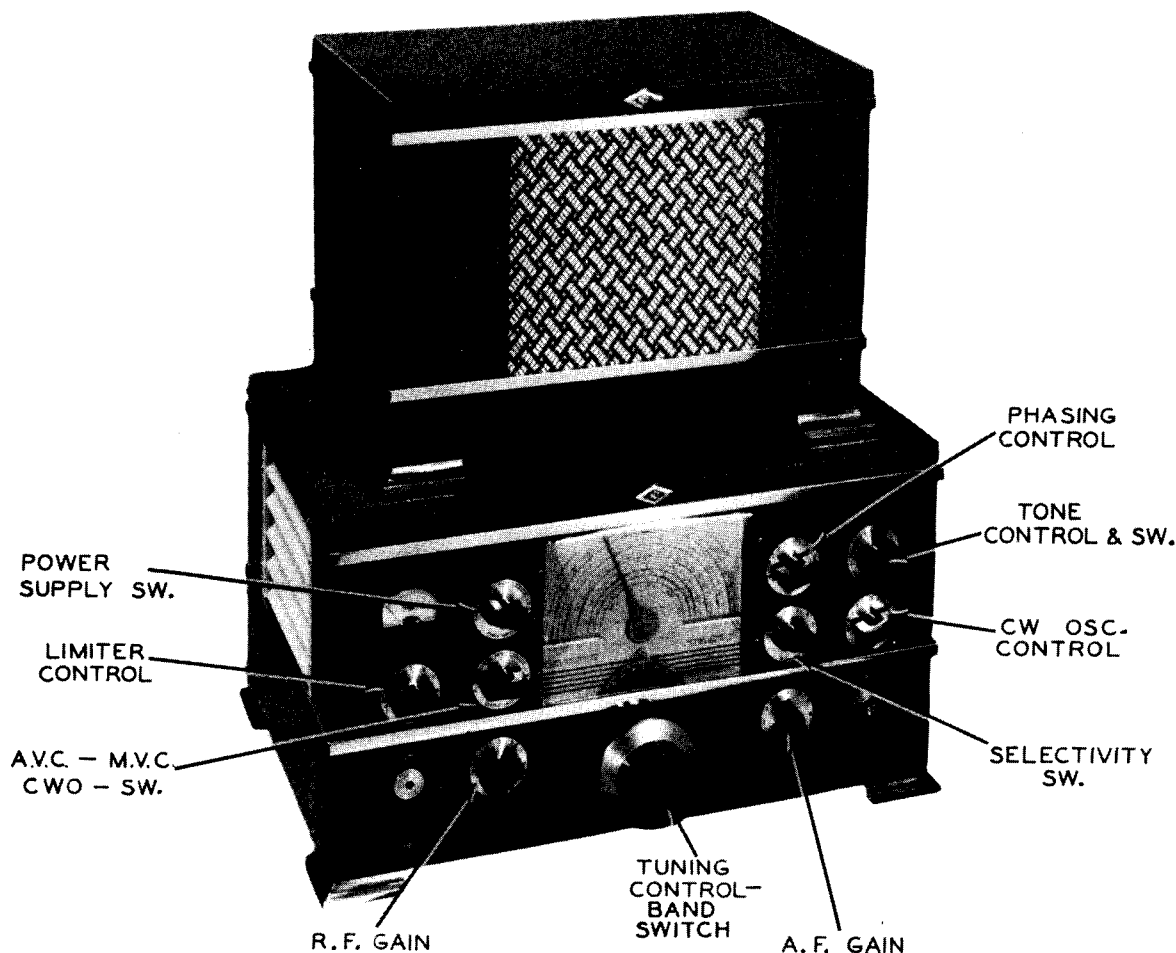


NATIONAL MODELS
NC-2-40DR, NC-2-40DT



NATIONAL MODELS
NC-2-40DR, NC-2-40DT

NATIONAL MODEL NC-2-40DR

TRADE NAME	National, Model NC-2-40DR, NC-2-40DT		
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.		
TYPE SET	AC Operated Communication Six Band Superheterodyne Receiver		
TUBES (TWELVE)	Types, 6SK7 RF Amp., 6K8 Mixer, 6J5 Osc., 6K7 1st IF Amp., 6SK7 2nd IF Amp., 6SL7GT 2nd Det.-Limiter, 6SJ7 CW-Osc., 6V6GT AVC, 6SN7GT AF-Phase Inv., (2) 6V6GT Power Output, 5Y3GT Rectifier.		
POWER SUPPLY	110-120 Volts or 220-240 Volts AC	RATING	.75 Amp. @ 117 Volts AC
TUNING RANGE	480-1040KC, 920-2100KC, 1.68-4.05MC, 3.4-4.05MC, 3.4-7.4MC, 6.9-7.35MC, 6.65-14.6MC, 13.8-14.46MC, 13.9-31MC, 26.9-30.05MC.		

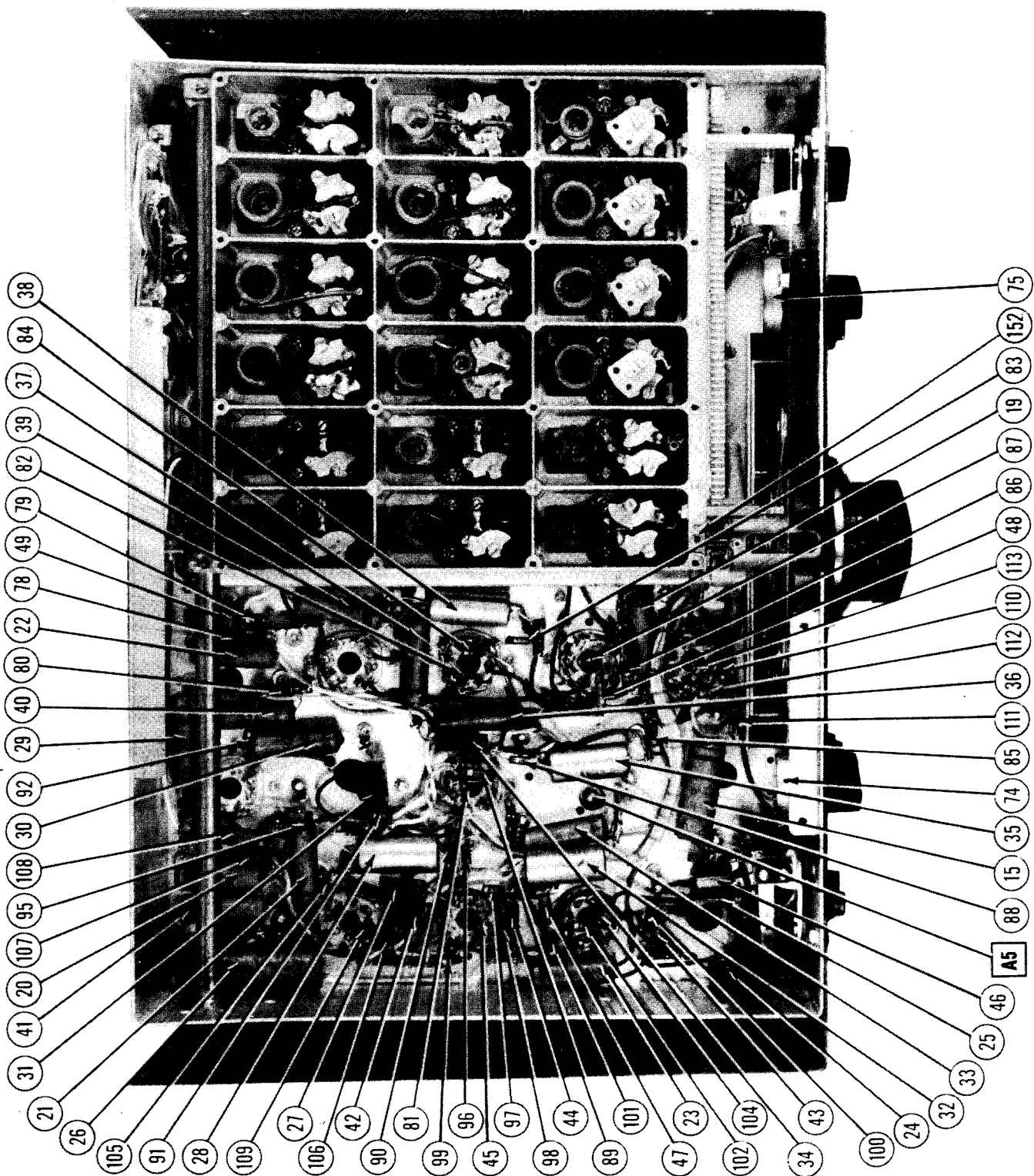
HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

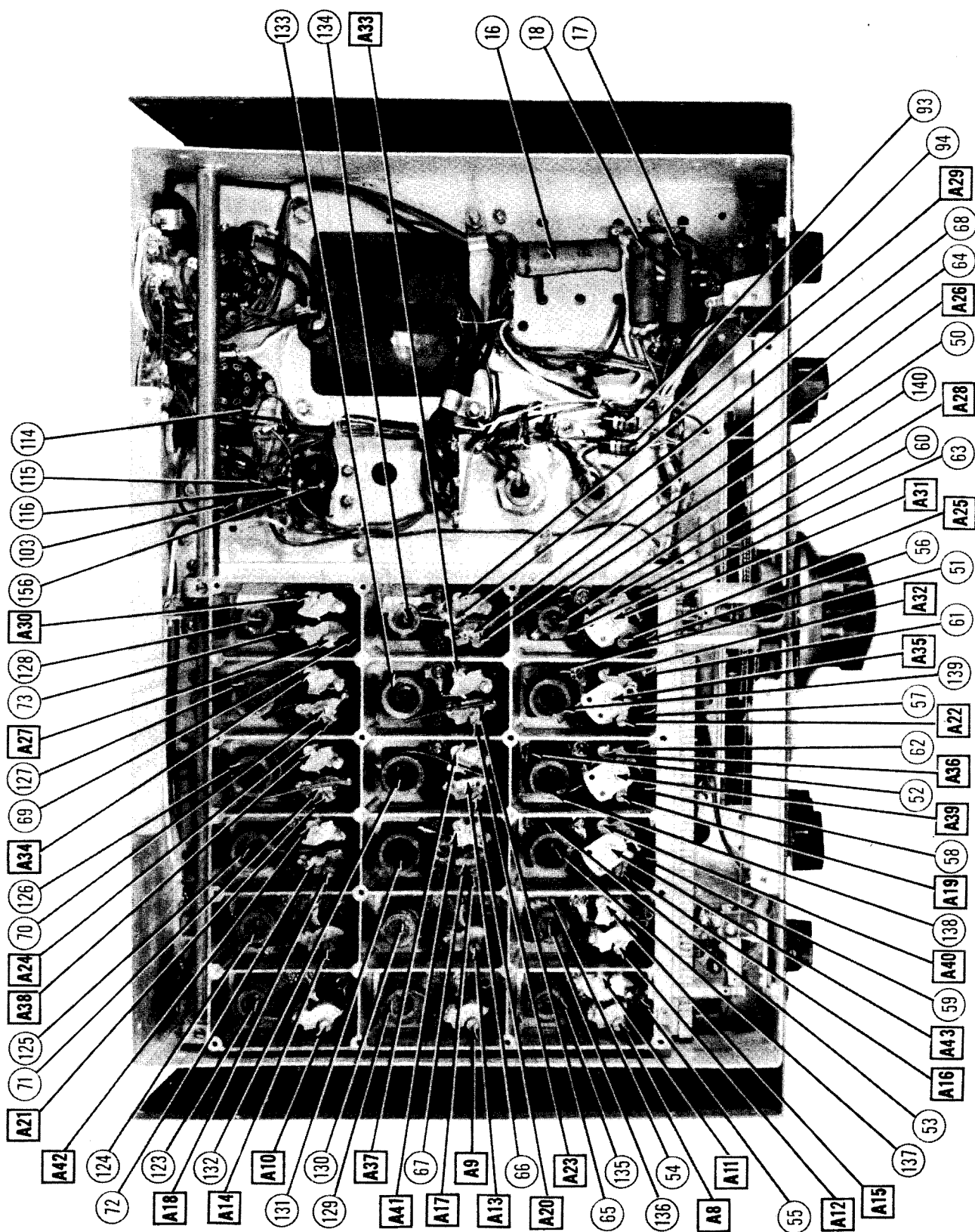
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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DATE 5/48-#4811-16

SET #41-FOLDER #16





PARTS LIST AND DESCRIPTIONS
TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		INSTALLATION NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT	
1	RF Amp.	6SK7	6SK7	
2	Mixer	6X8	6X8	
3	Osc.	6J5	6J5	
4	1st IF	6K7	6K7	
5	2nd IF	6SK7	6SK7	
6	2nd Det.-Limit	6SL7GT	6SL7GT	
7	CW Osc.	6SJ7	6SJ7	
8	AVC	6V6GT	6V6GT	
9	AF Phase Inv.	6SN7GT	6SN7GT	
10	Power Output	6V6GT	6V6GT	
11		6V6GT	6V6GT	
12	Rectifier	5Y3GT	5Y3GT	

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.	AEROVOX PART No.	
13A	8 CAP.	OL-475-8-8	OL-475-8-8	Filter-Red
14	475			Filter-Red-White
15	200			Bias Filter
16	50	GL450-40	GL450-40	Inverter Cathode Bypass
17	1.1	PR550-10	PR550-10	Power Supply Bypass
18	1.1	684-1	684-1	Audio Coupling
19	1.1	684-1	684-1	"
20	1.1	484-1	484-1	"
21	1.1	484-1	484-1	"
22	1.1	484-1	484-1	"
23	1.1	484-1	484-1	"
24	1.1	484-1	484-1	"
25	1.1	484-1	484-1	"
26	1.1	484-1	484-1	"
27	1.1	484-1	484-1	"
28	1.1	484-1	484-1	"
29	1.1	484-1	484-1	"
30	1.1	484-1	484-1	"
31	1.1	484-1	484-1	"
32	1.1	484-1	484-1	"
33	1.1	484-1	484-1	"
34	1.1	484-1	484-1	"
35	1.1	484-1	484-1	"
36	1.1	484-1	484-1	"
37	1.1	484-1	484-1	"
38	1.1	484-1	484-1	"
39	1.1	484-1	484-1	"
40	1.1	484-1	484-1	"
41	1.1	484-1	484-1	"
42	1000	1468-001	1468-001	AVC Filter
43	250	SWST25	SWST25	RF Bypass-Cer.
44	1000	1467-001	1467-001	"
45	250	SWST25	SWST25	"
46	1000	1468-001	1468-001	"
47	250	SWST25	SWST25	"
48	250	SWST25	SWST25	"
49	500	1467-005	1467-005	"
50	500			"
51	3000	500	500	"
52	1700	500	500	"
53	900	500	500	"
54	1500	500	500	"
55	250	500	500	"
56	250	500	500	"
57	12	500	500	"
58	12	500	500	"
59	35	500	500	"
60	10	500	500	"
61	10	500	500	"
62	10	500	500	"
63	28	500	500	"
64	38	500	500	"

PARTS LIST AND DESCRIPTIONS (Continued)
FILTER CHOKE

ITEM No.	TOTAL DIRECT CURRENT	RATINGS	REPLACEMENT DATA			INSTALLATION NOTES
			INDUCTANCE (H)	NATIONAL PART No.	STANCOR PART No.	
118	.093A	280Ω	12.5 H	C-2305*	T20C54*	*Drill new mounting holes
119	.093A	280Ω	12.5 H	C-2305*	T20C54*	*Drill new mounting holes

TRANSFORMER (OUTPUT)

ITEM No.	RATINGS	REPLACEMENT DATA			INSTALLATION NOTES
		IMPEDANCE	DC RES.	STANCOR PART No.	
120	9500Ω	7.5Ω	480Ω	A-3831	A-2301

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA		INSTALLATION NOTES
		NATIONAL PART No.	JENSEN PART No.	
121	FIELD	VC IMP.	ST-120	
122	9-3/4"	7/8"	Mod. P10-S	

R F COILS

ITEM No.	USE	REPLACEMENT DATA		INSTALLATION NOTES
		NATIONAL PART No.	MEISSNER PART No.	
123	Ant. Coil	3.4Ω		
124	"	1.6Ω		
125	"	.6Ω		
126	"	.3Ω		
127	"	.2Ω		
128	"	.1Ω		
129	RF Coil	2.9Ω		
130	"	1.4Ω		
131	"	.7Ω		
132	"	.3Ω		
133	"	.2Ω		
134	"	.1Ω		
135	Osc. Coil	1.4Ω		
136	"	.7Ω		
137	"	.3Ω		
138	"	.2Ω		
139	"	.1Ω		
140	Input IF	12.5Ω		
141	Inter. IF	7.8Ω		
142	Output IF	7.6Ω		
143	Osc. Trans	1.2Ω		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	REPLACEMENT DATA		INSTALLATION NOTES
				NATIONAL PART No.	STANCOR PART No.	
145	SCREW	6-8	0.15	40	40	Type 40
146-147	Bayonet	6-8	0.15	47	47	Type 47

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
148	Switch		On-Off
149	"		B* On-Off
150	"		AVC-MVC-QWO
151	"		Selectivity
152	"		Band
153	Fuse		1 Amp.
154	"		2 Amp.
155	3 Gang Var. Cap.		(31-260MμF) each section
156	Switch		Line Voltage (110-120V to 220-240V)

CHASSIS—TOP VIEW

35	15.5	500	"B"	"	"	"	"
66	21	500	"C"	"	"	"	"
67	38.5	500	"D"	"	"	"	"
68	16	500	"A"	"	"	"	"
69	38	500	"A"	"	RF Coupling	"	"
70	15.5	500	"B"	"	Paader	"	"
71	21	500	"C"	"	"	"	"
72	38.5	500	"D"	"	"	"	"
73	900	500	"A"	"	"	"	"

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESIST-ANCE	WATTS	NATIONAL PART No.	IBC PART No.	CLARISTAT PART No.	
74A	500KΩ	$\frac{1}{2}$				
75	B Shaft	1½				
76	10KΩ	1½				
77A	500KΩ	$\frac{1}{2}$				
B	Switch					

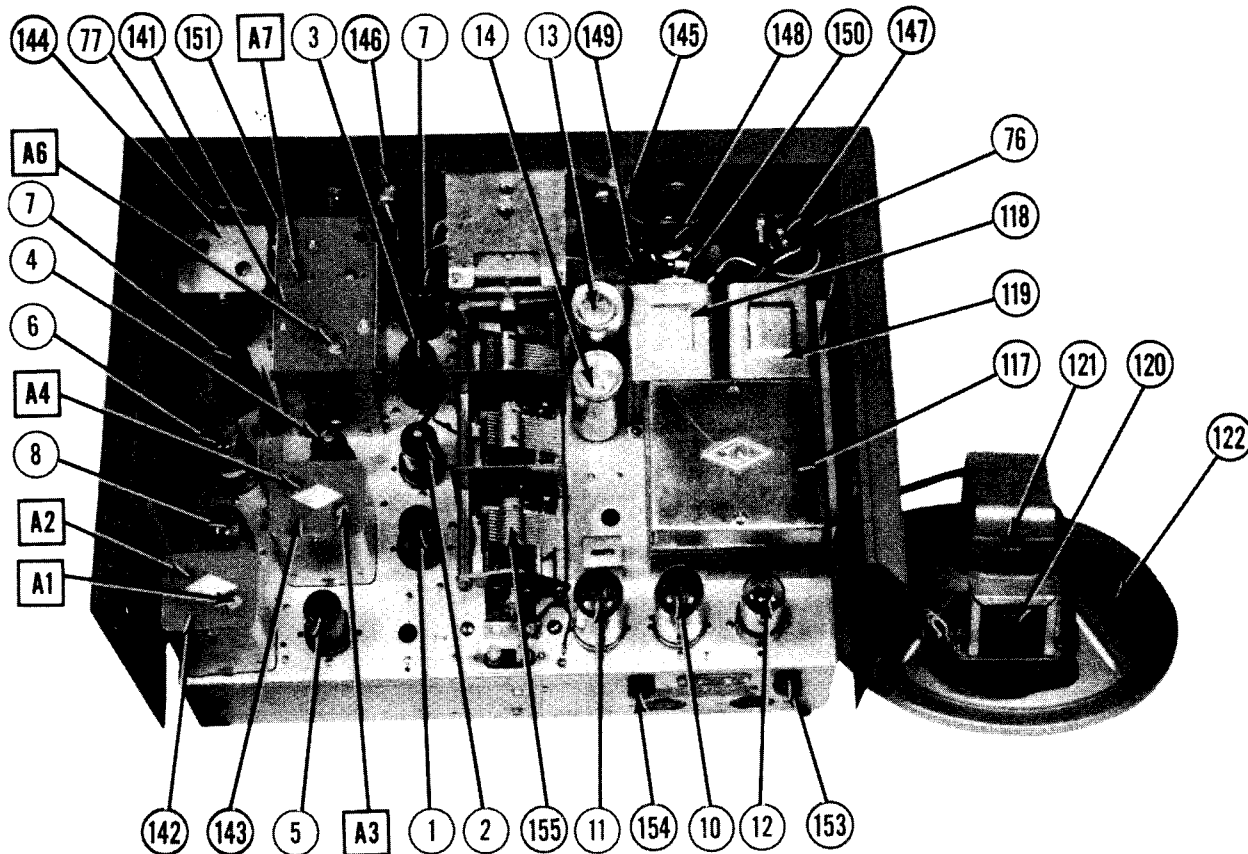
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
78	1.5 Meg.		BTS-1.5 Meg.		Br.-Grn.-Grn. AVC Network
79	470KΩ		BTS-470K		Yl.-Vi.-Yl.
80	470Ω		BTS-470		Yl.-Vi.-Br. AVC Cathode
81	47KΩ		BTS-47K		Yl.-Vi.-Or. Voltage Dropping
82	220Ω		BM-2-220		Red-Red-Br. Converter Dropping
83	47KΩ		BTS-47K		Yl.-Vi.-Or. Converter Screen Dropping
84	100KΩ		BTS-100K		Br.-Blk.-Yl. Bleeder
85	220Ω		BTS-220Ω		Red-Red-Red Decoupling
86	47KΩ		BTA-47K		Yl.-Vi.-Or. Voltage Dropping
87	47KΩ		BTS-47K		Yl.-Vi.-Or. Converter Grid
88	22KΩ		BTS-22K		Red-Red-Or. AVC Network
89	1500Ω		BTS-2200		Br.-Grn.-Red 1st IF Cathode-See Note
90	220Ω		BTS-470K		Red-Red-Red 1st IF Decoupling
91	470KΩ		BTS-470K		Yl.-Vi.-Yl. AVC Network
92	1000Ω		BT-2-22K		Br.-Blk.-Red 2nd IF Cathode-See Note
93	22KΩ		BTS-22K		Red-Red-Or. Voltage Dropping
94	22KΩ		BTS-1000		Br.-Blk.-Red 2nd IF Plate Decoupling
95	100Ω		BTS-2200		Red-Red-Red Detector Plate Decoupling
96	220Ω		BTS-4700		Yl.-Vi.-Red Detector Cathode
97	700Ω		BTS-22K		Red-Red-Or. Detector Output Load
98	22KΩ		BTS-100K		Br.-Blk.-Yl. Limiter Cathode
99	100KΩ		BTS-47K		Yl.-Vi.-Or. Limiter Grid
100	47KΩ		BTS-220K		Red-Red-Yl. BFO Plate Load
101	220KΩ		BTS-100K		Br.-Blk.-Yl. BFO Screen Dropping
102	100KΩ		BW-2-220		Red-Red-Br. Output Cathode
103	220Ω		BTS-100K		Br.-Blk.-Yl. Bleeder
104	100KΩ		BTS-470K		Yl.-Vi.-Yl. AVC Network
105	470KΩ		BTS-15K		Br.-Grn.-Or. "
106	15KΩ		BT-2-2700		Red-Vi.-Red Bias Network
107	2700Ω		BT-2-420		Gray-Red-Br. "
108	820Ω		BTS-47KΩ		Yl.-Vi.-Grn. "
109	1 Meg.		BTS-1 Meg.		Yl.-Vi.-Or. AF Plate Load
110	1100Ω		BTS-100Ω		Br.-Blk.-Red AF Cathode
111	47KΩ		BTS-47K		Yl.-Vi.-Or. Phase Inverter
112	47KΩ		BTS-470K		Yl.-Vi.-Yl. Phase Inverter Grid
113	220KΩ		BTS-220K		Red-Red-Yl. Output Grid
114	220KΩ		BTS-220K		Red-Red-Yl. "
115	220KΩ		BTS-220K		Red-Red-Yl. "

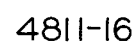
UIC	GEORGE	P	DID-SECRET	NOTED-IT.
Note-This resistor is selected individually for each receiver and should be replaced according to the value used.				

21

ITEM No.	RATING				REPLACEMENT DATA			
	PRI	SEC 1	SEC 2	SEC 3	NATIONAL PART No.	STANCOR PART No.	THORDARSON PART No.	MERIT PART No.
117	117V AC ② .75A or 230V AC	800V CH ③ .093A	500V AC ② 2.0A	6.0V AC ④ 4.7A		P-618S#		

†This replacement for 117V AC only.





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Cap
1	6SK7	0V.	64VAC	2.2VDC	0V.	2.2VDC	60VDC	0V.	200VDC	-
2	6K8	0V.	0V.	197VDC	47VDC	-8VDC§	0V.	6.4VAC	.5VDC	0V.
3	6J5	0V.	0V.	72VDC	117VDC	-8VDC§	0V.	6.4VAC	0V.	-
4	6K7	0V.	0V.	190VDC	60VDC	3.2VDC	0V.	6.4VAC	3.2VDC	0V.
5	6SK7	0V.	0V.	3VDC	0V.	3VDC	60VDC	6.4VAC	190VDC	-
6	6SL7GT	-52VDC	200VDC	-47VDC	-.2VDC	0V.	.3VDC	6.4VAC	0V.	-
* 7	6SJ7	0V.	0V.	0V.	-3VDC§	0V.	15VDC	6.4VAC	50VDC	-
8	6V6GT	0V.	0V.	0V.	0V.	-25VDC	0V.	6.4VAC	-35VDC	-
9	6SN7GT	0V.	110VDC	4VDC	0V.	90VDC	4VDC	6.4VAC	0V.	-
10	6V6GT	0V.	0V.	182VDC	190VDC	-60VDC§	0V.	6.4VAC	-48VDC	-
11	6V6GT	0V.	0V.	182VDC	190VDC	-60VDC§	-5.5VDC	6.4VAC	-48VDC	-
12	5Y3GT	0V.	240VDC	0V.	400VAC	0V.	400VAC	0V.	240VDC	-

§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	Cap
1	6SK7	0Ω	.1Ω	470Ω	1 Meg.	470Ω	13KΩ	0Ω	30KΩ	-
2	6K8	0Ω	0Ω	32KΩ	50KΩ	47KΩ	0Ω	.1Ω	240Ω	1.4Ω
3	6J5	0Ω	0Ω	80KΩ	80KΩ	47KΩ	INF.	.1Ω	0Ω	-
4	6K7	0Ω	0Ω	32KΩ	13KΩ	1.5KΩ	0Ω	.1Ω	1.5KΩ	520KΩ
5	6SK7	0Ω	0Ω	1KΩ	1 Meg.	1KΩ	13KΩ	.1Ω	31KΩ	-
6	6SL7GT	3KΩ	30KΩ	30KΩ	47KΩ	0Ω	100KΩ	.1Ω	0Ω	-
* 7	6SJ7	0Ω	0Ω	0Ω	47KΩ	2Ω	85KΩ	.1Ω	110KΩ	-
8	6V6GT	0Ω	0Ω	15KΩ	0Ω	1.2 Meg.	15KΩ	.1Ω	2.7KΩ	-
9	6SN7GT	500KΩ	80KΩ	1KΩ	470KΩ	80KΩ	1KΩ	.1Ω	0Ω	-
10	6V6GT	0Ω	0Ω	30KΩ	30KΩ	480KΩ	INF.	.1Ω	2.9KΩ	-
1	6V6GT	0Ω	0Ω	30KΩ	30KΩ	480KΩ	250KΩ	.1Ω	2.9KΩ	-
2	5Y3GT	INF.	30KΩ	INF.	3KΩ	INF.	3KΩ	INF.	30KΩ	-

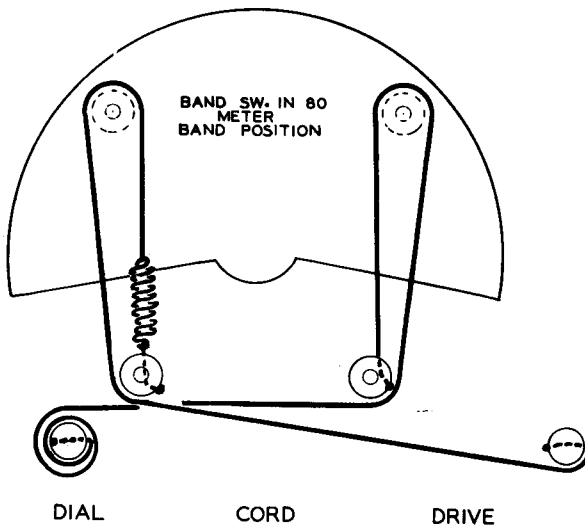
LIMITER CONTROL ON FULL, RF GAIN ON FULL, B+ ON, AF GAIN ON FULL, SELECTIVITY AT #5, TONE CONTROL AT LOW.

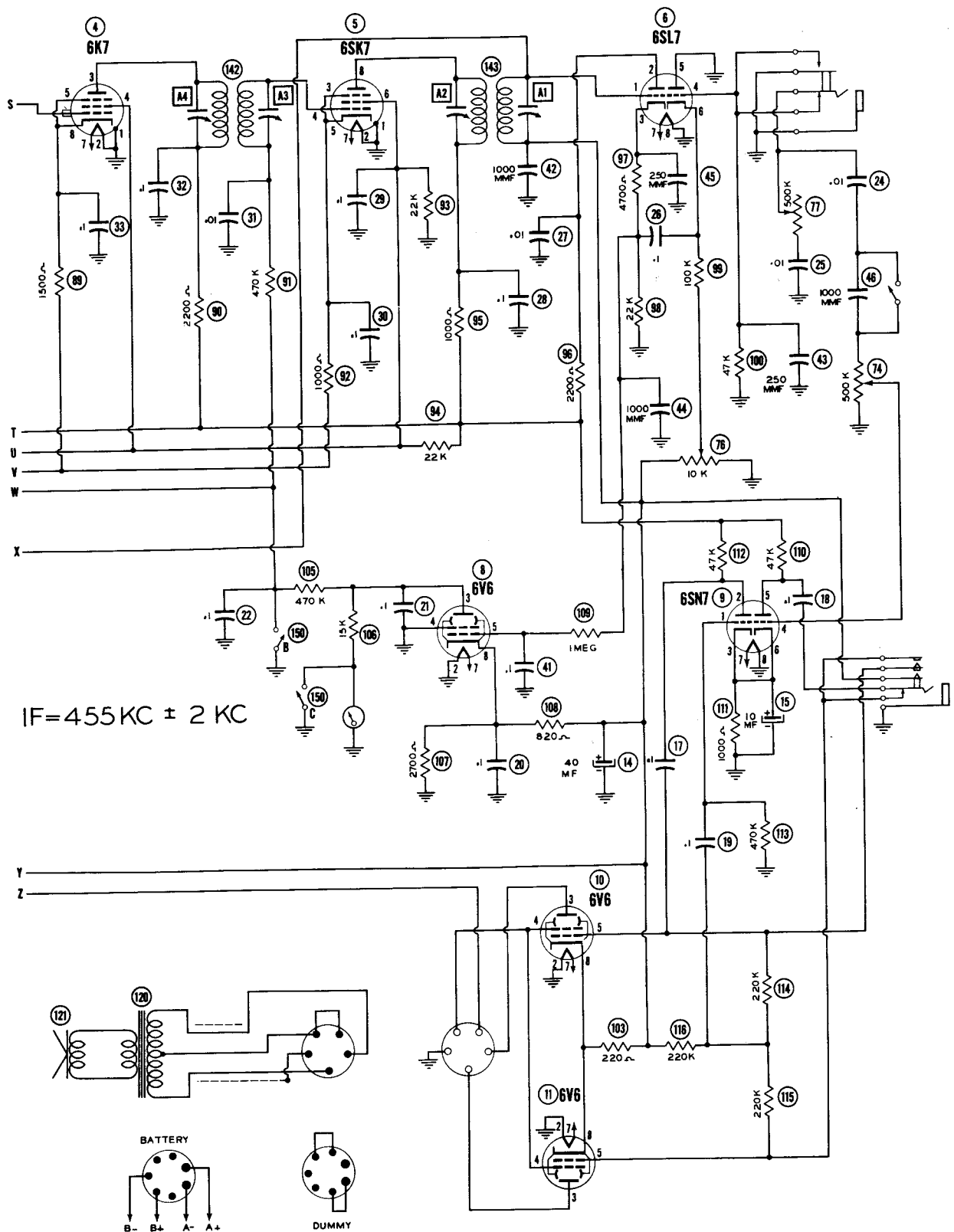
TUBES 10, 11 & 12, VOLTAGE AND RESISTANCE READINGS TAKEN IN 10 METER BAND.
*AVC-MVC-CWO SWITCH IN CWO POSITION.

TUBES 1 through 9, VOLTAGE AND RESISTANCE READINGS TAKEN IN BAND E.

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

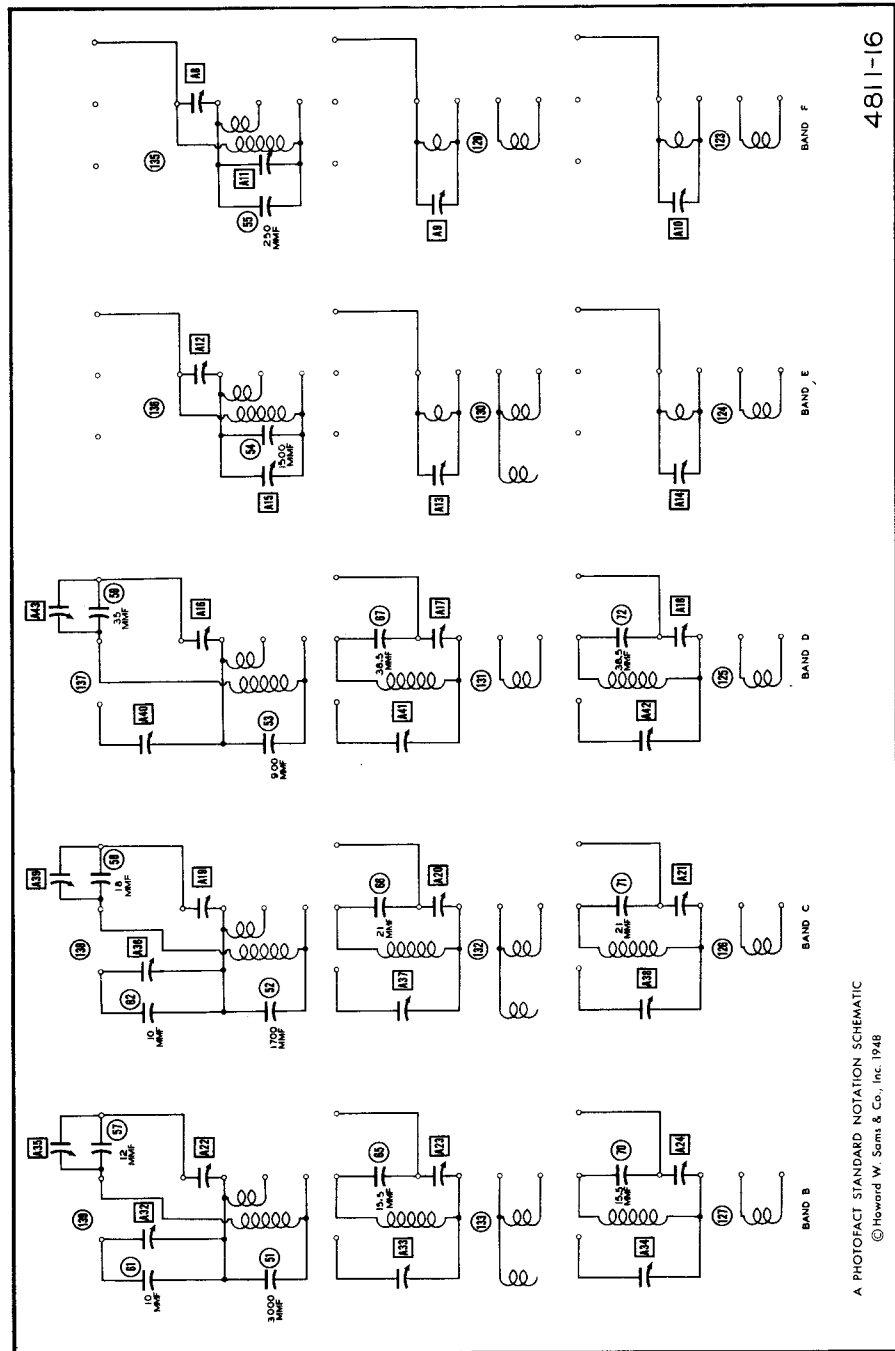
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.





A PHOTOFAC STANDARD NOTATION SCHEMATIC
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STAGE GAIN MEASUREMENTS		
ANTENNA TO RF GRID	14X	600KC
RF GRID TO CONV. GRID	1.5X	600KC
CONVERSION GAIN	25X	IN 600KC OUT 455KC $\pm 2\%$
1st IF TRANSFORMER	.1X	455KC $\pm 2\%$
1st IF TUBE	100X	455KC $\pm 2\%$
2nd IF TRANSFORMER	.6X	455KC $\pm 2\%$
2nd IF TUBE	45X	455KC $\pm 2\%$
3rd IF TRANSFORMER	.3X	455KC $\pm 2\%$
AUDIO	30X	400 $\sim$
OUTPUT	20X	400 $\sim$



The stage gain measured values listed above 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 connecting negative (-) 3 volts to the AVC line.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

RVA Dummy consists of 200 WYFD cap. in series with 20 microhmy choke with choke shunted by 400 WYFD cap. in series with 4002 carbon resistor.
Use 4002 amp. modulated signal in all steps of RF Alignment.
In Steps 4, 10, 12, 14 and 16 it is necessary for correct alignment that the oscillator work above the incoming signal. To check this tune signal generator 910KC above the dial reading of receiver. If image signal is not heard, retune signal generator to original frequency and open oscillator trimmer to next peak. Adjust for maximum output and recheck for image.
RF gain control and AF gain control should be at maximum (setting at 10) and output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for all adjustments.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 Direct	High side to grid cap. 6K8. Low side to chassis.	Tune for maximum output between 453 & 457KC (unmodulated signal)	F	Tuning cap. fully open.	Across voice coil	A1, A2, A3, A4, A5.	Limiter control should be set at "0", power supply switch to "B+ ON", control switch to "CW0", AF gain control to "10", selectivity control to "5", phasing control to "0", tone control to "N". Adjust CW osc. for beat note about 400 λ . After sig. gen. is tuned to maximum output adjust A1, A2, A3, A4 & A5 for maximum output. Use minimum signal input in order to avoid overloading.
2 Direct	See Remarks.					A6	Set selectivity switch to "1". Detune signal gen. 3 or 4 KC. Adjust A6 for maximum output. Retune sig. gen. for maximum output. (Setting of Step 1).
3 Direct						A7	Set selectivity switch to "Off". Tune for maximum output and adjust A7 for maximum output. Turn phasing control to 0, selectivity switch to "5" and tune sig. gen. for maximum output. Note meter reading. Turn to "Off". Meter reading should decrease slightly. If an increase is noted Steps 1, 2 & 3 should be repeated as this is an indication of improper IF adjustment.
4 RVA Dummy	High side to ext. ant. post. Low side to chassis.	1.0MC (4002 amp. mod.)		1.0MC		A8	Set control switch "WVC" selectivity switch to "Off". Adjust A8 for maximum output. Check for image per prealignment instructions.
5				Tune for maximum output.		A9, A10	Adjust for maximum output
6		500KC		500KC		A11	Adjust for maximum output Repeat Steps 4, 5 & 6 until no further improvement can be made.
7		2.0MC	E	2.0MC		A12	Adjust for maximum output Check for image per prealignment instructions.
8				Tune for maximum output.		A13, A14	Adjust for maximum output
9		1.0MC		1.0MC		A15	Adjust for maximum output Repeat Steps 7, 8 & 9 until no further improvement can be made.
10				4.0MC		A16	Adjust for maximum output Check for image per prealignment instructions.
11				Tune for maximum output.		A17, A18	Adjust for maximum output
12		7.2MC	C	7.2MC		A19	Adjust for maximum output Check for image per prealignment notes.
13				Tune for maximum output.		A20, A21	Rock tuning cap. and adjust for maximum output.
14		14.0MC	B	14.0MC		A22	Adjust for maximum output Check for image per prealignment notes.
15				Tune for maximum output.		A23, A24	Rock tuning cap. and adjust for maximum output.
16		30.0MC	A	30.0MC		A25	Adjust for image per prealignment notes.
17				Tune for maximum output.		A26, A27	Rock tuning cap. and adjust for maximum output.
18		30.0MC	"10" Meter Band-Spread	30.0MC		A28	Adjust for image per prealignment notes.
19				Tune for maximum output.		A29, A30	Rock tuning cap. and adjust for maximum output.
20		27.0MC		27.0MC		A31	Adjust for maximum output. Repeat Steps 18, 19 & 20 until no further improvement can be made.
21		14.4MC	"20" Meter Band-Spread	14.4MC		A32	Adjust for maximum output Check for image per prealignment notes.
22				Tune for maximum output.		A33, A34	Rock tuning cap. and adjust for maximum output.
23		14.0MC		14.0MC		A35	Adjust for maximum output Repeat Steps 21, 22 & 23 until no further improvement can be made.
24		7.3MC	"40" meter band-Spread	7.3MC		A36	Adjust for image per prealignment notes.
25				Tune for maximum output.		A37, A38	Rock tuning cap. and adjust for maximum output
26		7.0MC		7.0MC		A39	Adjust for maximum output Repeat Steps 24, 25 & 26 until no further improvement can be made.
27		4.0MC	"80" meter band-Spread	4.0MC		A40	Adjust for maximum output Check for image per prealignment notes.
28				Tune for maximum output.		A41, A42	Rock tuning cap. and adjust for maximum output.
29		3.5MC		3.5MC		A43	Adjust for maximum output Repeat Steps 27, 28 & 29 until no further improvement can be made.