

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

If IF transformers are not badly out of alignment, steps 1 & 2 may be omitted. Connect signal generator as in step 3 and adjust A1 through A5 for maximum output. Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD	High side to pin 1 (Grid) of 6BA6 2nd IF tube(2). Low side to chassis.	455KC	AM (Center position)	Tuning cap. across fully closed voice coil	Across voice coil	A1	Adjust for maximum output.
2	.1 MFD	High side to pin 1 (Grid) of 6BA6 1st IF tube(2). Low side to chassis.	"	"	"	"	A2, A3	"
3	.1 MFD	High side to large AM stator of tuning cap. Low side to chassis.	"	"	"	"	A4, A5	"
4		Loop.	1600KC	"	1600KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
5		Loop.	1400KC	"	Tune for maximum output.	"	A7	Rock tuning cap and adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Do not attempt alignment of FM IF's until AM IF's have been aligned. In step 6 connect two 100K resistors in series from point C to chassis. The junction of these two resistors is point B. These resistors must be within 5% of each other.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT	ADJUST	REMARKS
6	.001 MFD Mica Cap	High side to pin 1 (Grid) of 6BA6 1st IF tube(2). Low side to chassis.	10.7MC (Unmod.)	FM (Counter-clockwise)	Tuning cap. fully closed	D.C. Probe to point A. Common to point B.	A8	Adjust for Zero deflection.
7	.001 MFD Mica Cap	"	10.7MC (Unmod.)	"	"	D.C. Probe to point C. Common to chassis.	A9, A10, A11, A12, A13	Adjust for maximum deflection. Set signal generator output attenuator for 4 volts deflection for next step.
8	.001 MFD Mica Cap	"	10.7MC (Unmod.)	"	"	D.C. Probe to point A. Common to point B.	A8	Adjust for zero deflection. Remove two 100K resistors from point C.
9	.001 MFD Mica Cap	"	10.7MC (Unmod.)	"	"	D.C. Probe to point C. Common to chassis.	A9	Adjust for maximum deflection.
10	.01 MFD	High side to small FM stator of tuning cap. Low side to chassis.	10.7MC (Unmod.)	"	"	D.C. Probe to point C. Common to chassis.	A14, A15	Adjust for maximum deflection. Continue with FM RF alignment in step 11.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Do not attempt alignment of FM IF's until AM IF's have been aligned. Use 120 V sawtooth wave frequency modulated signal with 50 V modulation and 40KC sweep. Use scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	SCOPE	ADJUST	REMARKS
6	.01 MFD	High side to pin 1 (Grid) of 6BA6 1st IF tube(2). Low side to chassis.	10.7MC (Freq. Mod)	FM (Counter-clockwise)	Tuning cap. fully closed	Vertical input to point D. A12, ground to chassis.	A10, A11, A12, A13	Adjust for maximum amplitude, symmetry and coincidence of pattern per Fig. 1.
7	.01 MFD	High side to small FM stator of tuning cap. Low side to chassis.	10.7MC (Freq. Mod)	"	"	"	A14, A15	"
8	.01 MFD	"	10.7MC (Freq. Mod)	"	"	Vertical input to point A. ground to chassis.	A9, A8	Alternately adjust A9 for maximum amplitude and straightness of crossover lines, and A8 for occurrence of crossover on scope horizontal sweep line per Fig. 2. Continue with FM RF alignment in step 11.

FM RF ALIGNMENT

To check adjustment of FM oscillator coil, set signal generator at 88MC, and tune the receiver for maximum deflection. If dial pointer indicates 88MC no further adjustment is necessary. If the pointer is on the low frequency side of 88MC, slightly expand the oscillator coil; if the pointer is on the high frequency side of 88MC, slightly compress the oscillator coil.

To check adjustment of FM antenna coil, set signal generator at 90MC and tune the receiver for maximum deflection. Readjust A17 for maximum deflection. If setting is the same as in step 13, no further adjustment is necessary. If cap. of A17 is higher for maximum deflection, slightly compress the FM antenna coil; if cap. of A17 is lower for maximum deflection, slightly expand the FM antenna coil.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT	ADJUST	REMARKS
11	300Ω carbon resistor	High side to antenna terminal #2. Low side to chassis.	100MC (Unmod.)	FM (Counter-clockwise)	100MC	D.C. Probe to point C. Common to chassis.	A16	Adjust for max. deflection.
12	300Ω carbon resistor	"	88MC	"	Tune for maximum deflection.	"	FM Osc (87)	Check adjustment per pre-alignment instructions. Repeat steps 11 & 12 until no further improvement can be made, making step 11 last step.
13	300Ω carbon resistor	"	105MC	"	"	"	A17	Rock tuning cap. and adjust for maximum deflection.
14	300Ω carbon resistor	"	90MC	"	"	"	FM Ant. (85)	Check per pre-alignment instructions. Repeat steps 13 & 14 until no further improvement can be made, making step 13 last step.

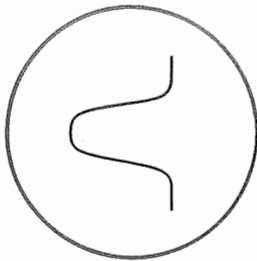


FIG. 1

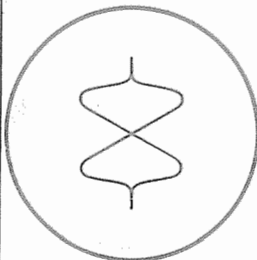
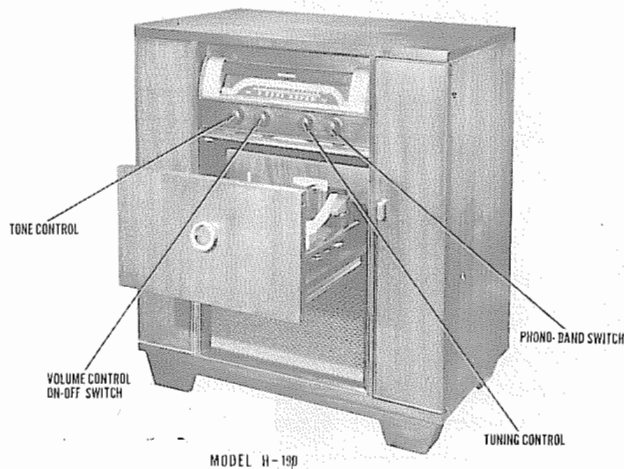


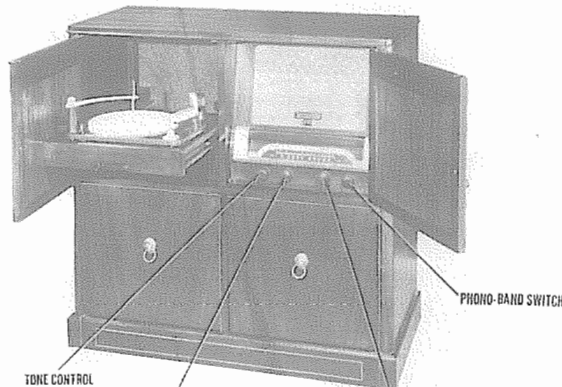
FIG. 2

PHOTOFACT* Folder



MODEL H-190

WESTINGHOUSE MODEL H-190



MODEL H-191

TRADE NAME	Westinghouse, Models H-190, H-191, H-191A, H-220 (Ch. V-2134)		
MANUFACTURER	Westinghouse Electric Corp., Receiver Div., Sunbury, Pa.		
TYPE SET	AC Operated Combination Phono-Radio, AM-FM Superheterodyne Receiver with Loop Antenna.		
TUBES(EIGHT)	Types 6J6 Converter, 6BA6 1st IF Amp., 6BA6 2nd IF Amp., 6AU6 FM Limiter, 6AL5 FM Detector, 6AV6 AM DET-AVC-AF, 6V6GT Power Output, 5Y3GT Rectifier.		
POWER SUPPLY	105-120 Volts	RATING	.69 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC	FREQ. MOD.	88-108MC

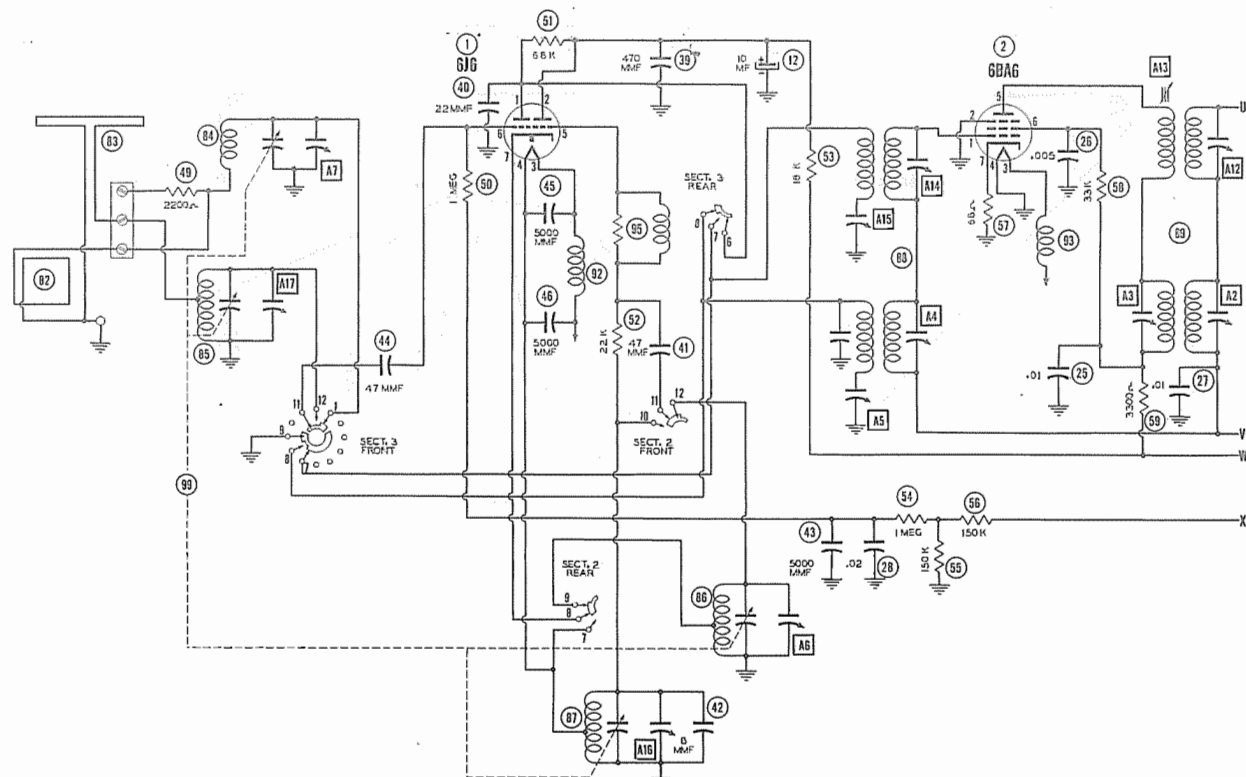
HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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DATE 4/49 497-23 SET #59 FOLDER 23

WESTINGHOUSE
MODELS H-190, H-191, H-191A, H-220

WESTINGHOUSE
MODELS H-190, H-191, H-191A, H-220



VOLTAGE AND RESISTANCE READINGS TAKEN IN BROADCAST POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1A	6U6	6.0VDC	115VDC	6.6VAC	0V	1-2.8VDC	-5.7VDC	0V	
1B	6U6	6.0VDC	105VDC	6.6VAC	0V	1-2.8VDC	-0VDC	0V	
2	6BA6	-5.5VDC	0V	6.6VAC	0V	235VDC	85VDC	0V	
3	6BA6	-5.5VDC	0V	0V	6.6VAC	240VDC	105VDC	1VDC	
4	6AU6	-7.0VDC	0V	0V	6.6VAC	250VDC	60VDC	0V	
5	6AL5	-8.0VDC	0V	6.6VAC	0V	0V	0V	15VDC	
6	6AV6	-5.5VDC	0V	6.6VAC	0V	0V	0V	80VDC	
7	6V6GT	0V	6.6VAC	250VDC	250VDC	0V	230VDC	0V	15VDC
8	6V6GT	0V	300VDC	0V	300VAC	6.6VAC	300VDC	6.6VAC	300VDC

† TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

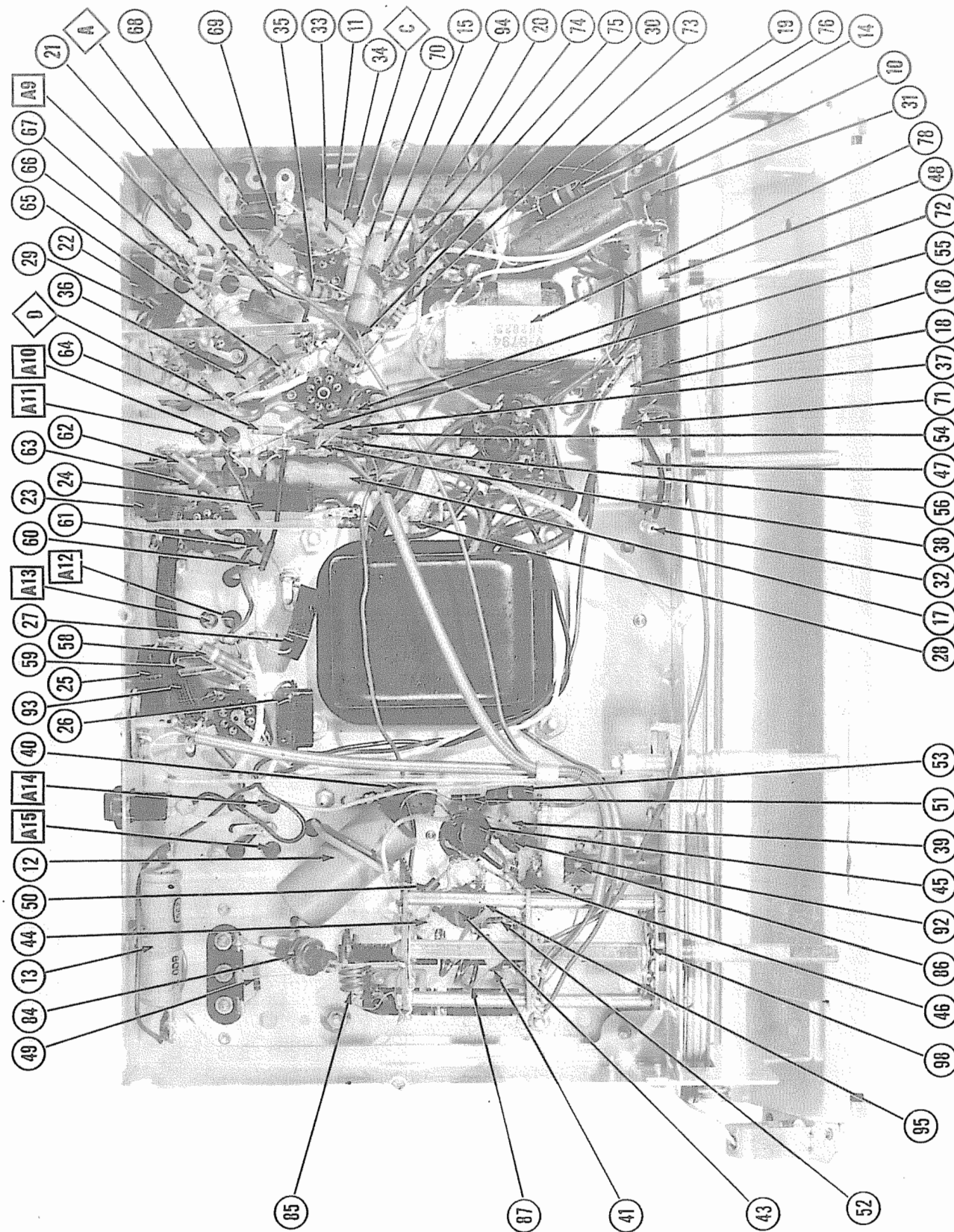
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1A	6U6	100KΩ	100KΩ	1Ω	0Ω	22KΩ	2 Meg.	1Ω	
1B	6U6	100KΩ	100KΩ	1Ω	0Ω	22KΩ	2 Meg.	0Ω	
2	6BA6	2.5 Meg.	0Ω	1Ω	0Ω	84KΩ	130KΩ	0Ω	
3	6BA6	2.5 Meg.	0Ω	0Ω	1Ω	84KΩ	130KΩ	60Ω	
4	6AU6	100KΩ	0Ω	0Ω	1Ω	100KΩ	250KΩ	0Ω	
5	6AL5	15KΩ	0Ω	1Ω	0Ω	570KΩ	0Ω	570KΩ	
6	6AV6	10 Meg.	0Ω	1Ω	0Ω	350KΩ	0Ω	200KΩ	
7	6V6GT	0Ω	1Ω	50KΩ	50KΩ	470KΩ	250KΩ	0Ω	270Ω
8	6V6GT	Inf.	50KΩ	Inf.	50Ω	1Ω	80Ω	1Ω	60KΩ

† VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

RESISTANCE READINGS IN THE 8+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 10\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		INSTALLATION NOTES
		WESTINGHOUSE PART No.	BMA BASE TYPE	
1	Converter	616	7BK	
2	1st IF Amp.	6A6	6A6	
3	2nd IF Amp.	6A6	7BK	
4	FM Limiter	6A6	7BK	
5	FM Detector	6AL5	6BT	
6	AM Det.-AFC-AF	6AV6		
7	Power Output.	6V6GT	7AC	
8	Rectifier	5Y3ZT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REPLACEMENT DATA			IDENTIFICATION CODES AND NOTES
		WESTINGHOUSE PART No.	AEROVOX PART No.	CORNELL-DUBIER PART No.	
9A	24	V-5821		UP2245	EL-220
10	20	V-3236	PRS25-25	BR202A	TA-25
11	25	V-4885	PRS150-4	BR415	UT-41
12	4	V-5985	PRS450-10	BR1045	UT-41
13A	0.1	V-4634	684-01	GT6S1	TC-11
14	0.005	RCP10M650 2A	684-005	GT6D5	TC-25
15	0.1	RCP10M4103A	484-01	GT4S1	TC-11
16	0.1	RCP10M4103A	484-01	GT4S1	TC-11
17	0.1	RCP10M4103A	484-01	GT4S1	TC-11
18	0.05	RCP10M430M	484-01	GT4S1	TC-11
19	0.03	RCP10M430M	484-01	GT4S1	TC-11
20	0.005	V-5040-15	684-01	GT6S1	TC-11
21	0.1	V-5040-15	684-01	GT6S1	TC-11
22	0.1	V-5040-15	684-01	GT6S1	TC-11
23	0.005	V-5040-11	684-005	GT6S1	TC-11
24	0.005	V-5040-11	684-005	GT6S1	TC-11
25	0.005	V-5040-11	684-005	GT6S1	TC-11
26	0.005	V-5040-11	684-005	GT6S1	TC-11
27	0.1	V-5040-15	684-01	GT6S1	TC-11
28	0.2	RCP10M4213A	484-02	GT4S2	TC-11
29	0.1	V-5040-13	484-01	GT6S1	TC-11
30	150	RCM20A151M	1468-00015	SM5T15	MO-5-315
31	680	RSC252V681M	1468-00075	LM5T7	MO-5-37
32	470	RCM20A471M	1468-00005	SM5T5	MO-5-35
33	150	RCM20A151J	1468-00015	SM5T15	MO-5-315
34	150	RCM20A151J	1468-00015	SM5T15	MO-5-315
35	1000	RCP10M6102A	1468-001	LM5D1	MO-5-21
36	47	RCM20A470M	1468-00005	SM5Q5	MO-5-45
37	100	RCM20A101M	1468-0001	SM5T1	MO-5-31
38	100	RCM20A101M	1468-0001	SM5T1	MO-5-31
39	470	RSC202V471M	1468-00005	SM5T5	MO-5-35
40	22	RCM20B220K	1468-000025	SM5Q25	MO-5-42
41	47	RSC202V471M	1468-00005	SM5Q5	MO-5-45
42	6000	RSC202V6000G	1467-005	LD5D5	MO-5-25
43	47	V-53596	1468-00005	SM5Q5	MO-5-45
44	5000	RCM20A501M	1467-005	LM5D5	MO-5-25
45	5000	V-5596	1467-005	LM5D5	MO-5-25
46	5000	V-5596	1467-005	LM5D5	MO-5-25

Note: If either item number 33 or 34 is replaced with a capacitor of a different value the other must be replaced with a capacitor of the same value.

CONTROLS

ITEM No.	RATING	REPLACEMENT DATA			INSTALLATION NOTES
		WESTING. PART No.	IRC PART No.	CLAROSTAT PART No.	
47A	500KΩ	V-5791	D18-133X	T-88	Volume Control. Attach to 47A per instructions.
47B	500KΩ	V-5791	D18-133X	T-88	Volume Control. Attach to 47A per instructions.
48A	2 Meg.	V-5790	D13-139	SN-A	Tone Control. Attach to 48A per instructions.
48B	2 Meg.	V-5790	D13-139	SN-A	Tone Control. Attach to 48A per instructions.

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	WESTINGHOUSE PART No.	MEISSNER PART No.	
82A	Loop Ant.		0Ω	V-5882-1		Model H-190
83A	1st IF Ant.		0Ω	V-5879-1		Models H-191, H-191A.
83B	FM Ant. Pois.		0Ω	V-5886-1		Model H-190.
84	Ant. Load		2Ω	V-5868-2		Models H-191, H-191A.
85	Coil		0Ω	V-4674	14-1060	
86	FM Ant. Coil		0Ω	V-5804		
87	FM Osc. Coil		0Ω	V-6076		
88A	1st IF FM	± 6	6.9Ω	V-4627		
89A	2nd IF AM	± 6	5.9Ω	V-4628		
90A	3rd IF FM	± 9.6Ω	11.9Ω	V-4629		
91	FM Ratio		.8Ω			
92	Det.		.1Ω	V-5796		
93	F11. Choke		0Ω	V-4886-3		
94	F11. Choke		0Ω	V-4886-3		
95	F11. Choke		0Ω	V-4886-3		

*Includes resistance of both Sec.

*Includes resistance of both Pri.

Wound on 22Ω resistor.

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	REPLACEMENT DATA		NOTES
				BEAD COLOR	WESTINGHOUSE PART No.	
96	Bayonet	6-8V	0.25A	Blue		Type #44.
97	"	6-8V	0.25A	Blue		Type #44.

MISCELLANEOUS

ITEM No.	PART NAME	WESTINGHOUSE PART No.	NOTES
98	Switch	V-5806	
99	Gang Var. Cap.	V-5802	Band (45-545MF, 10-190MF).
AG	Trimmer	V-5872	AM Oscillator Adjustment.
	Dial Pointer	V-5793	
	Dial Assembly.	V-3667-7	Band Switch.
	Knob Assembly.	V-3667-5	Tone-Volume-Tuning.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING	REPLACEMENT DATA			IDENTIFICATION CODES
		WESTINGHOUSE PART No.	IRC PART No.	CLAROSTAT PART No.	
49	2200Ω	RC10AE222M	BTS-2200		Antenna Loading.
50	1 Meg.	RC10AE105M	Br.-Blk.-Grn.		Converter Grid.
51	68KΩ	RC10AE683K	Blue-Gray-Or.		Converter Plate Load.
52	22KΩ	RC10AE223K	Red-Red-Or.		Oscillator Grid.
53	18KΩ	RC30AE183K	Br.-Gray-Or.		Converter Decoupling.
54	1 Meg.	RC10AE105M	Br.-Blk.-Grn.		AVC Network.
55	150KΩ	RC10AE154M	Br.-Grn.-Yl.		Diode Load.
56	150KΩ	RC10AE154M	Br.-Grn.-Yl.		1st IF Cathode, See Note.
57	68KΩ	RC10AE680K	Blue-Gray-Blk.		" Screen.
58	33KΩ	RC30AE333K	Or.-Or.-Or.		" Decoupling.
59	3300Ω	RC30AE332K	BTA-3300		AVC Network.
60	2.2 Meg.	RC10AE225H	Red-Red-Grn.		2nd IF Cathode.
61	68Ω	RC10AE680K	Blue-Gray-Blk.		" Screen.
62	33KΩ	RC30AE333K	BTA-33K		" Decoupling.
63	3300Ω	RC30AE332K	BTA-3300		Diode Filter.
64	100KΩ	RC10AE103M	Yl.-Yl.-Or.		Limiter Grid.
65	150KΩ	RC30AE154K	Br.-Blk.-Yl.		" Screen.
66	100KΩ	RC30AE103K	BTA-10K		" Decoupling.
67	10KΩ	RC10AE103M	BTS-68K		RF Filter.
68	22KΩ	RC10AE223M	Blue-Gray-Or.		De-emphasis.
69	68KΩ	RC10AE683M	BTS-15K		Ratio Detector Diode Load.
70	150KΩ	RC10AE153M	Br.-Grn.-Red.		AF Grid.
71	1500Ω	RC10AE152M	Br.-Blk.-Blue.		" Plate Load.
72	10 Meg.	RC10AE106M	BTS-10 Meg.		" Decoupling.
73	470KΩ	RC10AE474K	BTS-470K		Output Grid.
74	150KΩ	RC10AE154M	BTS-150K		Cathode.
75	470KΩ	RC10AE474K	BTA-470K		
76	270Ω	RC30AE271K	BM-4-270		

Note: Not used in all models.

TRANSFORMER (POWER)

ITEM No.	RATING	REPLACEMENT DATA			MERIT PART No.
		WESTINGHOUSE PART No.	STANCOR PART No.	THORDARSON PART No.	
77	117VAC 600VCT @ 0.69A	5.2VAC 6.8VAC @ 2.0A @ 2.75A	V-5797	T22R05	P-5053

FILTER CHOKE

ITEM No.	RATING	REPLACEMENT DATA			MERIT PART No.
		WESTINGHOUSE PART No.	STANCOR PART No.	THORDARSON PART No.	
78	210Ω	3.5HY	V-5794	C-2877	

TRANSFORMER (OUTPUT)

ITEM No.	RATING	REPLACEMENT DATA			MERIT PART No.
		WESTINGHOUSE PART No.	STANCOR PART No.	THORDARSON PART No.	
79	4750Ω 3.7Ω 400Ω	4Ω	V-5798	T22887	A-2802

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA			INSTALLATION NOTES
		WESTINGHOUSE PART No.	JENSEN PART No.	QUAM PART No.	
80A	FIELD PH 3.7Ω	V-5681	ST-116	8431	Used on Model H-190.
81A	CONV DIA. 3.7Ω	V-5681	MOD P8-V		
80B	FIELD PH 3.5Ω	V-5671	ST-119	10A31	Used on Models H-191, H-191A.
81B	CONV DIA. 3.5Ω	V-5671	MOD P10-T		Replace output transformer to match 6-68 ohm coil.