If no signal is heard, return to aligned frequency and turn the iron core adjusting screw counter-clockwise until a second peak is reached. Recheck for image at proper frequency per table below.

Band	Image Frequency
49 M.	6.94 M.C.
31 M.	10.44 M.C.
25 M.	12.64 M.C.
19 M.	16.14 M.C.

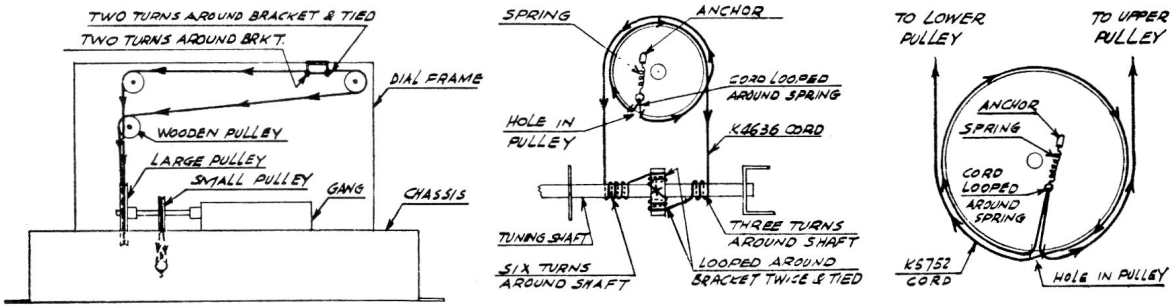
Note 4:—On early production sets it is necessary to install a small coil, item 5A, to ensure proper B.C. loop performance. If the coil is not present in the set, it may be obtained "No Charge" from the Northern Electric Company Limited.

IMPORTANT:

Receivers having a **yellow painted stripe** on the rear of the loop antenna do **not** require this coil.

To install this coil proceed as follows:

Remove the black loop lead from terminal No. 1 on the rear of the chassis and connect it to the coil bracket with the screw. Slide the other coil bracket under the No. 1 terminal from which the black lead was removed and tighten the screw. Realign the B.C. loop per alignment instructions.



LOOKING FROM REAR OF CHASSIS WITH GANG CLOSED

SIDE VIEW OF SMALL PULLEY WITH GANG CLOSED

SIDE VIEW OF LARGE PULLEY WITH GANG CLOSED

PULLEY STRINGING DIAGRAM