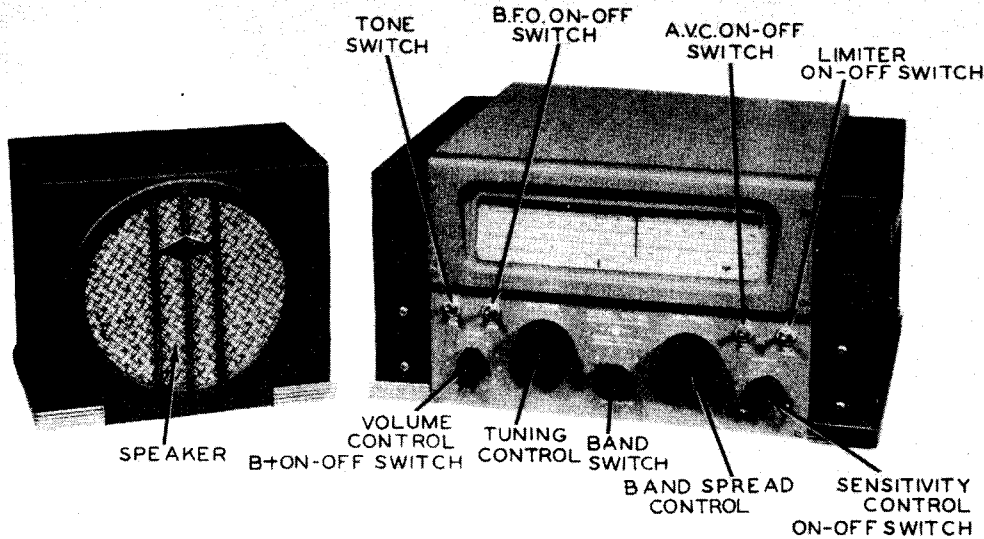




NATIONAL MODEL NC-46

TRADE NAME	National Model NC-46		
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.		
TYPE SET	AC-DC 4 Band Superheterodyne Communications Receiver		
TUBES (TEN)	Types, 6K8 Converter, 6SG7 1st IF Amp., 6SG7 2nd IF Amp., 6H6 2nd Det.-Limiter, 6SJ7 BFO, 6SF7 AVC, 6SC7 Amp.-Phase Inv., 2-25L6GT Power Output, 25Z5GT Rectifier.		
POWER SUPPLY	110-130 Volts AC	RATING	.540 Amps. @ 117V AC
TUNING RANGE—BROADCAST	540-1600KC	SHORT WAVE	1.55-4.6MC, 4.4-12.0MC, 11.5-30.0MC

ALIGNMENT INSTRUCTIONS

To set pointer, turn variable fully closed and set pointer at last reference mark at the left end of the "D" scale. Disconnect the antenna and set the controls as follows: Volume control at maximum, tone switch at "Hi" position, C.W.O. off, A.V.C. off, limiter off and sensitivity control at maximum. To determine correct IF Freq., feed signal into converter grid and slowly turn signal generator between 452 and 458KC. At the point where there is a sharp increase in the output is the correct IF freq. Keep band spread pointer at 90 throughout alignment procedure. Care should be taken that the oscillator is not aligned on the image freq. To check, increase the output of the signal generator and tune the receiver approx. 910KC below the signal generator freq. The image freq. should be heard and should be considerably weaker. If the image freq. is not heard, the oscillator trimmer should be decreased in capacity until the fundamental freq. appears at the proper dial setting. Use isolation trans. if available. If not, connect capacitor in series with the low side of the signal generator and chassis. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to grid cap of 6K8. Low side to chassis.	See instructions above	D	High freq. end.	across voice coil	A1,A2, A3,A4, A5,A6.	adjust for maximum output. If isolation trans. is not used, reduce dummy ant. to .001 MFD. to reduce hum modulation.
.1 MFD.	"	"	"	"	"	A7	Turn CWO switch "on" and adjust for an approximate 1000 cycle audio note.
500 ohm carbon resistor	High side to ant. terminal. Low side to chassis.	30.0MC	A	30.0MC	"	A8	Turn CWO to "off" position. Adjust for maximum output.
"	"	28.0MC	"	Tune for maximum output.	"	A9.	Rock dial and adjust for maximum output.
"	"	12.0MC	B	12.0MC	"	A10	Adjust for maximum output.
"	"	11.0MC	"	Tune for maximum output.	"	A11	Rock dial and adjust for maximum output.
"	"	4.6MC	C	4.6MC	"	A12	Adjust for maximum output.
"	"	4.0MC	"	Tune for maximum output.	"	A13	Rock dial and adjust for maximum output.
"	"	1500KC	D	1500KC	"	A14	Adjust for maximum output.
"	"	600KC	"	600KC	"	A15	Adjust for maximum output. Recheck A14 at 1500KC.
"	"	1400KC	"	Tune for maximum output.	"	A16	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

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PARTS LIST AND DESCRIPTIONS TUBES

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT		
1	Converter	6K8	6K8	8K	
2	1st IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	2nd Det.-Limiter	6H6	6H6	7Q	
5	BFO	6SJ7	6SJ7	8N	
6	AVC	6SF7	6SF7	7AZ	
7	Amp.-Phase Inv.	6SC7	6SC7	8S	
8	Power Output	25L6GT/G	25L6GT/G	7AC	
9	Power Output	25L6GT/G	25L6GT/G	7AC	
10	Rectifier	25Z5GT	25Z5GT	6Z	

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 INSTALLATION NOTES
		NATIONAL PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	
11	40	M-40-150	UT-401	PRS150-40	BR4015	TC48
12	40	M-40-150	UT-401	PRS150-40	BR4015	TC48
13	25	M-25-50	TA-525	PRS50-25	BR255	TC36
14	1	S-4-1	TC-1	434-1	DT4P1	TP428
15	1	S-4-1	TC-1	434-1	DT4P1	TP428
16	1	S-4-1	TC-1	434-1	DT4P1	TP428
17	1.02	S-4-02	TC-12	434-02	DT4S2	TP423
18	1	S-4-1	TC-1	434-1	DT4P1	TP428
19	1	S-4-01	TC-11	434-01	DT4S1	TP421
20	1	S-4-01	TC-11	434-01	DT4S1	TP421
21	1	S-4-01	TC-11	434-01	DT4S1	TP421
22	1	S-4-01	TC-11	434-01	DT4S1	TP421
23	1	S-4-1	TC-1	434-1	DT4P1	TP428
24	1	S-4-1	TC-1	434-1	DT4P1	TP428
25	1	S-4-01	TC-11	434-01	DT4S1	TP421
26	1	S-4-1	TC-1	434-1	DT4P1	TP428
27	1	S-4-1	TC-1	434-1	DT4P1	TP428
28	1	S-4-01	TC-11	434-01	DT4S1	TP421
29	1	S-4-01	TC-11	434-01	DT4S1	TP421
30	1	S-4-1	TC-1	434-1	DT4P1	TP428
31	1	S-4-1	TC-1	434-1	DT4P1	TP428
32	1	S-4-1	TC-1	434-1	DT4P1	TP428
33	1	S-4-1	TC-1	434-1	DT4P1	TP428
34	1	S-4-01	TC-11	434-01	DT4S1	TP421
35	1	S-4-1	TC-1	434-1	DT4P1	TP428
36	1	S-4-1M	TC-10	434-1	DT4W1	TP422
37	1	S-4-1	TC-1	434-1	DT4P1	TP428
38	1	S-4-1	TC-1	434-1	DT4P1	TP428
39	1	S-4-1	TC-1	434-1	DT4P1	TP428
40	1	S-4-01	TC-11	434-01	DT4S1	TP421
41	1	S-4-01	TC-11	434-01	DT4S1	TP421
42	270	M0.5-325	LFM-325	1468-00025	5W5T25	MC240
43	1	M0.5-45	LFM-45	1468-00005	5W5Q5	MC225
44	50	M0.5-21	LFM-21	1467-001	5W5D1	MC255
45	1000	M0.5-325	LFM-325	1468-00025	5W5T25	MC240
46	270	M0.5-325	LFM-325	1468-00025	5W5T25	MC240
47	100	M0.5-21	LFM-21	1468-001	5W5D1	MC235
48	4700	MW-5-25	LFM-25	1467-005	1D5D5	MC465
49	Capacitor	Ratings Differ for each TC-11 Range and Definite Ratings cannot be listed.				
112	.01	S-4-01	TC-11	434-01	DT4S1	TP421

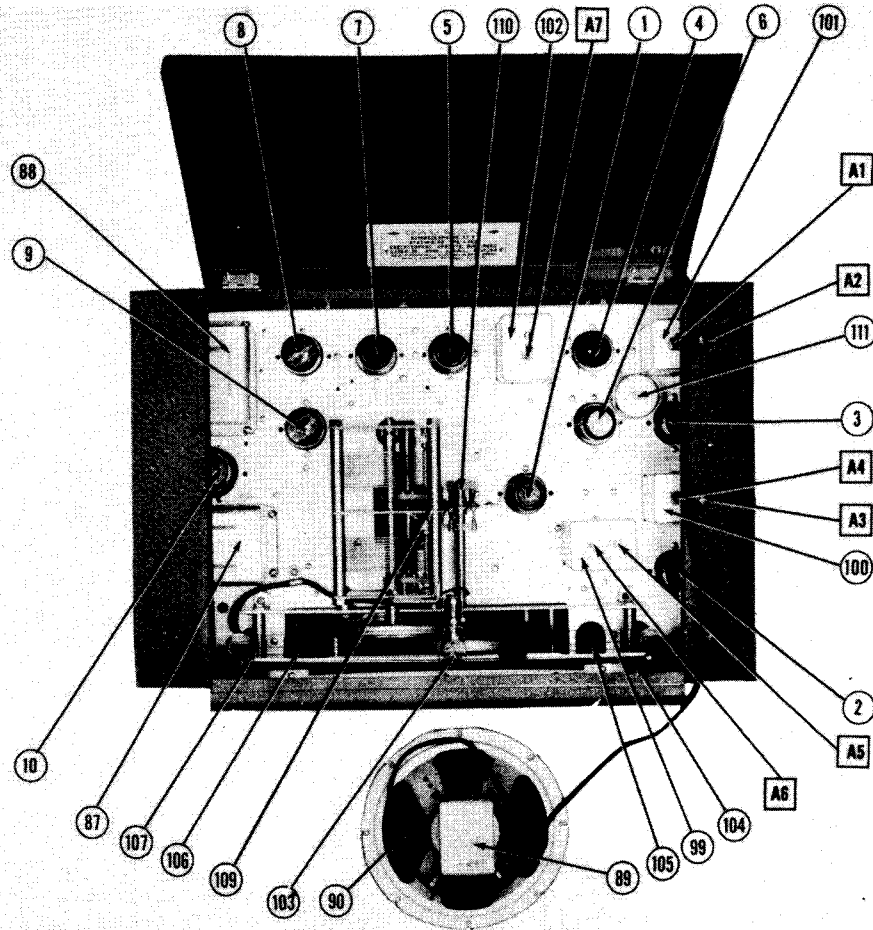
*Not Used in all Models.

CONTROLS

ITEM No.	RATING	REPLACEMENT DATA				INSTALLATION NOTES
		NATIONAL PART No.	MALLOY PART No.	IRC PART No.	CLAROSTAT PART No.	
50A	500KΩ	Not Req.	MH49#	D13-133#	M-60-2#	Volume Control & B+ Switch
B	Shaft	Not Req.	A	41	SW-A	Attach to 50A per Instructions
51A	10KΩ	Not Req.	G	W-10K	P-58-S-10K	Sensitivity Control & AC-Switch
B	Shaft	Not Req.	A	41	SW-A	Attach to 51A per Instructions
C	Switch	Not Req.	6-9	41	"	"

#Use ground lug supplied with control for shield bypass and original insulating sleeve to isolate control from chassis.

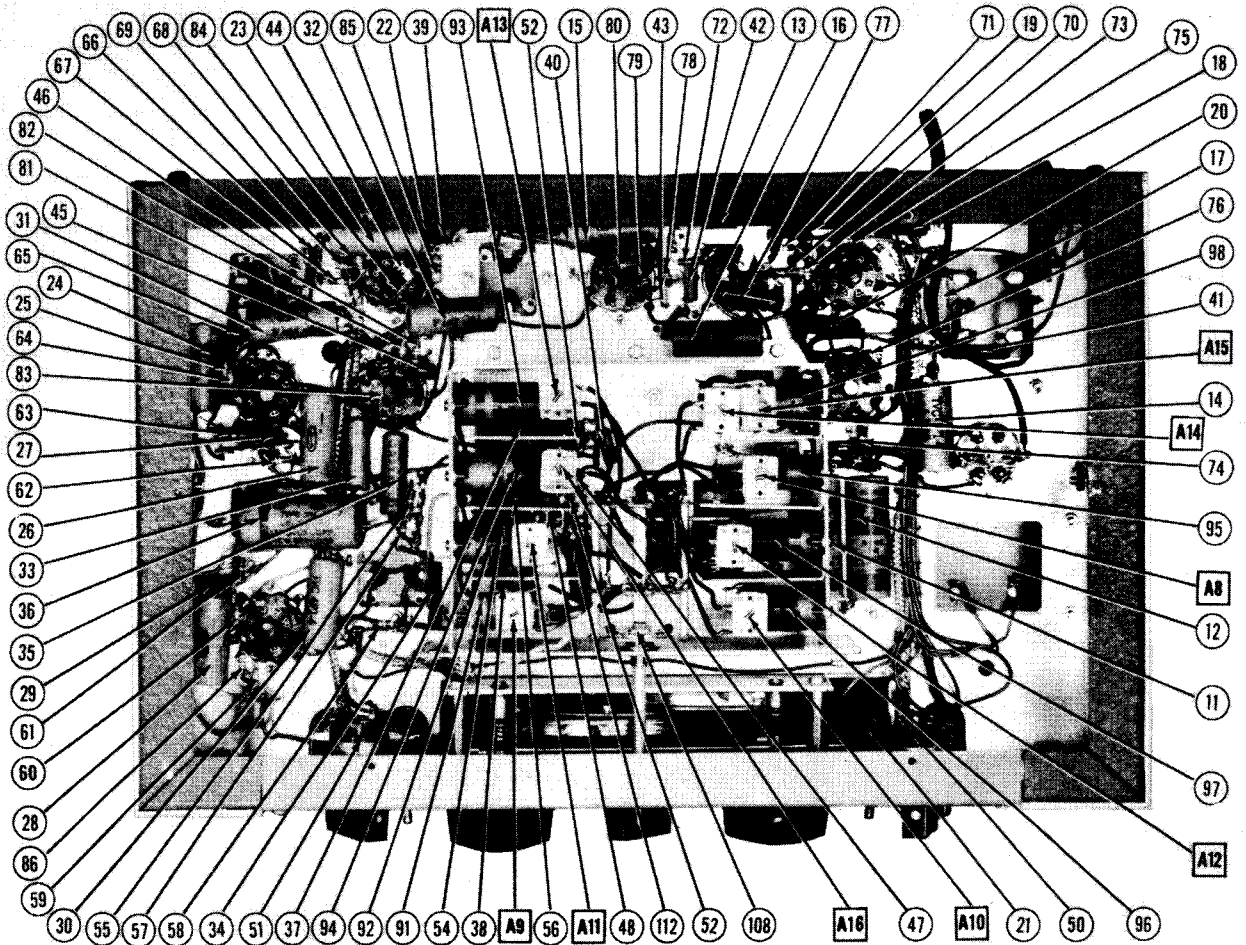
CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
52	470KΩ		BTS-470K		Yl.-Vl.-Yl. AVC Network
53	10KΩ		BTS-10K		Br.-Blk.-Or. Oscillator Plate Load
54	220Ω		BW-4-220		Red-Red-Br. Converter Cathode
55	1000Ω		BTS-1000		Br.-Blk.-Red Converter Screen Dropping
56	22KΩ		BTS-22K		Red-Red-Or. Oscillator Grid
57	1000Ω		BTS-1000		Br.-Blk.-Red Converter Plate Dropping
58	470KΩ		BTS-470K		Yl.-Vl.-Yl. AVC Network
59	560Ω		BTS-560		Grn.-Blue-Br. 1st IF Cathode
60	22KΩ		BTS-22K		Red-Red-Or. 1st IF Screen Dropping
61	1000Ω		BTS-1000		Br.-Blk.-Red 1st IF Plate Decoupling
62	470KΩ		BTS-470K		Yl.-Vl.-Yl. AVC Network
63	560Ω		BTS-560		Grn.-Blue-Br. 2nd IF Cathode
64	22KΩ		BTS-22K		Red-Red-Or. 2nd IF Screen Dropping
65	2200Ω		BTS-2200		Red-Red-Red 2nd IF Plate Decoupling
66	1 Meg.		BTS-1 Meg.		Br.-Blk.-Grn. Noise Limiter Filter
67	470KΩ		BTS-470K		Yl.-Vl.-Yl. Diode Load
68	1 Meg.		BTS-1 Meg.		Br.-Blk.-Grn. Noise Limiter Diode Load
69	470KΩ		BTS-470K		Yl.-Vl.-Yl. Diode Load
70	3700Ω		BTS-3900		Or.-Vl.-Red 1st AF Cathode
71	270KΩ		BTS-270K		Red-Vl.-Yl. 1st AF Plate Load
72	270KΩ		BTS-270K		Red-Vl.-Yl. 2nd AF Grid
73	270KΩ		BTS-270K		Red-Vl.-Yl. 2nd AF Plate Load
74	68Ω		BW-4-68		Blue-White-Blk. Output Cathode
75	270KΩ		BTS-270K		Red-Vl.-Yl. Output Grid
76	270KΩ		BTS-270K		Red-Vl.-Yl. Output Grid
77	5Ω		AB-5		Headphone Shunt
78	100KΩ		BTS-100K		Br.-Blk.-Yl. BFO Plate Dropping
79	100KΩ		BTS-100K		Br.-Blk.-Yl. Bleeder
80	100KΩ		BTS-100K		Br.-Blk.-Yl. Bleeder
81	470KΩ		BTS-470K		Yl.-Vl.-Yl. AVC Network
82	22KΩ		BTS-22K		Yl.-Vl.-Yl. AVC Load
83	2 Meg.		BTS-2 Meg.		Red-Red-Or. AVC Amplifier Cathode
84	100Ω		BW-4-100		Red-Blk.-Grn. AVC Amplifier Grid
85	33KΩ		BTS-33K		Br.-Blk.-Br. Detector-Limiter Filament Shunt
86					Or.-Or.-Or. Bleeder

CHASSIS—BOTTOM VIEW



FILTER CHOKE

ITEM NO.	RATINGS		REPLACEMENT DATA		INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (10 CURRENT 1000~)	STANCOR PART NO.	
87	20 Ma	270Ω	10 Henries	C-13551	Drill new mounting hole.

TRANSFORMER (OUTPUT)

ITEM No.	RATING		REPLACEMENT DATA		INSTALLATION NOTES
	IMPEDANCE	D. C. RES.	NATIONAL PART No.	STANCOR PART No.	
88	1500Ω CT	3.4Ω PRL SEC. 65Ω CT			

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA		INSTALLATION NOTES
	FIELD	VC IMP.	NATIONAL PART No.	JENSEN PART No.	
89	PM	3.48	ST-111		
90	6"	5/8"		Mod. P6-V	NOT READILY REPLACEABLE—USE COMPLETE SPEAKER UNIT.

PARTS LIST AND DESCRIPTIONS R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PR.	SEC.	NATIONAL PART No.	MEISSNER PART No.	
91	Ant. Coil-Brd.	32	52			
92	" " " "	1.52	.52			
93	" " " "	.52	.22			
94	" " " "	.12	.02			
95	Osc. Coil-Brd.	.62	2.52			
96	" " " "	1.62	.82			
97	" " " "	.52	.02			
98	" " " "	.02	.02			
99	1st IF Trans.	22	22	SA-3263		
100	2nd " " "	22	22	SA-3263		
101	3rd " " "	22	22	SA-3263		
102	BFO Trans.	22	22	SA-3263		
111	AVC Induct.	462				

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					NATIONAL PART No.		
103	Screw	115	.05				Type C-7

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
104	Limiter Switch		On-Off
105	AVC Switch		"
106	SFO Switch		"
107	Tone Switch		"
108	Band Switch		"
109	Tuning Cap.		"
110	Bandspread Cap.		2 Gang Variable Cap.

CONTROLS

The MAIN TUNING control knob is located to the left of the center of the front panel. This knob operates a two gang variable capacitor through a 30 to 1 radio reduction drive mechanism. The main tuning dial is the full vision slide rule type and features four accurate scales calibrated in megacycles which are easily and quickly read.

The ELECTRICAL BANDSPREAD control knob is located to the right of the center of the front panel. This knob operates a separate two gang variable capacitor to provide bandspread tuning. There is a separate scale and pointer provided for accurate logging of bandspread channels.

The BAND SELECTOR switch is located at the center of the front panel and functions to select the tuning band desired. The band in use is indicated by the designating letters on this switch dial. The four tuning scales on the main tuning dial are marked at either end of the dial by these designating letters.

Tuning is accomplished by the following steps:

- Select the band to be used by means of the BAND SELECTOR switch.
- The frequency calibration of the main tuning dial will only be correct with the bandspread pointer set at 90. After this setting has been made the MAIN TUNING control knob is used to tune in the desired station. The bandspread pointer may then be used to give greater accuracy in logging.

The TONE CONTROL switch is located at the upper left-hand side of the receiver and functions to select the frequency characteristic of the audio amplifier as desired, i.e. HIGH or LOW. The HIGH position will give the better fidelity and the LOW a better signal to noise ratio.

The C.W.O. CONTROL switch is located to the right of the TONE CONTROL switch functioning to switch on or off the beat frequency oscillator.

The VOLUME control is located to the left of the MAIN TUNING knob functioning to adjust the audio amplification of the receiver. Part of this control is a stand-by switch permitting the AC line switch to remain on but with B supply circuit open.

The LIMITER CONTROL switch is located at the upper right-hand side of the front panel functioning to switch "On" or "Off" the noise limiter. This control is normally in the "Off" position but can be turned "On" to suppress any undesired noise pulses.

The AVC CONTROL switch is located to the left of the LIMITER switch functioning to switch the automatic volume control circuits into or out of the receiver circuits.

The SENSITIVITY control is located to the right of the BANDSPREAD control knob and functions to adjust the amplification of the two I.F. amplifier tubes. Incorporated in this control is the power supply "ON" "OFF" switch, with this switch in the "Off" position the receiver is inoperative.

There is a B.S.W. terminal panel provided at the rear of the receiver to permit remote stand-by control. The terminals are connected in series with the B switch.

CONTROL S SET AS FOLLOWS: VOLUME AND SENSITIVITY CONTROLS FULL ON; AVC AND LIMITER ON; TONE SWITCH ON HIGH; BAND SWITCH AT DCWO SWITCH ON FOR 6S J7 READINGS ONLY.

VOLTAGE READINGS

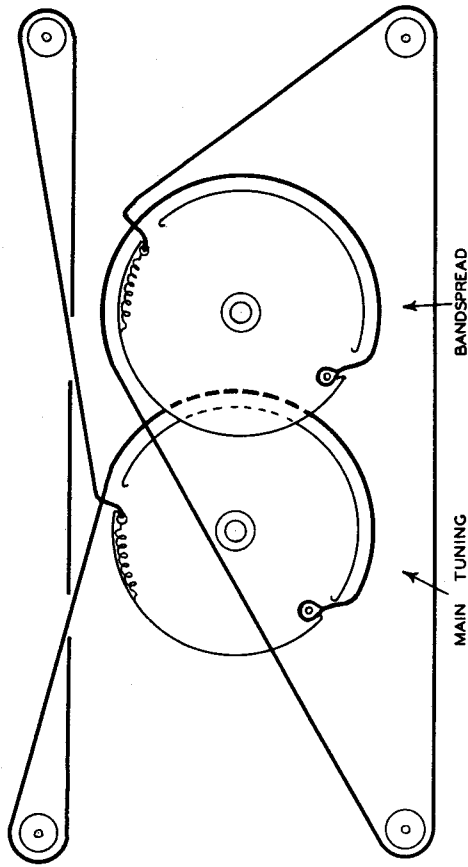
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0V	17VAC	103VDC	98VDC	-18VDC	76VDC	11VAC	3VDC	0V
2	6S67	0V	17VAC	115VDC	0V	15VDC	57VDC	23.5VAC	103VDC	
3	6S67	0V	30VAC	175VDC	0V	175VDC	87VDC	23.5VAC	102VDC	
4	6H6	0V	0V	-1VDC	0V	-2VDC	0V	5VAC	0V	
5	6S J7	0V	30VAC	0V	-35VDC	0V	-2VDC	35.5VAC	40VDC	
6	6SF7	0V	0V	15VDC	107VDC	0V	107VDC	5VAC	11VAC	
7	6SC7	0V	49VDC	3VDC	0V	73VDC	105VDC	42VAC	33.5VAC	
8	25L6GT/G	0V	42VAC	112VDC	107VDC	1VDC	0V	70VAC	71VDC	
9	25L6GT/G	0V	95VAC	112VDC	107VDC	2VDC	3VDC	70VAC	71VDC	
10	25Z5	95VAC	117VAC	117VDC	117VAC	117VAC				

RESISTANCE READINGS

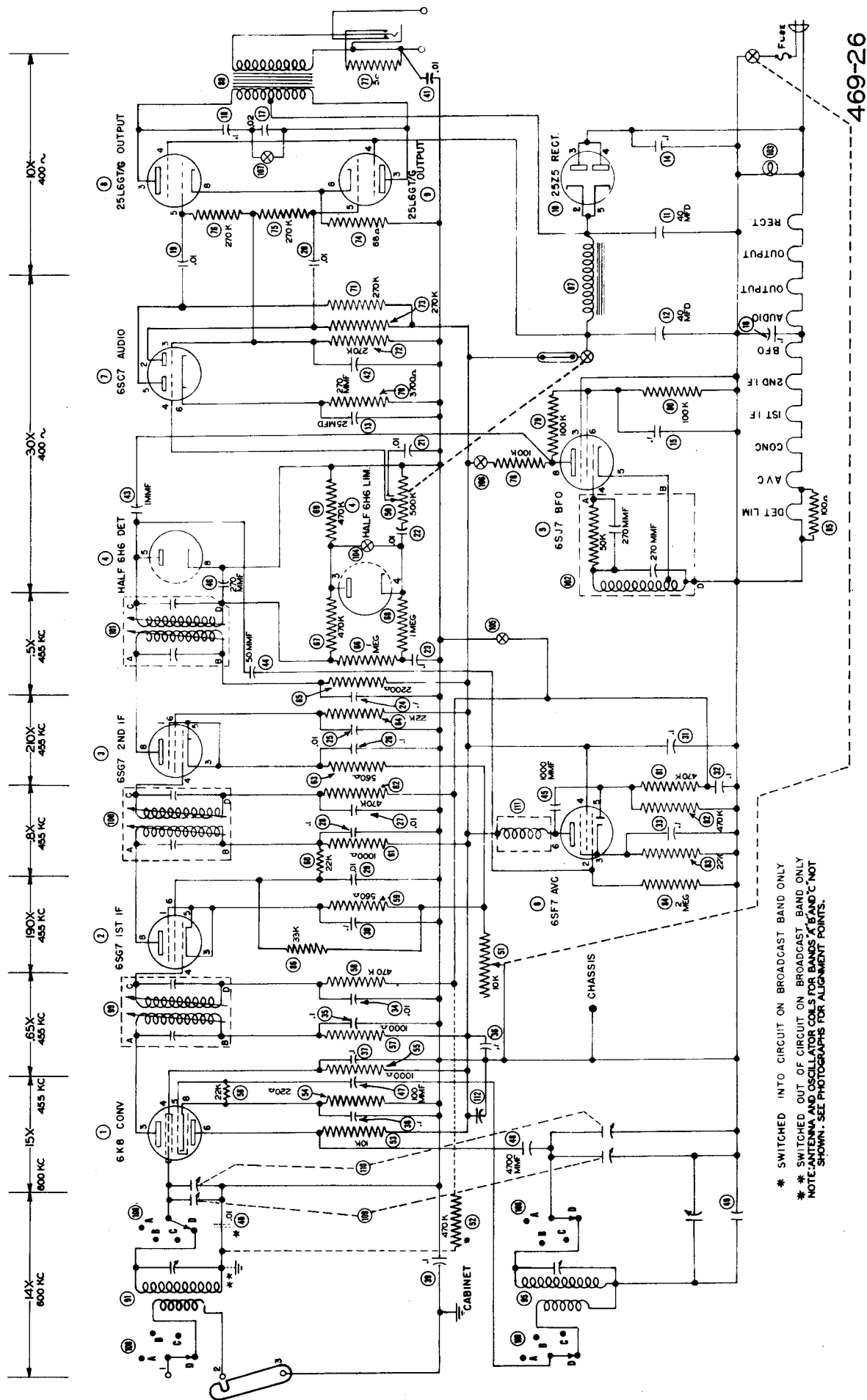
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6K8	0 Ω	11 Ω	51K Ω	51K Ω	19.5K Ω	60K Ω	8 Ω	225 Ω	1.3MEG Ω
2	6S67	0 Ω	11 Ω	510 Ω	1.3MEG Ω	510 Ω	35K Ω	15 Ω	51K Ω	
3	6S67	0 Ω	18 Ω	490 Ω	1.3MEG Ω	490 Ω	73K Ω	15 Ω	52K Ω	
4	6H6	0 Ω	0 Ω	450K Ω	27MEG Ω	875K Ω	1.8MEG Ω	4 Ω	0 Ω	
5	6S J7	0 Ω	18 Ω	0 Ω	43K Ω	8 Ω	95K Ω	22 Ω	82K Ω	
6	6SF7	0 Ω	18MEG Ω	19.5K Ω	50K Ω	450K Ω	50K Ω	4 Ω	8 Ω	
7	6SC7	0 Ω	320K Ω	265K Ω	510K Ω	320K Ω	29K Ω	26 Ω	22 Ω	
8	25L6GT/G	0 Ω	26 Ω	50K Ω	50K Ω	530K Ω	INF	37 Ω	58 Ω	
9	25L6GT/G	0 Ω	49 Ω	50K Ω	50K Ω	520K Ω	265K Ω	37 Ω	58 Ω	
10	25Z5	49 Ω	56 Ω	50K Ω	50K Ω	56 Ω				

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

- 1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 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.



DIAL CORD DRIVE



The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative by turning AVC switch to off position. Sensitivity control set at maximum.