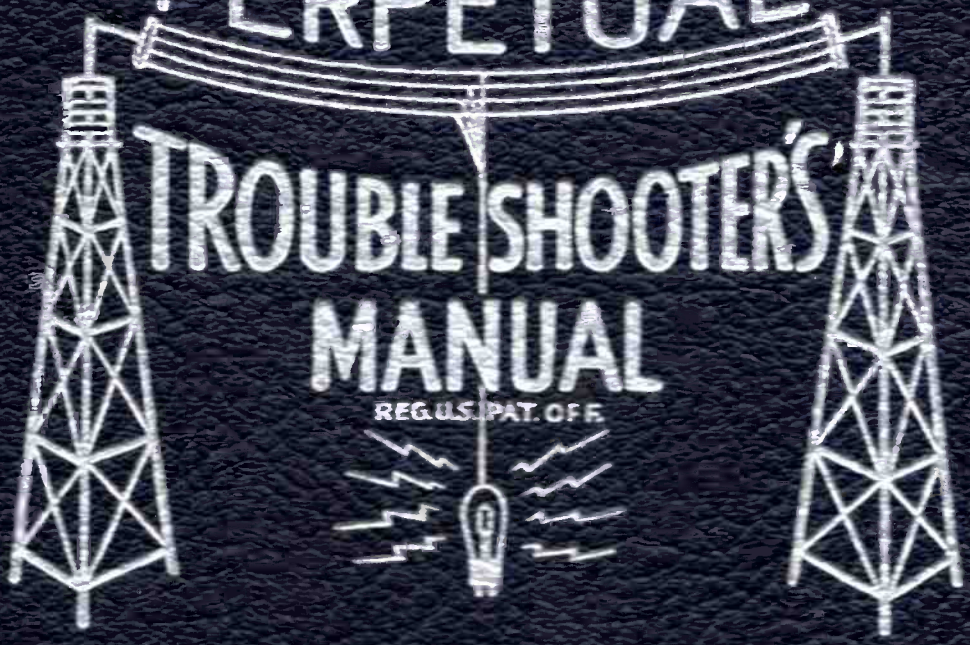
VOLUME XX

PERPETUAL TROUBLE SHOOTER'S MANUAL

REG. U.S. PAT. OFF.



JOHN F. RIDER

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PERPETUAL

TROUBLE SHOOTER'S MANUAL

Reg. U. S. Pat. Off.

VOLUME XX

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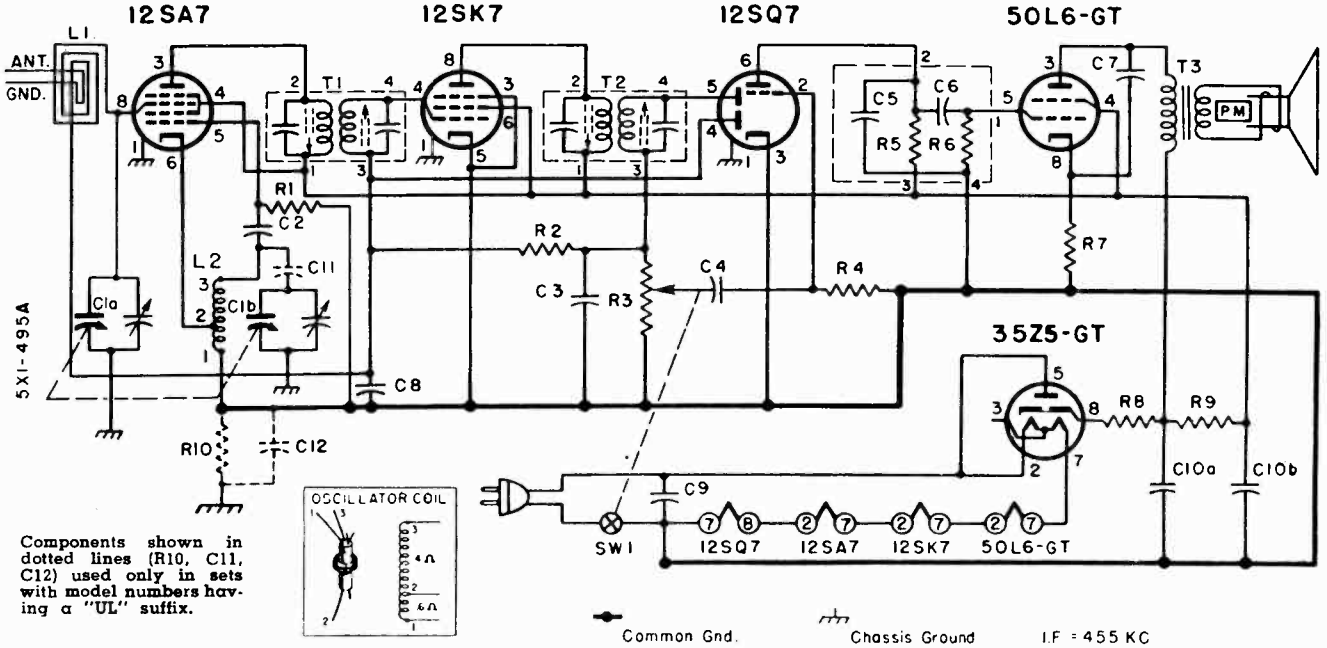
MODELS 5X11, 5X12, 5X13, 5X14; Ch. 5X1

If external antenna and ground is required, connect to wire leads on loop antenna. Caution: Do not connect ground wire directly to chassis.

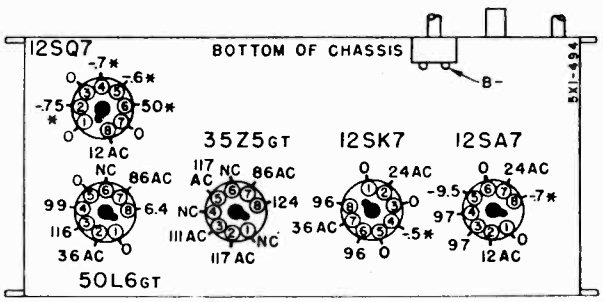


Components shown in dotted lines (R10, C11, C12) used only in sets with model numbers having a "UL" suffix.

NOTE: Common Gnd. becomes chassis ground in sets with model numbers ending in "N".

VOLTAGE DATA

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Dial turned to low frequency end; volume control at minimum.
- Measured on 117 Volts AC line. When measured from DC line, voltages may be slightly lower.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1,000 ohm per volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.



* If taken with a 1000 ohm-per-volt meter, readings will be either lower or practically zero.

RESISTORS

Symbol	Description	Part No.
R1	22,000 Ohms, ½ Watt	60B 8-223
R2	1 Megohm, ½ Watt	60B 8-105
R3	1 Megohm Volume Control and On-Off switch SW1	75B 1-25
R4	4.7 Megohms, ½ Watt	60B 8-475
*R5	470,000 Ohms, ½ Watt	
*R6	470,000 Ohms, ½ Watt	
R7	150 Ohms, ½ Watt	60B 8-151
R8	33 Ohms, 1 Watt	60B 28-3
R9	1,000 Ohms, 1 Watt	60B 28-2
R10	150,000 Ohms, ½ Watt	60B 8-154

R10 used only in sets with model numbers ending in "UL".

CONDENSERS

Symbol	Description	Part No.
C1a, C1b	Ant., 0 to 420 mmfd. / Osc., 0 to 108 mmfd. Gang (Dial drum spot welded to gang)	68B 28
C2	50 mmfd., Ceramic	65B 6-4
C3	250 mmfd., Ceramic	65B 6-5
C4	.01 mfd., 400 Volts, Paper	64B 1-25
*C5	250 mmfd., 500 Volts	
*C6	.01 mfd., 400 Volts	
C7	.02 mfd., 400 Volts, Paper	64B 1-24
C8	.1 mfd., 200 Volts, Paper	64B 1-30
C9	.05 mfd., 400 Volts, Paper	64B 1-22
C10a, C10b	50 mfd., 150 Volts / 30 mfd., 150 volts Elect.	67A 10
C11	.05 mfd., 400 Volts, Paper	64B 1-22
C12	.18 mfd., 200 Volts, Paper	64A 2-2

(C11, C12 used only in sets with model numbers ending in "UL".)

COILS, TRANSFORMERS, Etc.

Symbol	Description	Part No.
L1	Antenna, Loop (mounted on cardboard back)	69C 108
L2	Coil, Oscillator	69A 20-2
T1	Transformer, 1st I.F.	72B 50
T2	Transformer, 2nd I.F.	72B 51
T3	Transformer, Output	98A 4
	Speaker (5" PM) and Output Transformer	78B 26-1
SW1	Switch, On-Off	Part of R3
	*Couplate (Includes R5, R6, C5, C6)	63A 5-1

* C5, C6, R5, and R6 are contained in a multiple-unit component called a couplate (part number 63A5-1). Although a defective section of the couplate can sometimes be replaced by individual components, we strongly recommend replacing the entire couplate.

Note that numerals 1, 2, 3, 4, shown at schematic connections correspond to couplate lead numbers printed on face of couplate.

MISCELLANEOUS

Description	Part No.
Cabinet	
Ebony (5X11)	34D 26-5
Mahogany (5X12)	34D 26-6
Ivory (5X13)	34D 26-7
Mahogany and Gold (5X14)	34D 26-8
Cartons and fillers	44B 134
Clip, Elect. Mtg.	18A 10-6
Dial Cord	50A 1-3
Escutcheon, Dial Scale	23B 47
Knob, Tuning	
Ebony (5X11)	33A 39-7
Ivory (5X13)	33A 39-9
Mahogany (5X12, 5X14)	33A 39-8
Pointer, Dial (Disc)	25B 34
Shaft, Tuning	28A 26-1
Snap Button, Escutcheon Mtg.	13A 1-2-59
Spacer, Tuning Shaft	29A 2-7-71
Spring, Dial Cord Tension	19B1-2
Speed Nut (for tuning shaft spacer)	2B10-19
Socket, Tube	87A10-2
Washer, "C" (tuning shaft)	4A4-6-0
Washer, Felt (Knob)	5A 4-3
Washer, Spring (tuning shaft)	4A6-3-0

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MODELS 5X11, 5X12, 5X13, 5X14; Ch. 5X1

ALIGNMENT PROCEDURE

- Connect output meter across voice coil.
- Turn receiver volume control full on.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus (terminal of On-Off switch).

  Caution: Do not connect a ground wire directly to chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.

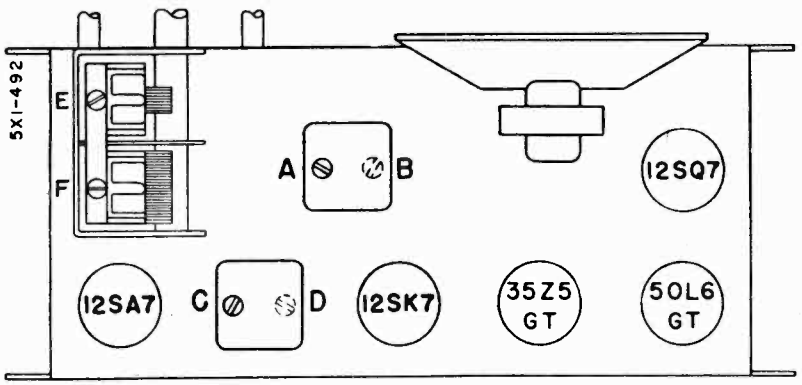
NOTE

- Use a non-metallic alignment tool for IF transformers.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	250 mmfd. condenser	Tuning condenser Antenna stator	455 KC	Gang fully open	2nd IF 1st IF	A, B C, D	Maximum Output
2	250 mmfd. condenser	Tuning condenser Antenna stator	1620 KC	Gang fully open	Oscillator (on gang)	E	Maximum Output
3	Loop of several turns of wire (or place generator lead close to receiver loop for adequate signal)	No physical connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna (on gang)	F	Maximum Output
4	Mount and set dial pointer as shown in Pointer Setting and Dial Cord Stringing Diagram.						

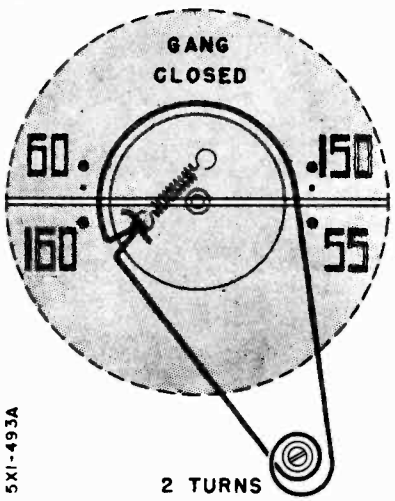
NOTE: Adjustments B and D are made from underside of chassis.

TUBE AND TRIMMER LOCATION



Adjustments B and D are made from underside of chassis.

POINTER SETTING AND DIAL CORD STRINGING



With gang fully closed, set pointer in horizontal position.

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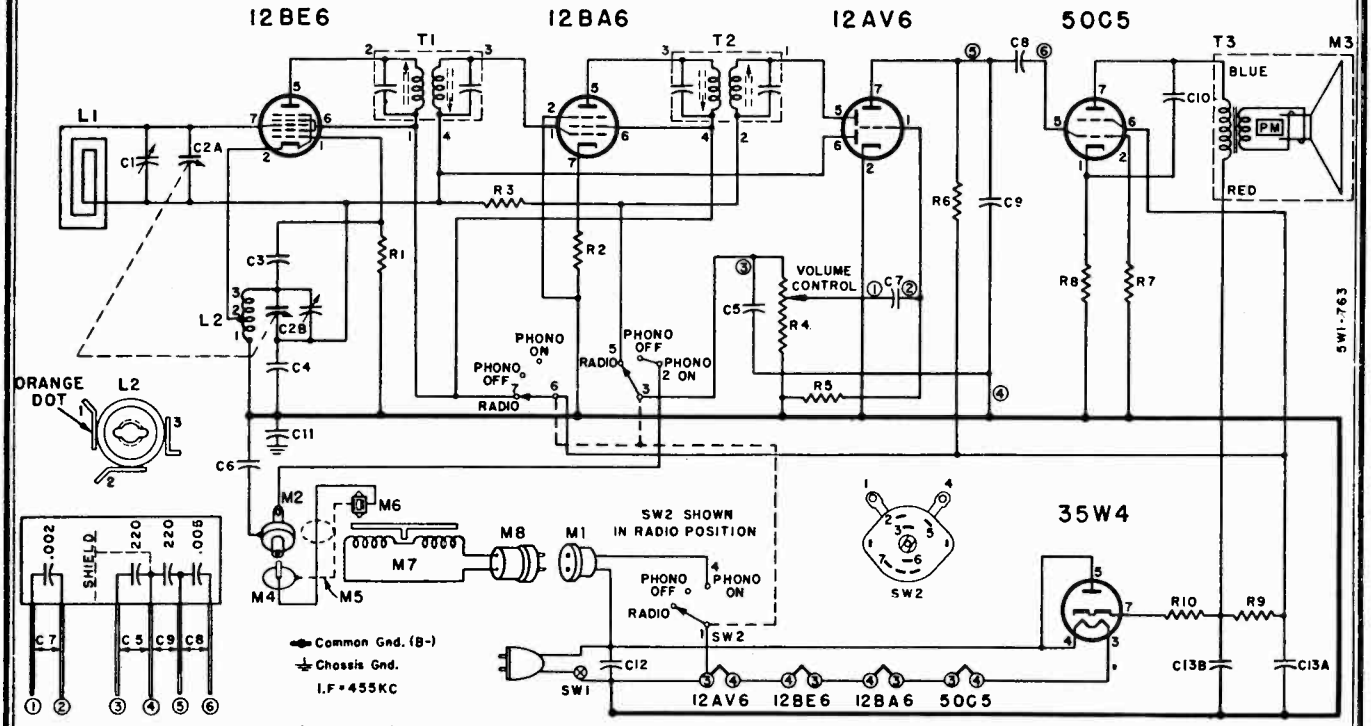
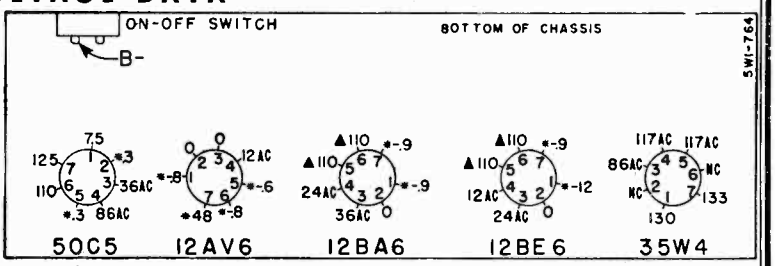
MODELS 5W11, 5W12; Ch. 5W1



For models ending in "UL", a .05 mfd, 400 V, condenser is wired between terminal 3 of L2 and stator of C2B.

VOLTAGE DATA

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Switch in "Radio" position.
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low frequency end.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1000 ohm-per-volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.



* If taken with a 1000 ohm-per-volt meter, readings will be either lower or practically zero.

▲ On "Phono" these voltages will be zero. All other DC readings may be slightly higher.

RESISTORS

Symbol	Description	Part No.
R1	22,000 ohms, ½ watt	60B 8-223
R2	100 ohms, ½ watt	60B 8-101
R3	1 megohm, ½ watt	60B 8-105
R4	Volume Control, 1 megohm (includes SW1)	75B 1-34
R5	4.7 megohms, ½ watt	60B 8-475
R6	470,000 ohms, ½ watt	60B 8-474
R7	470,000 ohms, ½ watt	60B 8-474
R8	150 ohms, ½ watt	60B 8-151
R9	1,000 ohms, 1 watt	60B 28-2
R10	33 ohms, 1 watt	60B 28-3

CONDENSERS

Symbol	Description	Part No.
C1	3 to 30 mmfd, Trimmer	Part of L1
C2a, C2b	0 to 420 mmfd, Ant. / 0 to 108 mmfd, Osc. Gang (drum spot welded to gang)	68A 30
C3	50 mmfd, Ceramic	65B 6-4
C4	.1 mfd, 200 volts, Paper	64B 1-30
*C5	220 mmfd. min, Ceramic	
C6	.1 mfd, 200 volts, Paper	64B 1-30
*C7	.002 mfd. min, Ceramic	
*C8	.005 mfd. min, Ceramic	
*C9	220 mmfd. min, Ceramic	
C10	.03 mfd, 400 volts, Paper	64B 1-23
C11	.18 mfd, 200 volts, Paper	64A 2-2
C12	.05 mfd, 400 volts, Paper	64B 1-22
C13a, C13b	30 mfd, 150 volts / 70 mfd, 150 volts Elect.	67A 17

* Part of condenser plate, part number 63A8. Replace with exact duplicate or individual components.

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna and Trimmer, Loop	69B 98
L2	Coil, Oscillator	69A 52-1
T1	Transformer, 1st IF	72B 28-17
T2	Transformer, 2nd IF	72B 28-17
T3	Transformer, Speaker Output	98A 4
M1	Socket and Leads, Phono Motor	89A 6-1
M2	Socket, Phono Input	88A 1
M3	Speaker and Output Transformer (5" PM)	78B 48-2
SW1	Switch, On-Off	Part of R4
SW2	Switch, Radio-Phono	77A 28
	Condenser, Plate (Consists of C5, C7, C8 and C9)	63A 8

CABINET PARTS

Description	Part No.
Cabinet, Plastic	
Bottom, less lid (Ebony 5W11)	34D 27-10
Bottom, less lid (Mahogany 5W12)	34D 27-11
Lid only (Ebony 5W11)	34D 27-12
Lid only (Mahogany 5W12)	34D 27-13
Escutcheon, Dial	23C 51
Hinge	37A 20-1
Hinge Stud	27A 122-1
Hinge Screw (4-40x5/16 O.H.M.S.)	343-312-C2-58
Knobs, Radio	
"Tuning" (Ebony 5W11)	33C 48-3
"Radio-Phono" (Ebony 5W11)	33C 48-11
"Off-On Volume" (Ebony 5W11)	33C 48-10
"Tuning" (Mahogany 5W12)	33C 48-6
"Radio-Phono" (Mahogany 5W12)	33C 48-14
"Off-On Volume" (Mah. 5W12)	33C 48-13
Rubber Bumber (for cabinet bottom)	12A 3-7
Spring, Escutcheon Mtg. (2 req.)	19A 60
Washer, Felt (for tuning knobs)	5A 4-9

MISCELLANEOUS

Description	Part No.
Bracket, Tuning Shaft	15A 496
Carton and Fillers	44B 139
Clip, Electrolytic Mounting	18A 10-6
Clip, IF Transformer Mounting	72B 28-10
Dial Cord	50A 1-3
Drum, Pointer	17A 27
Gasket, Sponge Rubber (mounts on Speaker)	12A 5-16
Grommet, Rubber (Gang mtg.)	12A 1-2
Insulator, Chassis Mtg. Plate	32B 112
Insulator, Phono Receptacle	32A 46
Manual	
Customer Instruction	41A 17-40
Service, for 5W1 Chassis	S274
Service, for RC400 Changer	S275
Plate, Pointer Support	15A 498
Pointer, Dial	25A 35-1
Shaft, Pointer	28A 42
Sleeve, Tuning (Brass)	27A 123
Spacer, "T" (Gang condenser mtg.)	29A 2-1-71
Spring, Dial Cord Tension	19B 1-5
Socket, Miniature Tube	
plain type	87A 24-2
with ground strap	87A 24-3
Washer, "C" (for pointer drum)	4A 4-6
Washer, Spring	4A 6-10-0

PHONOGRAPH PARTS

Check model label on underside of record changer for model number. Complete service information and parts list for the RC400 record changer is contained in the RC400 Record Changer Manual (form number S275).

M4	Plug, Pickup Shielded Cable	88A 2-3
M5	Shielded Cable & Plug	413A 11-1
M6	Cartridge, Pickup (includes needle)	See reverse side
	Needle, Pickup	See reverse side
M7	Motor, 33, 45 RPM; 60 cycle	407C 300
	Centerpost (for 33 RPM records)	G400B409
	Centerpost (for 45 RPM records)	G400B410
	Service Manual for RC400 Changer	S275

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MODELS 5W11, 5W12; Ch. 5W1

ALIGNMENT PROCEDURE

- Turn receiver volume control full on (fully clockwise).
- Loop antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis (terminal of On-Off Switch).

Caution: Do not connect a ground wire directly to chassis.

- Connect output meter across speaker voice coil.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and proceed in the following sequence.
- Repeat adjustments to insure good results.

NOTE

- Use a non-metallic alignment tool for IF transformers.

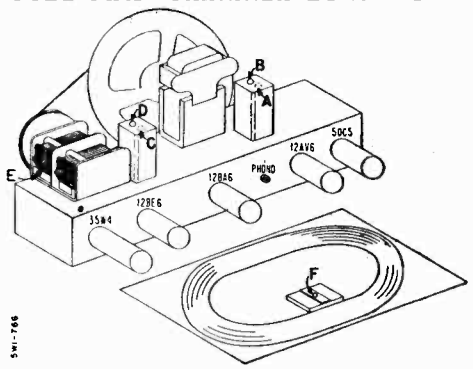
Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	250 mmfd. condenser	Tuning condenser, antenna stator	455 KC	Gang fully open	2nd IF 1st IF	*A, B *C, D	Maximum output
2	250 mmfd. condenser	Tuning condenser, antenna stator	1020 KC	Gang fully open	Oscillator	E	Maximum output

†Mount dial pointer. Set pointer to horizontal position with tuning condenser tuned to 1400 KC generator signal (see illustration below). Rotate the tuning condenser until the pointer is in a vertical position (900 KC), then slip chassis in cabinet, carefully guiding the pointer so that it locates between the dial escutcheon and the cabinet. Install loop antenna and chassis mounting bolts.

3	Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal.	No actual connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna	F (see note below)	Maximum output

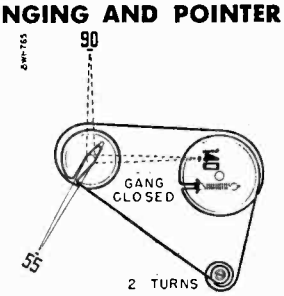
* Trimmer adjustments A and C made from the underside of the chassis.
†In later sets (with two piece escutcheon spring #19A60), the pointer and escutcheon can be mounted after installing the chassis in cabinet. Proceed as follows: Set pointer to horizontal position with gang tuned to 1400 KC signal (see illustration below). Place escutcheon on cabinet. With long nose pliers slip the hairpin ends of the escutcheon mounting springs in holes of escutcheon tabs.
NOTE: Antenna Trimmer "F" must be aligned after chassis and loop are mounted in cabinet.

TUBE AND TRIMMER LOCATION



Adjustments A and C made from underside of chassis.

DIAL STRINGING AND POINTER SETTING



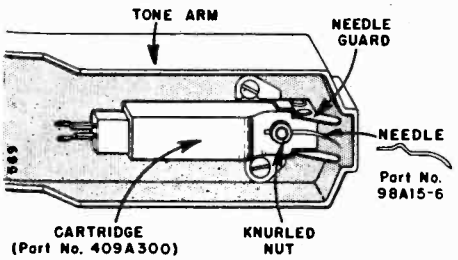
Dial stringing and pointer with solid lines shown with gang closed. Dashed line pointer positions (1400 KC and 900 KC) shown when tuning condenser is tuned to generator signal.

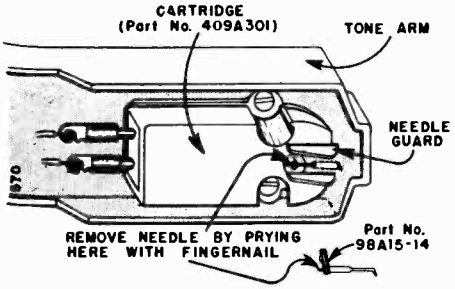
RECORD CHANGER SERVICE DATA

Check model label on underside of record changer for model number. Complete service information and parts list for the RC400 record changer is contained in the RC400 Record Changer Service Manual (form number S275).

Cartridge and Needle

As shown in the illustrations, alternate cartridges may be used. Cartridges are interchangeable when complete with needle.





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MODELS 6Q11, 6Q12, 6Q13, 6Q14; Ch. 6Q1

Antenna

This set has a built-in "Line Cord FM Antenna" with lead wire brought out through back of chassis to left side antenna terminal (facing back of set).

Instructions for connecting external FM antenna (300 ohm) or external AM antenna are on cabinet back. **Caution:** Do not use a ground.

Hum on FM Only in Sets with Early Ratio Detector

If hum is experienced on FM position in sets having the early ratio detector circuit (see schematic), replace the 12AL5 ratio detector tube. If hum still remains, disconnect the ground tie point from junction of resistors R18 and R19 (point "Y"), then connect the ground tie point to the junction of resistor R19 and negative of condenser C25. Complete schematic shows the modified (late) circuit.

FM Service

Much of FM service is similar to the usual service necessary for AM receivers such as voltage analysis, parts replacement, etc. The chief differences arise because of the considerably higher frequencies used in FM operation, and because of the different type of second detector needed in FM. For a complete discussion of the FM Ratio Detector circuit used in this chassis, see the 9A1 Service Manual, or any text book.

The higher frequencies involved means that more care must be exercised in location and length of leads. Leads tend to act as small inductances or capacities at high frequency and hence may appreciably alter the electrical characteristics of a circuit. For this reason, ground connections should always be maintained as originally made in the set. Also note that in certain circuits, the type by-pass condenser used is critical at the high FM frequencies. When replacing condensers it is important that they be replaced with condensers of identical capacity values, tolerances, temperature coefficients and construction. For example: C11 is a 2 mmfd ± .25 mmfd, — .00075 temperature coefficient, ceramic capacitor. If defective it should be replaced with a 2 mmfd ± .25 mmfd, — .00075 temperature coefficient, ceramic capacitor.

FM Alignment Equipment

This chassis should be aligned only with an AM signal generator and a vacuum tube voltmeter. Any standard brand vacuum tube voltmeter with a DC scale of not over 5 volts is suitable. A 3-volt zero center scale is desirable. A signal generator with a frequency range up to 110 MC. is desirable. It is possible however, to align the receiver with a signal generator going to 20 or 30 megacycles, by using the harmonics of these lower frequencies. To do this merely set the signal generator dial as follows and align exactly as explained in the alignment instructions.

Where alignment chart specifies 109 MC, 104 MC, 90 MC or 87 MC, set signal generator to highest available frequency shown in the column under that frequency (given in megacycles).

109.	104.	90.	87.
54.50	52.	45.	43.5
36.33	34.66	30.	29.
27.25	26.	22.5	21.75
21.80	20.8	18.	17.4
18.17	17.33	15.	14.5

Signal generators which do not tune to 110 MC or whose harmonics are not strong enough, cannot be used for FM alignment.

RESISTORS

Symbol	Description	Part No.
R1	1 megohm, ½ watt	60B 8-105
R2	100 ohms, ½ watt	60B 8-101
R3	1000 ohms, ½ watt	60B 8-102
R4	22,000 ohms, ½ watt	60B 8-223
R5	470 ohms, ½ watt	60B 8-471
R6	470 ohms, ½ watt	60B 8-471
R7	1000 ohms, ½ watt	60B 8-102
R8	1 megohm, ½ watt	60B 8-105
R9	1 megohm, ½ watt	60B 8-105
R10	220,000 ohms, ½ watt	60B 8-224
R11	1000 ohms, ½ watt	60B 8-102
R12	1000 ohms, ½ watt	60B 8-102
R13	1 megohm, ½ watt	60B 8-105
R14	1000 ohms, ½ watt	60B 8-102
**R15	47,000 ohms, ¼ watt	
R16	470,000 ohms, ½ watt	60B 8-474
R17	390 ohms, ½ watt	60B 8-391
R18	15,000 ohms, 5%, ½ watt	60B 7-153
R19	15,000 ohms, 5%, ½ watt	60B 7-153
R20	27,000 ohms, ½ watt	60B 8-273
R21	47 ohms, 1 watt	60B 14-470
R22	33 ohms, 1 watt	60B 14-330
R23	18,000 ohms, ½ watt	60B 8-183
R24	1 megohm Volume Control (tapped at 500,000 ohms)	75B 2-14
R25	10 megohms, ½ watt	60B 8-106
*R26	500,000 ohms, ¼ watt	
*R27	500,000 ohms, ¼ watt	
R28	150 ohms, 1 watt	60B 14-151

CONDENSERS

Symbol	Description	Part No.
C1a, C1b, C1c	485.8 mmfd, (max) AM RF; 15 mmfd, (max) FM RF; 15 mmfd, (max) FM Osc.	Gang 68B 27
C1d	142.6 mmfd, (max) AM Osc. (Dial drum welded to gang)	
C2	.01 mfd, 400 volts, Paper	64B 1-25
C3	.0015 mfd, "Hi-K" Ceramic	65B 9-63
C4	68 mmfd, Ceramic	65A 16-1
C5	.001 mfd, "Hi-K" Ceramic	65B 9-31
C6	65 mmfd, 3%, Silver Mica	65B 1-27
C7	.001 mfd, "Hi-K" Ceramic	65B 9-31
C8	3 to 12 mmfd, trimmer, Silver Ceramic	66A 19-2
C9	35 mmfd, Zero Temp. Coeff., Ceramic	65B 6-57
C10	50 mmfd, Ceramic	65B 6-4
C11	2 mmfd, ± .25 mmfd, —.00075 Temp. Coeff., Ceramic	65B 6-58
C12	.01 mfd min., Ceramic	65A 10-3
C13	.005 mfd min., Ceramic	65A 10-1
C14	.01 mfd min., Ceramic	65A 10-3
C15	.005 mfd min., Ceramic	65A 10-1
C16	.01 mfd min., Ceramic	65A 10-3
C17	.01 mfd min., Ceramic	65A 10-3
C18	.01 mfd min., Ceramic	65A 10-3
C19	.01 mfd min., Ceramic	65A 10-3
C20	.01 mfd min., Ceramic	65A 10-3
**C21	100 mmfd, Ceramic	
**C22	100 mmfd, Ceramic	
C23, C24	100 mmfd 10%; 100 mmfd 10% — Dual Ceramic	63A 7-1
C25	4 mfd, 50 volts, Elect.	67A 4-8
C26	.002 mfd, 600 volts, Paper	64B 1-14
C27	35 mmfd, Zero Temp. Coeff., Ceramic	65B 6-57
C28	.01 mfd min., Ceramic	65A 10-3
C29	.01 mfd min., Ceramic	65A 10-3
C30	.05 mfd, 200 volts, Paper	64B 1-32
C31a, C31b, C31c	70 mfd, 150 volts; 30 mfd, 150 volts; 20 mfd, 25 volts — Elect.	67C 7-14
C32	.005 mfd min., Ceramic	65A 10-1
C33	.01 mfd min., Ceramic	65A 10-3
C34	.005 mfd min., Ceramic	65A 10-1
*C35	.005 mfd, Ceramic	
C36	.002 mfd, 600 volts, Paper	64B 1-14
C37	.01 mfd, 400 volts, Paper (C37 used only in sets with model numbers ending in "UL".)	64B 1-25

COILS, TRANSFORMERS, ETC.

L1	Antenna, Loop (AM)	69C 97
L2	Coil, Antenna (FM)	69A 103
L3	Coil, Line Cord (FM antenna)	69A 102
L4	Coil, RF Choke	73A 6-2
L5	Coil, RF Choke	73A 6-2
L6	Coil, RF Choke	73A 6-2
L7	Coil, Oscillator (FM)	69A 104
L8	Coil, Oscillator (AM)	69A 105-1
L9	Choke, Filter (2.5 Henry)	74A 15-2
T1	Transformer, 1st IF (FM)	72B 89
T2	Transformer, 2nd IF (FM)	72B 90
T3	Transformer, 1st IF (AM)	72B 91
T4	Transformer, Ratio Detector	72B 39
T5	Transformer, 2nd IF (AM)	72B 74
T6	Transformer, Speaker Output	98A 4
M1	Speaker and Output Transformer (5" PM)	78B 42-2
M2	Rectifier, Selenium	93A 1-2
M3	Socket, Interlock (includes line cord)	A2006
M4	Plug, Interlock	88A 15-8
SW1	Switch, On-Off (SPST)	Part of R24
SW2	Switch, Band (AM-FM)	77B 27
*Couplate, Audio (consists of R26, R27 and C35)		63A 5-2
**Filter, Diode (consists of R15, C21 and C22)		63A 3-1

CABINET PARTS

Description	Part No.
Back Assembly, Interlocking (includes line cord and interlock socket)	A2005
Cabinet, Plastic	
Ebony (6Q11)	34D 25-1
Mahogany (6Q12)	34D 25-2
Ivory (6Q13)	34D 25-3
Red, Mahog. and Gold (6Q14)	34D 25-4
Clip, Tinnerman (for mtg. escutcheon)	2B 10-6-69
Escutcheon, Dial (Plastic)	23D 46
Knob, Plastic	
"On-Off Volume" (Ebony 6Q11)	33C 40-16
"FM-AM" (Ebony 6Q11)	33C 40-17
"Tuning" (Ebony 6Q11)	33C 40-18
"On-Off Volume" (Mahog. 6Q12 and 6Q14)	33C 40-19
"FM-AM" (Mahog. 6Q12 and 6Q14)	33C 40-20
"Tuning" (Mahog. 6Q12 and 6Q14)	33C 40-21
"On-Off Volume" (Ivory 6Q13)	33C 40-22
"FM-AM" (Ivory 6Q13)	33C 40-23
"Tuning" (Ivory 6Q13)	33C 40-24
Washer, Felt (for tuning knobs)	5A 4-9

MISCELLANEOUS

Description	Part No.
Baffle, Speaker	43B 74
Carton and Fillers	44B 150
Clip, Pointer Spring	401A 230
Dial Background	22B 20
Dial Cord	50A 1-3
Fastener (for mtg. speaker baffle)	8A 8-1
Grommet, Rubber (for mtg. gang)	12A 2-5
Grommet, Rubber Spacer (for mtg. gang)	12A 1-4
Insulator, Dial Background (fibre 4"x4")	32A 119
Lever Arm, Band Switch	15A 477
Pointer, Dial	25A 36-1
Ring, Pointer Compression	19A 31-1
Shaft, Band Switch	28A 41
Shield, Tube	87A 7-4
Sleeve, Dial Tuning (Brass)	27A 120
Socket, Line Cord and Interlock	A2006
Socket, Tube	
7 pin miniature	87A 3-4
9 pin miniature	87A 25-4
Spacer, Metal "T" (for mtg. gang)	29A 2-6-71
Spring, Dial Cord Tension	19B 1-2
Spring, Tuning Sleeve Retaining	401A 230
Washer, "C" (3/16" ID—for end of band switch shaft)	4A 4-6-0
Washer, "C" (5/32 ID—for lever on band switch shaft)	4A 4-4-0
Wrapper, Plastic (22"x33" for shipping 6Q13 and 6Q14)	45B 11-1

* Part of encased couplate unit (part number 63A5-2). Replace with exact duplicate part or individual components.
** Part of encased diode filter unit (part number 63A3-1). Replace with exact duplicate part or individual components.

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IMPORTANT PRELIMINARY ALIGNMENT STEPS

Under normal operating conditions or use, misalignment of RF or IF circuits with age will be slight. Lack of sensitivity and poor tone quality may be due to causes other than alignment. Do not attempt to realign the receiver until all other possible causes have first been thoroughly investigated.

In FM alignment, it is essential that every step be followed. Especially important is picking the center of the IF curve (step 4 in the FM-IF alignment instructions). During this portion of the alignment it is necessary to tune the signal generator very carefully; it may necessitate having to estimate the dial readings to a tenth of a division.

If complete alignment is necessary, it is essential that proper sequence be followed as tabulated in the alignment chart. However, if only the AM band or a portion of the FM circuit are to be aligned, proceed from that point on the chart being sure to follow all remaining steps.

Adjustments made to FM-IF's at 10.7 MC, will require realignment of AM-IF slug adjustments.

Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and connect to chassis. Caution: Do not connect a ground wire directly to chassis.

Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.

FM I.F. AND RATIO DETECTOR ALIGNMENT

- Keep output indicator leads well separated from signal generator leads and chassis wiring.
- Band switch in FM position (fully to the left).
- While peaking IF's, keep reducing signal generator output so VTVM reading is approximately +1.5 volts DC with exception of Step #5.
- To avoid splitting the slotted head of iron core tuning slugs in the IF transformers, use a non-metallic alignment tool with a ⅛" wide screwdriver blade. Do not exert undue pressure as threads of slugs may strip.
- Speaker must be connected during alignment.
- Disconnect FM antenna at antenna terminal strip.

Before proceeding, be sure to follow instructions above and under "Important Preliminary Alignment Steps."

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Special Connections	Adjust as Follows (very carefully)
1	Thru .001 cond. to 2nd IF grid (pin #1 of 12BA6 2nd IF)	‡10.7 MC	Tuning gang wide open	Connect VTVM (DC probe) to point "W", common to chassis. (See Fig. 7B.)	"A" (ratio detector primary) for maximum reading on VTVM.
2	**Thru .001 cond. to 1st IF grid (pin #1 of 12BA6 1st IF)	"	"	" "	Iron cores "B" and "C" (2nd IF trans.) for maximum reading on VTVM.
3	To FM antenna terminals thru 20 ohm carbon resistor in series with each generator lead.	"	"	" "	"D" and "E" (1st IF) for maximum on VTVM. (Keep reducing generator output to keep VTVM at 1.5 volts)
4	"	a. Reduce output of signal generator until VTVM reads **exactly** +1.5 volts DC. b. Tune generator frequency above 10.7 MC until VTVM reads **exactly** +1.0 volt. Note **exact** generator frequency. Extreme care in reading this is essential. c. Tune generator frequency below 10.7 MC until VTVM reads **exactly** +1.0 volt. Note **exact** generator frequency. Extreme care in reading this is essential. d. Add generator frequency in step c to generator frequency in step b and divide by 2. The result is the center frequency of the IF curve to be used in step 5. See example on next page. e. Tune generator frequency above and below 10.7 MC and note voltage reading on VTVM at different frequency points until you have a good impression of the shape of the selectivity curve. If you have two peaks as in Figures 5 or 6, note readings (voltage) of both peaks. If one peak is over 20% higher than the other one, it will be necessary to realign IF's. A selectivity curve that would require realignment is illustrated by Figure 6.			
5	"	Center of IF selectivity curve per step 4d above. See "EXAMPLE" on next page.	Tuning gang wide open	Connect VTVM (DC probe) to point "X", common to point "Y" (junction of R18 and R19) (See Fig. 7B.)	Iron core "F" (ratio detector secondary) for zero voltage reading on VTVM. (The correct zero point is located between a positive and a negative maximum.)

If any adjustments were very far off, it is desirable to repeat steps 3, 4 and 5.

**Do not feed I.F. signal into converter grid as this will cause mis-alignment.
‡Signal may be unmodulated or 400 cycle AM modulated.

Note: Trimmer adjustments A, B, and D made from underside of chassis.

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SETTING SIGNAL GENERATOR TO CENTER OF I.F. SELECTIVITY CURVE

CAUTION: Due to the difficulty of setting a signal generator to the accuracy required by this operation, extreme care must be exercised in making each setting. Otherwise, improper alignment of the ratio detector and consequent audio distortion will result.

EXAMPLE: (See Figures 1 and 2)

Voltage reading in Step 4a is + 1.5 volts.

Generator frequency on low side of 10.7 MC for a reading of + 1 volt DC = 10.640 MC.

Generator frequency on high side of 10.7 MC for a reading of + 1 volt DC = 10.800 MC.

Center frequency is obtained by adding 10.640 and 10.800, then dividing by 2. For these readings it will be 10.72 MC.

Set generator frequency to 10.72 MC as this is center of selectivity curve as shown in Figure 2.

Note: Numerical vernier dial readings may be used instead of MC.

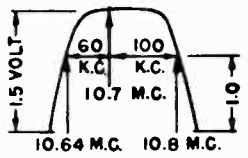

Fig. 1

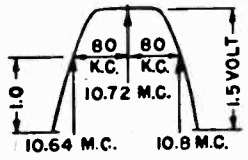

Fig. 2

TYPICAL SELECTIVITY CURVES

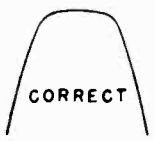

Fig. 3

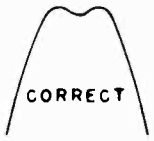

Fig. 4

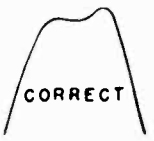

Fig. 5

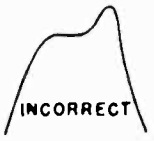

Fig. 6

FM RF ALIGNMENT PROCEDURE

Step	Connections	Generator Frequency	Receiver Gang or Dial Setting	Adjust as follows (very carefully)
1	Connect Generator: To FM antenna terminals thru 20 ohm carbon resistor in series with each generator lead. Connect VTVM: DC probe to point "W"; common to chassis.	†109 MC	Gang fully open	M (oscillator) and N (antenna) for maximum It is advisable to adjust generator output so VTVM readings do not exceed approximately + 1.5 V. DC while peaking.
2		†87 MC	Tune in Signal. (Gang should be closed or almost closed.)	If signals in steps 1 and 2 will not tune in at gang tuning extremes (±0.5 MC), it will be necessary to spread or squeeze oscillator coil turns and then repeat steps 1 and 2 until correct results are obtained.
3		†104 MC	Tune in Signal	Readjust N for maximum VTVM reading, while rocking gang. If trimmer does not peak, it will be necessary to squeeze or spread turns of FM antenna coil. Check tracking at 90 MC. Slide chassis into cabinet and check calibration. Calibration error should not exceed ±0.5 MC. If necessary, repeat steps 1, 2, 3 until correct results are obtained.

† Signal may be unmodulated or 400 cycle AM modulated. If your signal generator does not reach this frequency, use harmonics as dsecribed in "FM Alignment Equipment."

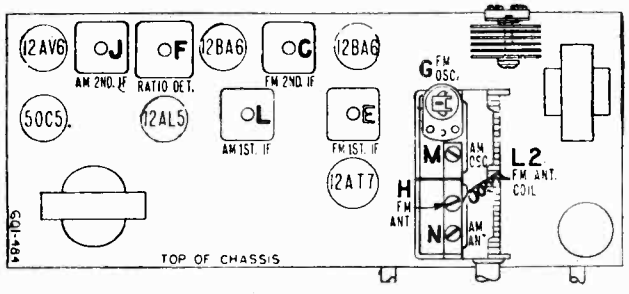

Fig. 7A. Trimmer Location, Top

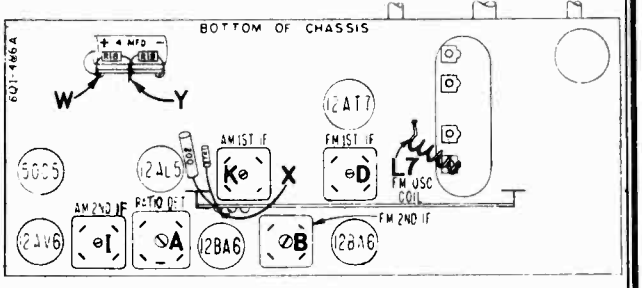

Fig. 7B. Trimmer Location, Bottom

AM ALIGNMENT PROCEDURE

- Use regular output meter connected across speaker voice coil.
- Turn receiver Volume Control fully clockwise.
- AM loop antenna must be connected, FM antenna disconnected.
- Use lowest output setting of signal generator that gives a satisfactory reading on meter.

	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
	Set Band Switch to Broadcast Position and be sure to follow instructions under heading "Important Preliminary Alignment Steps." Loop antenna must be connected, FM antenna disconnected.				
1	Gang condenser AM antenna stator	250 mmfd.	455 KC	Tuning gang wide open	I, J (2nd IF) K, L (1st IF)
2	"	"	1620 KC	"	M (oscillator)
3	Place generator lead close to loop of set to obtain adequate signal. No actual connection (signal by radiation).		1400 KC	Tune in signal	N (antenna)

Slide chassis in cabinet for checking dial calibration.

Note: Trimmer adjustments I and K made from underside of chassis.

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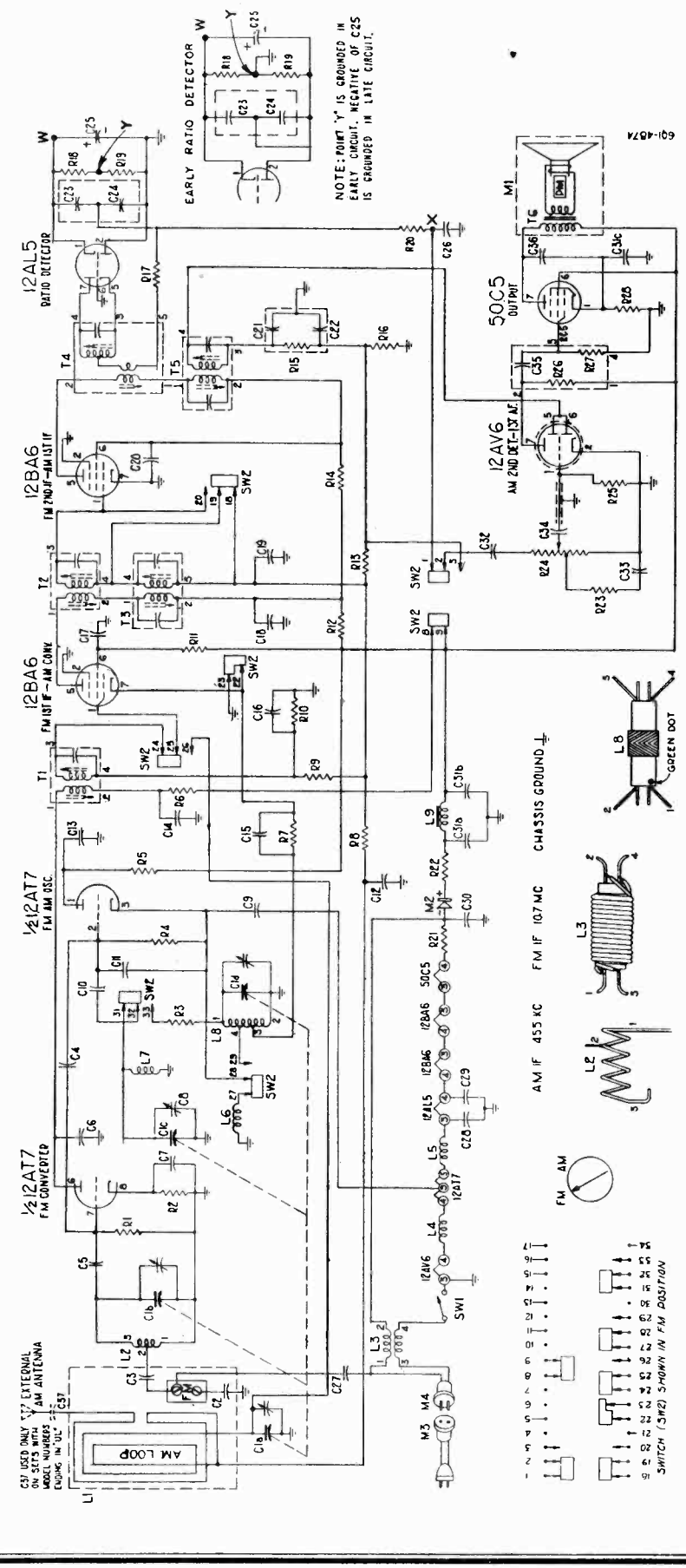
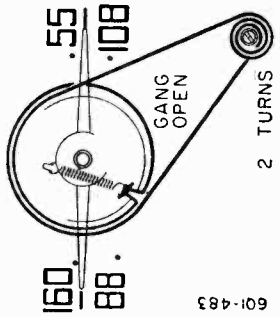
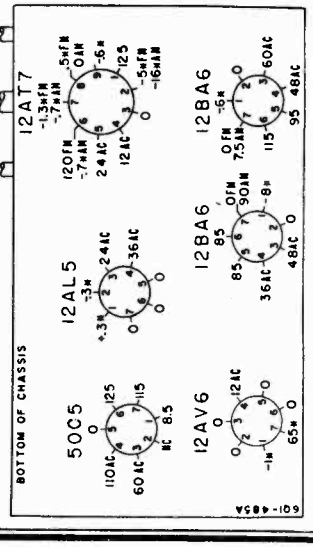




POINTER SETTING AND DIAL STRINGING

With gang open, pointer should be as shown in stringing diagram. If not, move it by hand while keeping the gang open.

VOLTAGE DATA



* Lower or zero if taken with 1000 ohm-per-volt meter.

- Voltages taken between terminals and chassis ground, except for 12AL5 terminals #1 and #2, which are taken to point "Y".
- Band switch in FM position unless otherwise indicated.
- Measured on 117 Volt AC line.
- Volume control minimum; dial at low frequency end.
- Voltages measured with vacuum tube voltmeter. Asterisk * indicates much lower or zero readings if measured with 1000 ohm-per-volt meter.

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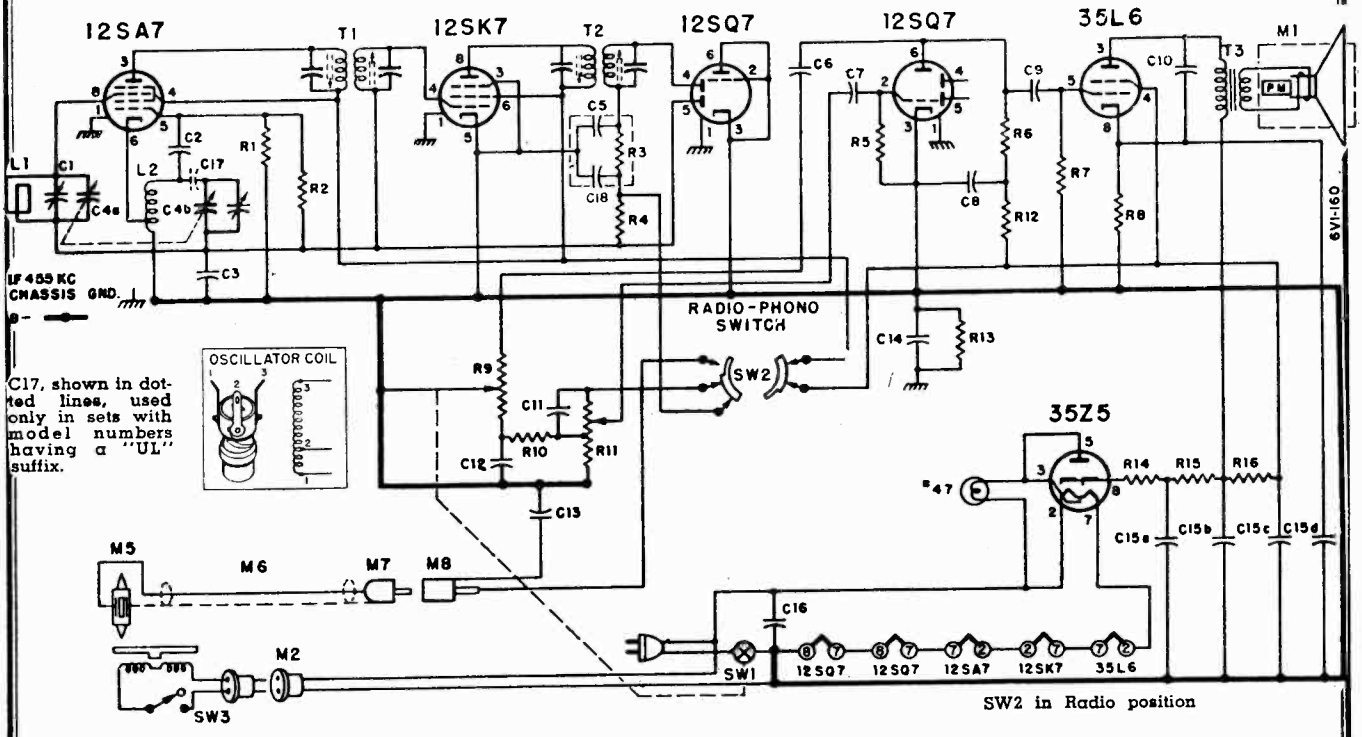
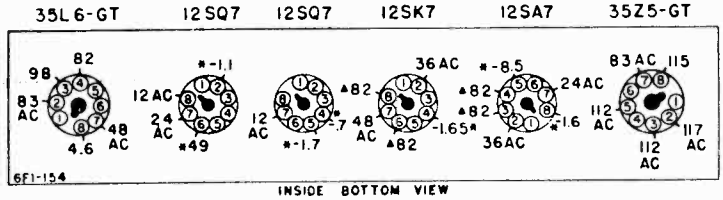


C17, shown in dotted lines, used only in sets with model numbers having a "UL" suffix.

SW2 in Radio position



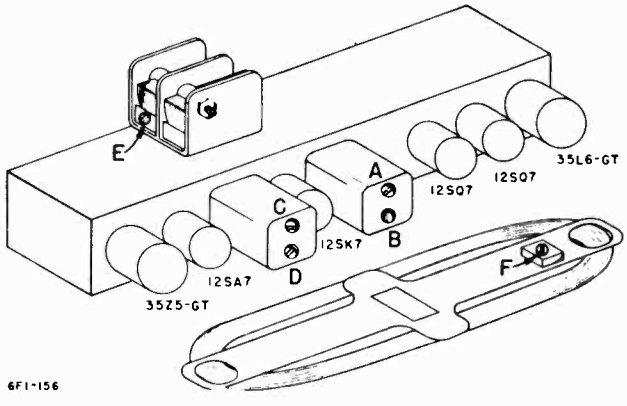
* If taken with a 1000 ohm-per-volt meter, readings will be either lower or practically zero.

▲ On "Phono" these voltages will be zero. All other DC readings may be slightly higher.

VOLTAGE DATA

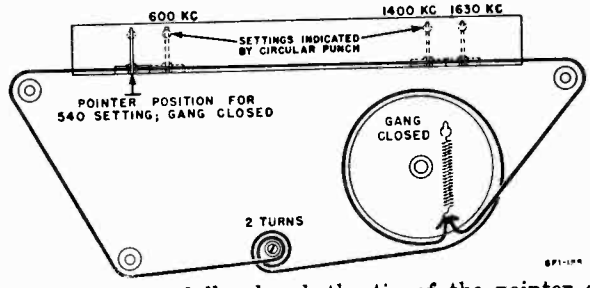
- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Switch in "Radio" position.
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low frequency end.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 1000 ohm-per-volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or practically zero.

TUBE AND TRIMMER LOCATION



Adjustments B and D made from underside of chassis.

DIAL STRINGING AND POINTER SETTING



With the gang fully closed, the tip of the pointer clip should be in line with the 1/16" circular punch at the extreme left end of the dial background.

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MODELS 6V11, 6V12; Ch. 6V1

ALIGNMENT PROCEDURE

- Check pointer position. With tuning gang closed, the tip of the pointer clip should be over the 1/16" circular punch at the extreme left end of the dial background (see stringing diagram).
- Connect output meter across voice coil.
- Turn receiver volume control full on; set tone control fully clockwise.
- Loop antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and proceed in the following sequence.
- Repeat adjustments to insure good results.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	250 mmfd. condenser	Tuning condenser, antenna stator	455 KC	Gang fully open	2nd IF 1st IF	A, B* C, D*	Maximum output
2	250 mmfd. condenser	Tuning condenser, antenna stator	1620 KC	Gang fully open	Oscillator	E	Maximum output
3	Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal.	No physical connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna	F (see note below)	Maximum output

* Trimmer adjustments B and D made from the underside of the chassis.

NOTE: Antenna Trimmer "F" must be aligned after chassis and loop are mounted in cabinet. Loop trimmer adjustment is located at the rear of the cabinet.

RESISTORS

Symbol	Description	Part No.
R1	22,000 Ohms, ½ Watt	60B 8-223
R2	10 Megohms, ½ Watt	60B 8-106
†R3	47,000 Ohms, ¼ Watt	
R4	1 Megohm, ½ Watt	60B 8-105
R5	4.7 Megohms, ½ Watt	60B 8-475
R6	470,000 Ohms, ½ Watt	60B 8-474
R7	470,000 Ohms, ½ Watt	60B 8-474
R8	150 Ohms, 1 Watt	60B 14-151
R9	2 Megohms Tone Control and On-Off Switch SW1	75B 1-12
R10	27,000 Ohms, ½ Watt	60B 8-273
R11	1 Megohm Volume Control	75B 2-6
R12	47,000 Ohms, ½ Watt	60B 8-473
R13	150,000 Ohms, ½ Watt	60B 8-154
R14	33 Ohms, 1 Watt	60B 28-3
R15	220 Ohms, 1 Watt	60B 28-7
R16	1,000 Ohms, 1 Watt	60B 23-2

CONDENSERS

Symbol	Description	Part No.
C1	Trimmer, 3 to 30 mmfd.	Part of L1
C2	50 mmfd., Ceramic	65B 6-4
C3	.1 mmfd., 200 Volts, Paper	64B 1-30
C4a C4b	Gang-0 to 420 mmfd. Gang-0 to 108 mmfd.	68B 20-1
	Note—Gang spot welded to dial drum.	
†C5	100 mmfd., Ceramic	
C6	.002 mfd., 600 Volts, Paper	64B 1-14
C7	.01 mfd., 400 Volts, Paper	64B 1-25
C8	.1 mfd., 200 Volts, Paper	64B 1-30
C9	.01 mfd., 400 Volts, Paper	64B 1-25
C10	.03 mfd., 400 Volts, Paper	64B 1-23
C11	500 mmfd., Ceramic	65B 6-6
C12	.01 mfd., 400 Volts, Paper	64B 1-25
C13	.1 mfd., 200 Volts, Paper	64B 1-30
C14	.18 mfd., 200 Volts, Paper	64A 2-2
C15a C15b C15c C15d	30 mfd., 150 Volts 30 mfd., 150 Volts 20 mfd., 150 Volts 20 mfd., 25 Volts	Elect. 67A 14-1
C16	.05 mfd., 400 Volts, Paper	64B 1-22
C17	.02 mfd., 400 Volts, Paper (Used only in sets with model numbers having a "UL" suffix.)	64B 1-24
†C18	100 mmfd., ceramic	

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna and Trimmer, Loop	69B 13
L2	Coil, Oscillator	69A 52
T1	Transformer, 1st IF	72B 50
T2	Transformer, 2nd IF	72B 51
T3	Transformer, Output	79A 11-2
M1	Speaker (5") without output Trans.	78B 39-1
M2	Socket & Leads, Phono Motor	89A 6-3
M8	Socket, Phono input	88A 1
SW1	Switch, On-Off	Part of R9
SW2	Switch, Radio-Phono	77A 16-4
	Diode Filter	63A 3-1

CABINET PARTS

Description	Part No.
Bracket, Dial Scale Mtg.	15A 169
Cabinet, Plastic	
Bottom Less Lid (Mahog. 6V12)	34D 11-12
Lid only (Mahogany 6V12)	34D 11-13
Bottom Less Lid (Ebony 6V11)	34D 11-14
Lid only (Ebony 6V11)	34D 11-15
Dial Scale, Glass	21B 35-2
Escutcheon Overlay	23C 23-1
Grille Cloth and Baffle	A1688
Hinge	37A8-1
Hinge Stud	27A17-1
Knobs, Radio	
"Volume" and "Tone" (Mahog.)	33A 21-7
"Volume" and "Tone" (Ebony)	33A 21-8
"Tuning" (Mahog.)	33B 34-6
"Tuning" (Ebony)	33B 34-8
"Radio-Phono" (Mahog.)	33B 34-5
"Radio-Phono" (Ebony)	33B 34-7
Rubber Strip, Dial Scale Mtg. (8½")	12A 9-3
Rubber Bumper (for Cabinet lid)	12A3-2
Stay Arm, Lid	37A9-1

MISCELLANEOUS

Background, Dial	22B 9-1
Bracket, Tuning Sleeve	15A 289
Bracket, Dial Light	15A 156
Cartons and Fillers	44B 112
Dial Cord	50A1-3
Pilot Light No. 47	81A 1-8
Pilot Light Socket and Leads	82A 2-4
Pointer, Dial	25A 21
Sleeve, Tuning (Brass)	27A 61
Spring, Dial Drum Tension	19B 1-3
Washer, Felt ("Volume" and "Tone")	5A 4-8
Washer, Felt ("Tuning" Knob)	5A 4-9

PHONOGRAPH PARTS

NOTE: Check Record Changer model number and see proper service manual for complete parts list.

M5	Cartridge (includes needles)	409A 11
	Needle, Phonograph	
	Long Play	98A 15-6
	Standard 78 RPM	98A 15-7
M6	Shielded Cable & Plug, Pickup	413A 11-1
M7	Plug, Pickup Shielded Cable	88A 2-3
SW3	Switch, Phono Motor On-Off (See caution in changer manual	408A 1
	Centerpost, for 10" and 12" records	G400B 311
	Centerpost, for 7" records	G400B 310

† Part of encased Diode Filter Unit 63A3-1. This unit consists of R3, C5, C18 (see schematic). If a section of the unit becomes defective, it may be replaced with an individual component.

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MODELS 6W11, 6W12; Ch. 6W1

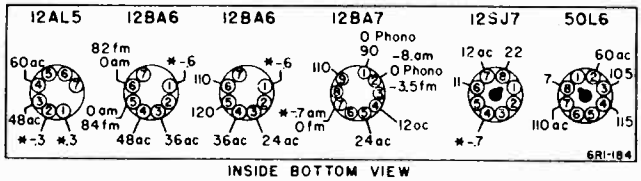
FM SERVICE

Much of FM service is similar to the usual service necessary for AM receivers such as voltage analysis, parts replacement, etc. The chief differences arise because of the considerably higher frequencies used in FM operation, and because of the different type of second detector needed in FM.

For a complete discussion of the FM Ratio Detector circuit used in this chassis, see Page 2 of the 9A1 Service Manual.

The higher frequencies involved means that more care must be exercised in location and length of leads. Leads tend to act as small inductances or capacities at high frequency and hence may appreciably alter the electrical characteristics of a circuit. For this reason, ground connections should always be maintained as originally made in the set. Also note that in certain circuits, the type by-pass condenser used is critical at the high FM frequencies. When replacing condensers it is important that they be replaced with condensers of identical capacity values, tolerances, temperature coefficients and construction. For example: C19 is a 100 mmfd ± 5%, — .00075 temperature coefficient, ceramic capacitor. If defective it should be replaced with a 100 mmfd ± 5%, — .00075 temperature coefficient, ceramic capacitor.

VOLTAGE DATA



INSIDE BOTTOM VIEW

* If taken with a 1000 ohm-per-volt meter, readings will be lower or zero.

- Voltages read between socket terminals and B minus (terminal of Off-On switch).
- Band switch in FM position unless otherwise indicated in chart.
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low frequency end.
- Voltages measured with Vacuum Tube Voltmeter. Readings taken with a 100 ohm-per-volt meter will be approximately the same except for those marked with an asterisk * in the voltage chart; these readings will either be lower or zero.

RESISTORS

Symbol	Description	Part No.
R1	470,000 Ohms, ¼ Watt	60B 2-474
R2	1,000 Ohms, ¼ Watt	60B 2-102
R3	22,000 Ohms, ¼ Watt	60B 2-223
R4	470 Ohms, ¼ Watt	60B 2-471
R5	470,000 Ohms, ¼ Watt	60B 2-474
R6	1,000 Ohms, ¼ Watt	60B 2-102
†R7	47,000 Ohms, ¼ Watt	
R8	220,000 Ohms, ¼ Watt	60B 2-224
R9	1,000 Ohms, ¼ Watt	60B 2-102
R10	390 Ohms, ¼ Watt	60B 2-391
R11	27,000 Ohms, ¼ Watt	60B 2-273
R12	6,800 Ohms, ½ Watt, 5%	60B 1-682
R13	6,800 Ohms, ¼ Watt, 5%	60B 1-682
R15	33 Ohms, 1 Watt	60B 14-330
R16	47 Ohms, 1 Watt	60B 14-470
R17	27,000 Ohms, ¼ Watt	60B 2-273
R18	2 Megohms Tone Control and ON-OFF Switch SW1	75B 1-12
R19	1 Megohm Volume Control (Tapped at 500,000 Ohms)	75B 2-12
R20	4.7 Megohms, ¼ Watt	60B 3-475
R21	1.8 Megohms, ¼ Watt	60B 3-185
R22	470,000 Ohms, ¼ Watt	60B 2-474
R23	47,000 Ohms, ¼ Watt	60B 2-473
R24	470,000 Ohms, ½ Watt	60B 2-474
R25	150 Ohms, ½ Watt	60B 8-151
‡R26	150,000 Ohms, ½ Watt	60B 2-154
R27	10 Ohms, ¼ Watt	60B 2-100

CONDENSERS

Symbol	Description	Part No.
C1	200 mmfd., Ceramic	65B 9-15
†C2	.0015 mfd., Ceramic	65B 9-63
‡C3	.005 mfd. min., Ceramic	65A 10-1
C4a, C4b, C4c, C4d	15 mmfd. (max.) FM RF; 485.8 mmfd. (max.) AM RF; 15 mmfd. (max.) FM Osc.; 142.6 mmfd. (max.) AM Osc. (Drum spot welded to gang)	A1814 Gang
C5	.01 mfd., 400 Volts, Paper	64B 1-25
C6	3-12 mmfd. Trimmer, Ceramic	66A 19-2
C7	50 mmfd., Ceramic	65B 6-4
C8	.005 mfd. min., Ceramic	65A 10-1
C9	35 mmfd., 10% Zero Temp. Coeff., Ceramic	65B 6-57
C10	.005 mfd., min., Ceramic	65A 10-1
C11	.005 mfd. min., Ceramic	65A 10-1
C12	.005 mfd. min., Ceramic	65A 10-1
C13	.005 mfd. min., Ceramic	65A 10-1
C14	.01 mfd. min., Ceramic	65A 10-3
‡C15	.005 mfd. min., Ceramic	65A 10-1
†C16	100 mmfd., Ceramic	
†C17	100 mmfd., Ceramic	
C18a, C18b	.004 mfd. min. } .004 mfd. min. } Dual Ceramic	65A 17-1
C19	100 mmfd. 5%, —.00075 Temp. Coeff., Ceramic	65B 6-7
C20	100 mmfd. 5%, —.00075 Temp. Coeff., Ceramic	65B 6-7
C21	4 mfd., 50 Volts, Elect.	67A 4-8
C22	.002 mfd., 600 Volts, Paper	64B 1-14
C23	.001 mfd., Ceramic	65B 9-31
C25	.005 mfd., 600 Volts, Paper	64B 1-12
C26	.002 mfd., 600 Volts, Paper	64B 1-14
C27	.01 mfd., 400 Volts, Paper	64B 1-25
C28	50 mmfd., Ceramic	65B 6-4
C29	.1 mfd., 200 Volts, Paper	64B 1-30
C30	.1 mfd., 200 Volts, Paper	64B 1-30
C31	.01 mfd., 400 Volts, Paper	64B 1-25
C32	.01 mfd., 400 Volts, Paper	64B 1-25
C33	.0015 mfd. min., Ceramic	65A 14-2
C34	.0015 mfd. min., Ceramic	65A 14-2
C35	.01 mfd., 400 Volts, Paper	64B 1-25
C37	.05 mfd., 200 Volts, Paper	64B 1-32
C38a, C38b	70 mfd., 150 Volts } 30 mfd., 150 Volts } Elect.	67C 6-40
‡C39	.1 mfd., 200 Volts, Paper	64B 1-30
‡C40	.01 mfd. min., Ceramic	65A 10-3
C41	.0015 mfd. min., Ceramic (Used only in sets with model numbers ending in "N".)	65A 14-2

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna, Loop (AM)	69B 73
L2	Coil, RF (FM)	69A 68
L3	Coil,, Oscillator (FM)	69A 69
L4	Coil, Oscillator (AM)	69A 20-3
L5	Choke, Cathode RF	AA139-5
L6	Choke, Heater RF	73A 2-3
L7	Choke, Heater RF	73A 2-3
L8	Choke, Filter	74A 15-2
‡L9	Coil, IF Trap Approx. 5 turns (18") of solid No. 22 hook-up wire wound on C39. Solder one end to inside foil lead of C39.	
L10	Antenna, Built in FM	AB155
T1	Transformer, 1st IF (FM)	72B 64
T2	Transformer, 2nd IF (FM)	72B 65
T3	Transformer, Ratio Detector	72B 39
T4	Transformer, 1st IF (AM)	72B 66
T5	Transformer, 2nd IF (AM)	72B 66
T6	Transformer, Output	79A 14-2
M1	Speaker 5" P.M. Dynamic	78B 39-1
M2	Socket and Leads, Phono-Motor	89A 6-1
M8	Socket, Phono input	88A1
SW1	Switch, On-Off	Part of R18
SW2	Switch, Band (FM, AM, Phono)	77B 22
	Diode Filter	63A3-1
	Rectifier, Selenium	93A 1-2

† Part of encased Diode Filter Unit 63A3-1. This unit consists of R7, C16, C17 (see schematic). If a section of the unit becomes defective, it may be replaced with a component of proper value.

‡ Used only in sets with model numbers ending in "UL".

PHONOGRAPH PARTS

NOTE: Check Record Changer model number and see proper service manual for complete parts list.

M5	Cartridge (includes needles)	409A 11
Needle, Phonograph (Long Play)		98A 15-6
Needle, Phonograph (Standard 78 RPM)		98A 15-7
M6	Shielded Cable & Plug, Pickup	413A 11-1
M7	Plug, Pickup Shielded Cable	88A 2-3
SW3	Switch, Phono Motor On-Off (See caution in Changer Manual)	408A 1
Centerpost, for 10" and 12" records		G400B 311
Centerpost, for 7" records		G400B 310

CABINET PARTS

Bracket, Dial Scale Mtg.	15A 169
Cabinet, Plastic	
Bottom, less Lid (Ebony 6W11)	34D 11-14
Bottom, less Lid (Mahog. 6W12)	34D 11-12
Lid only (Ebony 6W11)	34D 11-15
Lid only (Mahog. 6W12)	34D 11-13
Dial Scale, Glass	21B 51
Escutcheon Overlay	23C 23-2
Grille Cloth and Baffle	A1688
Hinge	37A 8-1
Hinge Stud	27A 17-1
Knobs, Radio	
"Volume" and "Tone" (Ebony 6W11)	33A 21-8
"Volume" and "Tone" (Mahog. 6W12)	33A 21-7
"Tuning" (Ebony 6W11)	33B 34-8
"Tuning" (Mahog. 6W12)	33B 34-6
"Radio-Phono" (Ebony 6W11)	33B 34-7
"Radio-Phono" (Mahog. 6W12)	33B 34-5
Rubber Bumper (for cabinet lid)	12A 3-2
Rubber Strip, Dial Scale Mtg. (8½")	12A 9-3
Spring Clip, FM Antenna Mtg.	19A 44
Stay Arm, Lid	37A 9-1

MISCELLANEOUS

Background, Dial	22B 9-2
Bracket, Tuning Sleeve	15A 289
Bracket, Dial Light	15A 369
Carton and Fillers	44B 112
Cover Plate, Chassis	15B 154
Dial Cord	50A 1-3
Pilot Light, Mazda No. 10C7	81A 2-2
Pilot Light, Socket and Leads	82A 9-1
Pointer, Dial	25A 21-1
Sleeve, Tuning (Brass)	27A 61
Spring, Dial Drum Tension	19B 1-3
Washer, Felt ("Volume" and "Tone")	5A 4-8
Washer, Felt (Center Knob)	5A 4-9

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MODELS 6W11, 6W12; Ch. 6W1

SETTING SIGNAL GENERATOR TO CENTER OF I.F. SELECTIVITY CURVE

CAUTION: Due to the difficulty of setting a signal generator to the accuracy required by this operation, extreme care must be exercised in making each setting. Otherwise, improper alignment of the ratio detector and consequent audio distortion will result.

EXAMPLE: (See Figures 1 and 2)

Voltage reading in Step 4a is + 1.5 volts.

Generator frequency on low side of 10.7 MC for a reading of + 1 volt DC = 10.640 MC.

Generator frequency on high side of 10.7 MC for a reading of + 1 volt DC = 10.800 MC.

Center frequency is obtained by adding 10.640 and 10.800, then dividing by 2. For these readings it will be 10.72 MC.

Set generator frequency to 10.72 MC as this is center of selectivity curve as shown in Figure 2.

Note: Numerical vernier dial readings may be used instead of MC.

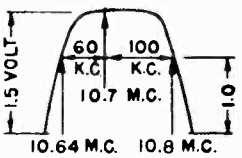


Fig. 1

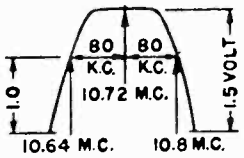


Fig. 2

TYPICAL SELECTIVITY CURVES

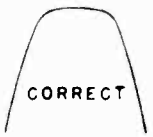


Fig. 3

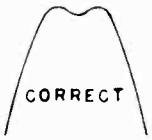


Fig. 4

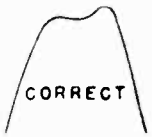


Fig. 5

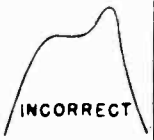


Fig. 6

FM RF ALIGNMENT PROCEDURE

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Connections	Adjust as Follows
6	Thru 270 ohm carbon resistor to high side FM antenna terminal	109 MC† (unmodulated).	Tuning gang wide open	Connect VTVM (DC probe) from point "W" to B minus ("Y"). See Fig. 7.	*G (osc.) for maximum VTVM reading.
7		102 MC† (unmodulated).	102 MC	"	*Tune in generator signal on receiver. Adj. H (ant.) for max. VTVM reading.

* It is advisable to adjust generator output so VTVM readings do not exceed approximately + 1.5 V. DC after peaking.
† If your signal generator does not reach this frequency, use harmonics as described in "FM Alignment Equipment."

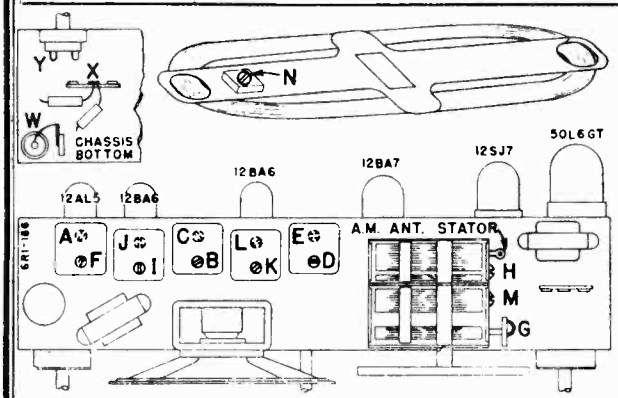
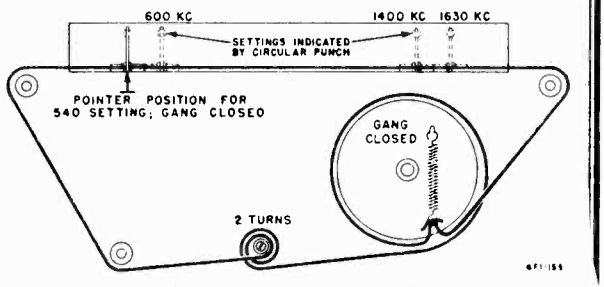


Fig. 7. Trimmer Location



With the gang fully closed, the tip of the pointer clip should be in line with the 1/16" circular punch at the extreme left end of the dial background.

Fig. 8. Dial Stringing and Pointer Setting

AM ALIGNMENT PROCEDURE

- Use regular output meter connected across speaker voice coil.
- Turn receiver Volume Control full on; Tone Control fully clockwise.
- AM loop antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use lowest output setting of signal generator that gives a satisfactory reading on meter.

	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
	Set Band Switch to Broadcast Position (center) and be sure to follow instructions under heading "Important Preliminary Alignment Steps." Loop antenna must be connected.				
1	Gang condenser antenna stator	.1 MFD	455 KC	Tuning gang wide open	I, J (2nd IF) K, L (1st IF)
2	AM Antenna Stator	Direct connection	1620 KC	Tuning gang wide open	M (oscillator)
	Install chassis and AM loop in cabinet.				
3	Place generator lead close to loop of set to obtain adequate signal. No actual connection (signal by radiation).		1400 KC	Tune in signal	N (antenna)

Note: Trimmer adjustments J and L made from underside of chassis.

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MODELS 6W11, 6W12; Ch. 6W1

IMPORTANT PRELIMINARY ALIGNMENT STEPS

Under normal operating conditions or use, misalignment of RF or IF circuits with age will be slight. Lack of sensitivity and poor tone quality may be due to causes other than alignment. Do not attempt to realign the receiver until all other possible causes have first been thoroughly investigated.

In FM alignment, it is essential that every step be followed. Especially important is picking the center of the IF curve (step 4 in the FM-IF alignment instructions). During this portion of the alignment it is necessary to tune the signal generator very carefully; it may necessitate having to estimate the dial readings to a tenth of a division.

If complete alignment is necessary, it is essential that proper sequence be followed as tabulated in the alignment chart. However, if only the AM band or a portion of the FM circuit are to be aligned, proceed from that point on the chart being sure to follow all remaining steps.

Adjustments made to FM-IF's at 10.7 MC, will require realignment of AM-IF slug adjustments.

Check pointer position. With tuning gang closed, the tip of the pointer clip should be over the 1/16" circular punch at the extreme left end of the dial background (see stringing diagram).

Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis.

Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.

FM I.F. AND RATIO DETECTOR ALIGNMENT

- Keep output indicator leads well separated from signal generator leads and chassis wiring.
- Band switch in FM position (fully to the left).
- While peaking IF's, keep reducing signal generator output so VTVM reading is approximately +1.5 volts DC with exception of Step #5.
- To avoid splitting the slotted head of iron core tuning slugs in the IF transformers, use a non-metallic alignment tool with a ⅛" wide screwdriver blade. Do not exert undue pressure as threads of slugs may strip.
- Speaker must be connected during alignment.
- FM antenna disconnected during alignment.

Before proceeding, be sure to follow all steps listed above, under "Important Preliminary Alignment Steps."

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Special Connections	Adjust as Follows (very carefully)
1	Thru .001 cond. to 2nd IF grid (pin #1 of 12BA6 2nd IF)	10.7 MC unmodulated.	Tuning gang wide open	Connect VTVM (DC probe) from point "W" to B minus ("Y"). (See Fig. 7.)	"A" (ratio detector primary) for maximum reading on VTVM.
2	**Thru .001 cond. to 1st IF grid (pin #1 of 12BA6 1st IF)	"	"	" "	Iron cores "B" and "C" (2nd IF trans.) for maximum reading on VTVM.
3	High side FM antenna terminal	"	"	" "	"D" and "E" (1st IF) for maximum on VTVM. Readjust A, B, C, D, E, for maximum. (Keep reducing generator output to keep VTVM at 1.5 volts)
4	"	a. Reduce output of signal generator until VTVM reads exactly +1.5 volts DC. b. Tune generator frequency above 10.7 MC until VTVM reads exactly +1.0 volt. Note exact generator frequency. Extreme care in reading this is essential. c. Tune generator frequency below 10.7 MC until VTVM reads exactly +1.0 volt. Note exact generator frequency. Extreme care in reading this is essential. d. Add generator frequency in step c to generator frequency in step b and divide by 2. The result is the center frequency of the IF curve to be used in step 5. See example on next page. e. Tune generator frequency above and below 10.7 MC and note voltage reading on VTVM at different frequency points until you have a good impression of the shape of the selectivity curve. If you have two peaks as in Figures 5 or 6, note readings (voltage) of both peaks. If one peak is over 20% higher than the other one, it will be necessary to realign IF's. A selectivity curve that would require realignment is illustrated by Figure 6.			
5	"	Center of IF selectivity curve per step 4d above. See "EXAMPLE" on next page.	Tuning gang wide open	Connect VTVM (DC probe) from point "X" to B minus ("Y"). (See Fig. 7.)	Iron core "F" (ratio detector secondary) for zero voltage reading on VTVM. (The correct zero point is located between a positive and a negative maximum.)

If any adjustments were very far off, it is desirable to repeat steps 3, 4 and 5.

**Do not feed I.F. signal into converter grid as this will cause mis-alignment.

Note: Trimmer adjustments A, C, and E made from underside of chassis.

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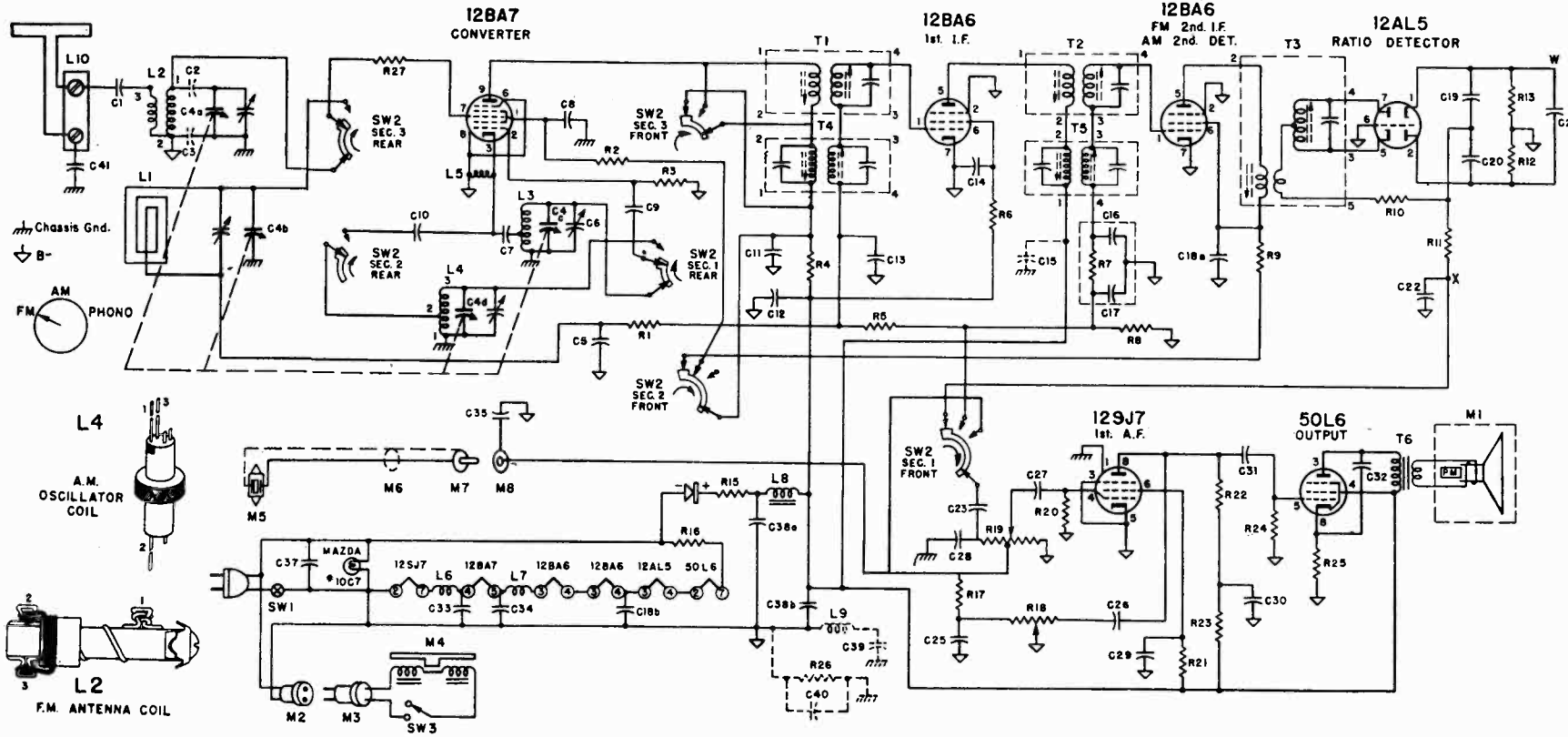

FM ALIGNMENT EQUIPMENT

This chassis should be aligned only with an AM signal generator and a vacuum tube voltmeter. Any standard brand vacuum tube voltmeter with a DC scale of not over 5 volts is suitable. A 3-volt zero center scale is desirable. A signal generator with a frequency range up to 110 MC. is desirable. It is possible however, to align the receiver with a signal generator going to 20 or 30 megacycles, by using the harmonics of these lower frequencies. To do this merely set the signal generator dial as follows and align exactly as explained in the alignment instructions.

Where alignment chart specifies 109 MC., set signal generator to highest available frequency of the following:

109. MC	27.25 MC
54.50 MC	21.80 MC
36.33 MC	18.17 MC

Where alignment chart specifies 102 MC., set signal generator to highest available frequency of the following:

102. MC	25.50 MC
51. MC	20.40 MC
34. MC	17. MC

Signal generators which do not tune to 110 MC or whose harmonics are not strong enough, cannot be used for FM alignment.

CAUTION

Do not connect a ground wire to this radio chassis.

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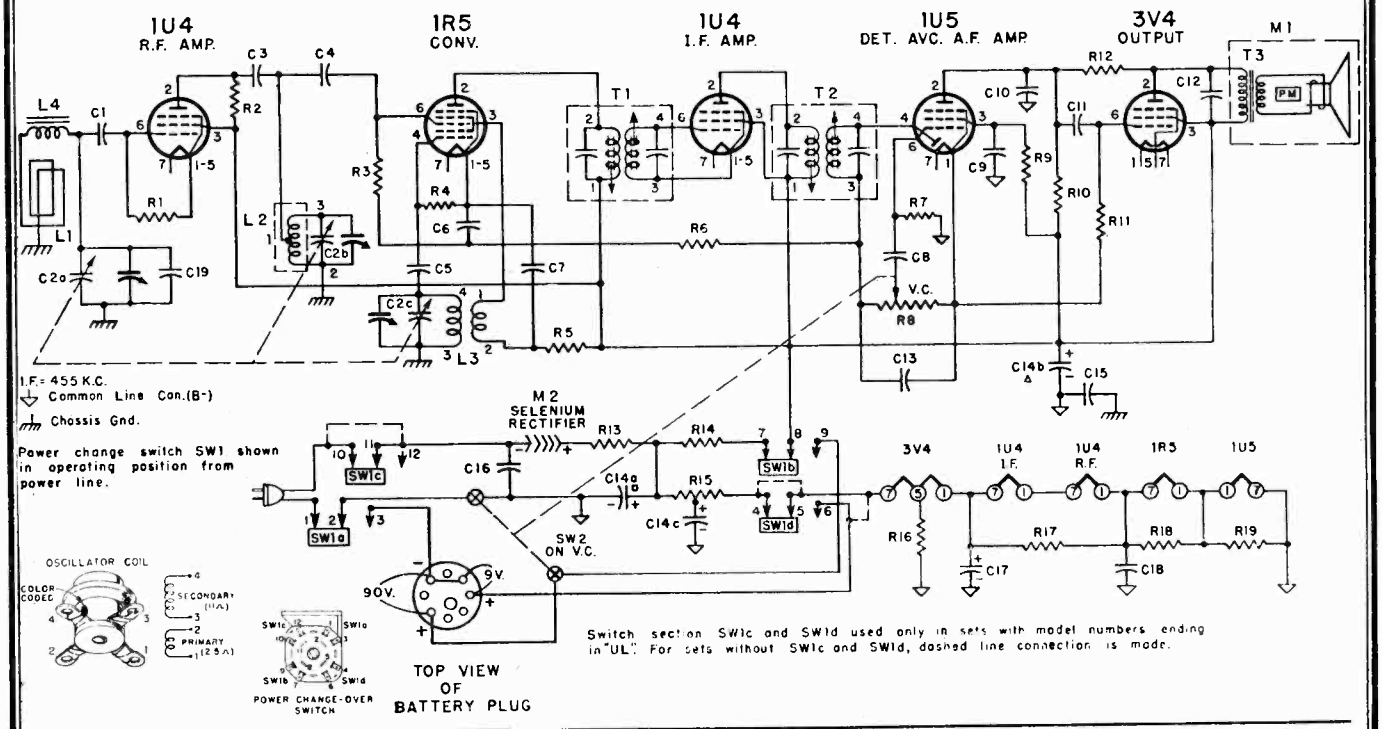
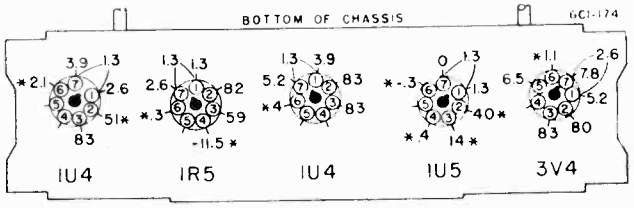
MODELS 6Y18, 6Y19; Ch. 6Y1



VOLTAGE DATA

- Voltage readings taken between tube socket terminals and B minus (metal shell of electrolytic condenser), unless otherwise shown.
- Dial set to low frequency, no signal, and volume control minimum.
- Measurements made from 117 volts AC line. If measured from DC line, voltages may be slightly lower.
- Voltage readings taken with a vacuum tube voltmeter. Socket terminals marked with an asterisk * indicate much lower voltage or zero voltage if measured with a 1000 ohm-per-volt meter.
- If measurements are made on battery operation, tube filament and B plus voltages will vary with the condition of the batteries. These voltages will equal the terminal voltage of the A or B battery less the voltage drop through components.



*If taken with a 1000 ohm-per-volt meter, readings will be lower or zero.

RESISTORS

Symbol	Description	Part No.
R1	2.2 Megohms, ½ Watt	60B 8-225
R2	27,000 Ohms, ½ Watt	60B 8-273
R3	1 Megohm, ½ Watt	60B 8-105
R4	100,000 Ohms, ½ Watt	60B 8-104
R5	8,200 Ohms, ½ Watt	60B 8-822
R6	3.3 Megohms, ½ Watt	60B 8-335
R7	10 Megohms, ½ Watt	60B 8-106
R8	1 Megohm, Volume Control and On-Off Switch	75B 1-26
R9	4.7 Megohms, ½ Watt	60B 8-475
R10	470,000 Ohms, ½ Watt	60B 8-474
R11	2.2 Megohms, ½ Watt	60B 8-225
R12	5.6 Megohms, ½ Watt	60B 8-565
R13	47 Ohms, 1 Watt	60B 14-470
R14	2,700 Ohms, 1 Watt	60B 14-272
R15	2,400 Ohms, 2.5 Watt Center-tapped Candohm	61A 5-3
R16	1,500 Ohms, ½ Watt	60B 8-152
R17	820 Ohms, ½ Watt	60B 8-821
R18	220 Ohms, ½ Watt	60B 8-221
R19	150 Ohms, ½ Watt	60B 8-151

CONDENSERS

Symbol	Description	Part No.
C1	250 mmfd., Ceramic	65B 6-5
C2a	Gang, 420.0 mmfd. (max.) Ant. Section	
C2b	Gang, 193.8 mmfd. (max.) RF Section	68B 10
C2c	Gang, 90.0 mmfd. (max.) Osc. Section	
C3	105 mmfd., Ceramic	65B 6-9
C4	250 mmfd., Ceramic	65B 6-5
C5	105 mmfd., Ceramic	65B 6-9
C6	.05 mfd., 200 Volts, Paper	64B 1-32
C7	.001 mfd. min., Ceramic	65B 6-41
C8	.005 mfd., 600 Volts, Paper	64B 1-12
C9	.05 mfd., 200 Volts, Paper	64B 1-32
C10	105 mmfd., Ceramic	65B 6-9
C11	.005 mfd., 600 Volts, Paper	64B 1-12
C12	.001 mfd. min., Ceramic	65B 6-41
C13	250 mmfd., Ceramic	65B 6-5
C14a	30 mfd., 150 Volts	
C14b	40 mfd. 150 Volts Elect.	67C 7-52
C14c	20 mfd., 150 Volts	
C15	.18 mfd., 200 Volts, Paper	64A 2-2
	Note: In sets with model numbers ending in "UL", C15 is .1 mfd., 400 V.	
C16	.05 mfd. 400 Volts, Paper	64B 1-22
C17	100 mfd., 25 Volts, Elect.	67A 4-6
C18	.25 mfd., 200 Volts, Paper	64B 1-28
C19	15 mmfd., 500 Volts, Ceramic	65B 6-18

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna, Loop	(Part of Cabinet)
L2	Coil, RF	69B 58
L3	Coil, Oscillator	69A 57
L4	Coil, Antenna Loading	69A 45-1
T1	Transformer, 1st IF	72B 55
T2	Transformer, 2nd IF	72B 56
T3	Transformer, Output	98A 21
M1	Speaker (4"x6" PM) and Output Transformer	78B 38-1
M2	Rectifier, Selenium	93A 1-4
SW1	Switch, Power Change DPDT, for "N" models	77A 19-2
	4PDT, for "UL" models	77A 19-1
SW2	Switch, On-Off (DPST)	(Part of R8)

MISCELLANEOUS

Description	Part No.
Bracket, Plastic Handle (6Y18)	98A 14-10
Bracket, Leather Handle (6Y19)	98A 14-9
Cabinet (Complete)	
Fabric Covered (6Y18)	35D 97-1
Leather Covered (6Y19)	35D 97-2
Carton and Fillers	44B 135
Caster skid (Bottom of Cabinet)	98A 14-1
Catch, Front Door (with monogram)	37B 19-2
Catch, Rear door (male)	98A 14-3
Catch, Rear door (female)	98A 14-4
Escutcheon, Dial and Grille	23D 33-3
Fibre Strip (for mounting rear door female catch)	32A 32
Grommet, Gang Mounting	12A 1-2
Grommet Spacer (for 12A1-2)	29A 2-1-71
Handle, Plastic (6Y18)	98A 14-2
Handle, Leather (6Y19)	98A 14-8
Hinge, Rear Door (2 required)	98A 14-7
Hinge, Front Door	98A 14-6
Knob	
Off-Volume	33B 35-1
Tuning	33B 35-2
Latch, Front Door	37B 19-6
Mounting Plate, Chassis (Metal)	15C 301
Mounting Plate, Electrolytic	67A 2-1
Plug, Battery	88A 3-3
Pointer, Dial	25A 32-1
Snap Button (2 required)	13A 1-1-71
Terminal Strip, Antenna	10A 25
Tube Socket	87A 3-4

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MODELS 6Y18, 6Y19; Ch. 6Y1

ALIGNMENT PROCEDURE

- Use battery power for alignment if fresh batteries are available.
- When using AC power, an isolation transformer should be used if available. If not using an isolating transformer, connect a .1 mfd. condenser in series with the signal generator low side to B minus of radio chassis.
- Connect loop antenna and maintain same relative position as when in cabinet.
- Set volume control full on.
- Connect output meter across speaker voice coil.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined below.
- Repeat adjustments to insure good results.

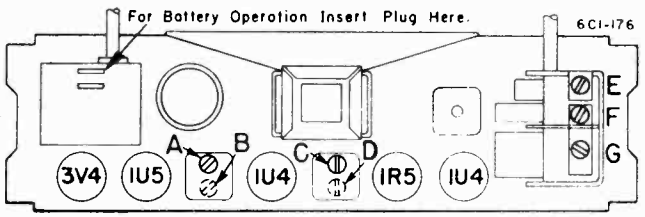
NOTE

To avoid splitting the slotted head of powdered iron core tuning slugs in I.F. transformer, use an alignment tool with a screw driver blade ⅛" wide.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	.001 mfd. when using AC .1 mfd. when using Battery	Grid of 1R5 (Pin 6)	455 KC	Gang fully open	2nd IF 1st IF	A, B C, D (see note below)	Maximum output
2	.001 mfd. when using AC .1 mfd. when using Battery	Tuning condenser, antenna stator	1620 KC	Gang fully open	Oscillator (on gang)	E	Maximum output
3	.001 mfd. when using AC .1 mfd. when using Battery	Tuning condenser, antenna stator	1400 KC	Tune in generator signal	R. F. (on gang)	F	Maximum output
Install chassis in cabinet. Mount dial pointer. Set pointer at 1400 K.C. with gang condenser tuned to 1400 K.C. signal.							
4	Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal.	No physical connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna (on gang)	G	Maximum output

NOTE: Adjustments B and D are made from underside of chassis.

TUBE AND TRIMMER LOCATION



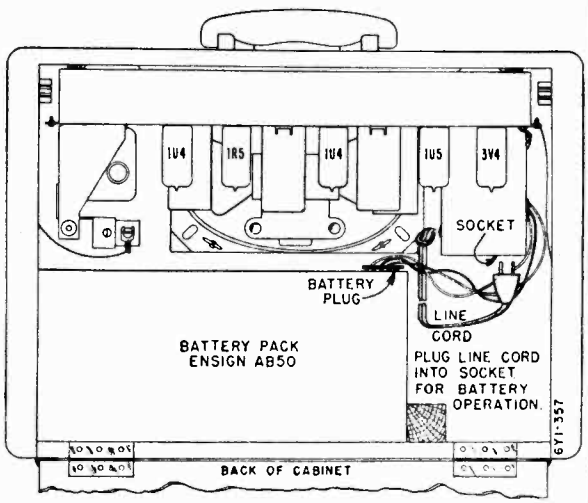
REPLACEMENT OF BATTERY PACK

Replace A-B battery pack with Ensign type AB50 pack, Ray-O-Vac AB994, General 60A-6F6-5, Burgess F6A60 or other equivalent.

Electrical characteristics of the recommended battery packs provide for equal life for both the A and B sections. The A section may give satisfactory performance as low as 6.6 volts, the B section as low as 60 volts. Replace battery pack when reception is weak and voltage has dropped below values given above.

To install a replacement battery pack, merely open the back of the cabinet, pull out the battery plug and slide out the run-down battery pack.

Slip a new battery pack into place, plug in the battery plug.



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RADIO TILT-OUT DOOR ADJUSTMENT

If the door on the radio tilt-out assembly is shifted to one side, readjustment of the tilt-out arm will correct the difficulty. If the tilt-out door is too far to the right, the right-hand tilt-out arm can be sprung. If the door is too far to the left, the left-hand arm can be sprung. The tilt-out arms are sprung by holding the lower end of the arm against its bracket and prying the arm toward the chassis with a screwdriver. The screwdriver is used as a lever between the tilt-out arm and the side of the radio compartment.

In the event that the bottom edge of the radio tilt-out door rubs, it can be planed off slightly. Care must be exercised in doing this in order that the door is not marred. Hold the plane flat against the beveled bottom edge of the door while planing off a small amount.

ALIGNMENT PROCEDURE

FM ALIGNMENT EQUIPMENT

The model 8D1 chassis should be aligned only with an AM signal generator and a vacuum tube voltmeter. Any standard brand vacuum tube voltmeter with a DC scale of not over 5 volts is suitable. A 3-volt zero center scale is desirable. A signal generator with a frequency range up to 110 MC. is desirable. It is possible however, to align the receiver with a signal generator going to 20 or 30 megacycles, by using the harmonics of these lower frequencies. To do this merely set the signal generator dial as follows and align exactly as explained in the alignment instructions.

Where alignment chart specifies 109 *MC.*, set signal generator to highest available frequency of the following:

109. MC	27.25 MC
54.50 MC	21.80 MC
36.33 MC	18.17 MC

Where alignment chart specifies 102 *MC.*, set signal generator to highest available frequency of the following:

102. MC	25.50 MC
51. MC	20.40 MC
34. MC	17. MC

Signal generators which do not tune to 110 MC or whose harmonics are not strong enough, cannot be used for FM alignment.

POINTER SETTING

With the gang closed, the pointer should be at the position as shown in the stringing diagram (Fig. 4), that is, the bottom edge of the pointer should line up with the top of the "MC" lettering on the dial scale. If the pointer is in a different position, move it by hand while keeping the gang closed.

TRIMMER IDENTIFICATION CHART

Trimmer Symbol		Function
A	T3	Ratio Detector transformer
B	T2	2nd IF transformer (FM)
C	T2	2nd IF transformer (FM)
D	T1	1st IF transformer (FM)
E	T1	1st IF transformer (FM)
F	T3	Ratio Detector transformer
G	C38	FM oscillator trimmer
H	C5b	FM RF trimmer
I	T5	2nd IF transformer (AM)
J	T5	2nd IF transformer (AM)
K	T4	1st IF transformer (AM)
L	T4	1st IF transformer (AM)
M	C5d	AM oscillator trimmer
N	C5a	AM antenna trimmer

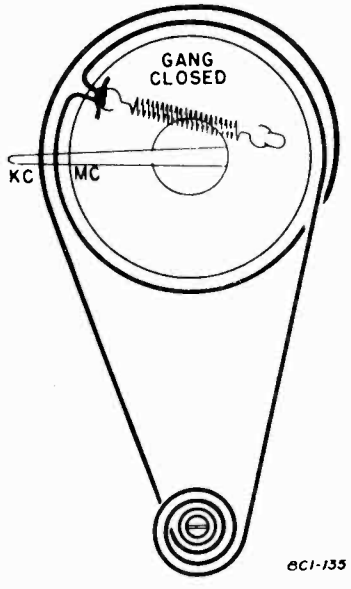

Fig. 4. Stringing Diagram

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MODELS 8D15, 8D16; Ch. 8D1

SETTING SIGNAL GENERATOR TO CENTER OF I.F. SELECTIVITY CURVE

CAUTION: Due to the difficulty of setting a signal generator to the accuracy required by this operation, extreme care must be exercised in making each setting. Otherwise, improper alignment of the ratio detector and consequent audio distortion will result.

EXAMPLE: (See Figures 5 and 6)

Voltage reading in Step 4a is + 1.5 volts.

Generator frequency on low side of 10.7 MC for a reading of + 1 volt DC = 10.640 MC.

Generator frequency on high side of 10.7 MC for a reading of + 1 volt DC = 10.800 MC.

Center frequency is obtained by adding 10.640 and 10.800, then dividing by 2. For these readings it will be 10.72 MC.

Set generator frequency to 10.72 MC as this is center of selectivity curve as shown in Figure 6.

Note: Numerical vernier dial readings may be used instead of MC.

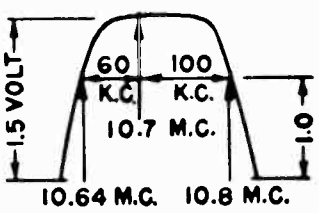

Fig. 5

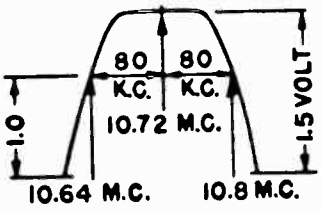

Fig. 6

TYPICAL SELECTIVITY CURVES

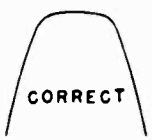

Fig. 7.

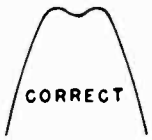

Fig. 8.

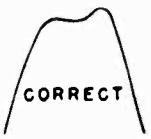

Fig. 9.

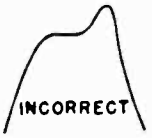

Fig. 10.

FM RF ALIGNMENT PROCEDURE

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Connections	Adjust as Follows
6	FM ant. terminal.	109 MC† (unmodulated).	Tuning gang wide open	Connect VTVM (DC probe) from point "W" to ground.	*G for maximum VTVM reading.
7	"	102 MC† (unmodulated).	102 MC	"	*Tune in generator signal on receiver. Adjust H for max. VTVM reading

* It is advisable to adjust generator output so VTVM readings do not exceed approximately + 1.5 V. DC after peaking.
† If your signal generator does not reach this frequency, use harmonics as described in "FM Alignment" on page 3.

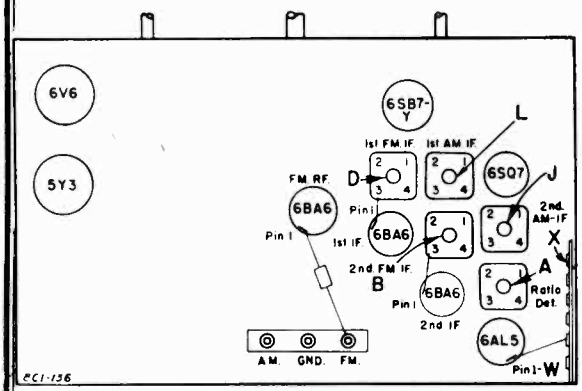

Fig. 11. Bottom Trimmer Location

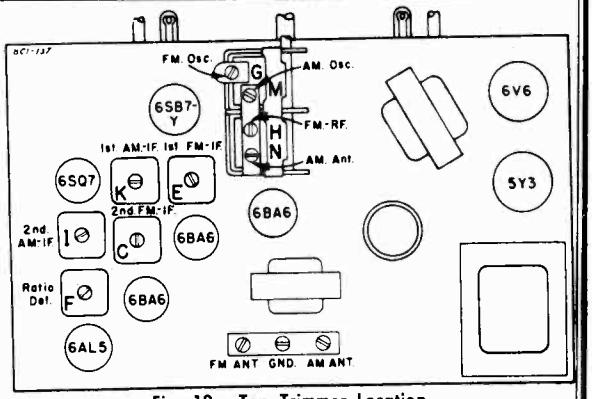

Fig. 12. Top Trimmer Location

AM ALIGNMENT PROCEDURE

- Use regular output meter connected across speaker voice coil.
- Turn receiver Volume Control full on; Tone Control full treble.
- Band Switch in center position.
- Use lowest output setting of signal generator that gives a satisfactory reading on meter.

	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
	Set Band Switch to Broadcast Position (center) and be sure to follow instructions under heading "Important Preliminary Alignment Steps." Loop antenna can be disconnected from chassis in Steps 1 and 2.				
1	6SB7-Y (Pin #8)	.1 MFD	455 KC	Tuning gang wide open	I, J, K, L
2	To loop ant. terminal	Direct connection	1620 KC	Tuning gang wide open	M
	Set Receiver Chassis on table next to back of cabinet. Connect Loop Antenna to Receiver.				
3	Place generator lead close to loop of set to obtain adequate signal. No actual connection (signal by radiation).		1400 KC	Tune in signal	N

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MODELS 8D15, 8D16; Ch. 8D1

IMPORTANT PRELIMINARY ALIGNMENT STEPS

In FM alignment, it is essential that every step be followed. Especially important is picking the center of the I.F. curve (step 4 in the FM-I.F. alignment instructions). During this portion of the alignment it is necesary to tune the signal generator very carefully; it may necessitate having to estimate the dial readings to a tenth of a division.

- Check the set screws that hold the tuning drum to the shaft to see that they are tight and that the drum has not slipped on the shaft. The correct position of the drum can be seen in the stringing diagram.
- With the gang closed, the pointer should be at the position as shown in the stringing diagram, that is, the bottom edge of the pointer should line up with the top of the "MC" lettering on the dial scale. If the pointer is in a different position, move it by hand while keeping the gang closed.
- Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.

FM I.F. AND RATIO DETECTOR ALIGNMENT

- Keep output indicator leads well separated from signal generator leads and chassis wiring.
- Band switch in FM position (fully to the left).
- While peaking IF's, keep reducing signal generator output so VTVM reading is approximately +1.5 volts DC with exception of Step #5.
- Speaker must be connected during alignment.
- FM antenna disconnected during alignment.

I.F. SLUG INFORMATION

To avoid splitting the slotted head of the powdered iron core tuning slug in the I.F. transformers, use a screw-driver with a blade ⅛" wide for I.F. alignment.

Under normal operating conditions, mis-alignment of slug-tuned circuits with age is slight. Therefore, re-alignment of the I.F. transformers should be accomplished by only a slight adjustment of the slugs.

Before proceeding, be sure to follow all steps listed above, under "Important Preliminary Alignment Steps."

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Special Connections	Adjust as Follows (very carefully)
1	Thru .001 cond. to pin # 1 of 6BA6 RF amplifier**	10.7 MC unmodulated.	Tuning gang wide open	Connect VTVM (DC probe) from point "W" to ground. (See Fig. 11.)	"A" (ratio detector primary) for maximum reading on VTVM.
2	"	"	"	" "	Iron cores "B" and "C" (2nd IF trans.) for maximum reading on VTVM.
3	"	"	"	" "	Iron cores "D" and "E" for maximum on VTVM. Re-adjust A, B, C, D, E, for maximum. (Keep reducing generator output to keep VTVM at 1.5 volts).
4	"	a. Reduce output of signal generator until VTVM reads exactly +1.5 volts DC. b. Tune generator frequency above 10.7 MC until VTVM reads exactly +1.0 volt. Note exact generator frequency. Extreme care in reading this is essential. c. Tune generator frequency below 10.7 MC until VTVM reads exactly +1.0 volt. Note exact generator frequency. Extreme care in reading this is essential. d. Add generator frequency in step c to generator frequency in step b and divide by 2. The result is the center frequency of the IF curve to be used in step 5. See example on next page. e. Tune generator frequency above and below 10.7 MC and note voltage reading on VTVM at different frequency points until you have a good impression of the shape of the selectivity curve. If you have two peaks as in Figures 9 or 10, note readings (voltage) of both peaks. If one peak is over 20% higher than the other one, it will be necessary to realign IF's. A selectivity curve that would require realignment is illustrated by Figure 10.			
5	"	Center of IF selectivity curve per step 4d above. See "EXAMPLE" on next page.	Tuning gang wide open	Connect VTVM (DC probe) from point "X" to ground. (See Fig. 11.)	Iron core "F" (ratio detector secondary) for zero voltage reading on VTVM. (The correct zero point is located between a positive and a negative maximum.)

If any adjustments were very far off, it is desirable to repeat steps 3, 4 and 5.

**Do not feed I.F. signal into converter grid as this will cause mis-alignment.

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MODELS 8D15, 8D16; Ch. 8D1

FM SERVICE

Much of FM service is similar to the usual service necessary for AM receivers such as voltage analysis, parts replacement, etc. The chief differences arise because of the considerably higher frequencies used in FM operation, and because of the different type of second detector needed in FM.

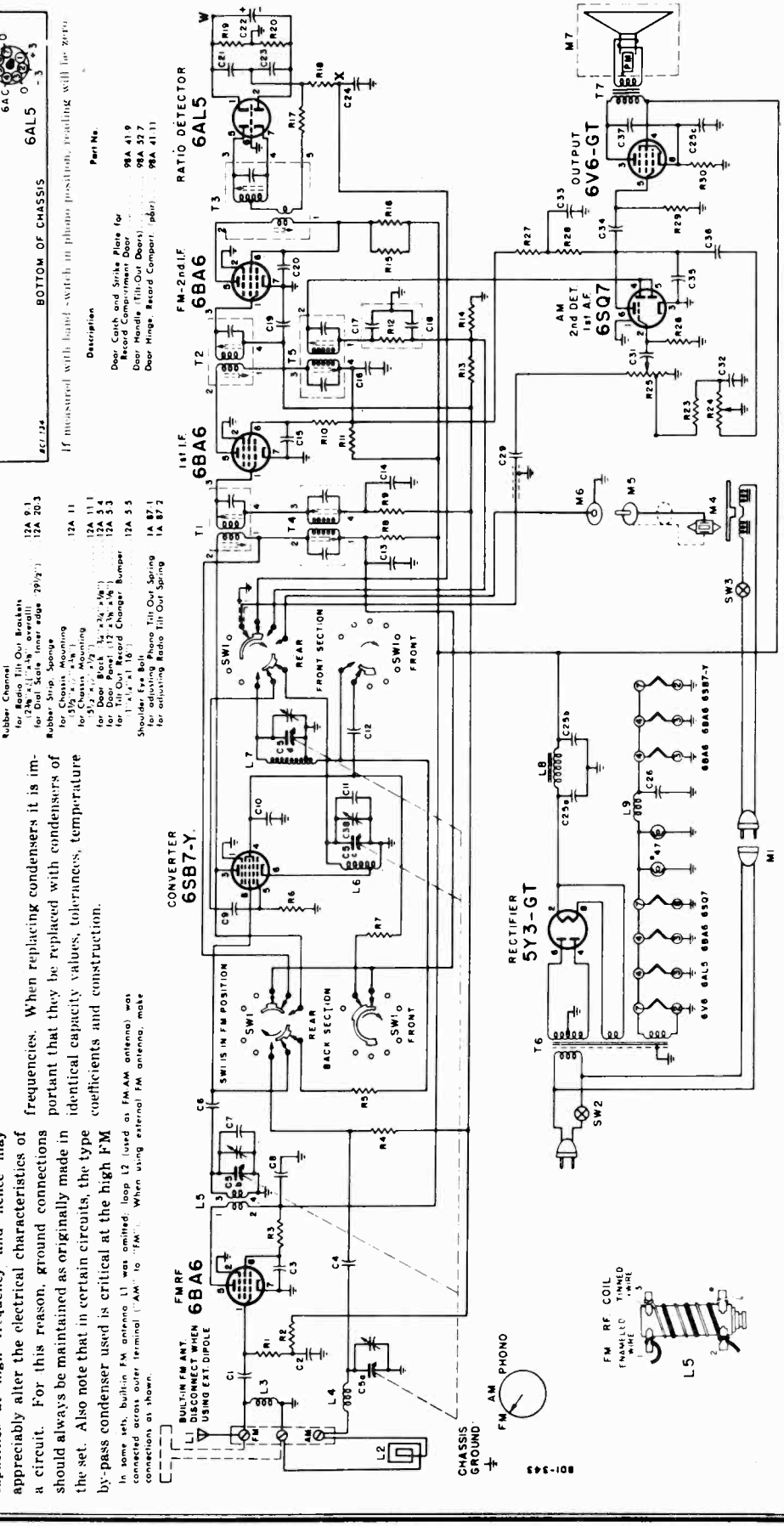
The higher frequencies involved means that more care must be exercised in location and length of leads. Leads tend to act as small inductances or capacities at high frequency and hence may appreciably alter the electrical characteristics of a circuit. For this reason, ground connections should always be maintained as originally made in the set. Also note that in certain circuits, the type by-pass condenser used is critical at the high FM frequencies. When replacing condensers it is important that they be replaced with condensers of identical capacity values, tolerances, temperature coefficients and construction.

In some sets, built-in FM antenna L1 was omitted. Loop L2 (used as FM AM antenna) was connected across outer terminal ("AM" to "FM"). When using external FM antenna, make connections as shown.

MISCELLANEOUS

Description	Part No.
Bracket, Shipping Retainer	15A 379
Plate, Cover (Chassis Mtg.)	15A 146
Socket, Miniature Tube	87A 3 4
Socket, Octal	87A 5 1
Strap, Shipping (for Changer Tilt-Out)	15C 193
Strap, Shipping (for Radio Tilt-Out)	15A 178
Terminal Board (Mounted on cabinet)	10B 3 5
Door Knob, Record Storage Compart.	98A 32 5
Grille Cloth (2 pieces)	98A 32 6
Grommet, Rubber	
for mounting Chassis	12A 1 11
for Changer Tilt-Out	12A 1 1
Knobs, Radio	
"FM BC PH"	33B 31 1
"Tuning"	33B 31 2
"Volume" and "On Off Tone"	33A 13 4
Rubber Channel	
for Radio Tilt-Out Brackets (2¾" x ¼" x ¼" overall)	12A 9 1
for Dial Scale Inner edge (29½")	12A 20 3
Rubber Strip, Sponge	
for Chassis Mounting (5½" x ½" x ½")	12A 11
for Chassis Mounting (5½" x ½" x ¼")	12A 11 1
for Door Block (1¾" x ¾" x ¼")	12A 5 4
for Door Panel (12 ¼" x ¾")	12A 5 3
for Tilt-Out Record Changer Bumper (1¼" x ¼" x ¼")	12A 5 5
Shoulder Eye Bolt	
for adjusting Phono Tilt-Out Spring	1A 87 1
for adjusting Radio Tilt-Out Spring	1A 87 2

Description	Part No.
Spring, Hairpin (Radio Tilt-Out)	19A 2 5
Spring, Tilt-Out Mechanism Adjusting	
for Phono	19A 15 1
for Radio	19A 13 2
Spring, Clamping (for holding extra centerpull)	84A 6
Tie Bar, Tilt-Out Mechanism	
for Phono	15B 126
for Radio	15B 160 2
Transmission Line, 4-wire (107" length) AM Antenna	95A 24 2
Washer, Felt (Radial)	
for "FM BC PH-Tuning" Knobs	5A 4 8
for "Volume & "On Off Tone" Knobs	5A 4 2
Washer, Fibre (Antenna Mtg.)	5A 1 1



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MODELS 8D15, 8D16; Ch. 8D1

RESISTORS

Symbol	Description	Part No.
R1	390 Ohms, ½ Watt	60B 8-391
R2	470,000 Ohms, ½ Watt	60B 8-474
R3	22,000 Ohms, 1 Watt	60B 14-223
R4	1 Megohm, ½ Watt	60B 9-105
R5	47,000 Ohms, ½ Watt	60B 8-473
R6	47,000 Ohms, ½ Watt	60B 8-473
R7	15,000 Ohms, 2 Watt	60B 20-153
R8	470 Ohms, ½ Watt	60B 8-471
R9	470,000 Ohms, ½ Watt	60B 8-474
R10	27,000 Ohms, 1 Watt	60B 14-273
R11	470 Ohms, ½ Watt	60B 8-471
*R12	47,000 Ohms, ¼ Watt	
R13	220,000 Ohms, ½ Watt	60B 8-224
R14	220,000 Ohms, ½ Watt	60B 8-224
R15	15,000 Ohms, 2 Watt	60B 20-153
R16	27,000 Ohms, ½ Watt	60B 8-273
R17	390 Ohms, ½ Watt	60B 8-391
R18	27,000 Ohms, 1 Watt	60B 14-273
R19	6,800 Ohms, ½ Watt, 5%	60B 7-682
R20	6,800 Ohms, ½ Watt, 5%	60B 7-682
R23	47,000 Ohms, ½ Watt	60B 8-473
R24	2 Megohms Tone Control (Includes ON-OFF Switch SW2)	75B 1-24
R25	1 Megohm Volume Control (Tapped at 500,000 Ohms)	75B 2-10
R26	10 Megohms, ½ Watt	60B 9-106
R27	22,000 Ohms, ½ Watt	60B 8-223
R28	470,000 Ohms, ½ Watt	60B 8-474
R29	470,000 Ohms, ½ Watt	60B 8-474
R30	390 Ohms, 1 Watt	60B 14-391

CONDENSERS

Symbol	Description	Part No.
C1	100 mmfd., Ceramic	65B 6-3
C2	.01 mfd., 400 Volts, Paper	64B 1-25
C3	.0015 mfd., "Hi-K" Ceramic	65A 14-1
C4	140 mmfd., 3%, Silver Mica	65B 1-26
C5a	486 mmfd. (max.), AM RF	Gang Cond. 68B 16
C5b	15 mmfd. (max.), FM RF	
C5c	15 mmfd. (max.), FM Osc.	
C5d	143 mmfd. (max.), AM Osc.	
C6	22 mmfd., 5%, Zero Temp. Coeff., Ceramic	65B 6-47
C7	7 mmfd., ±1 mmfd., —.00047 Temp. Coeff., Ceramic	65B 6-45
C8	.01 mfd., 400 Volts, Paper	64B 1-25
C9	35 mmfd., 5%, Zero Temp. Coeff., Ceramic	65B 6-46
C10	100 mmfd., Mica	65B 7-17
C11	7 mmfd., ±1 mmfd., —.00047 Temp. Coeff., Ceramic	65B 6-45
C12	.0015 mfd., "Hi-K" Ceramic	65A 14-1
C13	.01 mfd., 400 Volts, Paper	64B 1-25
C14	.01 mfd., 400 Volts, Paper	64B 1-25
C15	.005 mfd. min., Ceramic (Disc)	65A 10-1
C16	.01 mfd.. 400 Volts, Paper	64B 1-25
*C17	100 mmfd., Ceramic	
*C18	100 mmfd., Ceramic	

*Part of encased Diode Filter Unit 63A3-1. This unit consists of R12, C17, C18 (see schematic). If a section of the unit becomes defective, replace with exact duplicate or individual components of proper value.

Symbol	Description	Part No.
C19	.01 mfd., 400 Volts, Paper	64B 1-25
C20	.005 mfd. min., Ceramic (Disc)	65A 10-1
C21	105 mmfd., 5%, —.00075 Temp. Coeff., Ceramic	65B 6-9
C22	4 mfd., 150 Volts, Electrolytic	67A 4-2
C23	105 mmfd., 5%, —.00075 Temp. Coeff., Ceramic	65B 6-9
C24	.002 mfd., 600 Volts, Paper	64B 1-14
C25a	30 mfd., 350 Volts	Elect. 67C 6-25
C25b	30 mfd., 350 Volts	
C25c	20 mfd., 25 Volts	
C26	.01 mfd., 400 Volts, Paper	64B 1-25
C29	.005 mfd., 600 Volts, Paper	64B 1-12
C31	.005 mfd., 600 Volts, Paper	64B 1-12
C32	.01 mfd., 400 Volts, Paper	64B 1-25
C33	.1 mfd., 400 Volts, Paper	64B 1-20
C34	.01 mfd., 400 Volts, Paper	64B 1-25
C35	200 mmfd., 20%, Ceramic	65B 7-21
C36	.01 mfd., 400 Volts, Paper	64B 1-25
C37	.005 mfd., 600 Volts, Paper	64B 1-12
C38	2½ to 6 mmfd., Trimmer, Silver Ceramic	66A 24-2

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna, FM (90" of #22 wire)	
L2	Antenna, Loop (AM)	95A 24-2
L3	Choke, RF	AB103-33
L4	Coil, Loop Loading (AM)	69A 56
L5	Coil, RF (FM)	69A 55
L6	Coil, Oscillator (FM)	69A 54
L7	Coil, Oscillator (AM)	69A 20-1
L8	Choke, Filter	74A 10
L9	Choke, Filament	
	Approx. 10 turns (18") of solid #22 hook-up wire wound on C26. Solder one end to inside foil lead of C 26.	
T1	Transformer, 1st IF (FM)	72B 37
T2	Transformer, 2nd IF (FM)	72B 38
T3	Transformer, Ratio Detector	72B 39
T4	Transformer, 1st IF (AM)	72B 54
T5	Transformer, 2nd IF (AM)	72B 49
T6	Transformer, Power	80B 5
T7	Transformer, Output	79A 9
M7	Speaker 10" P.M. Dynamic	78B 28
SW1	Switch, Band (FM, AM, Phono)	77B 18
SW2	Switch, Power	Part of R24
SW3	Switch, Phono Motor (see Record Changer Manual)	
	Diode Filter (consists of R12, C17 and C18)	63A 3-1

DIAL PARTS

Description	Part No.
Dial Bulb, #47	81A 1-8
Dial Bulb Socket (with leads)	82A 8-3
Dial Cord (18")	50A 1-3
Dial Escutcheon and window (Radio)	23D 29-3
Dial Pointer, Plastic	A1685
Dial Scale Assembly	A1676
Drum and Hub Assembly	A1318
Rubber Channel (Inner edge of Dial Scale — 29½")	12A 20-3
Screw, Escutcheon Mtg. (#3 x ½ OH WS)	1A15-6-58
Set Screw, Dial Drum, 8-32x¼"	1A 5-59-0
Spring, Dial Cord	19B 1-3
Spring Clip, Pointer	18A 5-2
Sleeve, Dial Tuning (brass)	27A 45

PHONOGRAPH PARTS

Symbol	Description	Part No.
	Note: Check Record Changer model number and see proper service manual for complete parts list.	
M1	Cable and Socket, Phono Motor	89A6-5
M4	Cartridge, Dual Needle (includes needles)	409A11
	Needle, Phonograph (Long play)	98A 15-6
	Needle, Phonograph (Standard 78 RPM)	98A 15-7
M5	Plug, shielded cable	88A 2-3
M6	Socket, Phono Pickup	88A1
	Centerpost (for 7" record)	G400B 310
	Centerpost (for 10" or 12" records)	G400B 311
	Nut, Wing (for fastening Record Changer during shipment)	2A 5-9-2
	Shoulder Eye Bolt (for Tilt-Out Spring)	1A 87-1
	Spring, Clamping (for holding extra centerpost)	84A6
	Strip, Sponge Rubber (1/16x¼x1")	12A 5-5
	Stud Bolt (for fastening changer during shipment)	1A80-5
	Tilt-Out Hinge Assembly Closest to Pickup Arm	AC118-2
	Farthest from Pickup Arm	AC118-1
	Tilt-Out Spring (2¼" long)	19 A15-1
	Tilt-Out Tie Bar	15B 126
	Tilt-Out Tie Rod	28A 22

CABINET PARTS

Description	Part No.
Back, Cabinet	43B 44
†Cabinet	
Walnut (8D15)	35E 88-1
Mahogany (8D16)	35E 88-2
Cartan complete with fillers	44B 108
†Door, Radio and Phono Tilt-Out	
pair for Walnut (8D15)	98A 52-1
pair for Mahogany (8D16)	98A 52-2
†Door, Record Compartment Complete	
for Walnut (8D15)	98A 52-3
for Mahogany (8D16)	98A 52-4
Door Arm (see Ref. #5 in Fig. 1)	
Near center of cabinet	A1440
Nearest side of cabinet	A1441
Door Bracket (see Ref. #7 in Fig. 1)	
Near center of cabinet	A1438
Nearest side of cabinet	A1439

†Supplied only if old part cannot be repaired. When ordering, describe condition of old part in detail.

VOLTAGE CHART

- Line Voltage 117.
- Voltages measured with a vacuum tube voltmeter. Second voltage readings and A.C. voltages measured with a 1000 ohm-per-volt meter.
- Voltages read between socket terminals and ground, unless otherwise indicated.
- Band switch in FM position.
- Dial turned to low frequency end.
- Volume Control—minimum.

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VOLTAGE CHART

- Line Voltage 117.
- Voltage readings taken with a vacuum tube voltmeter. Socket terminals marked with an asterisk * indicate much lower voltage or zero voltage if measured with a 1000 ohm-per-volt meter.
- Voltages read between socket terminals and ground, unless otherwise indicated.
- Band switch in FM position.
- Dial turned to low frequency end.
- Volume Control—minimum.

IMPORTANT PRELIMINARY ALIGNMENT STEPS

In FM alignment, it is essential that every step be followed. Especially important is picking the center of the IF curve (step 4 in the FM-IF alignment instructions). During this portion of the alignment it is necessary to tune the signal generator very carefully; it may necessitate having to estimate the dial readings to a tenth of a division.

Under normal operating conditions or use, misalignment of RF or IF circuits with age will be slight. Lack of sensitivity and poor tone quality may be due to causes other than alignment. Do not attempt to realign the receiver until all other possible causes have first been thoroughly investigated.

When completely aligning the FM circuit, it is essential to follow the sequence of steps indicated in the chart. If only a portion of the FM circuit is being aligned, be sure to follow all the remaining steps.

Check the set screws that hold the tuning drum to the shaft to see that they are tight and that the drum has not slipped on the shaft. The correct position of the drum can be seen in the stringing diagram.

With the gang open, the pointer should be at the position as shown in the stringing diagram, that is, the end of the pointer should line up with the "AM" lettering on the dial scale. If the pointer is in a different position, move it by hand while keeping the gang open.

Be sure both the set and the signal generator are thoroughly warmed up before starting alignment.

AM ALIGNMENT PROCEDURE

- Use regular output meter connected across speaker voice coil.
- Turn receiver Volume Control full on; Tone Control full treble.
- AM loop antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use lowest output setting of signal generator that gives a satisfactory reading on meter.

Step	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
	Set Band Switch to Broadcast Position (center) and be sure to follow instructions under heading "Important Preliminary Alignment Steps." Loop antenna must be connected.				
1	Gang condenser antenna stator	.1 MFD	455 KC	Tuning gang wide open	A-B (2nd IF) C-D (1st IF)
2	Lug on AM Antenna Stator	.1 MFD	1620 KC	Tuning gang wide open	E (oscillator)
3	Place generator lead close to loop of set to obtain adequate signal. No actual connection (signal by radiation).		1400 KC	Tune in signal	F (antenna)

AM antenna trimmer adjustment "F" in step 3 should be repeated after set and antenna have been installed in cabinet. Important: AM antenna trimmer may not peak properly if antenna leads are not routed properly or separated as originally made.

FM ALIGNMENT EQUIPMENT

This chassis should be aligned only with an AM signal generator and a vacuum tube voltmeter. Any standard brand vacuum tube voltmeter with a DC scale of not over 5 volts is suitable. A 3-volt zero center scale is desirable. A signal generator with a frequency range up to 110 MC. is desirable. It is possible however, to align the receiver with a signal generator going to 20 or 30 megacycles, by using the harmonics of these lower frequencies. To do this merely set the signal generator dial as follows and align exactly as explained in the alignment instructions.

Where alignment chart specifies 109 MC, 106 MC, 90 MC or 87 MC, set signal generator to highest available frequency shown in the column under that frequency.

All frequencies in megacycles

109.	106.	90.	87.
54.50	53.	45.	43.5
36.33	35.33	30.	29.
27.25	26.5	22.5	21.75
21.80	21.2	18.	17.4
18.17	17.66	15.	14.5

Signal generators which do not tune to 110 MC or whose harmonics are not strong enough, cannot be used for FM alignment.

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FM I.F. AND RATIO DETECTOR ALIGNMENT

- Keep output indicator leads well separated from signal generator leads and chassis wiring.
- Band switch in FM position (fully to the right).
- While peaking IF's, keep reducing signal generator output so VTVM reading is approximately +1.5 volts DC with exception of Step #5.
- To avoid splitting the slotted head of iron core tuning slugs in the IF transformers, use an insulated alignment tool with a ⅛" wide screwdriver blade. Do not exert undue pressure as threads of slugs may strip.
- Speaker must be connected during alignment.
- FM antenna disconnected during alignment.

Before proceeding, be sure to follow all steps listed under "Important Preliminary Alignment Steps."

	Connect Signal Generator	Generator Frequency	Receiver Dial Setting	Output Indicator and Special Connections	(Adjust as Follows very carefully)
1	Thru .001 cond. to pin #1 of 6BA6 2nd IF. (Ground to chassis, close to tube.)	10.7 MC unmodulated.	Tuning gang wide open	Connect VTVM (DC probe) from point "W" to chassis. (See Fig. 10)	"G" (ratio detector primary) for maximum reading on VTVM
2	**Thru .001 cond. to pin #1 of 6BA6 1st IF. (Ground to chassis, close to tube).	"	"	" "	"H" and "I" (2nd IF trans.) for maximum reading on VTVM.
3	Across ends of FM antenna twin lead	"	"	" "	"J" and "K" (1st IF trans.) for maximum on VTVM. Readjust G, H, I, J, K, for maximum. (Keep reducing generator output to keep VTVM at 1.5 volts)
4	"	a. Reduce output of signal generator until VTVM reads **EXACTLY** +1.5 volts DC. b. Tune generator frequency above 10.7 MC until VTVM reads **EXACTLY** +1.0 volt. Note **EXACT** generator frequency. Extreme care in reading this is essential. c. Tune generator frequency below 10.7 MC until VTVM reads **EXACTLY** +1.0 volt. Note **EXACT** generator frequency. Extreme care in reading this is essential. d. Add generator frequency in step c to generator frequency in step b and divide by 2. The result is the center frequency of the IF curve to be used in step 5. See example under heading "Setting Signal Generator to Center of I.F. Selectivity Curve". e. Tune generator frequency above and below 10.7 MC and note voltage reading on VTVM at different frequency points until you have a good impression of the shape of the selectivity curve. If you have two peaks as in Figures 7 or 8, note readings (voltage) of both peaks. If one peak is over 20% higher than the other one, it will be necessary to realign IF's. A selectivity curve that would require realignment is illustrated by Figure 9.			
5	"	Center of IF selectivity curve per step 4d above.	Tuning gang wide open	Connect VTVM (DC probe) from point "X" to chassis. (See Fig. 10.)	"L" (ratio detector secondary) for zero voltage reading on VTVM. (The correct zero point is located between a positive and a negative maximum.)

If any adjustments were very far off, it is desirable to repeat steps 3, 4 and 5.

Do **not feed I.F. signal into converter grid as this will cause mis-alignment.

SETTING SIGNAL GENERATOR TO CENTER OF I.F. SELECTIVITY CURVE

CAUTION: Due to the difficulty of setting a signal generator to the accuracy required by this operation, extreme care must be exercised in making each setting. Otherwise, improper alignment of the ratio dectector and consequent audio distortion will result.

EXAMPLE: (See Figures 4 and 5)

Voltage reading in Step 4a is + 1.5 volts.

Generator frequency on low side of 10.7 MC for a reading of + 1 volt DC = 10.640 MC.

Generator frequency on high side of 10.7 MC for a reading of + 1 volt DC = 10.800 MC.

Center frequency is obtained by adding 10.640 and 10.800, then dividing by 2. For these readings it will be 10.72 MC.

Set generator frequency to 10.72 MC as this is center of selectivity curve as shown in Figure 5.

Note: Numerical vernier dial readings may be used instead of MC.

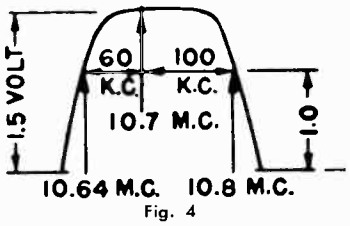

Fig. 4

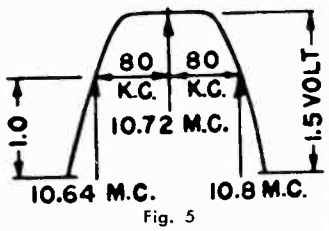

Fig. 5

TYPICAL SELECTIVITY CURVES

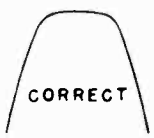

Fig. 6

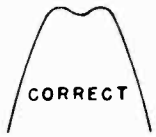

Fig. 7

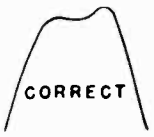

Fig. 8

Fig. 9

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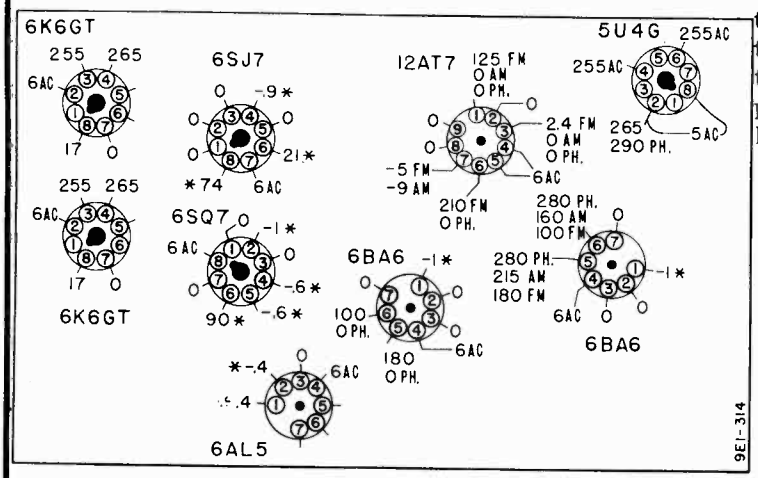
FM RF ALIGNMENT PROCEDURE

Step	Connect Generator	Generator Frequency	Receiver Gang or Dial Setting	Output Connections	Adjust as follows (very carefully)
1	To ends of FM antenna twin lead thru 120 ohm carbon resistors in series with each generator lead.	†109 MC (unmodulated)	Gang fully open	Connect VTVM (DC probe) from point "W" to chassis.	*M (oscillator) and N (antenna) for maximum
2		87 MC (unmodulated)	Tune in Signal. (Gang should be closed or almost closed.)	"	If signals in steps 1 and 2 will not tune in at gang tuning extreme (±0.5 MC), it will be necessary to spread or squeeze oscillator coil turns and then repeat steps 1 and 2 until correct results are obtained.
3		106 MC (unmodulated)	Tune in Signal	"	Readjust N for maximum VTVM reading, while rocking gang. If trimmer does not peak, it will be necessary to squeeze or spread turns of FM antenna coil. Check calibration and tracking at 90 MC. Calibration error should not exceed ±0.5 MC. If necessary, repeat steps 1, 2, 3 until correct results are obtained.

* It is advisable to adjust generator output so VTVM readings do not exceed approximately +1.5 V. DC while peaking.
† If your signal generator does not reach this frequency, use harmonics as described in "FM Alignment Equipment."

IMPORTANT

AM antenna trimmer adjustment "F" in step 3 of "AM Alignment Procedure" should be repeated after receiver and antenna have been installed in cabinet. Note: AM antenna trimmer may not peak properly if antenna leads are not routed properly or separated as originally made.



*If taken with a 1000 ohm-per-volt meter, readings will be lower or zero.

POINTER SETTING

With the gang open, the pointer should be at the position as shown in the stringing diagram, that is, the end of the pointer should line up with the "AM" lettering on the dial scale. If the pointer is in a different position, move it by hand while keeping the gang open.

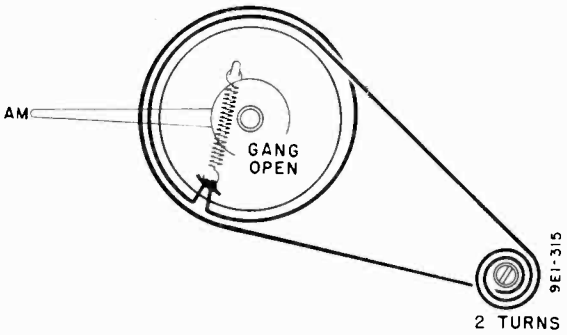


Fig. 12. Stringing Diagram

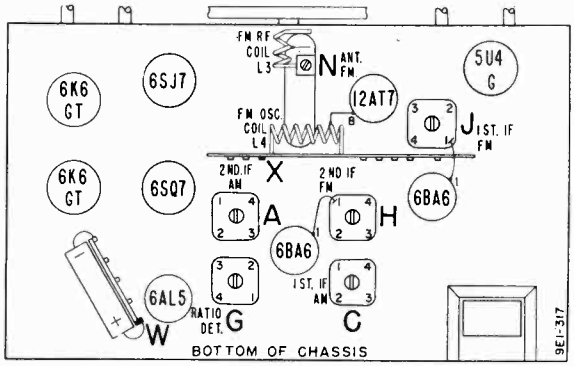


Fig. 10 Bottom Trimmer Location

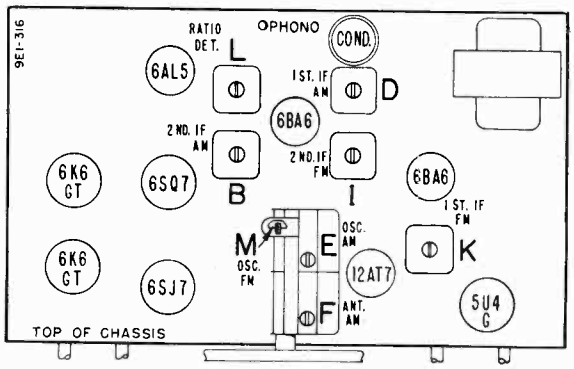


Fig. 11. Top Trimmer Location

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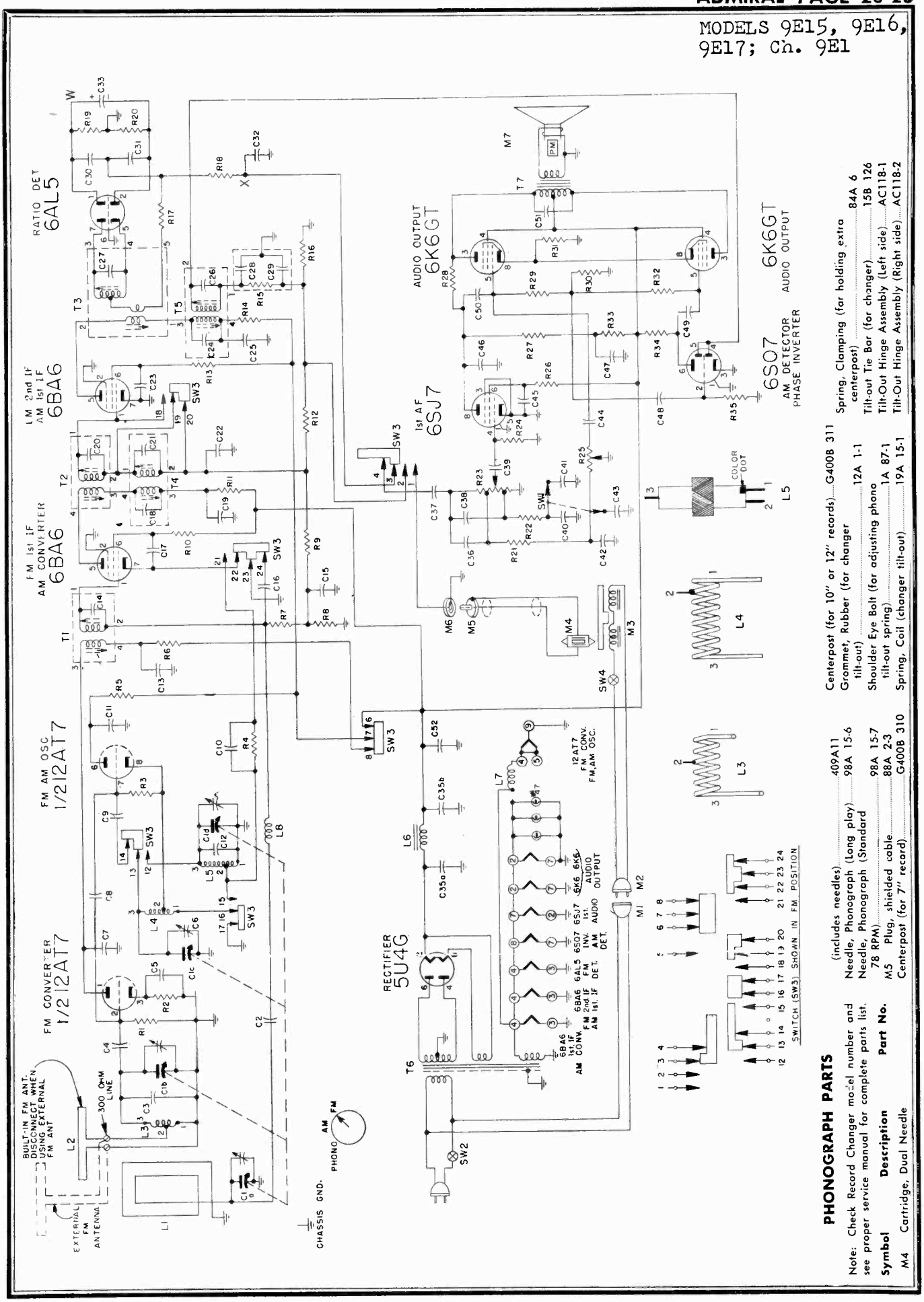

PHONOGRAPH PARTS

Note: Check Record Changer model number and see proper service manual for complete parts list.

Symbol	Description	Part No.
M4	Cartridge, Dual Needle (includes needles)	409A11
	Needle, Phonograph (Long play)	98A 15-6
	Needle, Phonograph (Standard 78 RPM)	98A 15-7
M5	Plug, shielded cable	88A 2-3
	Centerpost (for 7" record)	G400B 310
	Centerpost (for 10" or 12" records)	G400B 311
	Grommet, Rubber (for changer tilt-out)	12A 1-1
	Shoulder Eye Bolt (for adjusting phono tilt-out spring)	1A 87-1
	Spring, Coil (changer tilt-out)	19A 15-1
	Spring, Clamping (for holding extra centerpost)	84A 6
	Tilt-out Tie Bar (for changer)	15B 126
	Tilt-Out Hinge Assembly (Left side)	AC118-1
	Tilt-Out Hinge Assembly (Right side)	AC118-2

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CONDENSERS

Symbol	Description	Part No.
C1a	486 mmfd. (max) AM RF	Gang 68 B25
C1b	15 mmfd. (max) FM RF	
C1c	15 mmfd. (max) FM Osc.	
C1d	143 mmfd. max) AM Osc.	
C2	35 mmfd., Zero Temp. Coeff., Ceramic	65B 6-57
C3	7 mmfd., ± 1 mmfd., —.00047 Temp. Coeff., Ceramic	65B 6-45
C4	.002 mfd., "Hi-K" Ceramic	65B 9-38
C5	.001 mfd. min., Ceramic	65B 6-41
C6	3 to 12 mmfd., Trimmer (Silver Ceramic)	66A 19-2
C7	40 mmfd., 2%, Zero Temp. Coeff., Ceramic	65B 6-22
C8	2 mmfd., ±5 mmfd., Zero Temp. Coeff., Ceramic	65B 6-58
C9	50 mmfd., Ceramic	65B 6-4
C10	.005 mmfd., "Hi-K" Ceramic	65B 9-51
C11	.005 mfd. min., Ceramic	65A 10-1
C12	10 mmfd., Zero Temp. Coeff.	65B 6-44
C13	.01 mfd. min., Ceramic	65A 10-3
C14	100 mmfd., 3%, Silver Mica	Part of T1
C15	.01 mfd. min., Ceramic	65A 10-3
C16	.01 mfd. min., Ceramic	65A 10-3
C17	.01 mfd. min., Ceramic	65A 10-3
C18	200 mmfd., 3%, Silver Mica	Part of T4
C19	.01 mfd. min., Ceramic	65A 10-3
C20	100 mmfd., 3%, Silver Mica	Part of T2
C21	200 mmfd., 3%, Silver Mica	Part of T4
C22	.01 mfd. min., Ceramic	65A 10-3
C23	.01 mfd min., Ceramic	65A 10-3
C24	200 mmfd., 3%, Silver Mica	Part of T5
C25	.01 mfd. min., Ceramic	65A 10-3
C26	200 mmfd., 3%, Silver Mica	Part of T5
C27	90 mmfd., 3%, Silver Mica	Part of T3
*C28	100 mmfd., Ceramic	
*C29	100 mmfd., Ceramic	
C30	100 mmfd., 5%, —.00075 Temp. Coeff., Ceramic	65B 6-7
C31	100 mmfd., 5%, —.00075 Temp. Coeff., Ceramic	65B 6-7
C32	.002 mfd., 600 Volts, Paper	64B 1-14
C33	4 mfd., 150 Volts, Electrolytic	67A 4-2
C35a	30 mfd., 350 Volts	Electrolytic 67C 6-22
C35b	30 mfd., 350 Volts	
C36	200 mmfd., "Hi-K" Ceramic	65B 9-14
C37	.005 mfd. min., Ceramic	65A 10-1
C38	100 mmfd., Ceramic	65B 6-3
C39	.005 mfd. min., Ceramic	65A 10-1
C40	.01 mfd. min., Ceramic	65A 10-3
C41	.02 mfd., 400 Volts, Paper	64B 1-24
C42	.005 mfd. min., Ceramic	65A 10-1
C43	.005 mfd. min., Ceramic	65A 10-1
C44	.005 mfd. min., Ceramic	65A 10-1
C45	.1 mfd., 400 Volts, Paper	64B 1-20
C46	100 mmfd., Ceramic	65B 6-3
C47	.1 mfd., 400 Volts, Paper	64B 1-20
C48	.01 mfd. min., Ceramic	65A 10-3
C49	.01 mfd. min., Ceramic	65A 10-3
C50	.01 mfd. min., Ceramic	65A 10-3
C51	.002 mfd., 600 Volts, Paper	64B 1-14
C52	.01 mfd. min., Ceramic	65A 10-3

* Part of encased Diode Filter Unit 63A3-1. This unit consists of R15, C28, C29 (see schematic). If a section of the unit becomes defective, replace with exact duplicate or individual components of proper value.

RESISTORS

Symbol	Description	Part No.
R1	1 Megohm, ½ Watt	60B 8-105
R2	470 ohms, ½ Watt	60B 8-471
R3	22,000 ohms, ½ Watt	60B 8-223
R4	470 ohms, ½ Watt	60B 8-471
R5	4,700 ohms, ½ Watt	60B 8-472
R6	27,000 ohms, 1 Watt	60B 14-273
R7	1.5 Megohms, ½ Watt	60B 8-155
R8	1.5 Megohms, ½ Watt	60B 8-155
R9	1 Megohm, ½ Watt	60B 8-105
R10	27,000 ohms, 1 Watt	60B 14-273
R11	4,700 ohms, ½ Watt	60B 8-472
R12	1 Megohm, ½ Watt	60B 8-105
R13	27,000 ohms, 1 Watt	60B 14-273
R14	4,700 ohms, ½ Watt	60B 8-472
*R15	47,000 ohms, ¼ Watt	
R16	220,000 ohms, ½ Watt	60B 8-224
R17	390 ohms, ½ Watt	60B 8-391
R18	27,000 ohms, ½ Watt	60B 8-273
R19	6,800 ohms, ½ Watt, 5%	60B 7-682
R20	6,800 ohms, ½ Watt, 5%	60B 7-682
R21	47,000 ohms, ½ Watt	60B 8-473
R22	10,000 ohms, ½ Watt	60B 8-103
R23	1 Megohm Volume Control	75B 3-6
R24	4.7 Megohms, ½ Watt	60B 8-475
R25	2 Megohms Tone Control	75B 1-33
R26	1.5 Megohms, ½ Watt	60B 8-155
R27	330,000 ohms, ½ Watt	60B 8-334
R28	1.5 Megohms, ½ Watt	60B 8-155
R29	270,000 ohms, ½ Watt	60B 8-274
R30	270,000 ohms, ½ Watt	60B 8-274
R31	270 ohms, 2 Watt	60B 20-271
R32	270,000 ohms, ½ Watt	60B 8-274
R33	47,000 ohms, ½ Watt	60B 8-473
R34	470,000 ohms, ½ Watt	60B 8-474
R35	4.7 Megohms, ½ Watt	60B 8-475

* Part of encased Diode Filter Unit 63A3-1. This unit consists of R15, C28, C29 (see schematic). If a section of the unit becomes defective, replace with exact duplicate or individual components of proper value.

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna, AM Loop	69C 90
L2	Antenna, FM Dipole	AB128
L3	Coil, Antenna (FM)	69A 83
L4	Coil, Oscillator (FM)	69A 81
L5	Coil, BC Oscillator	69A 88-1
L6	Choke, Filter	74A 13
L7	Choke, RF	73A 2-3
L8	Choke, RF	73A 2-3
T1	Transformer, 1st IF (FM)	72B 77
T2	Transformer, 2nd IF (FM)	72B 78
T3	Transformer, Ratio Detector	72B 39
T4	Transformer, 1st IF (AM)	72B 79
T5	Transformer, 2nd IF (AM)	72B 80
T6	Transformer, Power	80B 9
T7	Transformer, Output	79A 16
M6	Socket, Phono pickup	88A1
M7	Speaker 12" PM	78B 44-1
SW1	Switch, Tone (DPST)	Part of R25
SW2	Switch, Power	Part of R23
SW3	Switch, Bond (FM, AM, Phono)	77B 24
	Diode Filter (consists of R15, C28, and C29)	63A 3-1
	Socket, Tube	
	Miniature (7 pin)	87A 3-4
	Miniature (9 pin)	87A 25-4
	Octal	87A 5-1

DIAL PARTS

Description	Part No.
Dial Bulb #47	81A 1-8
Dial Bulb Socket and Leads	82A 8-7
Dial Cord	50A 1-3
Dial Crystal	24B 9
Dial Drum and Hub Assembly	A1890
Dial Escutcheon (less rectangular insert)	23E 20-1
Dial Escutcheon Insert (approx. 2½ x 3¾")	23C 25-1
Dial and Indicator Plate Assembly	A1894
Dial Indicator Arm and Hub Assembly	A1508
Dial Lever Arm and Stud Assembly	A1493
Dial Pointer and Clip Assembly	A1487
Screw, Set	
for indicator hub (#6-32x¼")	1A 5-54-0
for dial drum (#8-32x¼")	1A 5-59-0
for lever arm (#8-32 cup point)	1A 5-61
Shaft, Band Switch	28B 21-4
Shaft, Tuning	28A 1-6
Snap Button (for dial scale mounting)	13A 1-4-47
Spring, Band Switch Detent	18A 14
Spring Clip, Pointer	18A 5-2
Spring, Dial Cord Tension	19B 1-3
Washer, "C" (for tuning shaft)	4A 4-6-0
Washer, Spring (for dial scale mounting)	4A 6-2-0
Washer, Spring (for tuning shaft)	4A 5-3-0

CABINET PARTS

Description	Part No.
Back, Cabinet	43B 49
Bracket, Dial Mounting	15B 274
Bracket, Dial Support	15A 398
†Cabinet	
Walnut (9E15)	35E 73-4
Mahogany (9E16)	35E 73-5
Blond (9E17)	35E 73-6
†Door, Radio or Phono Tilt-Out	
pair for Walnut (9E15)	98A 38-4
pair for Mahogany (9E16)	98A 38-5
pair for Blond (9E17)	98A 38-6
†Door, Record Comportment, Complete	
for Walnut (9E15)	98A 38-1
for Mahogany (9E16)	98A 38-2
for Blond (9E17)	98A 38-3
Door Hinge, Record Storage Compartment	
for Walnut (9E15) and Mahogany (9E16)	98A 38-9
for Blond (9E17)	98A 38-10
Door Catch and Strike Plate for Record Compartment Door	98A 38-11
Door Bracket (Near center; see Ref. #7 in fig. 1)	A1438
Door Bracket (Neorest side of cabinet; see Ref. # 7 in fig. 1)	A1439
Door Arm (Near center; see Ref. #5 in fig. 1)	A1440
Door Arm (Neorest side of cabinet; see Ref. #5 in fig. 1)	A1441
Grille Cloth	
for Walnut (9E15) and Mahogany (9E16)	98A 38-7
for Blond (9E17)	98A 38-8
Grommet, Rubber	
for changer tilt-out	12A 1-1
for mounting chassis	12A 1-11
Bumper for radio chassis	12A 3-6
Jewel, Green Pilot Light	82A 10-8
Knob (Tilt-Out Doors)	
for Walnut (9E15) and Mahogany (9E16)	98A 49-2
for Blond (9E17)	98A 49-3
Knob, Radio Tuning	33A 13-4
Medallion Block	
for Walnut (9E15)	98A 49-4
for Mahogany (9E16)	98A 49-5
for Blond (9E17)	98A 49-6
Medallion Retainer Plug	20A 6-1
Plate, Cover (Chassis mounting)	15A 146
Rubber Channel	
for radio tilt-out (⅜"x11/64"x2⅜")	12A 9-1
for dial scale (¼"x7/16"x29-5/16")	12A 20-2
Rubber Strip, Sponge	
for door panel (⅛"x⅜"x14")	12A 5-3
for door block (⅛"x¾"x¾")	12A 5-4
for changer tilt-out (1/16"x¼"x1")	12A 5-5
for chassis mounting (½"x7/16"x5½")	12A 11-1
Screw, Escutcheon Mtg. (#3x½ O.H.W.S.)	1A 15-6-58
Screw, Escutcheon Mtg. (3x⅜ O.H.W.S.)	1A 15-7-58
Shoulder Eye Bolt	
for adjusting radio tilt-out spring	1A 87-2
for adjusting phono tilt-out spring	1A 87-1
Spring, Clamping (for holding extra centerpost)	84A 6
Spring, Coil (for AM loop antenna)	19A 51
Spring, Coil (Changer tilt-out)	19A 15-1
Spring, Coil (Radio tilt-out)	19A 15-2
Spring, Hairpin (for radio tilt-out)	19A 2-5
Strap, Sash Weight Support	15A 343
Tilt-Out Tie Bar (Radio)	15B 160-1
Tilt-Out Tie Bar (Record Changer)	15B 126
Tilt-Out Hinge Assembly (Left side)	AC118-1
Tilt-Out Hinge Assembly (Right side)	AC118-2
Tilt-Out Tie Rod (Radio)	28A 22
Washer, Felt (for tuning knobs)	5A 4-2
Weight, Sash (Counter balance)	20A 3-2

†Supplied only if old part cannot be repaired. When ordering, describe condition of old part in detail.

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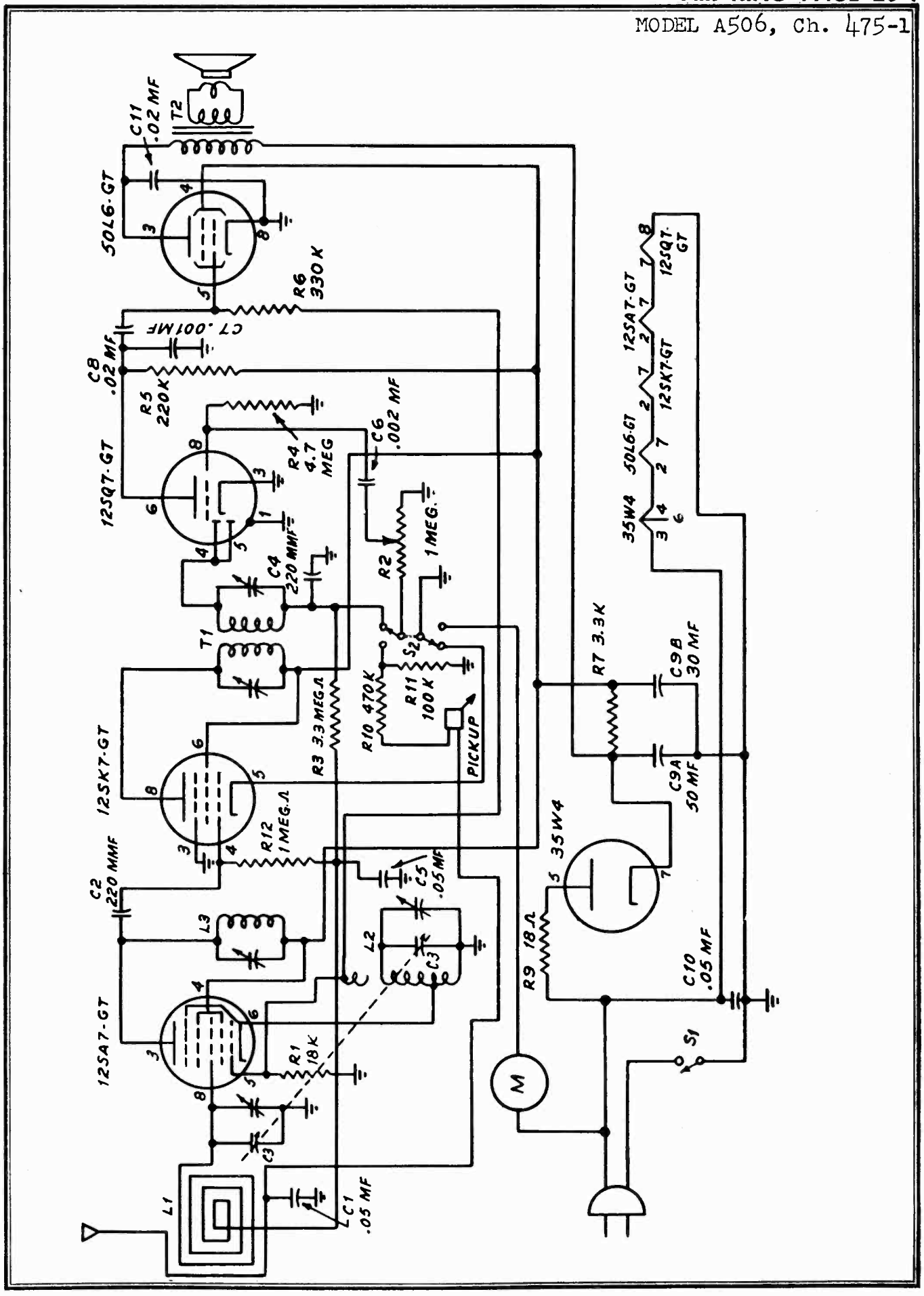
MODEL A506, Ch. 475-1



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MODEL A506, Ch. 475-1

PART NO.	CHASSIS	
	CAPACITORS	
1675	Variable Condenser	C3
2073	Electrolytic 50-30 µf. 150,150V (no mtg. wafer)	C9A, C9B
	Paper .05 µf. 400VV.	C10
	Paper .002 " 200V.	C6
	Paper .02 " 400V	C8, C11
	Paper .05 " 200V	C5
	Paper .001 mmfd. 400V	C7
	Ceramic 330 mmfd	C4
	Paper .002 Mfd 400V	C1
	Ceramic 220 µµf. 500V ±20%	C2
1673	Variable Condenser	C3
	RESISTORS	
	22K ohms 1/4W. ±20%	R1
	4.7 Megohms 1/4W. ±20%	R4
	220K ohms 1/4W. ±20%	R5
	2200 " 1W. ±20%	R7
	18 " 1/2W.	R9
	330K " 1/4W.	R6
	1.5 Meg. 1/4W.	R12
2483	Volume Control 1 Meg. with Switch (small size)	R2
2484	470K ±20%	R10
	3.3 Meg. 1/4W.	R3
	100K, 1/4W.	R11
	COILS & TRANSFORMERS	
28210	Oscillator Coil	L2
1770	I.F. Coil	
3535	I.F. Transformer Output	
28186	Loop (Part of Back) (No Primary Coil)	
62192	Loop	
	CHASSIS & CHASSIS PARTS	
54144	Grommets (Mtg. Var.)	
54145	Cup Washers (Mtg. Var.)	
18110	Sockets, Octal 1-5/16 mtg. wafer	
5877	Sockets, Miniature 1-5/16 mtg. wafer	
	Speaker & Output Transformer.	L4
54317	Wood Spacer	
3828	Switch Radio Phono	
6343	Pick-up arm and rest (with 2 insulated leads 12" lg. no plug. L-26 Cartridge	
6418	Motor & turntable -8" turntable 5" x 5" leads strip & tin 1/4"	
54124	Terminal Strip	
54114	Rubber grommets (var. Con. Mtg.)	
54145	Extruded Washers (" ")	

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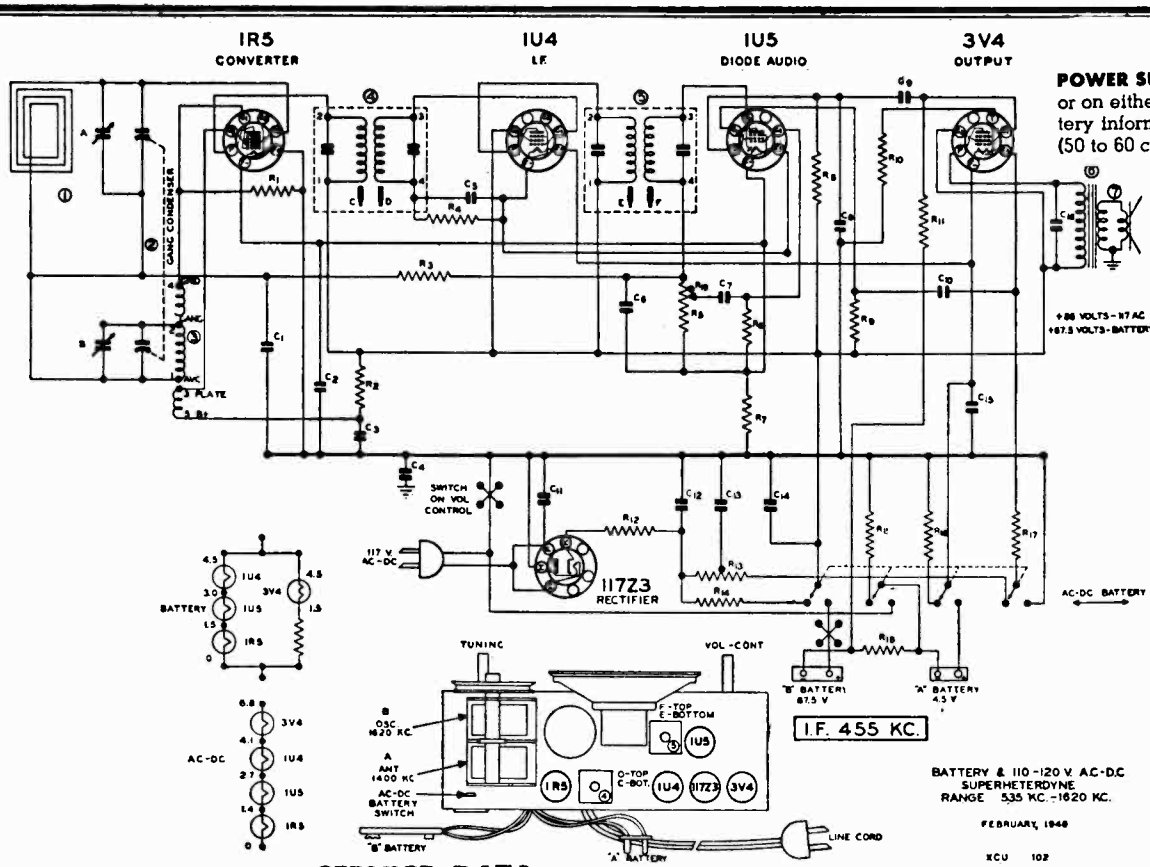

BATTERY & 110-120 V. AC-DC SUPERHETERODYNE
RANGE 535 KC. -1620 KC.

FEBRUARY, 1948

RCU 102

POWER SUPPLY. This receiver is designed to operate on self-contained batteries or on either an AC or DC power supply when such a supply is available. (For battery information, see section on batteries.) The receiver will operate on either AC (50 to 60 cycles) with a voltage of 110 to 120 or DC with a voltage from 110 to 120.

This receiver will accommodate any of the batteries listed below:

Manufacturer	Manufacturer's Type Number "A" Battery	"B" Battery
National Carbon	746	467
General Dry Battery	3H3	W45A
Ray-O-Vac	P83A	4367
Burgess Battery	G3	XX45

DIA. NO.	PART NO.	DESCRIPTION
C1	N-1345	.05 MFD 200V 20%
C2	N-134-	1 MFD 200V -40% +80%
C3	N-1345	.05 MFD 200V 20%
C4	N-1345	.05 MFD 200V 20%
C5	N-1344	.01 MFD 400V 20%
C6	N-8015	100 MMFD 500V 20%
C7	N-4896	.005 MFD 600V -15% +40%
C8	N-8015	.100 MMFD 500V 20%
C9	N-4896	.005 MFD 600V -15% +40%
C10	N-1344	.01 MFD 600V 20%
C11	N-1348	.05 MFD 400V 20%
C12	N-8841	50 MFD 150V ELECTRO
C13		30 MFD 150V LYTIC
C14		30 MFD 150V
C15		400 MFD 25V
C16	N-8317	.002 MFD 600V -15% +40%
R1	N-2972	100,000 OHM .5 W 10%
R2	N-5690	12,000 OHM .5 W 10%
R3	N-4061	4.7 MEGOHM .5 W 20%
R4	N-4028	5.6 MEGOHM .5 W 20%
R5	N-8778	1.0 MEGOHM VOL. CONT.
R6	N-4028	5.6 MEGOHM .5 W 20%
R7	N-4088	470 OHM .5 W 10%
R8	N-2978	1.0 MEGOHM .5 W 10%
R9	N-5473	3.9 MEGOHM .5 W 10%
R10	N-4793	1200 OHM .5 W 10%
R11	N-4877	2.2 MEGOHM .5 W 20%
R12	N-8113	68 OHM 1.5 W 10%
R13	N-8842	1838 OHM 50 W
R14	N-8783	1200 OHM .5 W 10%
R15	N-4028	220,000 OHM .5 W 20%
R16	N-8783	1200 OHM .5 W 10%
R17	N-8782	27 OHM .5 W 10%
R18	N-6121	270 OHM .5 W 10%
		47,000 OHM IN VOL. CONT.
1	N-8781	ANTENNA LOOP COIL
2	N-5636	2 GANG CAPACITOR
3	N-8003	OSCILLATOR COIL
4	N-8883	1ST I.F. COIL
5	N-8888	2ND I.F. COIL
6	N-8781	OUTPUT TRANSFORMER
7	N-8881	4" P.M. SPEAKER

SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT: Remove the chassis and batteries from the cabinet and remove the bottom enclosure plate from the chassis. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (1R5) through a .05 or .1 MFD condenser. The ground of the test oscillator should be connected to the buss. Align all four I.F. slugs to peak or maximum reading on the output meter. Each I.F. has an adjustment at the top and bottom of the can. The peaks on the slugs must be the ones farthest out of the coils.

R.F. ALIGNMENT: Place the cabinet on its face and open cabinet back to a 90° angle. Lay a board across the body of cabinet ahead of the loop. Replace the bottom chassis enclosure and set the chassis and batteries on the board so that they occupy the same relative position to the loop as they do in the cabinet. Care should be taken to have no iron or other metal near the loop.

Connect the test oscillator to a dummy loop which can be made by coiling 2 turns of hookup wire about 6" in diameter. Place this dummy loop about a foot from the loop on the receiver and in the same plane as the receiver loop. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on the gang condenser. Next set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC. and tune in signal on condenser to check alignment of coils

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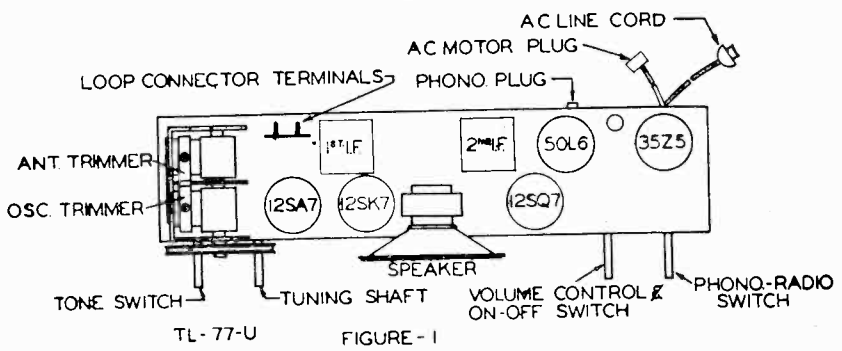
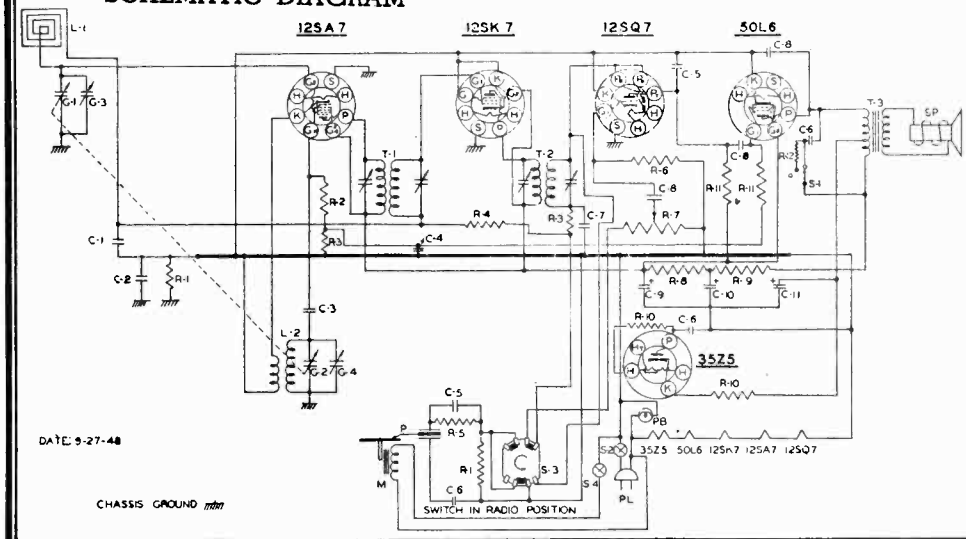
PART NO.		DESCRIPTION	PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
PC-2	C-1	.05MFD. CONDENSER 200 V.	1R-1	R-8	470Ω RESISTOR 1/2W. 20 %	SW-2	S-1	TONE SWITCH
PC-8	C-2	1MFD. CONDENSER 400 V.	1R-42	R-9	1000Ω RESISTOR 1 W. 10 %		S-2	SWITCH ON VOLUME CONTROL
MC-4	C-3	.00005MFD. MICA	1R-17	R-10	33Ω RESISTOR 1/2W. 20 %	SW-1	S-3	PHONO-RADIO SWITCH
PC-4	C-4	.25MFD. CONDENSER 200V.	1R-11	R-11	470MΩ RESISTOR 1/2 W. 20%		S-4	SWITCH ON RECORD CHANGER
MC-5	C-5	.0005MFD. MICA	1R-15	R-12	2200Ω RESISTOR 1/2 W. 20%	AC-M-7	M	RECORD CHANGER MOTOR
PC-5	C-6	.05MFD. CONDENSER 400V.	GC-5	G-1	GANG CONDENSER	AC-PU-7	P	CRYSTAL PICKUP ARM CARTRIDGE S-1
MC-2	C-7	.001MFD. MICA		G-2		PB-2	PB	110 V. 7½W PILOT BULB
PC-7	C-8	.01MFD. CONDENSER 400V.		G-3	ANT. TRIMMER	CO-2	PL	LINE CORD
EC-14	C-9	20MFD.		G-4	OSC. TRIMMER			
	C-10	40MFD. 150W.V ELECTROLYTIC						
	C-11	40MFD.	LI-6	T-1	INPUT I.F. TRANFORMER			
1R-20	R-1	220MΩ RESISTOR 1/2W. 20 %	LI-7	T-2	OUTPUT I.F. TRANSFORMER			
1R-9	R-2	22 MΩ RESISTOR 1/2 W. 20%		T-3	OUTPUT TRANSFORMER			
1R-10	R-3	47 MΩ RESISTOR 1/2 W. 20%						
1R-23	R-4	3.3MEGΩ RESISTOR 1/2 W. 20%	LL-17	L-1	LOOP ANT.			
1R-12	R-5	1MEGΩ RESISTOR 1/2 W. 20%	LO-14	L-2	OSC. COIL			
1R-13	R-6	22MEGΩ RESISTOR 1/2 W. 20%						
VC-4	R-7	1MEG. VOLUME CONTROL	SPK-12	SP	5" P.M. SPEAKER			

TUBE AND TRIMMER LOCATION



TL-77-U FIGURE-1

SCHEMATIC DIAGRAM SD-77 U



CAUTION: Never plug this unit into a 220 Volt or a DC power source as you will seriously damage the component parts, which have been designed for 110 to 125 volts AC current at 60 cycles only.

POWER SUPPLY: This receiver is designed to operate from a power source of 110 to 125 volts AC current at 60 cycles only.

ALIGNMENT DATA

Remove the chassis from the cabinet. A Signal Generator with the following frequencies is required: **455 KC, 1400 KC and 1720 KC.**

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the A.V.C. from working and giving false readings. Turn the tone control to complete left hand position. Keep the generator output as low as possible to prevent overloading.

Connect an output meter across the voice coil of the speaker.

Connect a 20,000 ohm resistor across the loop connector terminals to reflect proper loop impedance.

FIRST STEP: Connect the hot lead from the generator to the "ANT." section of the gang condenser through a .1 MFD. condenser. The ground lead must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455 KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator connected in the same manner as in I.F. alignment, adjust the signal generator to 1720 KC. The "O.S.C." trimmer is located on the front section of the gang condenser. Adjust this trimmer until the signal is tuned in. The gang condenser should be at complete minimum capacity for this setting.

THIRD STEP: Remove the generator leads from the chassis. Remove the 20,000 ohm resistor from the loop connector terminals. Reinstall the chassis in the cabinet, connect the loop leads, motor plug and phono pickup leads.

Connect the generator leads to a transmitting loop, made of a few turns of wire, and loosely couple to the receiver loop antenna which is located on the back end of the cabinet. Adjust the generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The "ANT." trimmer is located on the rear section of the gang condenser. Adjust this trimmer until a maximum signal is noted on the output meter.

No further adjustment should be necessary, unless the receiver has been damaged, as the coils and tuning condenser have been specially handled at the factory to insure proper alignment at the lower frequencies.

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POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

AERIAL SYSTEM

This receiver has a built-in "loop" aerial. Its excellent design is such as to increase pick-up from stations having wide variations in signal strength. The efficiency and selectivity of the loop provide outstanding reception without the use of an external aerial. The "loop" aerial used on this receiver is somewhat directional so reception from weak stations can be improved by turning the set in the proper direction. In or near metal buildings, iron ore deposits or steel structures or in localities remote from broadcasting stations, reception can be improved by using an outside aerial 50 feet to 100 feet in length including lead-in. Connect the outside aerial to the aerial lead. When using the outside aerial with AC power supply it may be necessary to reverse the power cord plug in wall socket to eliminate hum or distortion.

TUBES USED

Six tubes are used. Type numbers and locations are shown in the tube location diagram on the cabinet. If tubes are removed from their sockets for test or replacement purposes, make certain that each tube is placed in its proper socket when replacing the tubes in the set. Failure to replace the tubes in their proper sockets may result in damage to the tube, or to the receiver, or both.

TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters).

DIAL CALIBRATION. The scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcasts frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

One end of the indicator points to the wave length in meters. Therefore, both wave length in meters and frequency in kilocycles can be read at each setting of dial indicator.

SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED. OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) condenser. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

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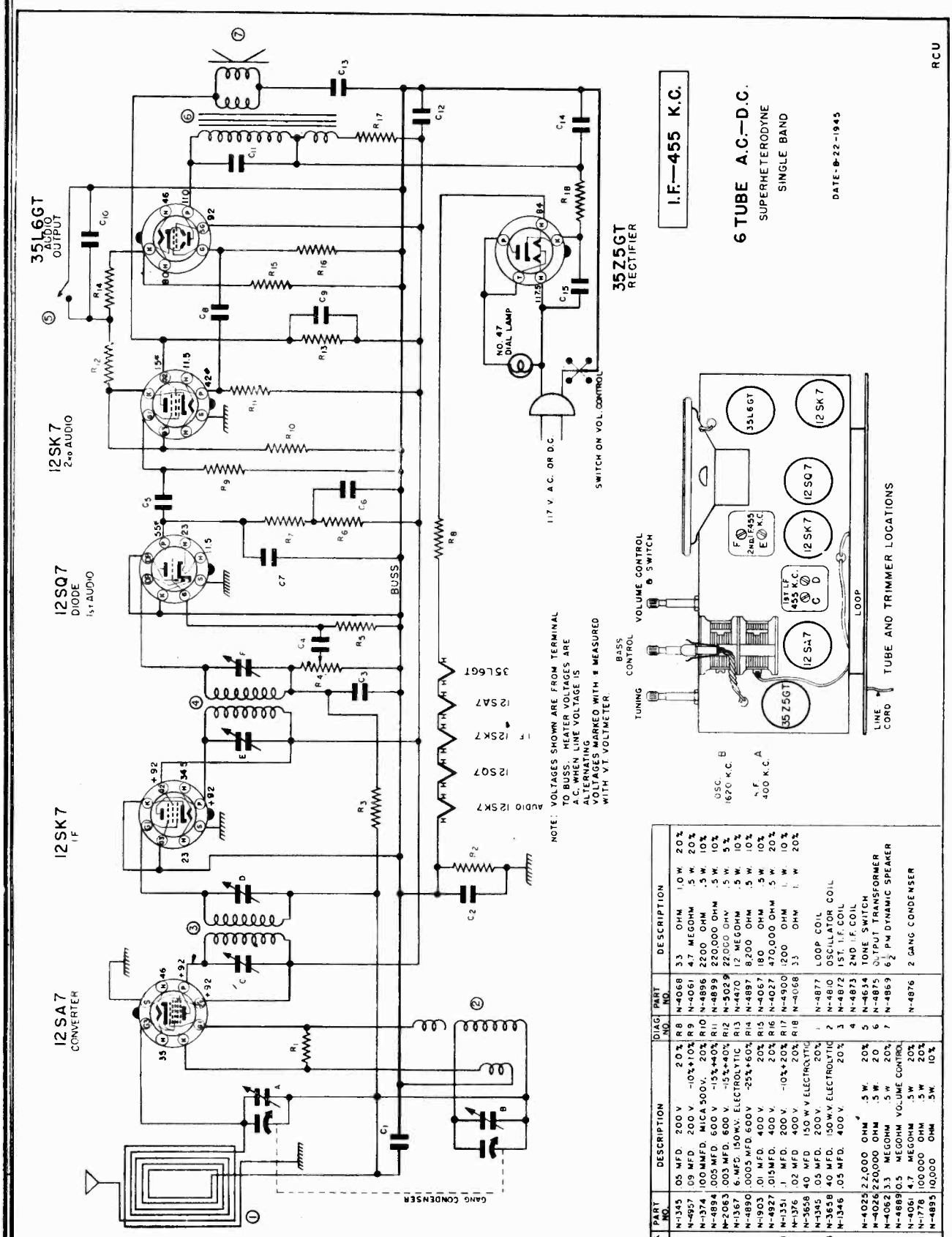
MODEL 6F-235



DIAG NO.	PART NO.	DESCRIPTION		DIAG NO.	PART NO.	DESCRIPTION	
C1	N-1345	.05 MFD.	200 V 20%	R8	N-4068	33 OHM	1.0 W. 20%
C2	N-4957	.09 MFD.	200 V -10%+10%	R9	N-4061	4.7 MEGOHM	.5 W. 20%
C3	N-1374	100 MMFD.	MICA 500 V. 20%	R10	N-4896	2200 OHM	.5 W. 10%
C4	N-4894	.005 MFD.	600 V -15%+40%	R11	N-4899	220,000 OHM	.5 W. 10%
C5	M-2063	.003 MFD.	600 V. -15%+40%	R12	N-5029	22000 OHM	.5 W. 5%
C6	N-1367	6 MFD.	150 W.V. ELECTROLYTIC	R13	N-4470	12 MEGOHM	.5 W. 10%
C7	N-4890	.0005 MFD.	600 V -25%+60%	R14	N-4897	8,200 OHM	.5 W. 10%
C8	N-1903	.01 MFD.	400 V. 20%	R15	N-4067	180 OHM	.5W 10%
C9	N-4927	.015 MFD.	400 V. 20%	R16	N-4027	470,000 OHM	.5 W. 20%
C10	N-1351	.1 MFD.	200 V. -10%+20%	R17	N-4900	200 OHM	1 W. 10%
C11	N-1376	.02 MFD.	400 V. 20%	R18	N-4068	33 OHM	1 W. 20%
C12	N-3658	40 MFD.	150 W.V ELECTROLYTIC 20%	1	N-4877	LOOP COIL	
C13	N-1345	.05 MFD.	200 V. 20%	2	N-4810	OSCILLATOR COIL	
C14	N-3658	40 MFD.	150 W.V. ELECTROLYTIC 20%	3	N-4872	1ST. I.F. COIL	
C15	N-1346	.05 MFD.	400 V. 20%	4	N-4873	2ND I.F. COIL	
R1	N-4025	2,2,000 OHM	.5 W. 20%	5	N-4614	TONE SWITCH	
R2	N-4026	220,000 OHM	.5 W. 20	6	N-4875	OUTPUT TRANSFORMER	
R3	N-4062	3.3 MEGOHM	.5 W. 20%	7	N-4869	6½ P.M DYNAMIC SPEAKER	
R4	N-4889	0.5 MEGOHM	VOLUME CONTROL		N-4876	2 GANG CONDENSER	
R5	N-4061	4.7 MEGOHM	.5W 20%				
R6	N-1778	100,000 OHM	.5 W 20%				
R7	N-4895	10,000 OHM	.5W. 10%				

SCHEMATIC AND PARTS LIST INCLUDING CHASSIS LAYOUT AND TUBE POSITIONS

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MODEL 8G-200, 8G-201

TUNING RANGE

This receiver is designed to operate over two tuning ranges; the broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters), and the Frequency Modulation (FM) Band which extends from 87 to 109 Megacycles (MC).

DIAL CALIBRATION. (Standard Broadcast Band.) The upper scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba, and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

DIAL CALIBRATION. (Frequency Modulation Band.) The entire lower scale is calibrated from 88 to 108 Megacycles (201 to 300 FM channels) which covers the entire popular Frequency Modulation (FM) Band.

BROADCAST ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED: Modulated Test Oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC, also an Output Meter to connect across the primary or secondary of the output transformer.

I. F. ALIGNMENT: Put switch in the broadcast position and connect the test oscillator to the converter grid through a .05 condenser. The ground lead of the test oscillator should be connected to the buss of the receiver. Adjust the four I. F. trimmers (F,G,L and K) for maximum reading on the output meter. Always use the peak on the slug which is obtained when screw is out of the can the greatest distance.

R. F. ALIGNMENT: Connect the test oscillator to the antenna lead on the loop through a 100 mmf. condenser. Set the gang condenser to the maximum high frequency position and the test oscillator to 1620 KC. Adjust Trimmer "C" to the maximum output. Set test oscillator to 1400 KC and tune in signal with the gang condenser and adjust Trimmer "A" to maximum response. Set test oscillator to 600 KC and tune in signal with gang condenser. Check for damage to gang condenser or coils.

F. M. ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED: F. M. Generator with frequencies of 90, 98, 106, and 109 megacycles, and generctor without any modulation which covers 10.7 megacycles, also a zero center microammeter, and a DC Vacuum Tube Voltmeter (An oscilloscope and variable frequency audio oscillator can be used for better results. This method of alignment is described in the last paragraph).

DISCRIMINATOR ALIGNMENT: Connect DC Vacuum Tube Voltmeter between the buss and point "XX" on circuit diagram. Point "XX" is negative potential on the vacuum tube voltmeter. Isolate point "XX" and buss connections to vacuum tube voltmeter with chokes made by wrapping approximately 20 turns of hookup wire around a pencil. This is illustrated in Figure 1. Connect two 100,000 ohm resistors in series. (These resistors must match to 5%.) Connect them from point "XX" to buss. Between junction of 100,000 ohm resistors and the point "YY" connect Zero Center Meter, which is also isolated by the choke described above. These connections are illustrated in Figure 1. Connect test oscillator which is adjusted to 10.7 magacycles to grid of IF Driver through a 250 mmf condenser. Adjust slug "M" to maximum on the vacuum tube voltmeter. Reduce test oscillator to keep vacuum tube voltmeter to around 5 volts. Adjust slug "N" to bring zero center meter to zero point. Slug "N" should never be touched after this alignment.

PRELIMINARY IF ALIGNMENT: Connect test oscillator to the converter grid through a 250 mmf. mica condenser. Adjust slugs D, E, H and J to maximum output on the vacuum tube voltmeter. In making these adjustments reduce the generator input to keep the vacuum tube voltmeter at approximately 5 volts when making this adjustment. Always use the peak on the slug which is obtained when the screw is out of the can the greatest distance.

FINAL I. F. ALIGNMENT: Set the test oscillator to 109 MC without frequency moldulation and connect it to converter grid. Adjust trimmer "B" for approximate maximum output on the vacuum tube voltmeter and zero center for exact centering. Adjust test oscillator to approximately 25 KC deviation, carefully adjust trimmers D, E, H, J and M for maximum on vacuum tube voltmeter. It may be necessary to shift the frequency of the oscillator slightly to hold the zero center meter on center. In making this adjustment turn up volume control slightly to obtain an audio signal out of the speaker. If this signal is free of distortion, increase the deviation to approximately 75 KC and repeat the above alignment. If this is done carefully there will be no distortion in the speaker with this deviation. If distortion is obtained in the speaker with this deviation, it will be necessary to carefully repeat the I.F. alignment.

R. F. ALIGNMENT: Move the signal generator to the FM antenna terminals, using 150 ohm resistors between the generator terminals and each of the FM antenna terminals. Set the test oscillator to 106 megacycles and tune in signal with gang condenser to obtain approximate maximum on the vacuum tube voltmeter and zero center on the meter. Slightly bend the RF section in the gang condenser for maximum output with vacuum tube voltmeter. Set the signal generator to 98 megacycles, tune in signal with the gang condenser. Repeat the above procedure at this frequency and also at 90 megacycles. Recheck alignment at 106 megacycles.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

FINAL ALIGNMENT OF FM IF WITH OSCILLOSCOPE AND VARIABLE AUDIO OSCILLATOR: The oscilloscope and variable audio oscillator should be connected as shown in Figure 2. Adjust the deviation to approximately 25 KC and align trimmers D, E, H, J and M to maximum on the vacuum tube voltmeter while watching the oscilloscope for a straight line. It may be necessary to vary the frequency of the variable audio oscillator in order to make the line straight on the scope. Next increase deviation to approximately 75 KC and repeat procedure, adjusting for maximum or as close to maximum as it is possible to obtain without losing the straight line on the oscilloscope. After all the trimmers have been properly adjusted to a maximum and a straight line on the scope, increase the deviation from approximately 125 to 150 KC. The curves illustrated in Figure 3 should be obtained. In making the above adjustments it may be necessary to make slight variations in the RF frequency in order to hold the zero center meter at the zero point.

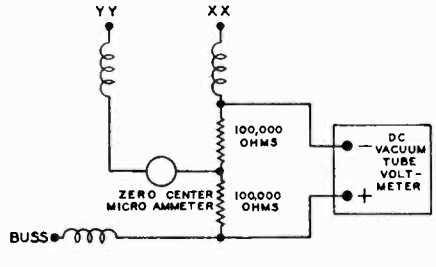

FIG. 1

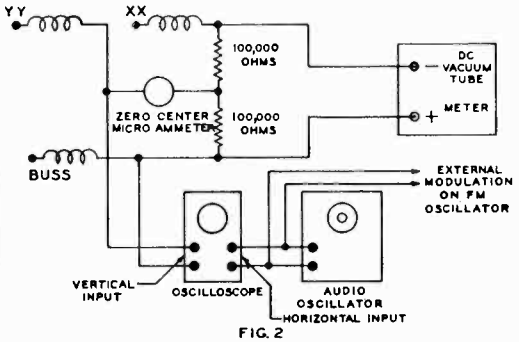

FIG. 2

OSCILLOSCOPE PATTERNS

FIG. 3

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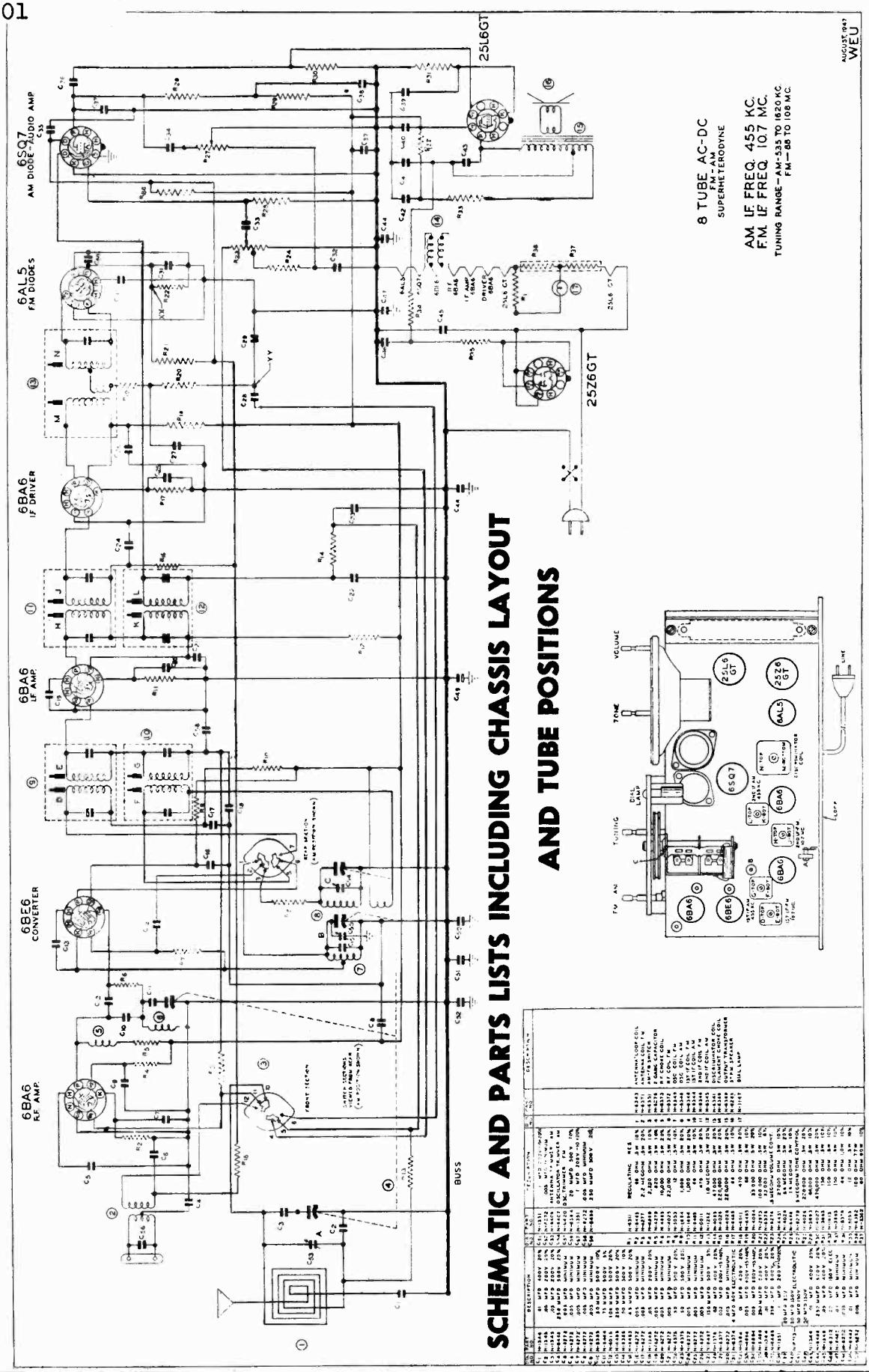
8G-201



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OPERATING INSTRUCTIONS

Miniature Superheterodyne Broadcast Tuner — Model A-600

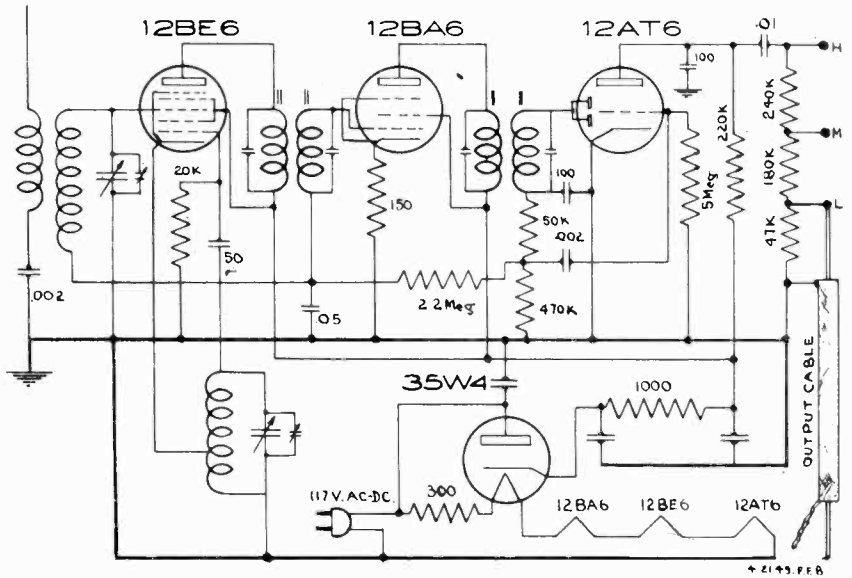
Introduction:

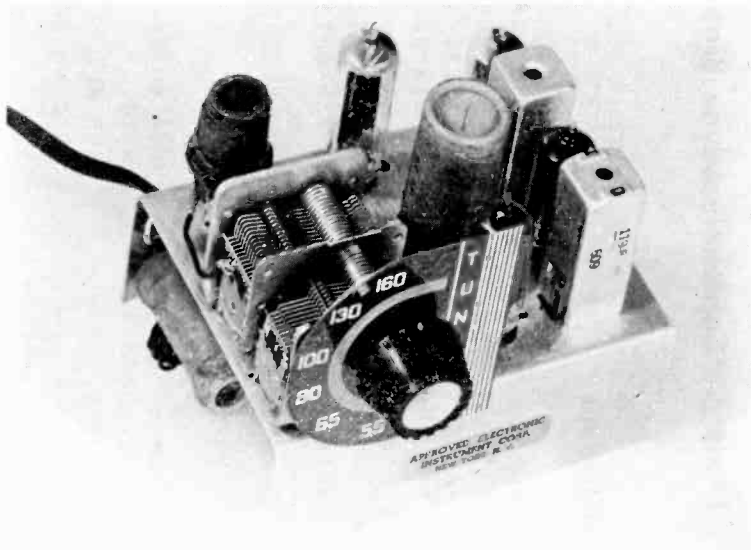
The circuit of this tuner is a standard superheterodyne of high efficiency, using miniature tubes throughout. A.C.-D.C. circuitry is used and therefore CARE SHOULD BE EXERCISED WHEN THIS TUNER IS CONNECTED TO OTHER EXISTING EQUIPMENT. Inasmuch as the audio output cable is connected to the power line (for low hum consideration) it would be unreasonable to float the chassis. While it is possible to do so and insert a fairly large paper capacitor in return with the output cable shield, the existing above ground voltage between the cable shield and power line ground would result in unbearable hum conditions. In order to avoid fuse blowouts or shock, it is ABSOLUTELY NECESSARY THAT THE POLARITY OF THE TUNER POWER LINE CORD IS SUCH THAT THE TUNER CHASSIS AND ASSOCIATED EQUIPMENT ASSUMES THE SAME POLARITY IN RESPECT TO THE POWER LINE GROUND. This can be easily checked with an A.C. voltmeter. The output cable is attached within the tuner to the low output tap. If higher output is desired connect the output cable to the medium or high output as shown in the diagram below.

Specifications:
With a strong signal tuned in -

A.V.C.: - - - - - - - -	3-7 volts.
Oscillator Grid - - -	8-11 "
IF Frequency- - - - -	455 Kc.
Selectivity - - - - -	10/down 7Kc.
Gain- - - - Ant.- - -	5
Gain- - - - Converter	30
Gain- - - - IF - - -	60
Output impedance- - -	High
Audio output - - - - -	10 - 5 - 1 volt Adjustable in 3 steps.
Power consumption- - -	25 Watts
D.C. Voltage - - - - -	110-120 volts
Total current- - - - -	25 mils.

Tubes: 1 - 35W4 Rectifier
1 - 12AT6 Diode Audio
1 - 12BA6 IF Amplifier
1 - 12BE6 Converter





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MODEL A-600 AC

OPERATING INSTRUCTIONS

Miniature Superheterodyne Broadcast Tuner — Model A-600 AC

Introduction:

The circuit of this tuner is a standard superheterodyne of high efficiency, using miniature tubes. The power supply is a standard 117V. 60 cycle, fullwave rectifier. A power transformer isolates the line from the chassis. No shock hazards. Ideally suited for installations where space is at a premium. The output cable is attached within the tuner to the low output tap. If higher output is desired connect the output cable to the medium or high output as shown in the diagram below.

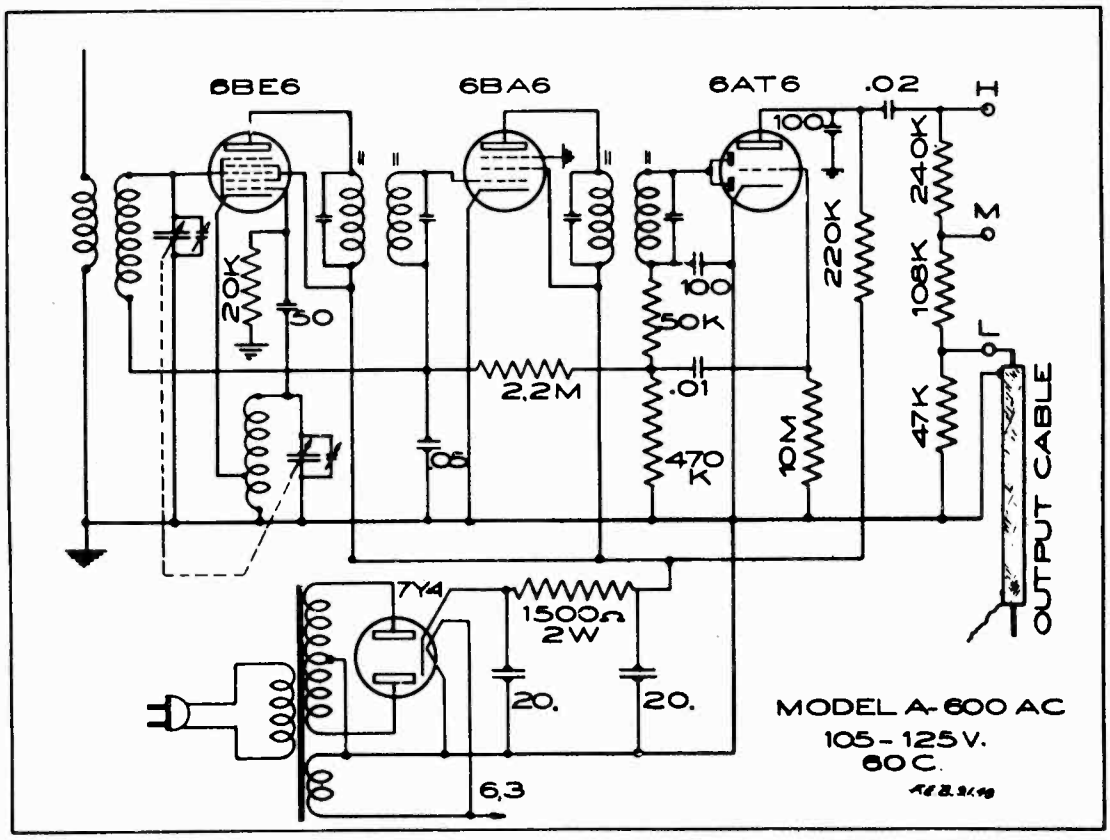
Specifications:

With a strong signal tuned in –

A.V.C.: – – – – – – – – – – 3-7 volts.
Oscillator Grid – – – – – – 8-11 "
If frequency – – – – – – – 455 Kc.
Selectivity – – – – – – – – 10/down 7Kc.
Gain – – – – Ant. – – – – – 5
Gain – – – – Converter – 30
Gain – – – – IF – – – – – – 60
Output impedance – – – – – – High

Audio output – – – – – 10 – 5 – 1 volt
Adjustable in 3 steps

Power consumption – – – 25 Watts
D.C. Voltage – – – – – 110-120 volts
Total current – – – – – 25 mils.
Tubes: 1-7Y 4 Rectifier
1-6AT6 Diode Audio
1-6BA6 IF Amplifier
1-6BE6 Converter



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GENERAL

Model 710 tuner chassis described herein, is a high quality AM-FM tuner, designed for connection to any good amplifier, radio or television receiver.

Its small and compact size lends itself to custom installations, remote and numerous other applications.

Because of the fact that in some cabinets the tuner must be mounted in an inverted or upright position, a special dial scale is made available, with dial calibrations from top to bottom. An attractive bronze finished escutcheon is supplied with each tuner.

The tuner does not carry its own power supply and an external source is required. A 3-foot power cable emerging from the rear of the chassis is color coded for easy identification.

-SPECIFICATIONS-

POWER SUPPLY REQUIRED: AC or DC
6.3V-4A. 170V D.C.-20Mil. 140V D.C.-37Mil.

Total A.M.	F.M.
F.M. Intermediate Freq.	10.7 Mc
Tuning Range	88 - 108 Mc
Tubes:	
RF Amplifier	6AG5
Mixer	6C4
Oscillator	6J6
First IF Amplifier	6AU6
Second IF Amplifier	6AU6
First Limiter	6AU6
Second Limiter	6AU6
Detector	6AL5
AM Intermediate Freq.	456 Kc
Tuning Range	530 - 1800 Kc
Tubes:	
RF Amplifier	6BA6
Converter	6BE6
First IF Amplifier	6BA6
Detector - Amplifier	6AT6
Triode Section of 6AT6 Common to AM & FM	

DATA ON THE APPROVED FM-AM TUNER

The ever-increasing number of FM stations on the air, and the spiraling demand for high-quality FM reception are a challenge to the ingenuity of circuit engineers who must steer a course between very cheap designs of such poor performance that dealers are coming to recognize them as spurious models, and FM receivers which are too high in price for the mass market at this time.

It was with the middle course in mind that our engineers at Approved Electronic Instrument Corporation designed the unit shown in the circuit diagram.

First of all, it employs a tuned RF stage with two limiters and a discriminator, giving high sensitivity and effective static reduction. These assure reception that does full justice to FM broadcasting. Then, a simplified electrical design was developed which assures high stability and freedom from drift.

This tuner contains all the controls required for operation, and one stage of audio amplification common to both FM and AM section. Thus it can be connected to a special amplifier and speaker, or to the audio system of an existing television set capable of supplying the necessary filament and B+ power requirements of the tuner.

FM - I.F. Section

Following the mixer are two I.F. stages operating at a center frequency of 10.7 mc. into two limiter stages which in turn feed a standard discriminator. All I.F. transformers are constructed for high frequency operations throughout. Special iron cores are used that reach their peak "Q" value at 10.7 mc. The fixed capacitors are of the compensatory type. Wave shape tests have shown these transformers to possess excellent symmetry and stability. The discriminator transformer has been designed to provide extreme uniformity of wave shape with equal positive and negative peaks resulting in high voltage output with very good discrimination. A band width of 200 kc. is the nominal value of all I.F. Discriminator transformers. Fig. 3 and Fig. 4.

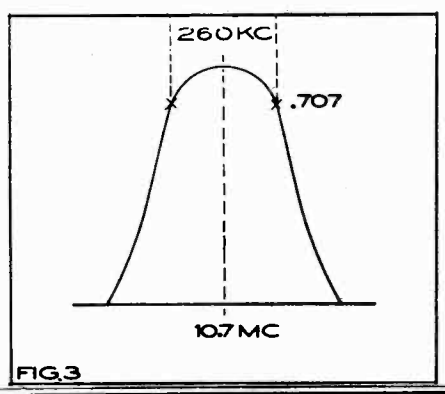

FIG.3

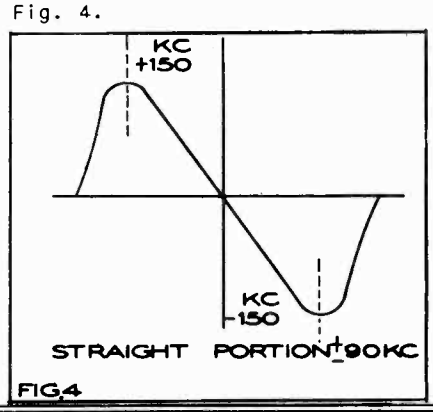

FIG.4

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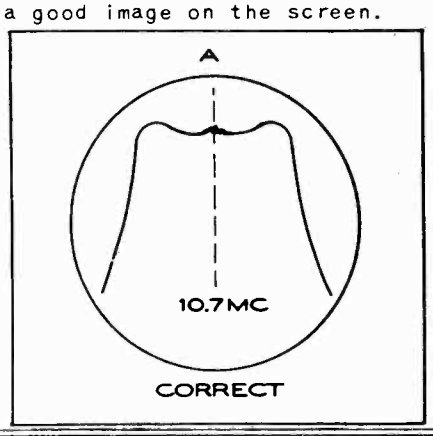
MODEL A-710

FM - I.F. Alignment

The center frequency of the IF amplifier is 10.7 mc. Due to overcoupling of the IF transformers a bandwidth of about 150 kc. can be expected and is of the double humped variety. While it is possible to align the IF amplifier with an ordinary AM signal generator and meter, for maximum response, it does not follow that this method produces the correct alignment for proper bandpass characteristic. A much more efficient and time saving procedure of the I.F. amplifier alignment is the visual method requiring a frequency modulated signal generator, an oscilloscope and for double check purposes a deviation meter to be connected across the discriminator output. The meter is a D.C. V.T.V.M. zero center and calibrated -3.-0 +3 volts. The frequency modulated signal generator must be capable of sweeping through a range of about 10.5 to 10.9 mc. in sawtooth fashion with a possible adjustment for contraction or expansion of the total sweep width and a simultaneously generated sweep voltage is necessary for horizontal deflection of the oscilloscope. A good AM signal generator with a wide spread around 10.7 mc. completes the total test instruments necessary for proper IF amplifier alignment. Using the visual method of IF alignment, the sweep voltage output of the frequency modulated signal generator must be connected to the horizontal deflection input of the oscilloscope. The controls of the scope should be adjusted that the trace covers almost the full width of the screen. Connect the vertical deflection input of the oscilloscope across the grid return resistor of the limiter stage and with the output of the frequency modulated signal generator applied to the grid of the second IF stage, adjust the generator to sweep from about 10.5 to 10.9 mc. Due to grid rectification action of the limiter stage, a signal corresponding to the amplitude response of the preceding circuits is then available, and by careful adjustment of the oscilloscope controls a picture of the response curve will be visible on the screen. Never apply more generator voltage than required to produce a good image on the screen.

In order to insure correct center frequency setting, it is now necessary to apply a marker frequency, conveniently obtained from the standard AM signal generator, unmodulated and applied in parallel with the sweep frequency generator. The output of the AM generator should be isolated by means of a small mica condenser and have sufficient R.F. voltage output to produce a small marker pip superimposed upon the response curve trace. With the AM generator set to exactly 10.7 mc. observe the position of the marker pip and if the pip falls in the center of the response curve, the alignment to follow consist of equalizing the peaks on either side of the marker pip by means of the iron core adjustment screws from the top and bottom of the IF transformers. If the AM generator possesses a good frequency spread around 10.7 mc., the marker pip can be used to measure actual band width by slowly moving the AM generators frequency to either side of center frequency, noting where the pip begins to slide off the center of either hump, and adding both frequency differences from center frequency. This equals the total bandwidth. A correct alignment pattern is shown in Fig. 7A. Greater amplitude of patterns indicate higher gain and therefor all adjustments made must be based not only upon symmetry but gain as well.

The generators, both AM and FM are now shifted to the grid of the preceding stage and the whole procedure as outlined repeated. It will be necessary to reduce the output of the generators due to the gain of the added stage. When this stage has been properly aligned, the signal generators are then shifted to the grid of the mixer tube (6C4), where the oscillator voltage is injected. During the alignment of the first IF transformer, the oscillator should be inoperative by removing the 6J6 tube. The next step is to align the first IF transformers prim. and sec. The pattern appearing on the screen is then a picture of the overall response of the complete IF amplifier and should be symmetrical with the highest possible amplitude for maximum gain.



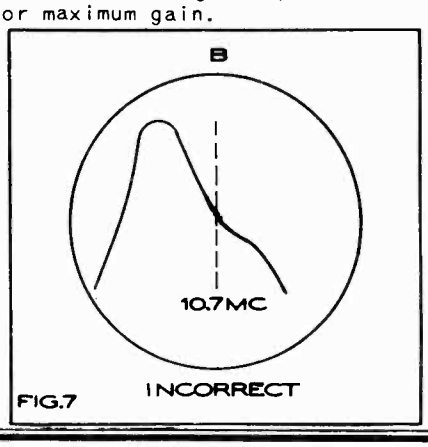


FIG.7

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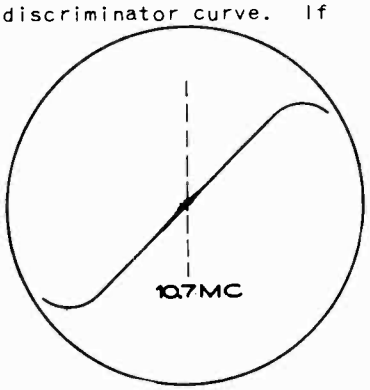
Discrimator Alignment

The alignment of the discriminator is comparatively easy. The output of the frequency modulated signal generator is applied to the grid of the 1st limiter tube and the output of the AM generator is fed to the same point at 10.7 mc. The vertical input of the oscilloscope must be connected across the discriminator output with the ground side of the scope to the grounded side of the discriminator. The controls of the scope should be adjusted for the best image possible with a minimum of signal generator voltage applied to the grid of the limiter. Symmetry must be obtained around the 10.7 mc. marker pip with linearity above and below the marker pip point. A correct discriminator pattern is shown in Fig. 8.

The adjustment of the primary of the discriminator transformer controls the linearity of the discriminator curve. If meter alignment is preferred, or no oscilloscope available, a simple D.C. vacuum tube voltmeter preferably one having a zero center scale and reading plus and minus 3 volts is connected across the discriminator output. A frequency of 10.7 mc. from an AM signal generator is fed to the grid of the limiter stage. The meter will probably read off center. The secondary of the discriminator must now be adjusted until the meter reads zero volts. Now change the generators frequency in equal steps above and below 10.7 mc. and note the voltage read on the meter. Readings should increase linearly on either side of the 10.7 mc. center frequency. Checks and rechecks with simultaneous adjustment of the discriminators primary may be necessary before a curve is obtained that resembles the pattern in Fig. 8.



CORRECT DISCRIMINATOR ALIGNMENT PATTERN WITH 10.7 MC MARKER PIP

FIG.8

R. F. Frontend Alignment

To align the RF section of the Approved Tuner the following equipment is required. A signal generator with a frequency coverage of 88-108 mc. and preferably on fundamentals, a D.C. vacuum tube voltmeter with a low scale reading of about 3 volts or a D.C. meter having at least 20,000 ohms per volt impedance. The meter should be connected across the grid return resistor of the limiter stage. The output of the generator is then applied to the input of the tuner with the frequency set to 106 mc. and the tuner dial indicator set to read likewise 106 mc. The next step is to adjust the oscillator trimmer until the meter indicates maximum voltage. If the meter tends to read off scale, reduce the R.F. input voltage and hold the meter reading to about 2 volts average. The oscillator has been designed to operate at 10.7 mc. lower than signal frequency and proper setting of the oscillator frequency can be readily checked with a small absorption type wavemeter. At resonance, a large dip or increase in voltage reading will be noticed. The text adjustment consists of tuning the antenna and mixer stages for maximum response. Like the oscillator, both stages are tuned by means of silver ceramic capacitors.

The generator should now be set to 90 mc. and the dial indicator to the same frequency, and the oscillator, RF and antenna inductance slugs adjusted until the meter again reads maximum voltage. A small adjustment of the oscillator inductance at 90 mc. may show up as a large frequency deviation at 106 mc. due to the inter-relationship of L to C. It may be necessary to repeat the alignment procedure several times before good tracking is finally obtained. With a perfectly aligned tuner, tracking error should never be more than 3 db.

Audio Amplifier

For full enjoyment of high quality reception possible, an amplifier having a flat response of 50-15,000 c.p.s. within 2 db. should be used with a correspondingly good speaker.

Power connection external or from the amplifier to the tuner must be made and a shielded lead from the tuner output must be used to the amplifier input in order to avoid hum pickup.

Antenna

The input of the Approved Tuner has been designed to accommodate an FM antenna with a 300 ohm downlead impedance. It must be remembered that the higher the antenna above ground the greater its effectiveness. A simple folded di-pole antenna may be constructed from the new type 300 ohm line. For construction information see Fig. 5.

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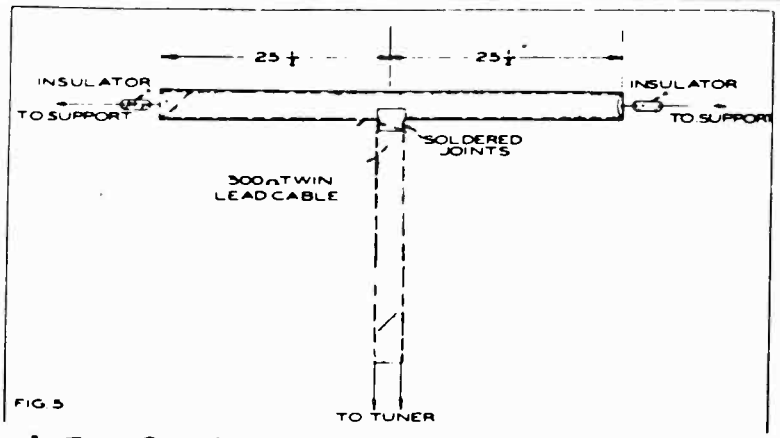

FIG 5

AM - I. F. Section

Following the converter are two IF transformers operating at 456 Kc. Special ironcore tuned IF transformers of high quality, high "Q" construction contribute to the excellent stability.

AM -I. F. Alignment

The following instruments are required for the complete alignment of the AM receiver section.

1. A signal generator with Audio Modulation covering the 456 Kc. and 540 -1800 Kc. band.
2. Voltmeter (AC) preferably vacuum tube (Voltmeter).

The alignment of the AM section should be as follows:

Connect the AC output meter to the audio terminal from the 6AT6 tube, set meter to a suitable scale, volume control half on, selector switch in AM position.

Connect the signal generator to the converter signal grid and ground and feed in a 456 Kc. signal. Align all IF transformers for maximum meter reading. Use as little generator input as possible. If an amplifier is connected to the tuner use the output meter across the voice coil, modulate signal generator and align for maximum sound output.

AM - R. F. Alignment

Connect the output meter as above and feed a 1450 Kc. signal into the antenna terminals. Check dial pointer to coincide with dial calibrations. Adjust all AM trimmer condensers for maximum output. Use as little generator input as possible.

Set dial pointer to 600 Kc. (generator likewise to 600 Kc.) and adjust ironcore slug of the AM oscillator coil for maximum output. Rock variable condenser slightly back and forth, note output and adjust tuning slug until maximum output is obtained near 600 Kc. Return dial setting to 1450 Kc., generator setting likewise and repeat trimmer adjustment. This procedure may be repeated until no further increase in output is obtained at 1450 Kc. and 600 Kc. Due to the great sensitivity of this tuner, only a small antenna is required for average reception.

To the left of the tuning capacitor is the FM section with the antenna coil located directly between the 6AG5 tube and variable capacitor. Directly behind the antenna coil follows the mixer coil and tube and this is followed by the oscillator tube and coil. All three coils are slug tuned and these slugs are used for inductance adjustment around 90 Mc. only. Temperature compensated silver ceramic trimmer condensers are shunted across the main tuning sections and are used for high frequency adjustment around 106 Mc. only. All FM alignments are critical and must be made with great care in order to obtain the maximum performance of which the tuner is capable. Model 710 has been aligned at the factory by the sweep generator and scope method for maximum efficiency and no adjustments should be disturbed unless the service man has the necessary tools to perform alignment service. Approved Electronic Instrument Corp. sweep generator Model A-400 is a Sweep generator ideally suited for FM and television alignments.

Page 7 shows a tube layout. The top view of the tuner shows clearly all important parts and are identified as to their function. To the right of the tuning condenser and located near the dial scale is the AM antenna coil. Directly in line, but under the chassis is the AM-RF coil. These coils are fixed and have no other adjustment but the trimmers on the variable capacitor. Again in line and under chassis is the AM oscillator coil. This coil has an ironcore slug and its adjustment is rather critical and should only be used and adjusted around 600 Kc. To the right of the chassis are located the IF tubes and 456 Kc. IF transformers.

In good signal areas where fairly strong FM signals are available, an indoor antenna as described on page 5 will work satisfactorily; however, for maximum performance an outdoor dipole with 300 ohm line is strongly recommended. For those who intend to use the tuner in conjunction with a television receiver, we recommend a simple 2 pole knife switch arrangement to transfer the television antenna to the tuner, using the same antenna for either television or FM reception.

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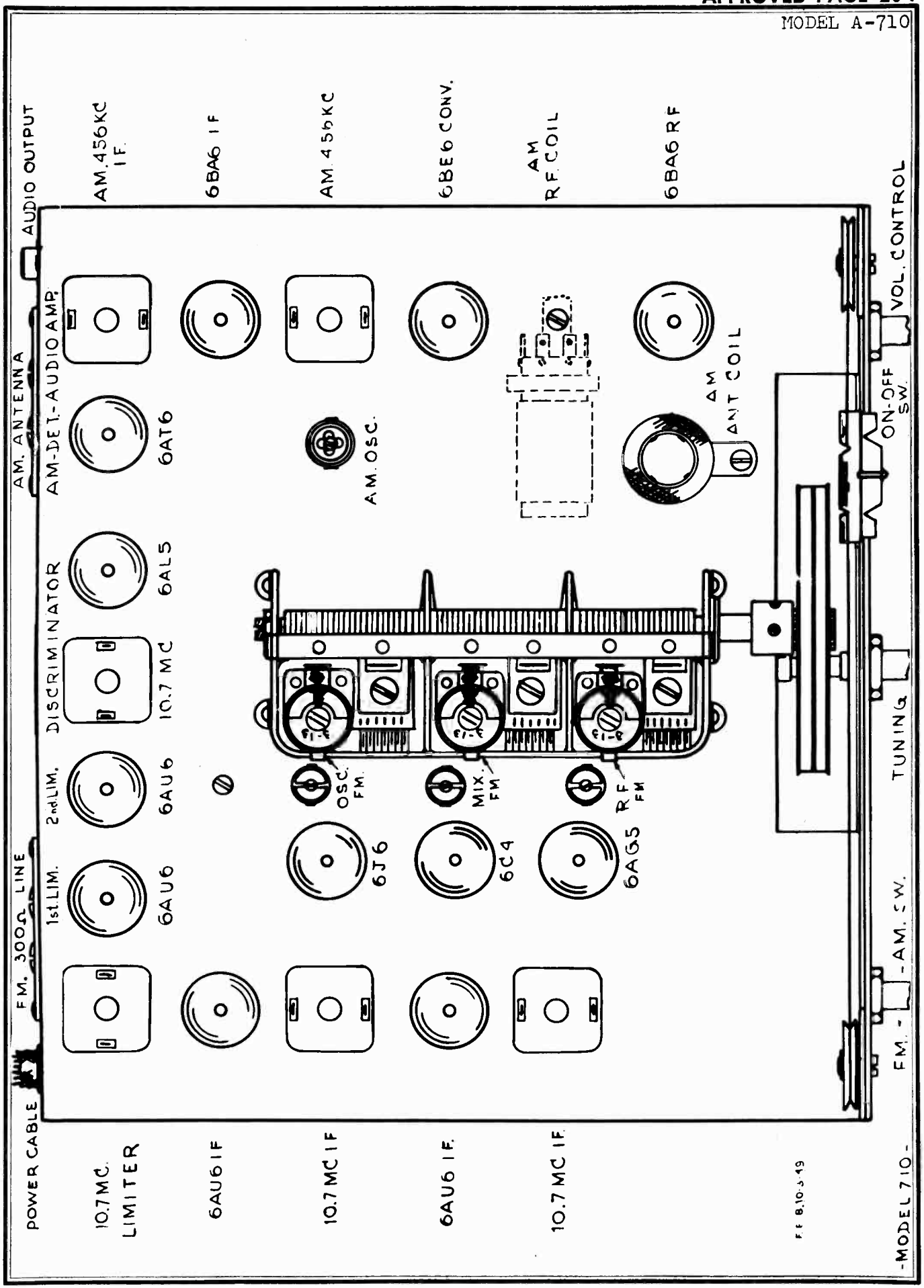

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MODEL A-710

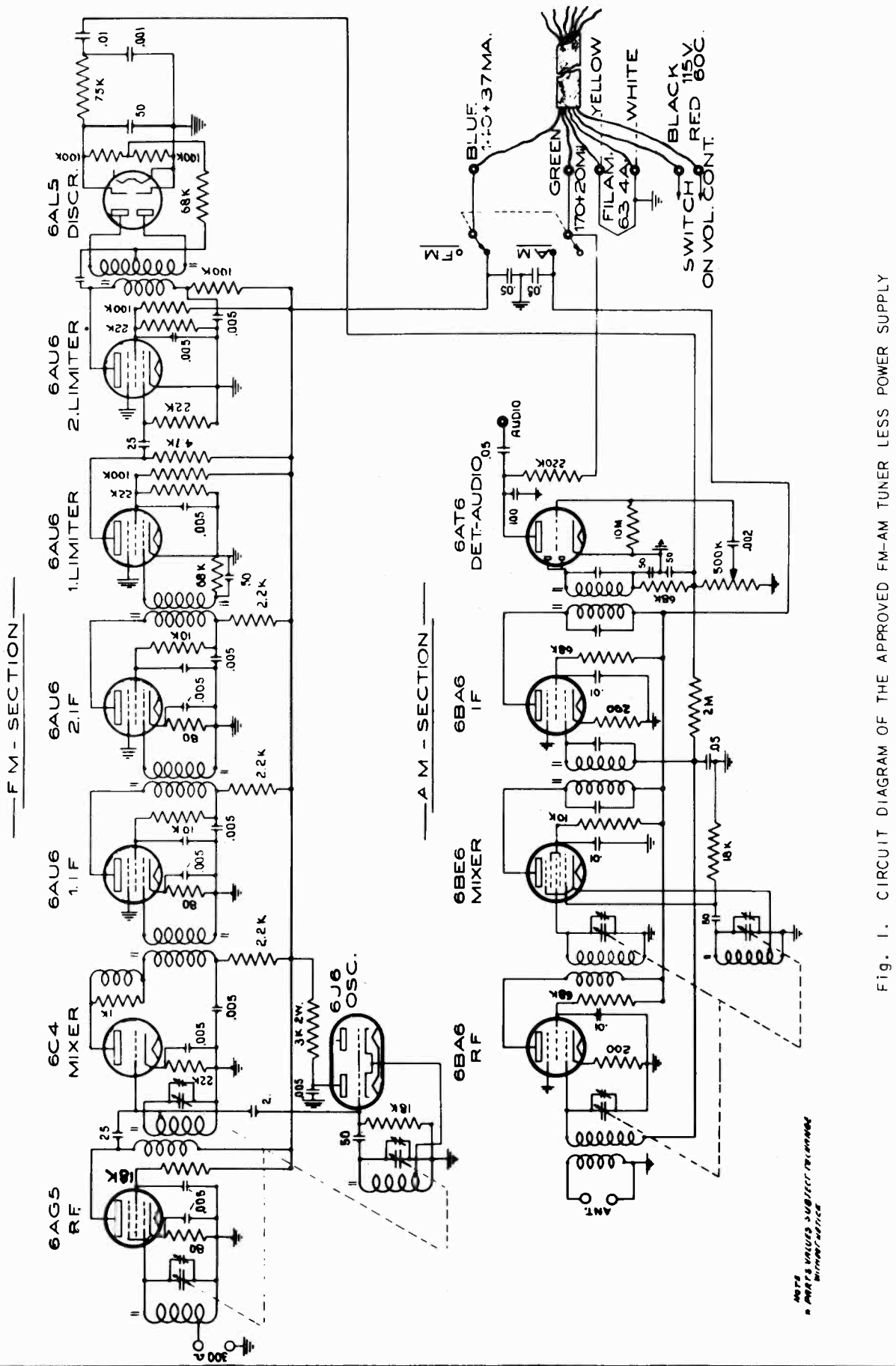

Fig. 1. CIRCUIT DIAGRAM OF THE APPROVED FM-AM TUNER LESS POWER SUPPLY

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TECHNICAL AND ALIGNMENT DATA FOR FMF-3 TUNER

The tuning slugs used in our tuners have a nominal operating range from 87.5 to 108.5 megacycles. They are held within 1% tolerance in permeablity. The oscillator operates 10.7 megacycles higher in frequency than the signal. This means that the effective permeability of the tuning slug is greater in the oscillator coil than in the signal coils. Some method, therefore, is required to reduce the actual frequency coverage of the oscillator. This is done by means of a coil in shunt with the oscillator coil which reduces the latters frequency coverage to agree with the signal coils. The inductance of this coil is made adjustable by meansof an iron core. Frequency stability of the oscillator through careful design and the use of capacitors of the proper temperature co-efficient is equalled only by the use of crystal controlled circuits.

The mixer circuit is of purely conventional design. Oscillator voltage is injected directly into the grid of the mixer by a .68 mmf. capacitor from the oscillator plate.

The RF stage consists of a cathode follower-grounded grid amplifier. At VHF this type of circuit offers a considerable advantage over the more conventional pentode stage. The loading effect of the tube on the coil is many times less than a pentode at these high frequencies. Consequently the "Q" of the circuit is improved which increases both the sensitivity and the image ratio.

ALIGNMENT INSTRUCTIONS

It is necessary that an accurately calibrated signal generator be employed that covers the range of 86 to 109 mc. It should be frequency modulated but not necessarily so. It will be assumed that the alignment work is being done in a completed FM radio with some kind of tuning indicator on it. The following table lists the operations to be performed:

1. Set oscillator tuning slug to 1/32" from end of winding with tuning slugs all the way out .
2. Connect the signal generator through a .1mfd. condenser to the grid of the mixer tube. Remove RF tube.
3. Set the signal generator to 87.5 mc. and run the tuning slugs all the way in the coils.
4. With an insulated screwdriver adjust the oscillator trimmer until a signal is heard. Make sure that the oscillator is on the high side of the signal by swinging thesignal generator to 108.9 mc. T he image should be heard practically as loud as the signal was. If the image is not heard the oscillator trimmer should be re-adjusted by reducing the capacity ofthe trimmer until another signal isheard. The proper setting will be with the screwdriver slot at approximate right angles with the front of the tuner.
5. Run the tuning slugs all of the way out of the coils and check the frequency. If the coverage is too great unscrew t he shunt coil core two or three turns and repeat steps three and four. If too narrow screw the shunt core in two or three turns and repeat steps three and four. This may have to be repeated several times until proper coverage is obtained. The oscillator trimmer will have to be adjusted each time this is done. The tuning range now should be 88.5 to 108.5 megacycles.
6. Remove signal generator lead from mixer grid and connect it to the antenna. Insert RF tube.
7. Set mixer tuning core to 1/32" f rom end of winding with the tuning slugs all the way out. Adjust mixer trimmer for maximum output.
8. Set RF tuning core flush with end of winding with slugs all the way out. Adjust RF trimmer for maximum output.
9. Set signal generator to 106 megacycles, tune in the signal, and re-adjust the RF and mixer trimmers for maximum output.
10. Set signal generator to 90 megacycles, tune in the signal, and check alignment by adjusting the RF and mixer trimmers to see if they are at optimum alignment. If circuits do not track do the following:

a. If the RF trimmer has to be screwed in at 90 megacycles to obtain tracking, screw the RF tuning slug in about 1 turn, and repeat steps 9 & 10 until tracking is obtained.

b. If the RF trimmer has to be screwed out at 90 megacycles to obtain t racking, screw the RF tuning slug out about 1 turn & repeat steps 9 & 10 until tracking is obtained

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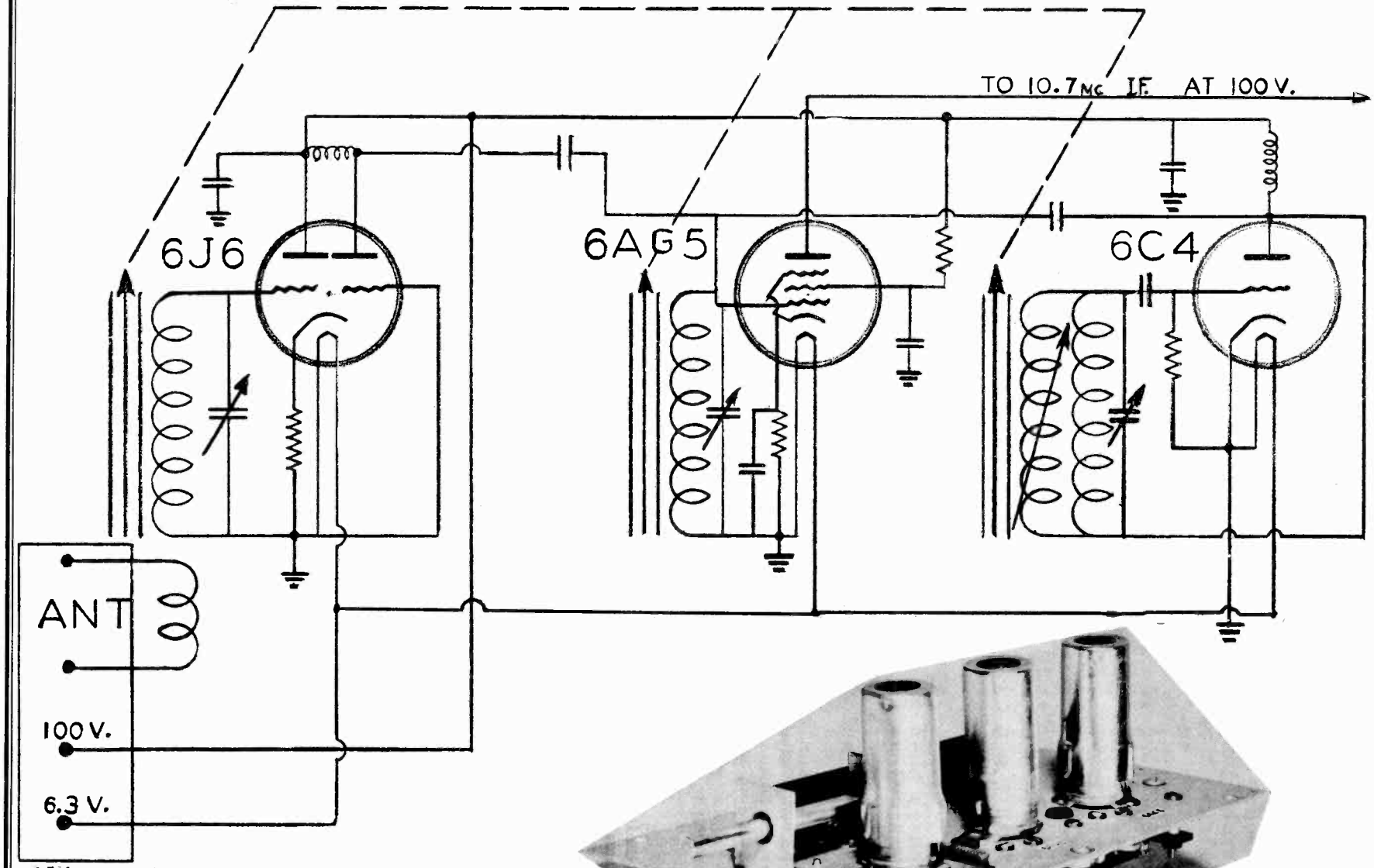

Alignment steps equally apply if the mixer stage requires tracking. Tracking within 3DB may be obtained if the Alignment steps are carefully followed.

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MODEL M-90 AUTO RADIO INSTALLATION

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.

2. Using the front mounting bracket as a template, locate the two front mounting holes and drill a ¼" hole at each point.

3. Attach front mounting bracket to the receiver by two No. 6 self-tapping screws.

4. Locate the position for the rear mounting stud in the bulkhead and drill a ½" hole.

5. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with the small screws provided for that purpose.

6. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

7. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.

8. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

Motor Noise Elimination

1. Disconnect the center lead in the distributor head of the motor and insert a "distributor suppressor" in the cavity and then place the lead in the top receptacle of the suppressor.

2. Clamp a "generator condenser" under the screw which mounts the cut-out on the generator. Connect the flexible terminal of the condenser to the lead on the cut-out.

Operation

Volume Control Knob — This knob is located on the right side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the required loudness. The volume should never be reduced by detuning the station selector knob.

Station Selector Knob — This knob is located on the left side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

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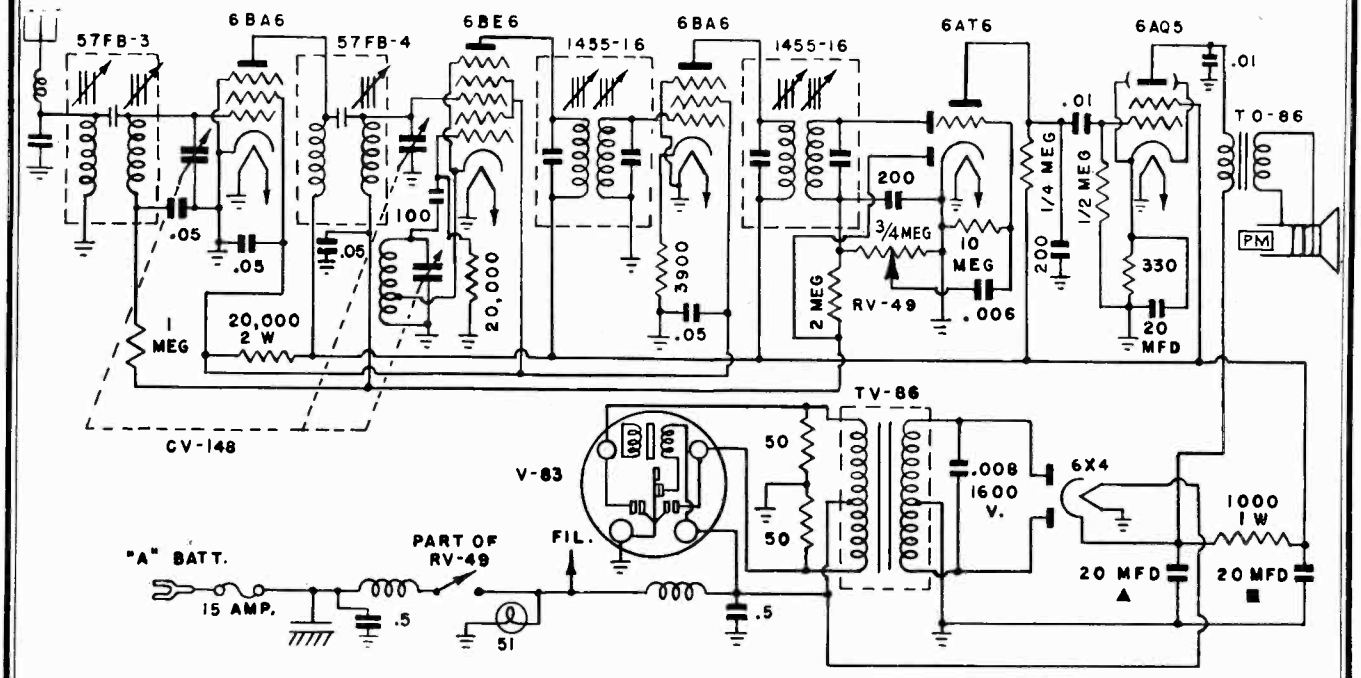
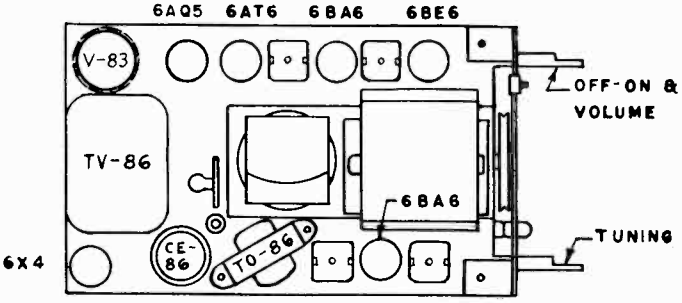
MODEL M-90



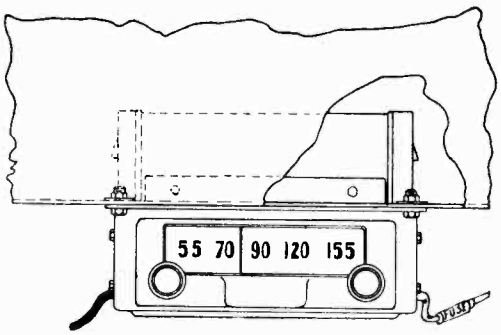


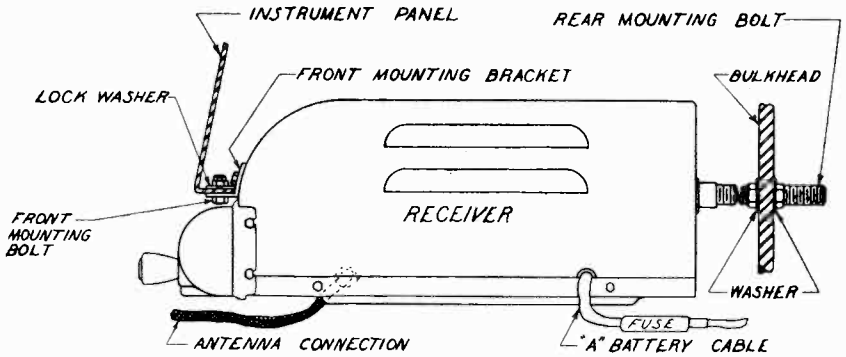
ELECTROLYTIC CONDENSER CE-86	
■ 20 MFD	350 VDC
▲ 20 MFD	350 VDC
20 MFD	25 VDC

I.F. 455 KC
RANGE 540 TO 1560 KC

ISSUE 1247

FIGURE 1





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MODEL M-92C AUTO RADIO
with built-in
BATTERY CHARGER
and
ELECTRIC SHAVER POWERIZER

INSTALLATION AND OPERATING INSTRUCTIONS

This radio is equipped with a patented built-in storage battery charger. A "run-down" storage battery can be recharged **without removing the battery from the car** or making any direct connection to the battery. One end of a power line cord is plugged into a connector on the radio and the other end is inserted into any convenient 117 Volt AC receptacle.

A "Powerizer" has been built into this radio as an extra added feature for the vacationist or traveler. It is possible to operate a standard 117 volt electric razor from this "Powerizer" with the automobile storage battery as the original source of power.

IMPORTANT

READ CAREFULLY BEFORE INSTALLING RADIO IN ANY CAR

Polarity Reversing Switch

Since the polarity of the grounded battery terminal is not the same in all types of cars, this instrument is equipped with a Polarity Reversing Switch.

The position of this switch has no effect on the normal operation of the radio but it must be in the correct position for battery charging.

The switch is located on top of the radio. It should be adjusted to the correct position before installation.

Slide switch to "—GND" position for cars with the negative battery terminal grounded.

Slide switch to "+GND" position for cars with the positive battery terminal grounded.

Refer to the chart below to determine the polarity of the grounded battery terminal in the car in which the radio is to be installed.

Automobile Battery Ground Chart

YEAR	1936	1937	1938	1939	1940	1941	1942	1946	1947	1948	1949
Auburn	Pos.	Pos.									
Buick	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	
Cadillac	Pos.	Neg.	Pos.	Pos.	Pos.	Pos.	Pos.	Neg.	Neg.	Neg.	Neg.
Chevrolet	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	
Chrysler	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Crosley									Pos.	Pos.	
DeSoto	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Dodge	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Duesenberg	Neg.										
Ford	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.
Frazer								Pos.	Pos.	Pos.	
Graham	Pos.	Pos.	Pos.	Pos.							
Hudson	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Hupmobile	Pos.		Pos.	Pos.							
Kaiser								Pos.	Pos.	Pos.	
Lafayette	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.					
LaSalle	Pos.	Neg.	Pos.	Pos.	Pos.						
Lincoln	Neg.	Neg.	Neg.	Neg.	Neg.						
Lincoln Continental						Pos.	Pos.	Pos.	Pos.	Pos.	
Lincoln Zephyr		Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Mercury				Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.
Nash*	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Oldsmobile	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	
Packard	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Pierce-Arrow	Pos.	Pos.	Pos.	Pos.							
Plymouth	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Pontiac	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	
Studebaker	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.	
Terraplane	Pos.	Pos.	Pos.	Pos.	Pos.	Pos.					
Willys	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	

*Some special custom-built models have negative grounded.

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MODEL M-92C

INSTALLATION

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.

2. Using the front mounting bracket as a template, locate the two front mounting holes and drill a ¼" hole at each point.

3. Attach front mounting bracket to the receiver by two No. 6 self-tapping screws.

4. Locate the position for the rear mounting stud in the bulk head and drill a ½" hole.

5. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with the small screws provided for that purpose.

6. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

7. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.

8. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

Motor Noise Elimination

1. Disconnect the center lead in the distributor head of the motor and insert a "distributor suppressor" in the cavity and then place the lead in the top receptacle of the suppressor.

2. Clamp a "generator condenser" under the screw which mounts the cut-out on the generator. Connect the flexible terminal of the condenser to the lead on the cut-out.

OPERATION

"Charge-Radio" Switch

This switch is centrally located just below the tuning dial. Slide this switch to the right for normal radio operation and to the left for battery charging.

Volume Control Knob — This knob is located on the right side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the required loudness. The volume should never be reduced by detuning the station selector knob.

Station Selector Knob — This knob is located on the left side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

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Battery Charging

A "run-down" storage battery can be charged in the following manner:

1. Slide switch, located on the front of the radio, to the "CHARGE" position.
2. Insert female connector of "Radio Cord" into socket located below speaker grill.
3. Insert other end of cord into any convenient 117 Volt AC power receptacle.

The length of time required for a charge is dependent entirely on the condition of the battery being charged. An overnight charge will usually be sufficient if the battery is only slightly run down.

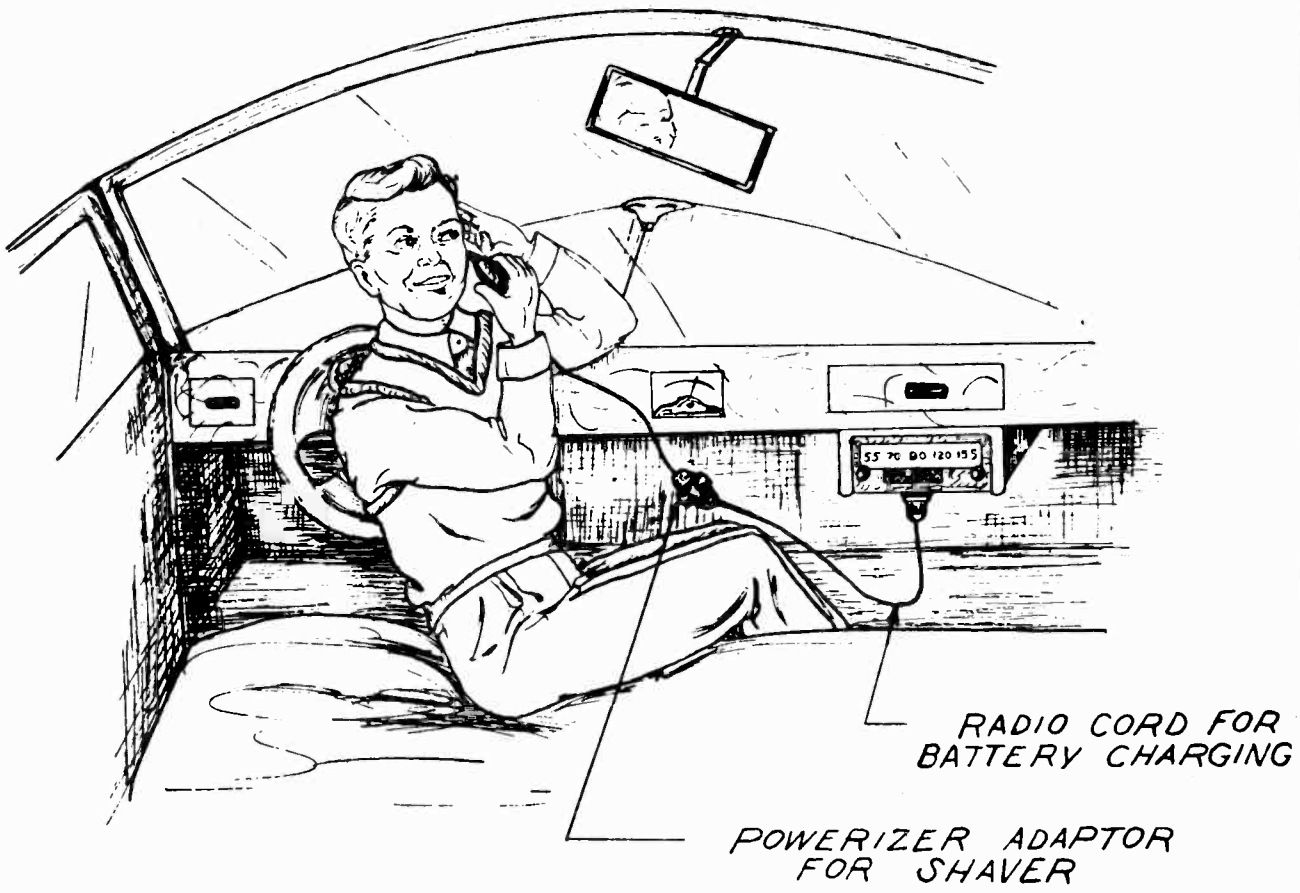
ELECTRIC SHAVER POWERIZER

The "Electric Shaver Powerizer" can be operated by connecting an adaptor to the same cord as used for battery charging.

Electric Shaver Operation

1. Insert one end of "Radio Cord" into socket under speaker grill. (Same socket as used in battery charging.)
2. Plug other end of "Radio Cord" and Electric Shaver into "Powerizer Adaptor."
3. Keep front switch in "Radio" position.
4. Turn set on.
5. Start shaver immediately.

A disturbance similar to static will normally be heard through the loud speaker while the razor is being used. The volume control should be turned back until the disturbance is no longer heard.



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MODEL M-92C

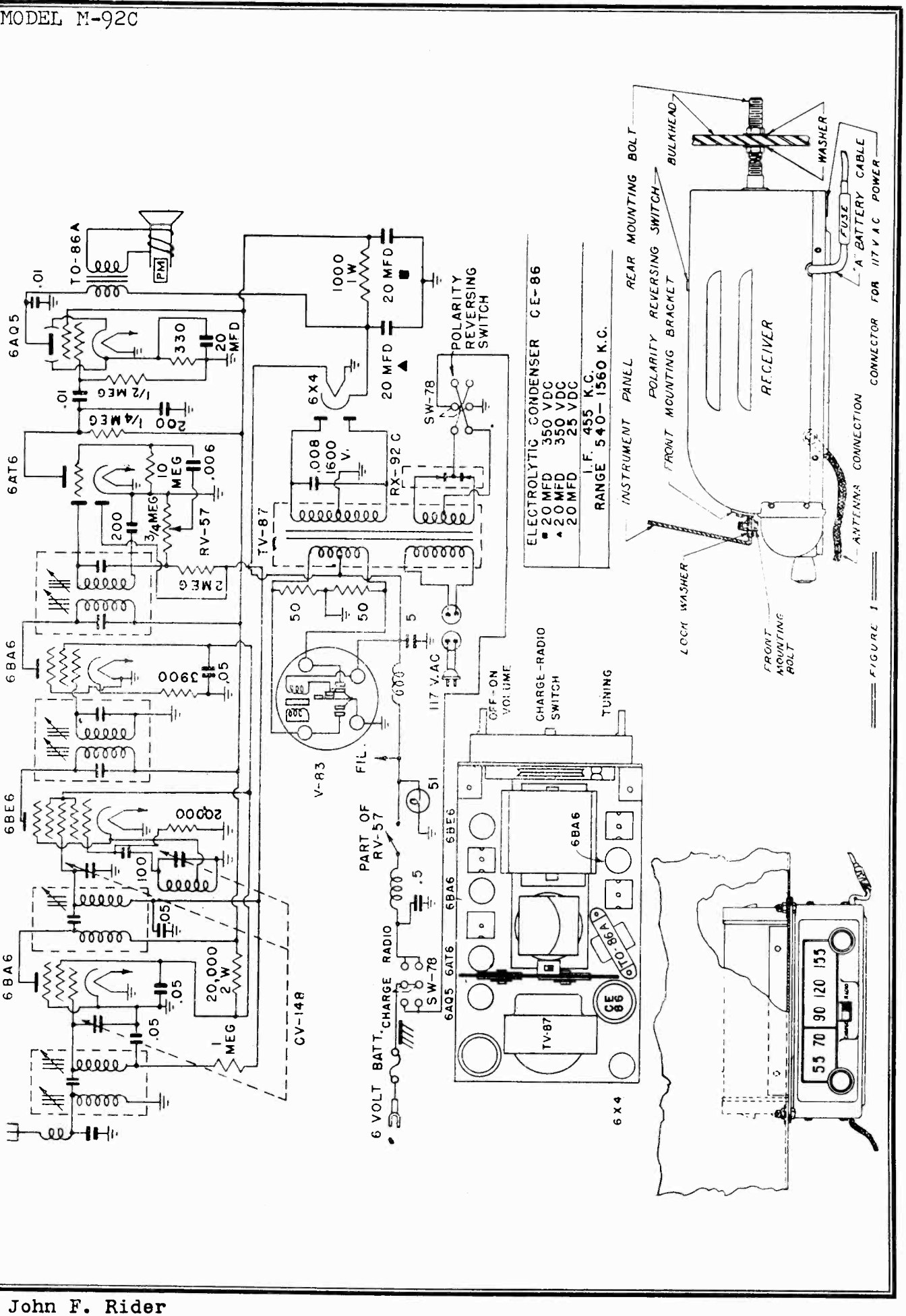

FIGURE 1

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MODEL X-50 AUTO RADIO

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.

2. Using the template on the bottom of this page, locate the two front mounting holes and drill a ¼" hole at each point.

3. Locate the position for the rear mounting stud in the bulkhead and drill a ½" hole.

4. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with the small screws provided for that purpose.

5. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

6. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.

7. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

Motor Noise Elimination

1. Disconnect the center lead in the distributor head of the motor and insert a "distributor suppressor" in the cavity and then place the lead in the top receptacle of the suppressor.

2. Clamp a "generator condenser" under the screw which mounts the cut-out on the generator. Connect the flexible terminal of the condenser to the lead on the cut-out.

Operation

Volume Control Knob — This knob is located on the right side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the required loudness. The volume should never be reduced by detuning the station selector knob.

Station Selector Knob — This knob is located on the left side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

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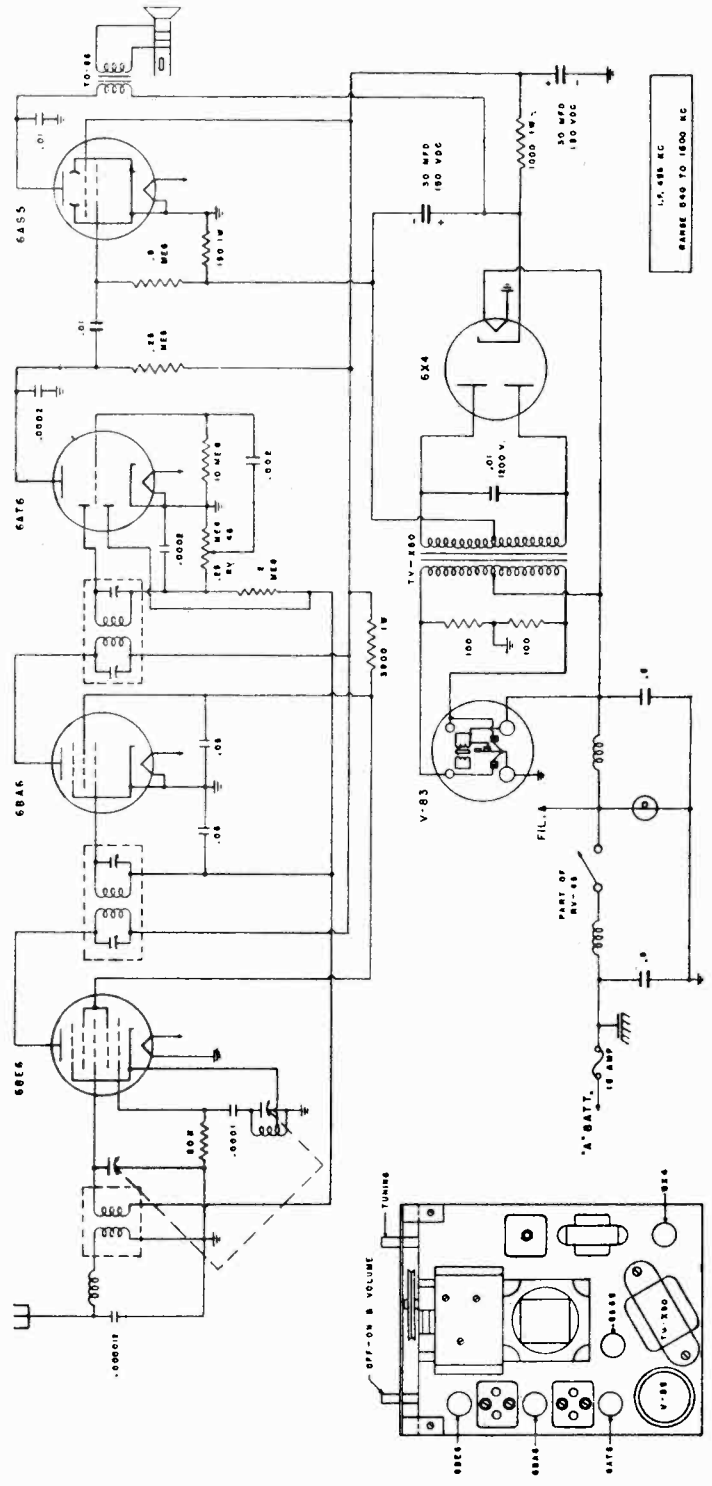
MODEL X-50



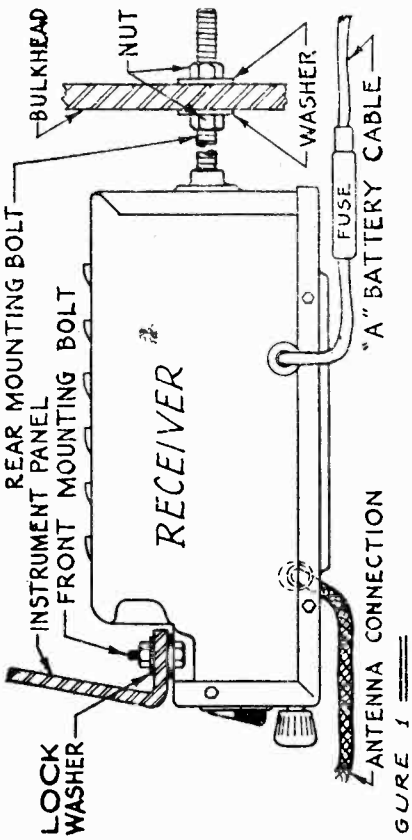
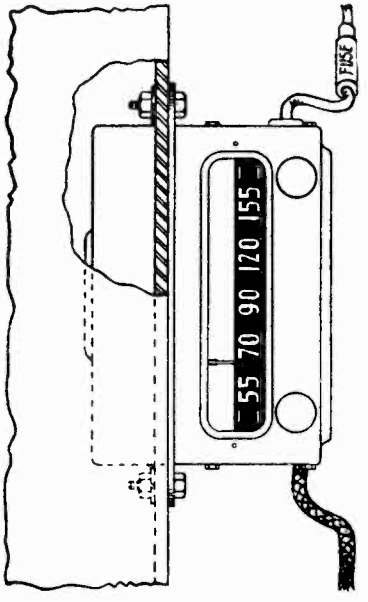


FIGURE 1
RECEIVER MOUNTING DIAGRAM



FRONT HOLE MOUNTING TEMPLATE

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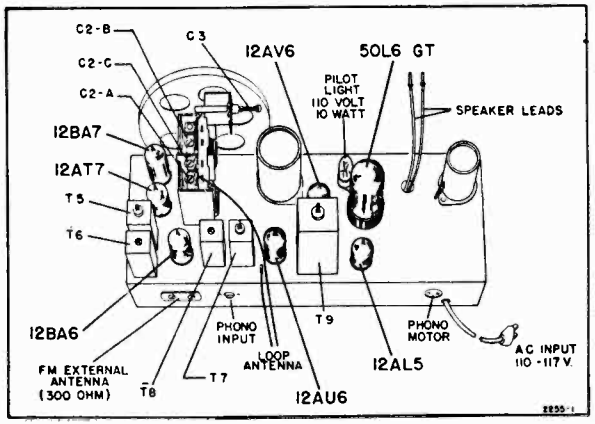
ALIGNMENT PROCEDURE

Broadcast Band Section I. F. and R. F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of .50 watts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.25 volts AC across this resistor will be approximately equivalent to .50 watt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissable.



Chassis View

ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts, AC, 60-cycles; Chassis only 75 watts. With phono operation 100 watts.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band—88 to 108 mc.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.
Selectivity	AM-43 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-250 kc. broad at 2 times down. I.F. FM-650 kc. broad at 10 times down.
AM Sensitivity	(For .5 watt output with external antenna)—18 microvolts average.
FM Sensitivity	(For .5 watt output)—16 microvolts average.
Power Output	2 watts, 10% distortion. 4 watts maximum.
Loud Speaker	10" PM. Voice coil impedance 3.2 ohms, 400 cycles.

Tube Complement

12AT7, FM-RF amp. mixer; 12BA7, AM converter, FM oscillator; 12BA6, IF amplifier; 12AU6, FM driver; 12AL5, FM detector; 12AV6, AM detector, AVC, 1st audio; 50L6GT, output.

Automatic Changer See Manual 5078A.

AM—I. F. ALIGNMENT

Band Switch in AM Position, Gang Open, Dummy Antenna .1 Mfd.

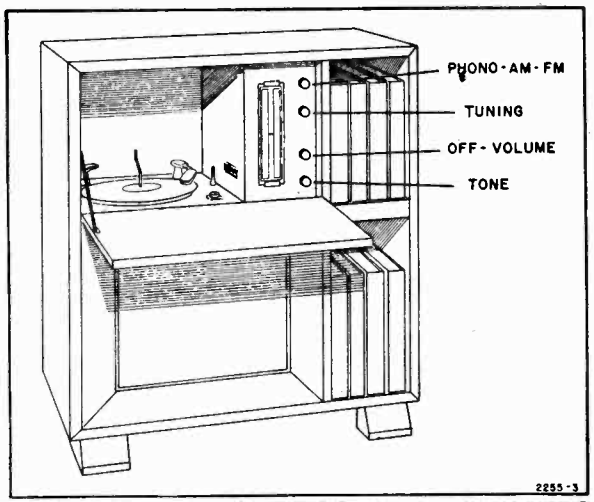
SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
455 Kc. Use 2500 microvolts	Pin 1 of 12BA6 I.F. Amp. and B minus	Primary and Secondary of T8. See chassis view.	Maximum output should be .5 watts
455 Kc. Use 75 microvolts	Pin 7 of 12BA7 Converter and B minus	Primary and Secondary of T6. See chassis view.	Maximum output should be .5 watts
400 cycles. Use 45 millivolts	High side of Volume Control and B minus	None	Maximum output should be .5 watts

BROADCAST BAND—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme right when gang is closed. For Adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	SET POINTER AT	CONNECT TO RADIO	ADJUST
1620 Kc.	Extreme Right Calibration Marker	AM Antenna Clip and B minus	Oscillator trimmer C2-B for maximum
1400 Kc.	Second Calibration from Left	AM Antenna Clip and B minus	Antenna trimmer C2-A for maximum

Check tracking at 1000 Kc, 600 Kc, and 535 Kc to be sure oscillator is set correctly.



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MODEL A-7AF21,
Series A

ALIGNMENT PROCEDURE

FM Band Section I. F. and R. F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over a long period of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube voltmeter which has a "floating ground". In other words, the meter, when used as a vacuum tube voltmeter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM—I.F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .1 volt	Pin No. 1 of 12AU6	Pin No. 7 of 12AL5 and B minus	Bottom Core Primary of T9 Ratio Detector	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 12AU6	See nofe "A"	Top Core Secondary of T9 Ratio Detector	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 330 microvolts	Pin No. 1 of 12BA6	Pin No. 7 of 12AL5 and B minus	Primary and Secondary of T7. FM Driver IF See chassis view.	Resonance should be about 3 volts
10.7 Mc. Use about 600 microvolts	Top end of C2-C	Pin No. 7 of 12AL5 and B minus	Primary and Secondary of T5. Input IF See chassis view.	Resonance should be about 3 volts

NOTES ON FM—I. F. ALIGNMENT

NOTE "A"—Connect two resistors in series, 100K OHMS each, from Pin No. 7 of 12AL5 to B minus (pin no. 5). These resistors must be matched within 5%. Connect vacuum tube voltmeter between the midpoint of the resistors and point zz.

NOTE "B"—If T9 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

NOTE "C"—To use a VTVM which does not have the "floating ground" feature, in step 2 above, connect "ground" side of VTVM to midpoint of resistors (Note "A") and "high" side to point zz.

GENERAL—Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme right when gang is closed. For Adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	POINTER	CONNECTION TO RADIO	ADJUST	V T V M CONNECTIONS
108 MC.	108 MC. Marker	FM antenna terminals	FM Osc C3 for maximum	Pin No. 7 of 12AL5 to B minus
98 MC.	Tune in Gen. Signal	See Note "B" below	FM Mixer C2-C for maximum	

NOTE "A"—If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however, will not produce 3 volts.

NOTE "B"—Connect 300 ohms in series with "hot" side of generator and connect to left hand screw of external FM Antenna Terminals. Connect cold side of generator to right hand screw.

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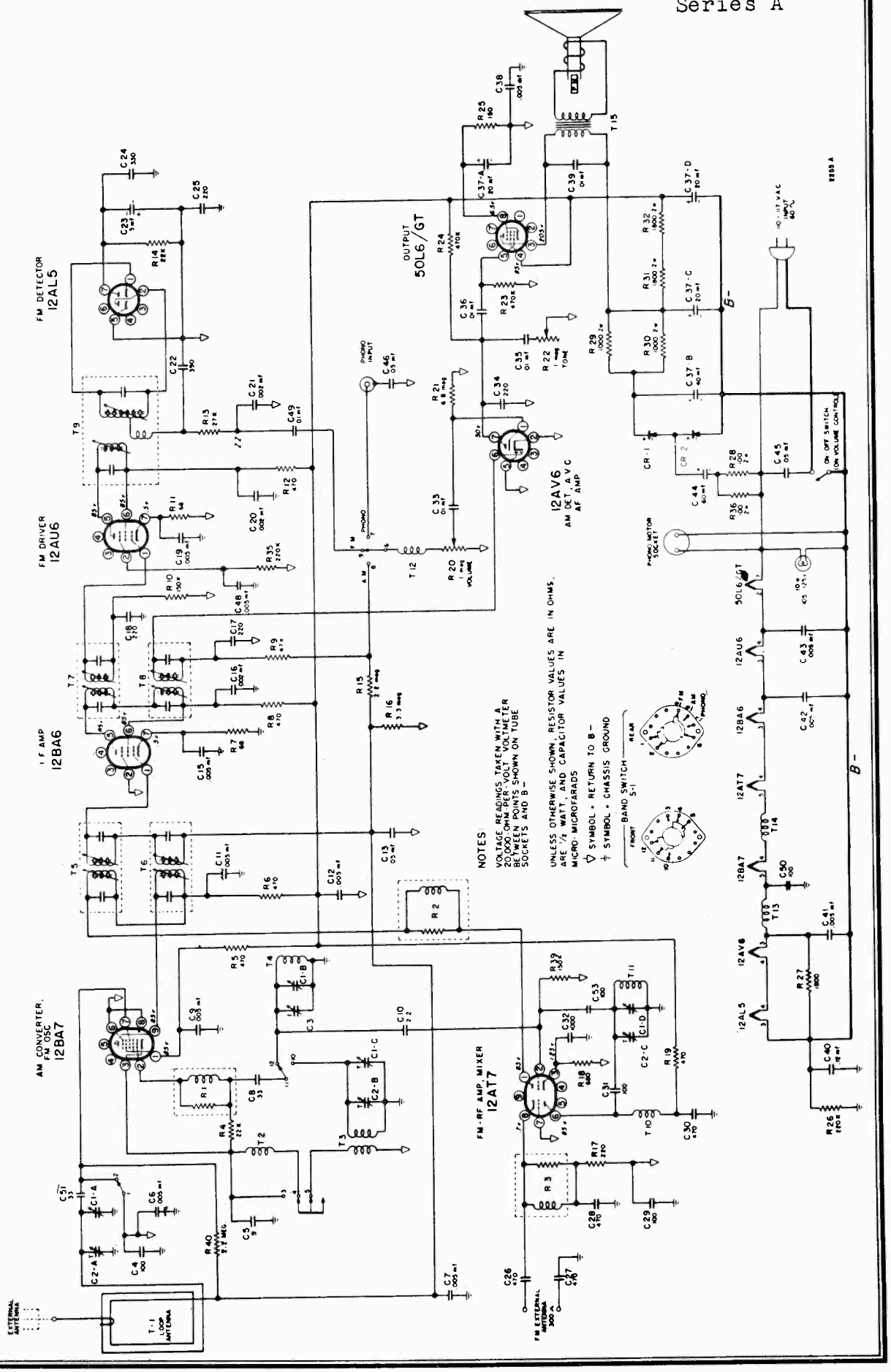
MODEL A-7AF21,
Series A



NOTE: R7 returns to B minus instead of chassis.
NOTE: Resistor R27 is omitted.
NOTE: A 330 mmf condenser, Part C-8F3-11, is added between B minus and chassis at the Phono Motor socket.
NOTE: 100 mmf condenser, Part C-8G-11734, added between B minus and junction of R15-R16.

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MODEL A-7AF21, Series A

REPLACEMENT OF DIAL CORDS

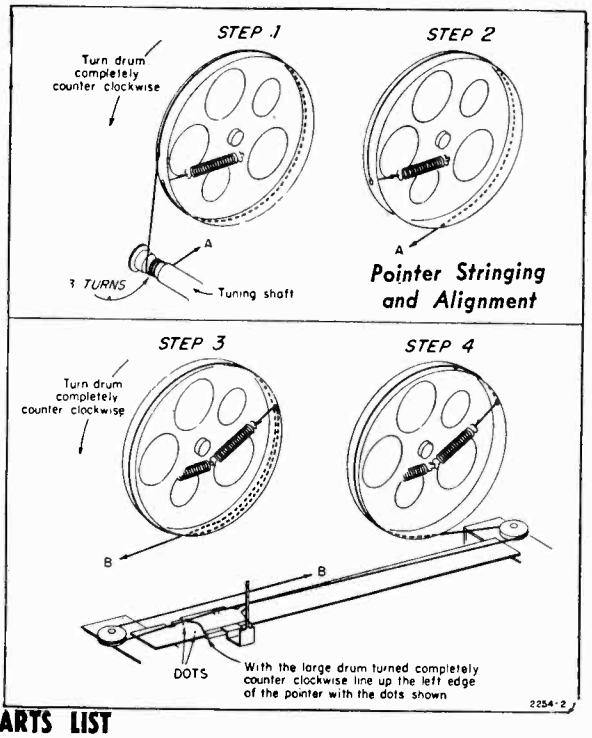
GENERAL—A dual track drum pulley and two individual cords are used on this model.

The rear track carries the Drive String (see Fig. 1 and 2) while the front track carries the Pointer String (see Fig. 3 and 4).

DRIVE STRING: Using approximately 20 inches of dial cord, fasten one end to the tension spring and pass around drum and drive shaft (Fig. 1). Continue cord around drum and pass through hole in rear track (see Fig. 2). Tie end of cord to spring so that spring is extended 1/4 inch.

POINTER STRING: Use approximately 40 inches of dial cord, fasten one end to tension spring and pass around drum pulley (see Fig. 3). Continue cord (Fig. 4) from point B around idler pulleys, around drum, then pass through hole in front track, and tie cord to tension spring so that the spring is extended 1/4 inch.

POINTER CALIBRATION: Adjust pointer as shown in Fig. 4, then loop Pointer string once around upright ear on Pointer carriage.



Pointer Stringing and Alignment

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used In set
		CONDENSERS	
C1, ABCD	B-8A-16592	4 section gang condenser	1
C2, ABC		Trimmer on gang	
C3	A-201-15142	FM Osc. trimmer	1
C4,29,31,50,53,	C-8G-11734	100 mmf, ceramic	5
C5	C-8G-12166	5 mmf, ceramic	1
C6,7,9,11,12, 15,19,38,41,42, 43,48	A-8G-13962	.005 mf, disk ceramic	12
C8,51	C-8G-14172	33 mmf, ceramic	2
C10	A-8G-12495-4	2.2 mmf, ceramic	1
C14,46	C-8D-10770	.05 mf, 200 volts, paper	2
C16,20,21	C-8G-16049	.002 mmf, ceramic	3
C17,18,25,34	C-8G-11733	220 mmf, ceramic	4
C22	C-8F3-120	390 mmf, mica	1
C23	C-8C-16013	5 mf x 100 volts, electrolytic	1
C24	C-8F3-11	330 mmf, mica	1
C26,27,28,30	C-8G-11732	470 mmf, ceramic	1
C32	C-8G-13201	1000 mmf, ceramic	1
C33,35,36,39, 49	C-8D-10761	.01 mf, 400 volts, paper	5
C37, ABCD	A-8G-16432-1	40-20-20 mf x 300 volts, electrolytic, 20 mf x 25 volts	1
C40	C-8D-16791	.12 mf, 200 volts, paper	1
C44	A-8C-16370	60 mf x 120 volts, electrolytic	1
C45	C-8D-10813	.05 mf, 400 volts, paper	1
		RESISTORS	
R1	A-16B-16615	Suppressor	1
R2	A-16B-16614	Suppressor	1
R3	A-16B-16616	Suppressor	1
R4,14	C-9B1-78	22K ohms, 1/2 watt	2
R5,6,8,12,19	C-9B1-58	470 ohms, 1/2 watt	5
R7,11	C-9B1-48	68 ohms, 1/2watt	2
R9	C-9B1-82	47K ohms, 1/2 watt,	1
R10,39	C-9B1-26	150K ohms, 1/2 watt	2
R13	C-9B1-79	27K ohms, 1/2 watt	1
R15,40	C-9B1-33	2.2 megohms, 1/2 watt	2
R16	C-9B1-34	3.3 megohms 1/2 watt	1
R17	C-9B1-54	220 megohms, 1/2 watt	1
R18	C-9B1-60	680 megohms, 1/2 watt	1
R20	A-10A-16503	1 megohm, volume control and switch	1
R21	C-9B1-36	6.8 megohm, 1/2 watt	1
R22	A-11B-16502	1 megohm, tone control	1
R23,24	C-9B1-94	470K ohms, 1/2 watt	2
R25	C-9B1-52	150 ohms, 1/2 watt	1
R26,35	C-9B1-27	220K ohms 1/2 watt	2
R28,36	C-9C4-50	100 ohms, 2 watts	2
R29,30	C-9B4-62	1000 ohms, 2 watts	2
R31,32	C-9B4-65	1800 ohms, 2 watts	2

Ref. No.	Part No.	Description	Qty. Used In Set
		COILS AND TRANSFORMERS	
T1	C-13E-16496	Loop antenna	1
T2,13,14	A-16B-16023	RF choke	3
T3	B-13D-16611	AM Osc. coil	1
T4	A-13D-16617	FM Osc. coil	1
T5	B-13A-16612	FM input IF	1
T6	B-13A-16662	AM input IF	1
T7	B-13B-16000	FM driver IF	1
T8	B-13B-16302	AM output IF	1
T9	B-13M-16001	FM ratio detector	1
T10	A-16B-16613	RF choke	1
T11	A-13E-16618	FM mixer coil	1
T12	A-16A-16637	RF choke	1
T15	B-12C-16489	Output transformer	1
	B-18A-16528	10" PM speaker	1
		DIAL PARTS	
	B-30A-16480	Dial scale	1
	A-3A-16504	Tuning shaft	1
	B-29C-15876	"C"washer for above	1
	B-2M-16656	Pointer bar	1
	A-3H-10299	Idler pulley	2
	B-2G-16719	Dial Pointer	1
	A-53A-10989	Dial string 60" req.	yd
	A-49A-10078	Tension spring	2
	B-4M-15913-1	Dial scale bracket	2
		RECORD CHANGER	
	B-201-16988	Type 802 Record Changer, (three speed)	1
	P77	Crystal cartridge	1
		33 and 45 RPM needle (red)	1
		78 RPM needle	1
		MISCELLANEOUS	
	B-20A-16663	Band switch	1
	A-46A-16545	Pilot lite bulb	1
	A-15B-13430	Min. 9 pin tube socket	2
	A-15C-16297	Min. 7 pin tube socket	4
	A-15B-10440	Octal tube socket	1
	A-3B-16758	Tuning shaft bushing	1
	A-7B-13050	FM dipole Terminal strip	1
	A-47A-16720	Pilot lite assembly	1
	A-19B-12468	Phono motor socket	1
	A-19B-12170	Phono pickup socket	1
	B-14MA-11066-6-16	FM dipole ribbon	1
CR-1,2	A-21J-12775	Selenium rectifier	2
	B-15B-13785	Large lytic mtg. plate	1
	B-15B-10076	Small lytic mtg. plate	1
	B-5B-16633-41	Knob	3
	B-5B-16642-41	Knob with dot	1
	A-23A-10344	Line cord lock	1
	B-14M-11479-2	Line cord	1

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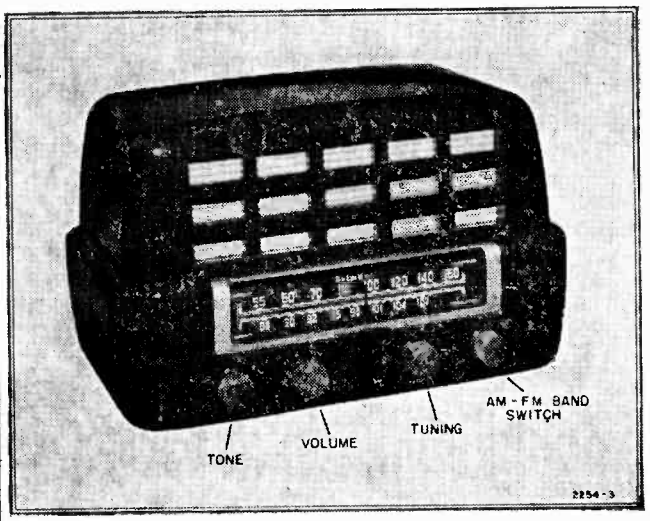
MODEL A-7DF21,
Series A



APPLYING POWER TO RADIO

This receiver, unless otherwise marked must be operated on an AC voltage of 105 to 125 volts, 50 to 60 cycles, or on a DC voltage of 105 to 125 volts. If you are in doubt as to the voltage of your power supply, consult your local power company. Receivers of this same model which are for use on voltages other than those specified above are so marked.

BROADCAST BAND

This is the tuning band in which the standard broadcast stations operate. The upper scale on the dial covers the broadcast range of 535-1620 Kc., and is calibrated in channel numbers. To obtain the kilocycle reading, multiply the number on the dial by 10; thus 80 on the dial corresponds to 800 kilocycles.

FM ANTENNAS

The noise-reducing capabilities of FM are noticeably greater when strong FM signals are obtained. Therefore, we recommend, whenever expedient, the use of an outside "folded dipole" aerial with a 300-ohm line lead-in. The aerial must be carefully installed according to the directions furnished with it. The radio is shipped from the factory with the built-in FM aerial connected by means of the long jumper wire to the left-hand FM Antenna Terminal. (See Chassis view).

IMPORTANT: The built-in Antenna is part of the line cord and, therefore, should be fully extended. Changing the angle of drop of the line cord will IMPROVE RECEPTION. If HUM is objectionable reverse the line cord plug in the power receptacle. Select the position giving least amount of hum.

To connect the lead-in from the outside FM aerial, remove the wire from the built-in FM antenna and connect the twin lead-in wire to the two screws. Either wire of the twin lead-in may be connected to either screw. A ground connection is not required for FM reception.

It should be remembered in conjunction with the erection of an FM folded dipole aerial that the signal strength from an FM transmitting station is less and less at greater distances from the transmitter and that FM reception is hardly ever possible beyond "line of sight" distances between transmitting and receiving aerials. This maximum limit is usually about 45 miles but consistently satisfactory reception is frequently limited to 30 miles or less depending on the height of transmitting and receiving aerials and the intervening terrain.

REPLACEMENT OF DIAL CORDS

REPLACEMENT OF DIAL CORDS

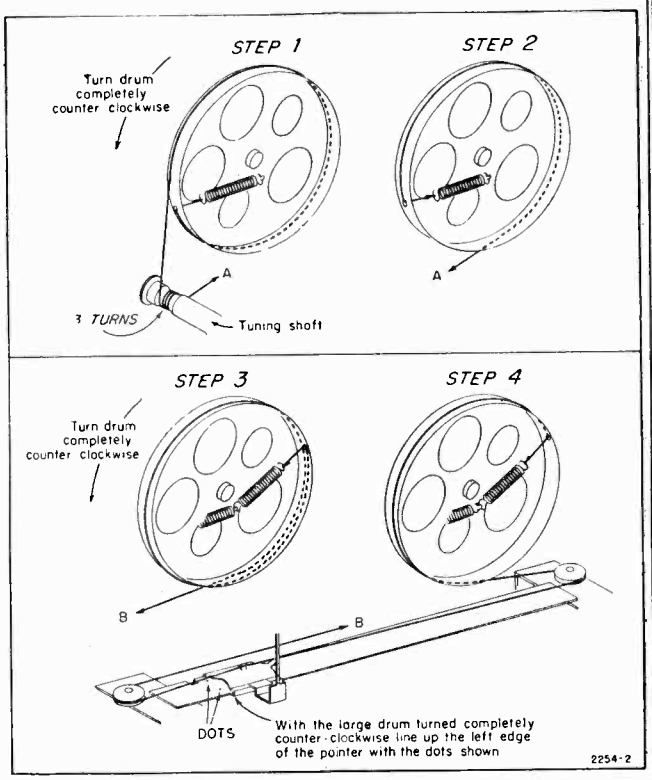
GENERAL—A dual track drum pulley and two individual cords are used on this model.

The rear track carries the Drive String (see Fig. 1 and 2) while the front track carries the Pointer string (see Fig. 3 and 4).

DRIVE STRING: Using approximately 20 inches of dial cord, fasten one end to the tension spring and pass around drum and drive shaft (Fig. 1). Continue cord around drum and pass through hole in rear track (see Fig. 2). Tie end of cord to spring so that spring is extended 1/4 inch.

POINTER STRING: Use approximately 40 inches of dial cord, fasten one end to tension spring and pass around drum pulley (see Fig. 3). Continue cord (Fig. 4) from point B around idler pulleys, around drum, then pass through hole in front track, and tie cord to tension spring so that the spring is extended 1/4 inch.

POINTER CALIBRATION: Adjust pointer as shown in Fig. 4, then loop Pointer string once around upright ear on Pointer carriage.



Pointer Stringing and Alignment

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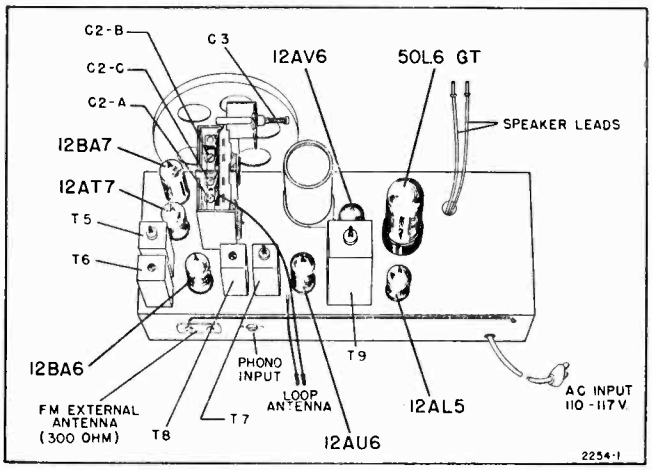
MODEL A-7DF21,
Series A

ALIGNMENT PROCEDURE

Broadcast Band Section I. F. and R. F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of .40 volts AC across this resistor will be approximately equivalent to 50 milliwatt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissable.



Chassis View

AM-I. F. ALIGNMENT

Band Switch in AM Position, Gang Open, Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQENCY	*CONNECTION TO RADIO*	*ADJUSTMENTS TO BE MADE*	*ADUST FOR*
455 Kc. Use 1000 microvolts	Pin 1 of 12BA6 I.F. Amp. and B minus	Primary and Secondary of T8. See chassis view.	Maximum output Should be 50 Milliwatts
455 Kc. Use 30 microvolts	Pin 7 of 12BA7 Converter and B minus	Primary and Secondary of T6. See chassis view.	Maximum output Should be 50 Milliwatts
400 cycles. Use 17 millivolts	High Side of Volume Control and B minus	None	Maximum output Should be 50 Milliwatts

BROADCAST BAND-R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme left when gang is closed. For Adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	*SET POINTER AT*	*CONNECT TO RADIO*	*ADJUST*
1620 Kc.	Extreme Right Calibration Marker	AM Antenna Clip and B minus	Oscillator trimmer C2-B for maximum
1400 Kc.	Second Calibration from Left	AM Antenna Clip and B minus	Antenna trimmer C2-A for maximum

Check tracking at 1000 Kc, 600 Kc, and 535 Kc to be sure oscillator is set correctly.

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MODEL A-7DF21,
Series A

ALIGNMENT PROCEDURE

FM Band Section I. F. and R. F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over a long period of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube voltmeter which has a "floating ground". In other words, the meter, when used as a vacuum tube voltmeter, can have both the positive and negative sides connected to points above ground and still give true readings.

A standard AM signal generator is required.

FM-I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	*CONNECTION TO RADIO*	*VACUUM TUBE VOLT METER CONNECTION TO RADIO*	*ADJUSTMENTS TO BE MADE*	*ADJUST FOR*
10.7 Mc. Use about .1 volt	Pin No. 1 of 12AU6	Pin No. 7 of 12AL5 and B minus	Bottom Core Primary of T9 Ratio Detector	Resonance should be about 3 volts
10.7 Mc. Use about .1 volt	Pin No. 1 of 12AU6	See note "A"	Top Core Secondary of T9 Ratio Detector	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 330 microvolts	Pin No. 1 of 12BA6	Pin No. 7 of 12AL5 and B minus	Primary and Secondary of T7. FM Driver IF See chassis view.	Resonance should be about 3 volts
10.7 Mc. Use about 600 microvolts	Top end of C2-C	Pin No. 7 of 12AL5 and B minus	Primary and Secondary of T5. FM Input IF See chassis view.	Resonance should be about 3 volts

NOTES ON FM — I. F. ALIGNMENT

NOTE "A"—Connect two resistors in series, 100K OHMS each, from Pin No. 7 of 12AL5 to B minus (pin no. 5). These resistors must be matched within 5%. Connect vacuum tube voltmeter between the midpoint of the resistors and point zz.

NOTE "B"—If T9 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

NOTE "C"—To use a VTVM which does not have the "floating ground" feature, in step 2 above connect "ground" side of VTVM to midpoint of resistors (Note "A") and "high" side to point zz.

GENERAL—Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a resonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM - R.F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme left when gang is closed.

For Adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	*POINTER*	*CONNECTION TO RADIO*	*ADJUST*	*V T V M CONNECTIONS*
108 MC.	108 MC. Marker	FM antenna terminals	FM Osc C3 for maximum	Pin No. 7 of 12AL5 to B minus
98 MC.	Tune in Gen. Signal	See Note "B" below	FM Mixer C2-C for maximum	

NOTE "A"—If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. Use extreme care in picking harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube volt-meter as above for resonance indication. A weak carrier, however, will not produce 3 volts.

NOTE "B"—Connect 300 ohms in series with "hot" side of generator and connect to left hand screw of external FM Antenna Terminals. Connect cold side of generator to right hand screw.

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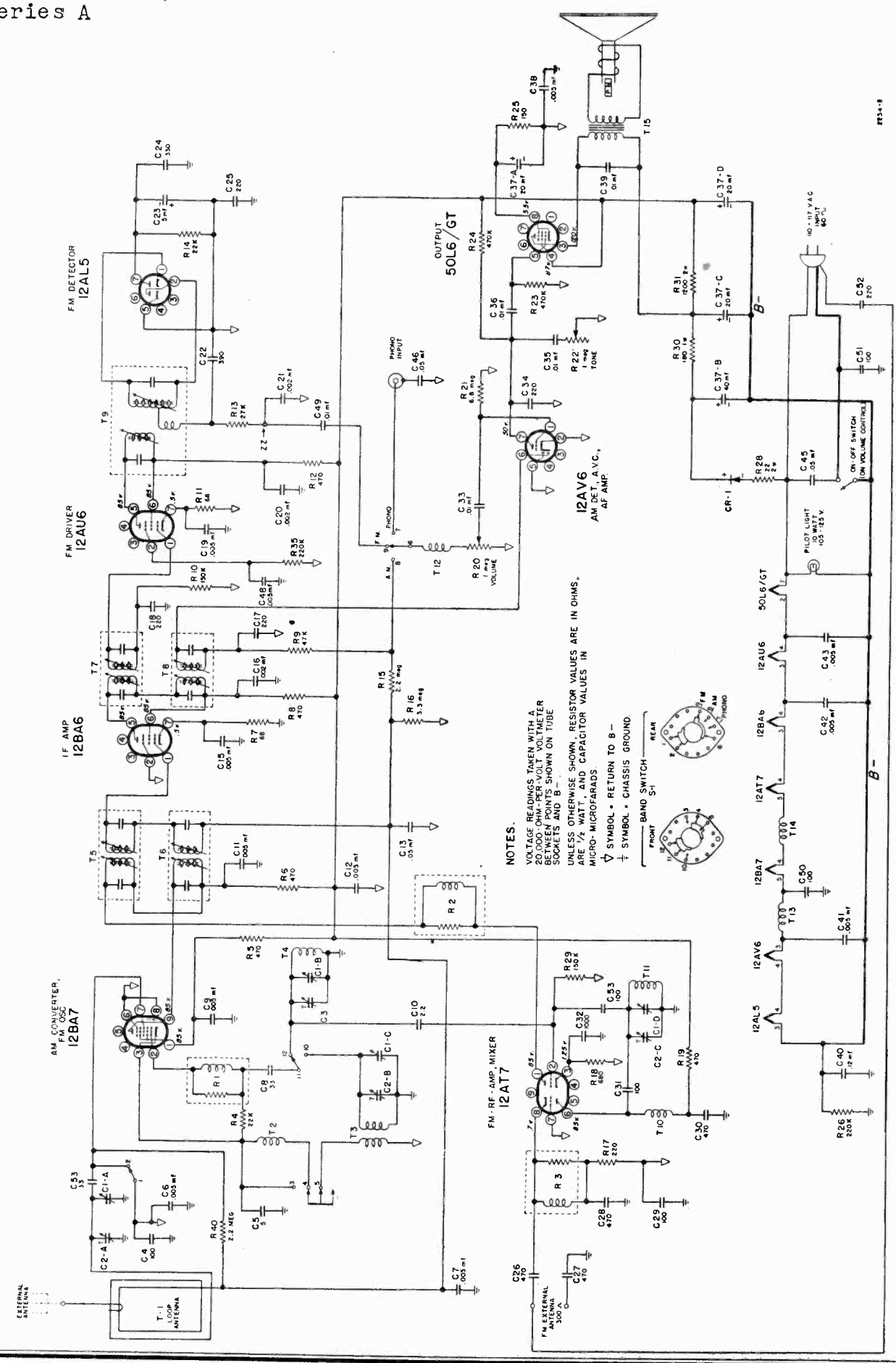
MODEL A-7DF21,
Series A



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REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used
		Condensers	
C1 ABCD	B-8A-16592	4 section gang cond.	1
C2 ABC		Trimmers on gang	
C3	A-201-15142	Variable Trimmer	1
C4,29,31, 50,51,53	C-8G-11734	100 mmf, ceramic	6
C5	C-8G-12166	5 mmf, ceramic	1
C6,7,9,11,12, 15,19,38,41, 42,43,48	C-8G-13962	.005 mmf, ceramic	12
C8	C-8G-14172	33 mmf, ceramic	1
C10	A-8G-12495-4	2.2 mmf, ceramic	1
C13,14,46	C-8D-10770	.05 mf, 200 volts, paper	3
C45	C-8D-10813	.05 mf, 400 volts, paper	1
C16,20,21	C-8G-16049	.002 mf, ceramic	3
C17,18,25, 34,52	C-8G-11733	220 mmf, ceramic	5
C22	C-8F3-120	390 mmf, mica	1
C23	B-8C-16013	5 mf x 100 volts, electrolytic	1
C24	C-8F3-11	330 mmf, mica	1
C26,27,28,30	C-8G-11732	470 mmf, ceramic	4
C32	C-8G-13201	1000 mmf, ceramic	1
C33,35,36, 39,49	C-8D-10761	.01 mf, 400 volts, paper	5
C37 ABCD	B-8C-15880	40-20-20 mf x 300 volts, 20 mf x 25 volts	1
C40	C-8D-16791	.12 mf, 200 volts, paper	1
		Resistors	
R1	A-16B-16615	Suppressor	1
R2	A-16B-16614	Suppressor	1
R3	A-16B-16616	Suppressor	1
R4,14	C-9B1-78	22K ohms, ½ watt	2
R5,6,8,12,19	C-9B1-58	470 ohms, ½ watt	5
R7,11	C-9B1-48	68 ohms, ½ watt	2
R9	C-9B1-82	47K ohms, ½ watt	1
R10,29	C-9B1-26	150 ohms, ½ watt	2
R13	C-9B1-79	27K ohms, ½ watt	1
R15	C-9B1-33	2.2 megohms, ½ watt	1
R16	C-9B1-34	3.3 megohms, ½ watt	1
R17	C-9B1-54	220 ohms, ½ watt	1
R18	C-9B1-60	680 ohms, ½ watt	1
R20	A-10A-15853	1 meg., vol. cont. & switch	1
R21	C-9B1-36	6.8 megohms, ½ watt	1
R22	A-11B-15852	1 megohm tone control	1
R23,24	C-9B1-94	470K ohms, ½ watt	2
R25	C-9B1-52	150 ohms, ½ watt	1
R26,35	C-9B1-27	220K ohms, ½ watt	2
R28	C-9B4-42	22 ohms, 2 watts	1
R30	C-9B2-53	180 ohms, 1 watt	1
R31	C-9B4-63	1200 ohms, 2 watts	1

Ref. No.	Part No.	Description	Qty. Used
		Coils and Transformers	
T1	C-13E-16026-1	Loop antenna	
T2,13,14	A-16B-16023	RF choke	
T3	B-13D-16611	AM osc. coil	
T4	A-13D-16617	FM osc. coil	
T5	B-13A-16612	FM input IF	
T6	B-13A-16662	AM input IF	
T7	B-13B-16000	FM driver IF	1
T8	B-13B-16302	AM output IF	1
T9	B-13M-16001	FM ratio detector	1
T10	A-16B-16613	RF choke	
T11	A-13E-16618	EM Mixer coil	
T12	A-16A-16637	RF choke	
T15	B-12C-16014	Audio output	1
		Dial Parts	
	B-2C-16682	Dial scale	1
	B-6A-16664	Dial crystal	1
	A-2M-16034	Clip for crystal	2
	A-3A-16004	Tuning shaft	1
	B-29C-15876	"C" washer	1
	B-2M-16656	Pointer bar	1
	A-2D-15991	Dial bracket	2
	A-53A-10989	Dial string, 60" req.	
	B-2G-16005	Dial Pointer	1
	A-49A-10078	Tension spring	2
	A-3H-10299	Idler pulley	2
	A-47A-17141	Pilot lite assembly	1
	A-46A-16545	Pilot lite bulb	1
	B-6B-17139	Diffuser	1
		Miscellaneous	
	B-18A-16024	PM speaker, 4"x6", oval	1
	A-15B-13430	Socket, miniature, 9 pin	1
	A-15B-16297	Socket, miniature, 7 pin	4
	A-15B-10440	Socket, octal	1
	B-15B-13785	Lytic mounting plate	1
	B-14M-16251	Line cord and plug, 3-wire	1
	5C-12875-36	Cabinet	1
	A-2M-10096	Snap pins for back	2
	B-5B-11131-41	Knob, plain	3
	B-5B-16057-41	Knob, with dot	1
	A-21J-12775	Selenium rectifier	1
	A-3B-16758	Bushing for tuning shaft	1
	A-7B-13050	FM dipole terminal strip	1
	B-2D-15432	Loop mounting bracket	1
	B-29J-13364	Rubber washer	3
	42A-10874	¾" chassis mtg. screws	3
	B-29A-2104	Steel washers for above	3
	B-23K-13138	Grill screen	1
	A-19A-15257	Pin for speaker leads	2
	B-20A-16598	Band change switch	1

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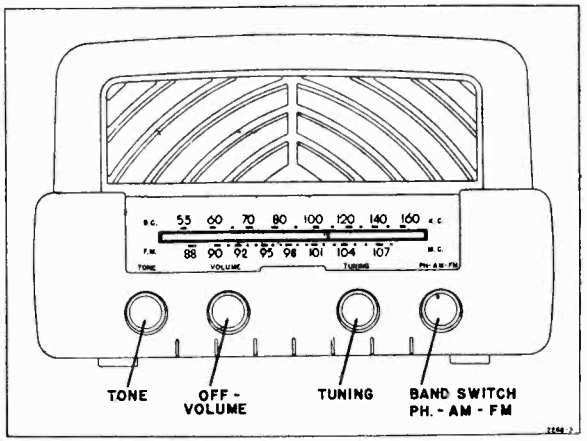


APPLYING POWER TO RADIO—This receiver, unless otherwise marked must be operated on an AC voltage of 105 to 125 volts, 50 to 60-cycles.

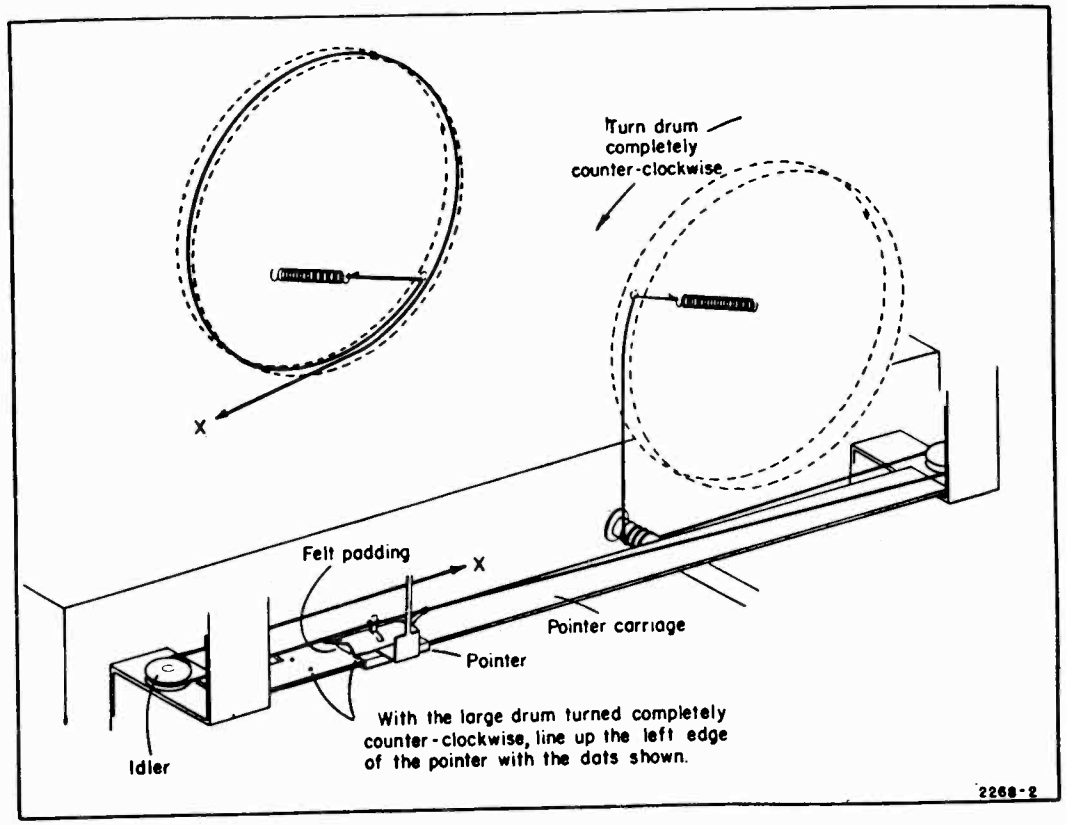
BROADCAST BAND—This is the tuning band in which the standard broadcast stations operate. The upper scale on the dial covers the broadcast range of 535-1620 Kc., and is calibrated in channel numbers. To obtain the kilocycle reading, multiply the number on the dial by 10; thus 80 on the dial corresponds to 800 kilocycles.

FM BAND—The FM tuning range covers the newly allocated frequency-modulation band of 88 to 108 megacycles into which all FM stations are required to move. Check with your local newspaper to determine the frequency of your local FM stations.

ON-OFF SWITCH AND VOLUME CONTROL—The knob second from the left is both the on-off switch and the volume control. When this control is turned all the way to the left the set is off. A slight rotation to the right will click the switch and turn the set on. The knob may then be used to regulate the volume. Be sure your set is turned completely off when not in use; otherwise the tubes will wear out unnecessarily.

TONE CONTROL—Rotating the extreme left hand knob gives a full variation of the tonal response from a deep bass to a brilliant treble.

REPLACEMENT OF DIAL CORDS



Pointer Stringing and Alignment

TUNING KNOB—The knob second from the right is the tuning knob; rotation of this knob moves the indicator along the dial scales. When selecting a station turn the knob back and forth until the tone is clearest and loudest. Do not use the tuning knob to regulate volume; the volume control should be used for that purpose after the station has been tuned in properly. It is particularly important in FM reception to tune the station accurately; otherwise the tone is distorted and the background noise not eliminated.

BAND SWITCH—The knob on the extreme right is used to select FM BAND, BROADCAST BAND, or PHONO. When this knob is turned fully clockwise FM programs can be tuned in. In the center position STANDARD BROADCASTS can be heard.

PHONOGRAPH—To PLAY RECORDS through this radio, connect the "pickup lead" wire from record player to the "PHONO INPUT" on the cabinet back. Turn Bandswitch to PHONO and adjust volume as required.

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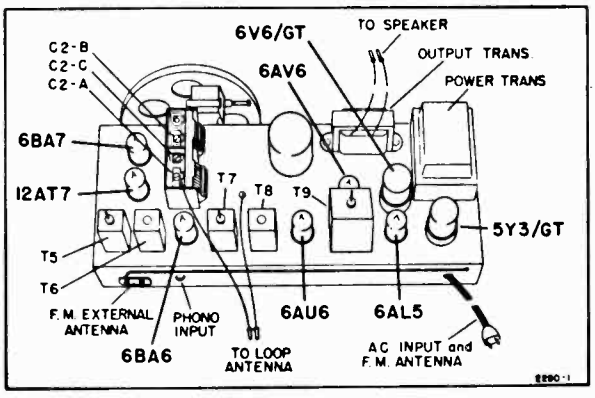
ALIGNMENT PROCEDURE

Broadcast Band Section I. F. and R. F.

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of 500 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.27 volts AC across this resistor will be approximately equivalent to 500 milliwatt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissable.



Chassis View

AM—I. F. ALIGNMENT

Band Switch in AM Position, Gang Open, Dummy Antenna .1 Mfd.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
400 cycles. Use 65 millivolts	High Side of Volume Control and chassis	None	Maximum output Should be 500 Milliwatts
455 Kc. Use 3300 microvolts	Pin 1 of 6BA6 I.F. Amp. and chassis	Primary and Secondary of T8. See chassis view.	Maximum output Should be 500 Milliwatts
455 Kc. Use 55 microvolts	Pin 7 of 6BA7 Converter and chassis	Primary and Secondary of T6. See chassis view.	Maximum output Should be 500 Milliwatts

BROADCAST BAND—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme left when gang is closed.
For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	SET POINTER AT	CONNECT TO RADIO	ADJUST
1620 Kc.	Extreme Right Calibration Marker	RADIATION COUPLING Use six turn loop across generator output. Place close to cabinet back.	Oscillator trimmer C2-B for maximum
1400 Kc.	Third Calibration from Right		Antenna Trimmer C2-A for maximum

Check tracking at 1000 Kc, 600 Kc, and 535 Kc to be sure oscillator is set correctly.

ELECTRICAL SPECIFICATIONS

Power Supply ..... 105 to 125 volts, AC, 60-cycles; Chassis only 75 watts.

Frequency Ranges ..... Broadcast Band—535 to 1620 kc. FM Band—88 to 108 mc.

Intermediate Freq. ..... AM-455 kc.; FM-10.7 mc.

Selectivity ..... AM-47 kc. broad at 1000 times signal, measured at 1000 kc.
I.F. FM-230 kc. broad at 2 times down.
I.F. FM-470 kc. broad at 10 times down.

AM Sensitivity ..... (For .5 watt output)—200 microvolts per meter average.

FM Sensitivity ..... (For .5 watt output)—30 microvolts average.

Power Output ..... 1.5 watts. 10% distortion. 3.0 watts maximum.

Loud Speaker ..... 5"x 7" PM. Voice coil impedance 3.2 ohms, 400 cycles.

Tube Complement .....
12AT7, FM-RF amp. mixer;
6BA7, AM converter, FM oscillator;
6BA7, IF amplifier;
6AU6, FM driver;
6AL5, FM detector;
6AV6, AM detector;
6V6 output;
5Y3, rectifier.

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MODEL 8AF25

ALIGNMENT PROCEDURE

FM Band Section I. F. and R. F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over a long period of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube voltmeter which has a "floating ground". In other words, the meter, when used as a vacuum tube voltmeter, can have both the positive and negative sides connected to points above ground and still give true readings. (See note "C" below.)

A standard AM signal generator is required.

FM —I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .05 volt	Pin No. 1 of 6AU6	Pin No. 7 of 6AL5 and chassis	Bottom Core Primary of T9 Ratio Detector	Resonance should be about 3 volts
10.7 Mc. Use about .05 volt	Pin No. 1 of 6AU6	See note "A"	Top Core Secondary of T9 Ratio Detector	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 1800 microvolts	Pin No. 1 of 6BA6	Pin No. 7 of 6AL5 and chassis	Primary and Secondary of T7. FM Driver IF See chassis view	Resonance should be about 3 volts
10.7 Mc. Use about 400 microvolts	Top end of C2-C	Pin No. 7 of 6AL5 and chassis	Primary and Secondary of T5. FM Input IF See chassis view	Resonance should be about 3 volts

NOTES ON FM — I. F. ALIGNMENT

NOTE "A"—Connect two resistors in series, 100K OHMS each, from Pin No. 7 of 6AL5 to chassis (Pin No. 5). These resitors must be matched within 5%. Connect vacuum tube voltmeter between the midpoint of the resistors and point zz.

NOTE "B"—If T9 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necesary.

NOTE "C"—To use a VTVM which does not have the "floating ground" feature, in step 2 above, connect "ground" side of VTVM to midpoint of resistors (Note "A") and "high" side to point zz.

GENERAL—Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme left when gang is closed.

For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	POINTER	CONNECTION TO RADIO	ADJUST	V T V M CONNECTIONS
108 mc.	108 mc. Marker	FM antenna terminals	FM Osc. C3 for maximum	Pin No. 7 of 6AL5 to chassis.
98 mc.	Tune in Gen. Signal	See Note "B" below.	FM Mixer C2-C for maximum	

NOTE "A"—If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube voltmeter as above for resonance indication. A weak carrier, however, will not produce 3 volts.

NOTE "B"—Connect 300 ohms in series with "hot" side of generator and connect to left hand screw of external FM Antenna Terminals. Connect cold side of generator to right hand screw.

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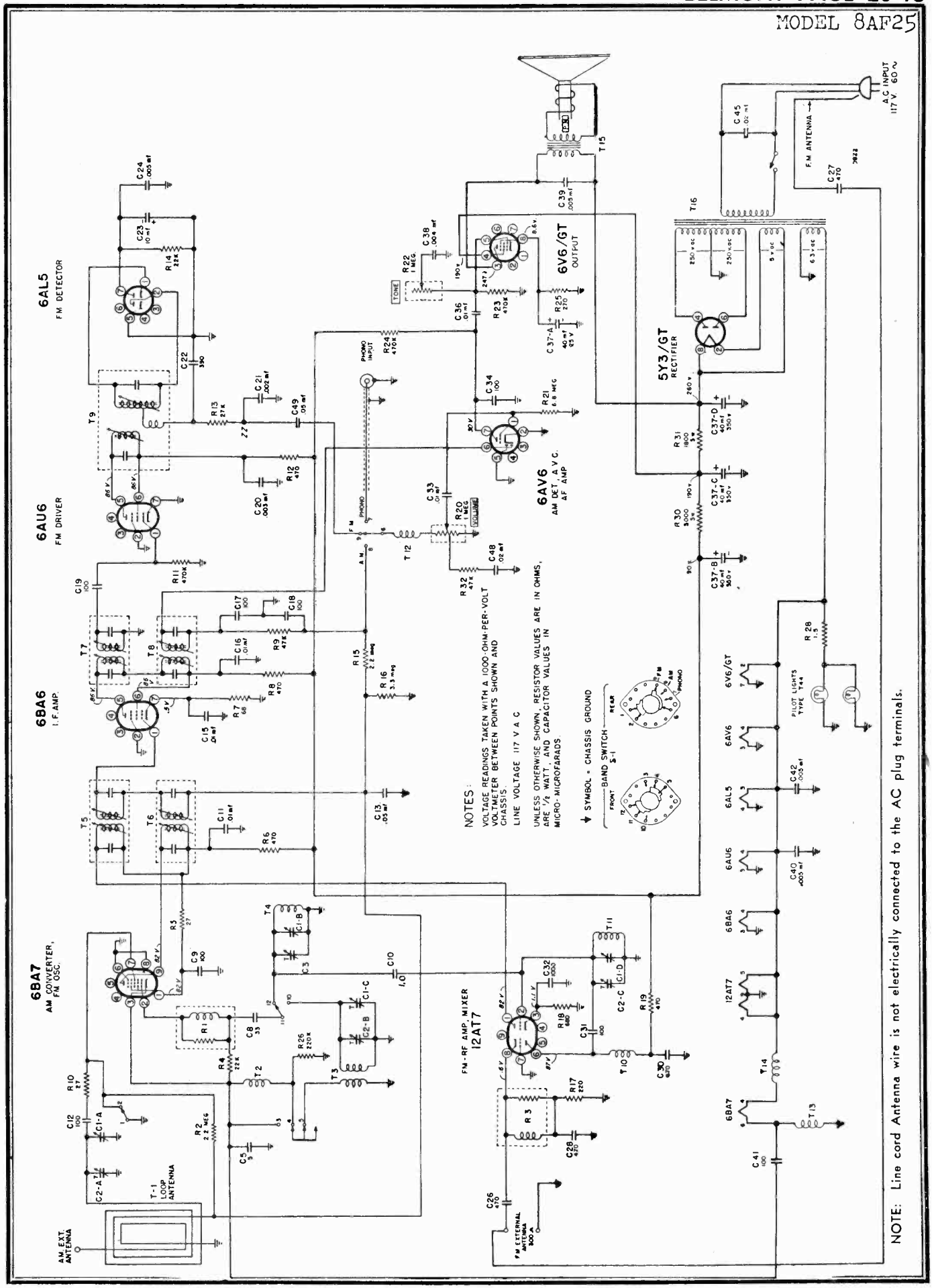
MODEL 8AF25



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MODEL 8AF25

REPLACEMENT PARTS INFORMATION

Please specify *PART* number and chassis model number when ordering replacements.

REPLACEMENT PARTS LIST

Use Only Genuine Factory Replacement Parts

CAPACITORS

Ref. No.	Part No.	Description	Qty.
C1A,B,C,D	B-8A-17673	Gang tuning condenser	1
C2A,B,C,		Trimmers on gang	3
C3	A-201-15142	Trimmer condenser	1
C5	C-8G-12166	5 mmf, ceramic, 10%	1
C8	C-8G-14172	33 mmf, ceramic, 10%	1
C9-31-41	C-8G-12759	100 mmf, ceramic, 10%	3
C10		1.0 mmf, ceramic, 20%	1
C11-16-36	C-8D-10761	.01 mfd, 400 volts, 20%	3
C12	C-8G-13131	100 mmf, ceramic, 10%	1
C13-49	C-8D-10770	.05 mfd, 200 volts, 20%	2
C15-33	C-8D-11738	.01 mfd, 200 volts, 20%	2
C17-18	A-8F-13127	.0001 mfd-dual mica, +30% —20%	1
C19-34	C-8G-11734	100 mmf, ceramic, 10%	2
C20	C-8D-11013	.003 mfd, 600 volts, 10%	1
C21	C-8G-16049	2000 mmf, ceramic, 10%	1
C22	C-8F3-120	390 mmf, mica, 10%	1
C23	A-8C-18128	10 mfd, 50 volts	1
C24-40-42	A-8G-13962	.005 mfd, ceramic	3
C26-27-28-30	C-8G-11732	470 mmf, ceramic, 20%	4
C32	C-8G-13201	1000 mmf, ceramic	1
C37-A-B-C-D	A-8C-18125	40-40-40 mfd x 350 volts, 40 mfd x 25 volts	1
C38	C-8D-10788	.004 mfd, 600 volts, 20%	1
C39	C-8D-10935	.005 mfd, 600 volts, +40% —15%	1
C45	C-8J-11321	.02 mfd, 600 volts, 20%	1
C48	C-8D-11304	.02 mfd, 200 volts, 20%	1

RESISTORS

R1	A-16B-16615	Suppressor	1
R2-15	C-9B1-33	2.2 megohms, 1/2 watt, 20%	2
R3	A-16B-16616	Suppressor	1
R4-14	C-9B1-78	22K ohms, 1/2 watt, 10%	2
R5-10	C-9B1-43	27 ohms, 1/2 watt, 10%	1
R6-8-12-19	C-9B1-58	470 ohms, 1/2 watt, 10%	4
R7	C-9B1-48	68 ohms, 1/2 watt, 10%	1
R9-32	C-9B1-82	47K ohms, 1/2 watt, 10%	2
R11-23-24	C-9B1-94	470K ohms, 1/2 watt, 10%	3
R13	C-9B1-79	27K ohms, 1/2 watt, 10%	1
R16	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1
R17	C-9B1-54	220 ohms, 1/2 watt, 10%	1
R18	C-9B1-60	680 ohms, 1/2 watt, 10%	1
R20	A-10A-18117	1 megohm, (volume control and switch)	1
R21	C-9B1-36	6.8 megohms, 1/2 watt, 20%	1
R22	A-11B-15852	1 megohm, (tone control)	1
R25	C-9B1-55	270 ohms, 1/2 watt, 10%	1
R26	C-9B1-27	220K ohms, 1/2 watt, 20%	1
R28	C-9C2-1065	1.5 ohms, 1 watt, 10%	1
R30	C-9C12-2059	3000 ohms, 5 watts, 5%	1
R31	C-9C12-1102	1800 ohms, 5 watts, 10%	1

COILS, TRANSFORMERS, CHOKES

T1	C-13E-18179	Loop antenna assembly	1
T2-T13-T14	A-16B-16023	RF choke coil assembly	3
T3	B-13D-16611	Oscillator coil (AM)	1
T4	A-13D-16617	Oscillator coil (FM)	1
T5	B-13A-16612	Input IF transformer (FM)	1
T6	B-13A-16662	Input IF transformer (AM)	1
T7	B-13B-16000	Output IF transformer (FM)	1
T8	B-13A-16662	Output IF transformer (AM)	1
T9	B-13M-16001	Ratio detector transformer	1
T10	A-16B-16613	RF choke coil	1
T11	A-13E-16618	RF coil (FM)	1
T12	A-16A-16637	RF choke coil	1
T15	B-12C-18143	Output transformer	1
T16	B-12A-18137	Power transformer	1

MISCELLANEOUS

A-15B-13430	9-prong, miniature tube socket	2
A-15B-10440	8-prong, octal socket	2
A-15C-16007	7-prong, miniature tube socket	4
B-20A-18118	Band change switch	1
B-14M-18147	AC line cord and plug	1
A-23A-16328	Line cord lock	1
A-19B-12170	Phono pick-up socket	1
A-7B-13050	Dipole socket	1
A-3A-18116	Tuning shaft	1
A-2D-10033	Tuning shaft bracket	1
B-47A-18150	Pilot light assembly	1
A-46A-11739	Pilot light bulb, T-44	2
B-18A-17637	5"x7" PM speaker	1

DIAL PARTS

C-6D-17737	Dial scale	1
A-2M-16034	Dial mounting bracket	2
B-6M-17622	Background diffuser	1
B-2M-16656	Pointer bar	1
A-2D-17627	Pointer bar bracket	1
A-3M-10299	Pulley	2
B-27A-10102	Shoulder rivet	2
A-53A-10989	Dial strings	60" yd.
B-2G-18119	Dial pointer	1
A-50A-16434	Felt strip for pointer	1
A-49A-11324	Tension spring	2

CABINET PARTS

R-5C-18159-36	Bakelite cabinet	1
B-24M-17623	Baffle board	1
A-23C-15453	M/W Crest	1
B-5B-1131-41	Knob	3
B-5B-16057-41	Knob (with dot)	1

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MODELS 0526, 526A, 526B, 526C, 526E

AC-DC SUPERHETERODYNE RADIO RECEIVER

GENERAL

The Bendix Radio Models O526 and 526 incorporate two similar chassis designated as O-1 and R-1. They are both AC-DC operated, 5 tube, superheterodyne receivers providing reception of the Standard Broadcast Band. A high impedance loop antenna is installed on the back of the chassis. An outside antenna may be connected to the terminal, marked EXTERNAL ANTENNA, on the bottom of Models 526A and 526B and on the rear of Models 526C and 526E. The tuning gang is isolated from the chassis and carries AVC. Care must be exercised so that it is not grounded at any time. The Models shown in Fig. 1 and Fig. 2 use both the O-1 and R-1 chassis, but only the O-1 chassis is employed in Model 526E (see Fig. 3).

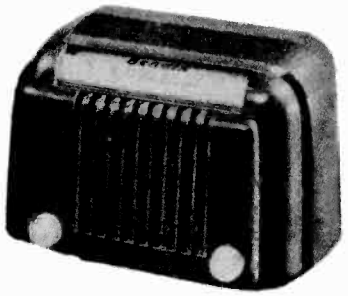

Fig. 1
Model 526A Brown Plastic
Model 526B Ivory Plastic

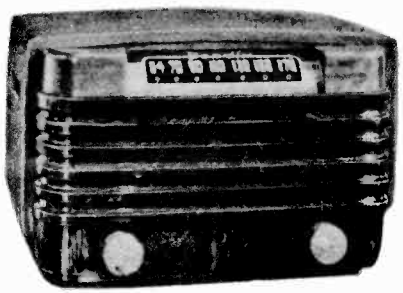

Fig. 2
Model 526C Black & Green Catalin

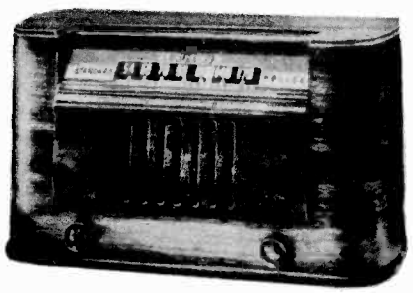

Fig. 3
Model 526E Walnut

SPECIFICATIONS

Power Requirements
105 - 125 Volts, 60 cycles AC
105 - 125 Volts DC
Power Consumption
30 Watts
Tuning Frequency Range
O526 - 540-1700KC
526 - 550-1600KC
Intermediate Frequency - 455KC
Power Output
Maximum - 1.88 Watts
Tube Complement - 5 Tubes
1-12SA7, 1-12SK7, 1-12SQ7, 1-50L6, 1-35Z5
Tuning Drive Ratio - 14:1
Pointer Travel - 4 Inches
Loudspeaker
4" Diameter PM
Voice Coil Impedance - 3.2 ohms @ 400 CPS

Stock No.	Description	0526C	526C
	CABINET COMPONENTS FOR 0526C & 526C		
BZ0B04	BACK—Tekwood, Cabinet	x	x
BZ0R03	BUMPER—Rubber, Cabinet	x	x
DS0A00	DIAL—Plastic (540-1700)	x	
DS0A13	DIAL—Plastic (550-1600)		x
GC0D00	GASKET—Cork, Dial	x	x
GF0S00	GASKET—Felt, Speaker	x	x
GR0D00	GASKET—Rubber, Dial	x	x
HC0S08	CLIP—Knob Retainer Spring	x	x
HZ0S01	STUD—Trimount, Cabinet	x	x
ID0M01	INDICATOR—Metal Dial Pointer	x	x
KC0600	KNOB—Control, Green	x	x
XS0C00	STRIP—Dial Cord Protector	x	x
ZC0B01	RETAINER—Dial, R.H.	x	x
ZC0B02	RETAINER—Dial, L.H.	x	x
ZC0T00	CABINET—Complete	x	x

Stock No.	Description
	CABINET COMPONENTS FOR 0526E
BZ0B01	BACK—Tekwood, Cabinet
BZ0R02	BUMPER—Rubber, Cabinet
DS0A07	DIAL—Glass (540-1700)
GC0D00	GASKET—Cork, Dial
GZ0C01	GRILLE—Cloth & Cardboard Baffle
HC0D02	CLAMP—Dial Retainer
HK0R00	RING—Retainer Spring
ID0M03	INDICATOR—Metal Dial Pointer
KC0B00	KNOB—Control, Mottled Brown
PI0B01	PLATE—Asbestos Base
XS0C00	STRIP—Dial Cord Protector
ZW5A00	CABINET—Walnut

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MODELS 0526, 526A, 526B, 526C, 526E

PRELIMINARY ALIGNMENT PROCEDURE

Connect line cord plug to 117 volt AC power source and allow receiver and test equipment to warm up for at least five minutes. Set Volume control at maximum and connect output meter across voice coil. (If a DC VTVM is available it may be more convenient to connect from tuning gang stator to chassis ground, thus using AVC voltage to indicate circuit resonance. Volume can then be kept low, no modulated signal is needed, and a steadier indication on the meter is obtained.) Make all adjustments in order given in table and tune for maximum output. Keep input as low as possible at all times.

For the O-1 chassis, pre-set dial pointer with gang condenser fully counterclockwise by sliding pointer on dial cord until it is exactly 2 inches from left end of dial back plate. Refer to alignment chart and to diagram of Dial Reference Points, Fig. 4, for proper input signals and their corresponding reference points.

On the R-1 chassis dial settings and frequency check points are indicated on the dial back plate.

PRECAUTIONS

An isolating transformer should be used between the power supply and the receiver if any of the test equipment is AC operated. The use of isolating capacitors is not recommended as AC through the capacitor may introduce hum modulation, and if the capacitors should break down, the test instruments are likely to be damaged.

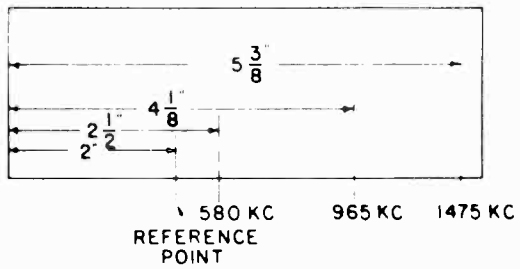

Fig. 4 Dial Reference Points O-1 Chassis

ALIGNMENT CHART

Generator Frequency	Generator Coupling	Circuit Aligned	Dial Setting	Adjust	Remarks
1) 455KC	Through .05 mfd to antenna	2nd IF	Maximum to right	C6a, C6b	Adjust for Maximum output
2) 1475KC	"	1st IF	5⅜" (See Fig. 4)	C3a, C3b	Adjust for Maximum output
3) 1475KC	"	RF	5⅜" (See Fig. 4)	C1b, C10	Adjust for Maximum output
4) REPEAT STEP 3 SEVERAL TIMES TO INSURE MAXIMUM OUTPUT					
5) 965KC	Through .05 mfd to antenna		4⅛" (See Fig. 4)		*Check Calibration
6) 580KC	"		2½" (See Fig. 4)		*Check Calibration

* If calibration is off more than 10KC bend plates of gang condenser. This is a very delicate operation and should be attempted only by experienced technicians.

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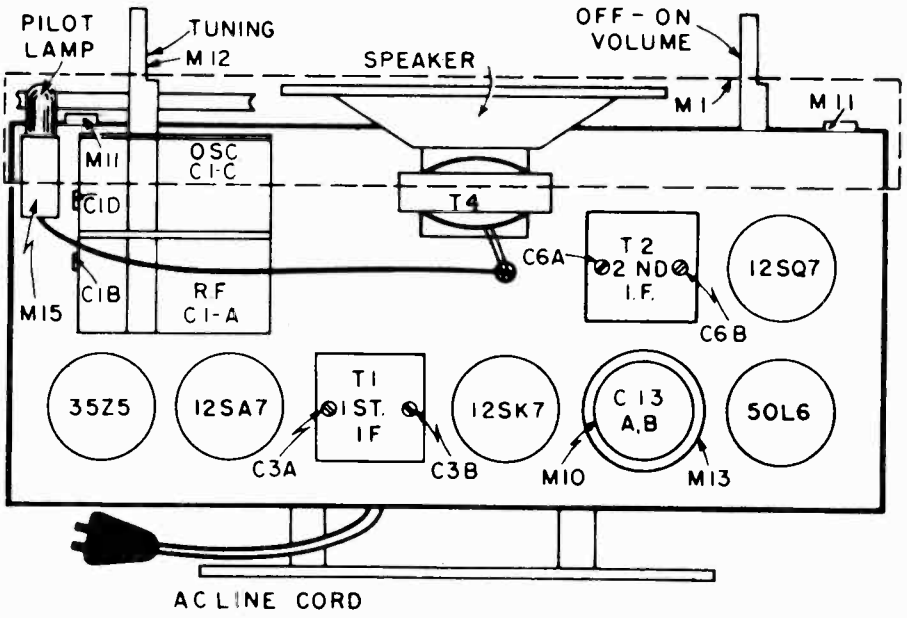
MODELS 0526, 526A, 526B, 526C, 526E



NOTE: In the O-1 chassis the positions of the electrolytic capacitor (C13a, b) and 2nd IF transformer (T2) are reversed.

Where trimmers have been removed from gang, the RF trimmer will be found on the antenna, the oscillator trimmer on the side of the chassis.

Fig. 5 Trimmer Location Diagram

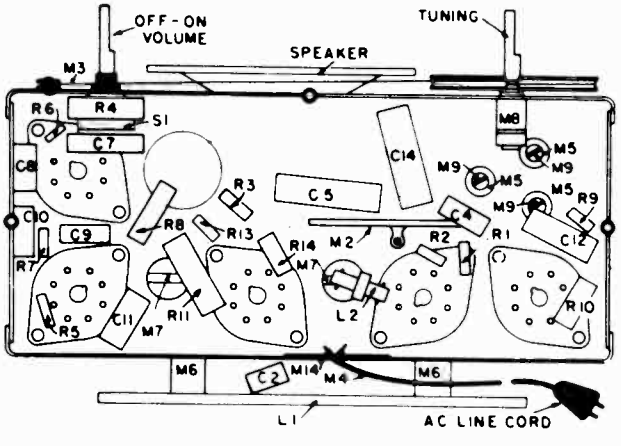


Fig. 6 Component Diagram Bottom View

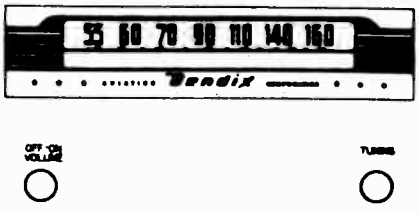


Fig. 7 Front Panel Controls

Figure 7 shows Front Panel Controls for 526A & B Models. On all 0526 Models the Frequency Range is 540-1700KC, but otherwise the Controls are similar.

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MODELS 0526, 526A,
526B, 526C, 526E

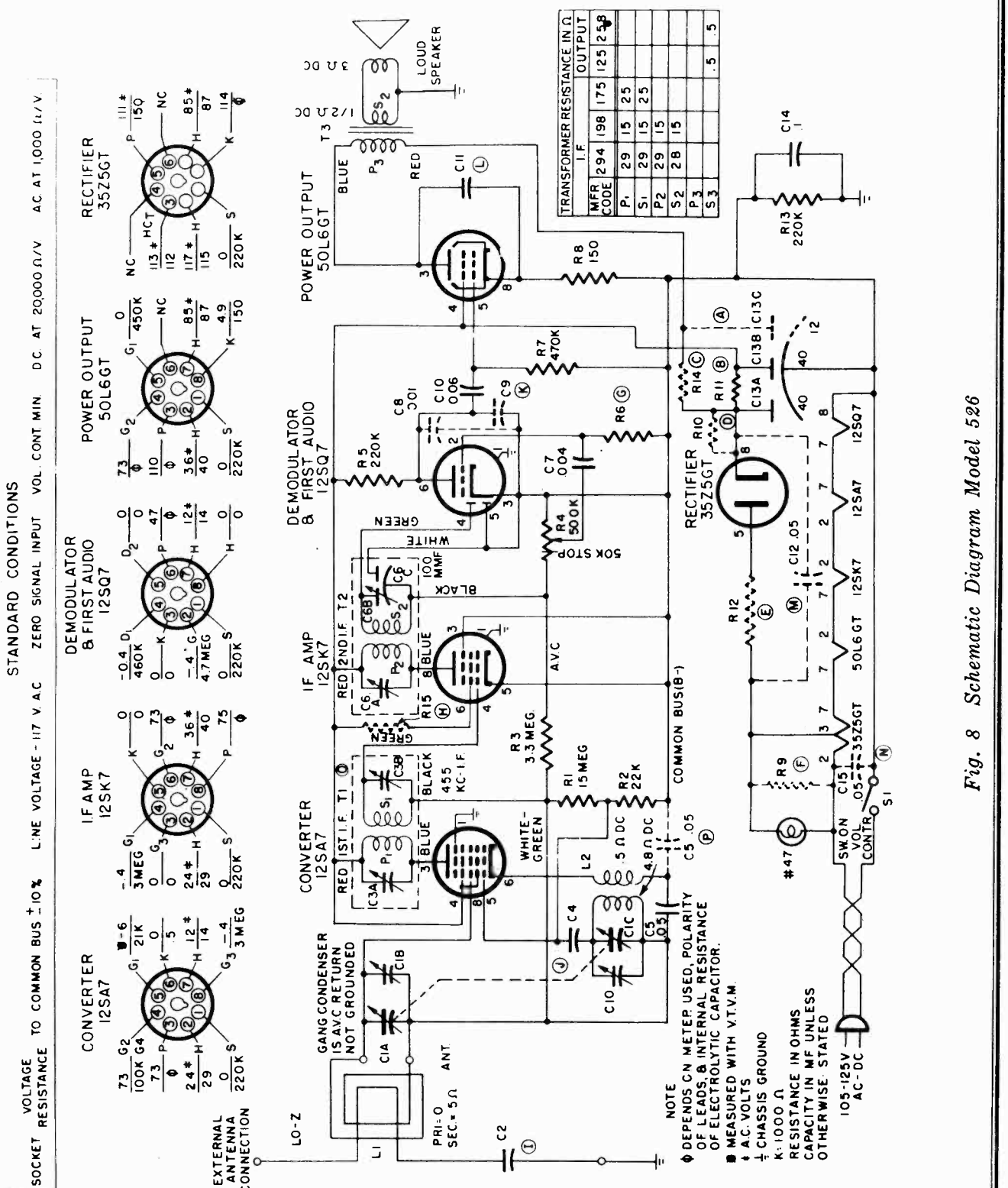

Fig. 8 Schematic Diagram Model 526

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CIRCUIT FOOTNOTES

The Schematic Diagram, Fig. 8, combines the two similar chassis O-1 and R-1. Where differences occur, changes are noted on the diagram by dotted lines, and a letter beside each circuit element involved indicates the corresponding footnote.

A. Capacitor C13a, b (40-40 mfd) is found in O-1 chassis. Capacitor C13a, b, c (40-40-12 mfd) is found in R-1 chassis.

B. R11 is 2200 ohms in O-1 chassis and 1500 ohms in R-1 chassis.

C. R14 (230 ohms) is used in R-1 chassis, not in O-1 chassis.

D. R10 (33 ohms) is not used in R-1 chassis.

E. R12 (33 ohms) is not used in R-1 chassis.

F. R9 (100 ohms) is not used in R-1 chassis.

G. R6 is 4.7 meg in O-1 chassis, but may be either 4.7 or 10 meg in R-1 chassis.

H. R15 (33 ohms) is not used in O-1 chassis.

I. C2 is .004 mfd in R-1 chassis, but may be .004 mfd or 470 mmf in O-1 chassis.

J. C4 (47 mmf) is 50 mmf in some receivers.

K. C9 may be either 300 mmf or 330 mmf in O-1 chassis. It is not used in R-1 chassis.

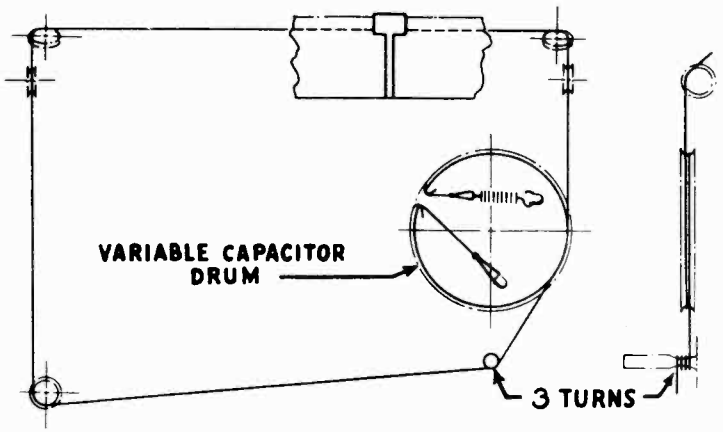
L. C11 is .01 mfd in O-1 chassis and .03 mfd in R-1 chassis.

M. C12 (.05 mfd) is used in O-1 chassis, not in R-1 chassis.

N. C15 (.05 mfd) is used in R-1 chassis, not in O-1 chassis.

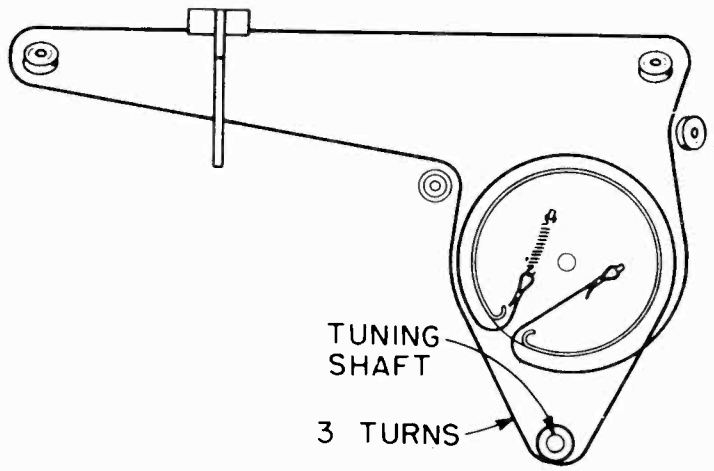
O. In R-1 chassis only, T1 may be a "K" transformer in some units.

P. In some units of R-1 chassis only, C5 (.05 mfd) may be connected between the untuned winding of L2 and the lower end of R2.



FRONT VIEW

Dial Stringing Diagram
Model O526



Dial Stringing Diagram
Model 526

MODELS 0526, 526A, 526B, 526C, 526E

REPLACEMENT PARTS LIST

Stock No.	Description	Chassis 0-1	Chassis R-1
	ELECTRICAL COMPONENTS		
CV0B00	CAPACITOR—Variable 2 Gang (Trimmer on Loop)	C1	
CV0B01	CAPACITOR—Variable 2 Gang	C1	
CV0B03	CAPACITOR—Variable 2 Gang		C1
CM5A38	CAPACITOR—Mica 470 mmf 500V	C2	
CP6T16	CAPACITOR—Paper .004 mfd 600V	C2, C7	C2, C7
CM5A14	CAPACITOR—Mica 47 mmf 500V	C4	
CC6A30	CAPACITOR—Ceramic 47 mmf 500V		C4
CP4T40	CAPACITOR—Paper .05 mfd 400V	C5	C5
CM5A46	CAPACITOR—Mica .001 mfd 500V	C8	C8
CM5A34	CAPACITOR—Mica 330 mmf 500V	C9	
CP4T20	CAPACITOR—Paper .006 mfd 400V	C10	C10
CP4T31	CAPACITOR—Paper .01 mfd 400V	C11	
CP4T36	CAPACITOR—Paper .03 mfd 400V		C11
CP6T16	CAPACITOR—Paper .05 mfd 600V	C12	C15
CE2A00	CAPACITOR—Electrolytic 40-40 mfd 150V	C13a, b	
CE3E01	CAPACITOR—Electrolytic 40-40-12 mfd 150V		C13a, b, c
CP4T51	CAPACITOR—Paper .1 mfd 400V	C14	C14
RC22A156M	RESISTOR—Comp. 15 meg ¼W	R1	R1
RC22A223M	RESISTOR—Comp. 22K ¼W	R2	R2
RC22A335M	RESISTOR—Comp. 3.3 meg ¼W	R3	R3
RV0S00	POTENTIOMETER—500K with switch	R4, S1	R4, S1
RC22A224M	RESISTOR—Comp. 220K ¼W	R5, R13	R5, R13
RC22A475M	RESISTOR—Comp. 4.7 meg ¼W	R6	R6
RC22A106M	RESISTOR—Comp. 10 meg ¼W		R6
RC22A474M	RESISTOR—Comp. 470K ¼W	R7	R7
RC24A151K	RESISTOR—Comp. 150 ohms 1W ±10%	R8	R8
RC24A102M	RESISTOR—Comp. 100 ohms 1W	R9	
RC24A330M	RESISTOR—Comp. 33 ohms 1W	R10, R12	R15
RC25A222K	RESISTOR—Comp. 2200 ohms 2W ±10%	R11	
RC25A152K	RESISTOR—Comp. 1500 ohms 2W ±10%		R11
RC25A221K	RESISTOR—Comp. 220 ohms 2W ±10%		R14
AL0C00	ANTENNA—Loop Assembly	L1	
AL0C02	ANTENNA—Loop with RF Trimmer	L1	
AL0C04	ANTENNA—Loop Assembly		L1
LO5B00	COIL—Oscillator	L2	
LO5H00	COIL—Oscillator (used with CV0B00)	L2	
LO5B01	COIL—Oscillator		L2
TI0C00	TRANSFORMER—Converter IF (1st)	T1	T1
TI0C11	TRANSFORMER—"K" Converter IF		T1
TI0D00	TRANSFORMER—Diode IF (2nd)	T2	
TI0D07	TRANSFORMER—Diode IF (2nd)		T2
TA0000	TRANSFORMER—Output	T3	T3
SP4R00	SPEAKER—4" PM (Less output transformer)	x	x
	LAMP—Dial	1	1

MECHANICAL COMPONENTS

Stock No.	Description	Chassis 0-1	Chassis R-1
AD0B00	ASSY—Dial Back	M1	
AD0B01	ASSY—Dial Back		M1
BT1S00	BOARD—Terminal, 1 Lug 1 Mtg.		x

Stock No.	Description	Chassis 0-1	Chassis R-1
	MECHANICAL COMPONENTS—(Continued)		
BT4S00	BOARD—Terminal, 4 Lug 1 Mtg.	M2	
BT5S00	BOARD—Terminal, 5 Lug 1 Mtg.		x
CD0C01	CABLE—Dial (39 5/16")	M3	M3
CL2A00	CORD—AC Line, Brown (except 526B)	M4	
CL2A03	CORD—AC Line, White (526B only)	M4	
CL2A06	CORD—AC Line, Ivory (526B only)		M4
CL2A07	CORD—AC Line, Brown (except 526B)		M4
GR0S00	GROMMET—Capacitor Shockmtg.	M5	M5
HB0A00	BRACKET—Antenna Mtg.	M6	
HB0M58	BRACKET—Antenna Mtg.		M6
HC0C00	CLIP—Oscillator Coil Mtg.	x	
HC0C12	CLIP—IF Transformer	M7	M7
HC0S00	CLIP—Tuning Shaft Spring	M8	M8
HR0S01	CLIP—Electrolytic Spring Mtg.		x
HC0S31	RIVET—Shoulder (.171 dia.)	x	
HR0S02	RIVET—Shoulder (.218 dia.)	x	x
HS0C00	SPRING—Coil, Dial Cable	x	x
HS6F00	SLEEVE—Spacer, Tuning Cap. Mtg.	M9	M9
IT0C00	INSULATOR—Tube, Electrolytic	M10	
MB0B00	BEARING—Brass, Tuning Shaft	x	x
MP0100	PULLEY—Idler	M11	M11
MS0T00	SHAFT—Tuning	M12	M12
PI0C00	PLATE—Insulator, Cap. Mtg.	M13	
PI0P00	PLATE—Insulator, Line Cord	M14	
PI0P02	PLATE—Insulator, Line Cord		M14
SO0D00	SOCKET—Dial Lamp	M15	M15
SO8S00	SOCKET—Octal Tube	x	
SO8S03	SOCKET—Octal Tube		x

CABINET COMPONENTS FOR 0526 & 526A & B

Stock No.	Description	0526A	0526B	526A	526B
BT1T00	BOARD—Antenna Terminal	x	x	x	x
BZ0D00	BAFFLE—Board, Speaker	x	x	x	x
BZ0R00	BUMPER—Rubber, Cabinet	x	x	x	x
DS0A03	DIAL—Plastic (540-1700)	x	x		
DS0A11	DIAL—Plastic (550-1600)			x	
DS0A12	DIAL—Plastic (550-1600)				x
HC0S01	CLIP—Spring Retainer	x	x	x	x
HK0R00	RING—Knob Retainer Spring	x	x	x	x
HP0B00	PLATE—Metal Base	x	x	x	x
HZ0S00	STUD—Trimount, Cabinet	x	x	x	x
KC0B01	KNOB—Mottled Brown	x		x	
KC0B03	KNOB—Metallic Brown		x		x
KC0R00	KNOB—Red				x
ID0M00	INDICATOR—Metal Dial Pointer	x	x	x	x
PI0B01	PLATE—Asbestos Base	x	x	x	x
XS0C00	STRIP—Dial Cord Protector	x	x	x	x
ZP0B01	CABINET—Brown Plastic	x		x	
ZP0I01	CABINET—Ivory Plastic		x		x

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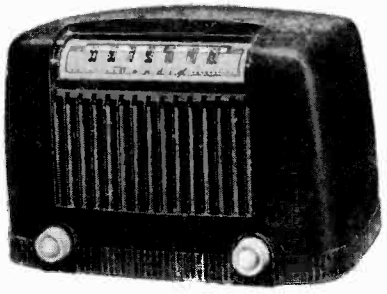
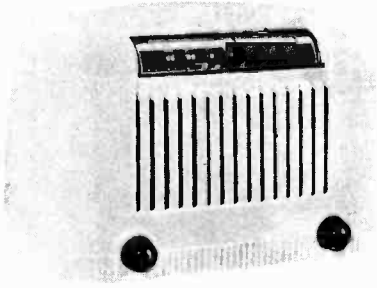
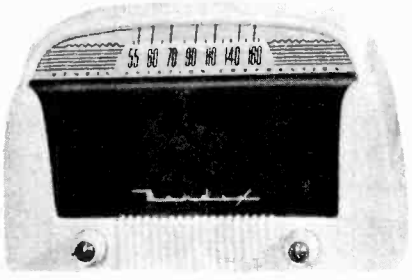
MODELS 55L2, 55P2, 55L3, 55P3



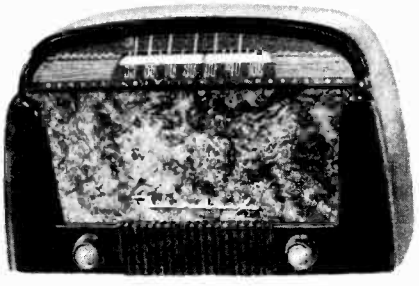
55P2



55L2



55L3



55P3

MODELS 55P2, 55L2, 55L3 AND 55P3

GENERAL

Connect line cord plug to correct power source (see SPECIFICATIONS) and turn on receiver and any power operated test equipment. Allow a five minute warm up period before beginning alignment. Turn tuning gang fully closed (low end of band) and set dial pointer directly over point marked REFERENCE.

After warm up period, rotate tuning condenser fully open and turn volume control to maximum ON position. Place a low range output meter across voice coil and refer to ALIGNMENT CHART for detailed alignment procedure.

Connect signal generator to external antenna through isolating capacitor designated in ALIGNMENT CHART. Be sure to adjust slugs at both top and bottom of IF cans beginning with T2. Keep input signal as low as practicable at all times and make all adjustments for maximum output meter reading.

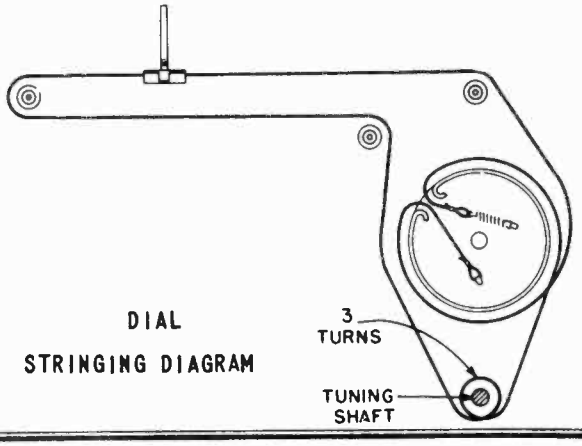
PRECAUTIONS

Various interchangeable IF transformer cans are used in these receivers. The chassis is punched to accommodate either the small, slug tuned type or the larger, capacitor tuned IF cans. Before aligning one of these radio receivers, determine the type of IF can used and align set accordingly.

An isolating transformer should be used between the AC power line and the receiver for protection of any test equipment that must be operated from the same power line.

SPECIFICATIONS

Power Requirements	
Voltage	105-120V AC or DC
Frequency	50-60 CPS
Power Consumption	30 Watts
IF Frequency	455 KC
Tuning Range	540-1620 KC
Max. Power Output	1.8 Watts
Loudspeaker	PM
Cone Diameter	4 Inches
Voice Coil Impedance	3.2 Ohms @ 400 CPS



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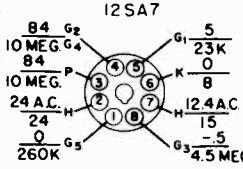
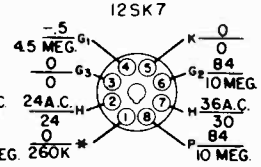
CONDITIONS OF MEASUREMENTS

LINE VOLTAGE 117 A-C. ZERO SIGNAL INPUT VOL CONT. MIN. SOCKET VOLTAGE / RESISTANCE TO COMMON B MINUS D. C. AT 20,000 Ω / V A.-C. AT 1,000 Ω / V

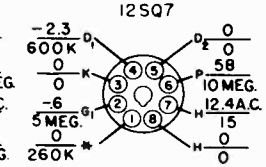
CONVERTER 12SA7



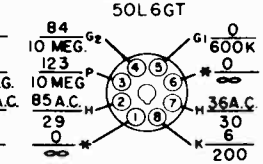
I.F. 12SK7



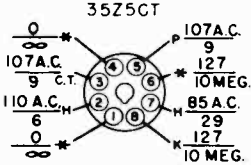
DEMODULATOR & FIRST AUDIO 12SQ7



POWER OUTPUT 50L6GT

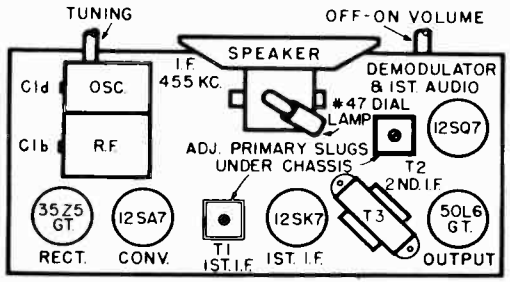


RECTIFIER 35Z5GT

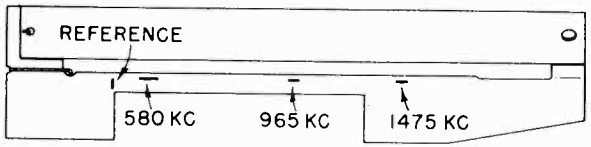


* NO INTERNAL TUBE CONNECTION LUG CONNECTION ONLY

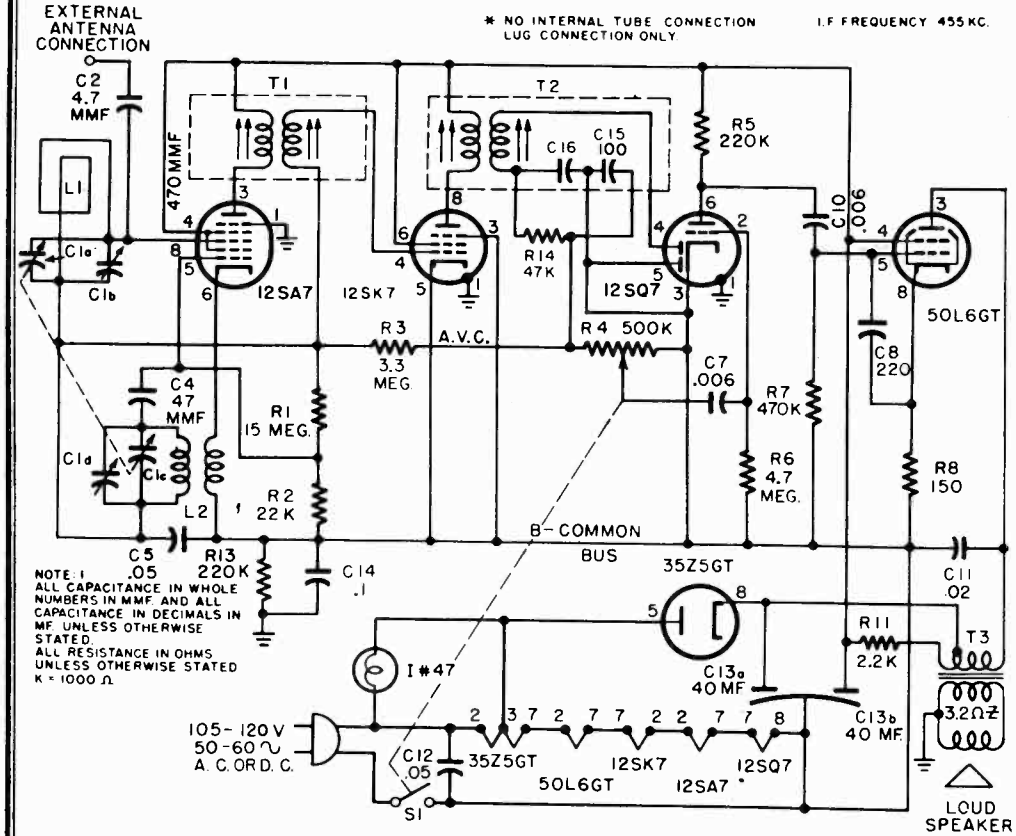
I.F FREQUENCY 455 KC.



TRIMMER LOCATION



DIAL REFERENCE POINTS



SCHEMATIC DIAGRAM MODELS 55L2, 55P2, 55L3, 55P3

ALIGNMENT CHART

CIRCUITS ALIGNED	DIAL POINTER	INPUT FREQUENCY	APPLY THROUGH	ADJUST
IF	Max. to Right	455 KC +	.01 mfd	Slugs-Top & Bottom of T2 Slugs-Top & Bottom of T1
OSC. & ANT.	1475 Ref. Mark	1475 KC	50 mmf	C1d C1b
	965 Ref. Mark	965 KC	50 mmf	* Check Calibration
	580 Ref. Mark	580 KC	50 mmf	* Check Calibration

* If Calibration does not check within the frequency mark, both oscillator and antenna sections of the gang condenser must be bent to correct tracking.

\+ Signal Generator connected to external antenna connection for complete alignment.

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MODELS 55L2, 55P2, 55L3, 55P3

REPLACEMENT PARTS LIST

Stock Number	Symbol Nos.	Description
		ELECTRICAL COMPONENTS
CV0B05 +	(C1)	CAPACITOR-Variable, 2 Section
CC8A18 +	(C2)	CAPACITOR-Ceramic (Insulated)
CC6A30 +	(C4)	CAPACITOR-Ceramic 47 mmf 500V
CP4T40 +	(C5,C12)	CAPACITOR-Paper .05 mfd 400V
CP4T20 +	(C7,C10)	CAPACITOR-Paper .006 mfd 400V
CC6A38 +	(C8)	CAPACITOR-Ceramic 220 mmf 500V
CP4T34 +	(C11)	CAPACITOR-Paper .02 mfd 400V
CE2E01 +	(C13a,b)	CAPACITOR-Electrolytic (dry) 2 Sections (40-40 mfd)
CP4T51 +	(C14)	CAPACITOR-Paper .1 mfd 400V
HRC22A156M +	(R1)	RESISTOR-Comp. 15 meg 1/4w
HRC22A223M +	(R2)	RESISTOR-Comp. 22K 1/4w
HRC22A335M +	(R3)	RESISTOR-Comp. 3.3 meg 1/4w
RV0S02 +	(R4)	RESISTOR-Pot. with Switch 500K
HRC22A475M +	(R6)	RESISTOR-Comp. 4.7 meg 1/4w
HRC22A474M +	(R7)	RESISTOR-Comp. 470K 1/4w
HRC24A151K +	(R8)	RESISTOR-Comp. 150 ohms ±10% 1w
HRC25A222M +	(R11)	RESISTOR-Comp. 2.2K 2w
HRC22A473M +	(R14)	RESISTOR-Comp. 47K 1/4w
L06B03 +	(L2)	COIL-Oscillator
TI0C11	(T1)	TRANSFORMER-IF Input
TI0D21	(T2)	TRANSFORMER-IF Output
TA0010 +	(T3)	TRANSFORMER-Audio Output
AL0C08	(L1)	ANTENNA-Loop
SP4R01 +		SPEAKER-PM 4"
#47 +		LAMP-Bayonet Base
		MECHANICAL COMPONENTS
AD0B04		PLATE-Dial Back (Used On 55P2, 55L2)
AD0B05		PLATE-Dial Back (Used on 55P3, 55L3)
BT1S03 +		BOARD-Terminal (1 Lug, 1 Mtg.)
BT4S04 +		BOARD-Terminal (4 Lug, 1 Mtg.)
CD0C23		CABLE-Dial Tuning
GR0S09 +		GROMMET-Shockmount Rubber
HB0M58 +		BRACKET-Loop Ant. Mounting
HB0M81		BRACKET-Light
HC0C03 +		CLAMP-Dial Cord
HC0S00 +		CLIP-Spring (Tuning Shaft)
HC0S60 +		CLIP-Mounting
HC0S61 +		CLIP-Dial Back Plate Window, Spring
HS6F01 +		SPACER-Tuning Cond. Mounting
HZ0S08 +		STUD-Trimount
ID0M17 +		INDICATOR-Dial
MB0B00 +		BEARING-Brass (Tuning Shaft)
MS0T15		SHAFT-Tuning
PI0P03 +		PLATE-Line Cord
SO0D00 +		SOCKET-Dial Light
SO0D14		SOCKET-Dial Light
SO8S01 +		SOCKET-Tube Octal
SO8S03		SOCKET-Tube Octal (#1 Lug Gnd.)
WP0D03 +		WINDOW-Dial Back Plate
XS0C00 +		STRIP-Dial Cord Protector
		CABINET COMPONENTS - 55L2
BZ0D18 +		BAFFLE-Cloth and Cardboard
CL2A06 +		CORD-A.C. Line (Ivory)
DS0A32		DIAL-Scale (1 band) (550-1600 KC)
HC0S63 +		CLIP-Spring Baffle Retainer
HK0R00 +		CLIP-Knob Retainer
HP0B02 +		PLATE-Base
HZ0S00 +		STUD-Trimount Cabinet
KC0B14		KNOB-Control Dark Tan
ZP0I02 +		CABINET-Plastic (Bingman #2 Ivory)
		CABINET COMPONENTS - 55P2
BZ0D18 +		BAFFLE-Cloth and Cardboard
CL2A07 +		CORD-A.C. (Brown)
DS0A31		DIAL-Scale (1 band) (550-1600 KC)
HC0S63 +		CLIP-Spring Baffle Retainer
HK0R00 +		CLIP-Knob Retainer
HP0B02 +		BASE-Plate
HZ0S00 +		STUD-Trimount Cabinet
KC0B00		KNOB-Control
ZP0B03 +		CABINET-Plastic (Bingman #2 Brown)
		CABINET COMPONENTS - 55L3
BZ0D29		BAFFLE-Speaker
CL2A06 +		CORD-A.C. (Ivory)
DS0A34		DIAL-Scale
HK0R00 +		CLIP-Knob Retainer
HN3S00		NUT-Speed 3/16
HN9S01		NUT-Speed (Special)
HP0B06		PLATE-Base
HS0F17		SPRING-Dial Retainer Flat
KC0I01		KNOB-Control (Ivory)
NE0B00		NAMEPLATE-Bendix
ZP0I03		CABINET-Plastic Bingman 21 (Ivory)
		CABINET COMPONENTS - 55P3
BZ0D30		BAFFLE-Speaker (Cushion & Bracket Assy.)
CL2A07 +		CORD-A.C. (Brown)
DS0A33		DIAL-Scale
HK0R00 +		SPRING-Ring Retainer .015 Blued Finish
HN3S00		NUT-Speed 3/16
HN9S01		NUT-Special
HP0B06		PLATE-Base
HS0F17		SPRING-Dial Retainer Flat
KC0B15		KNOB-Control Brown Plain
NE0B00		NAMEPLATE-Bendix
ZP0P05		CABINET-Plastic Bingman 21 (Brown)

+ Used on previous models

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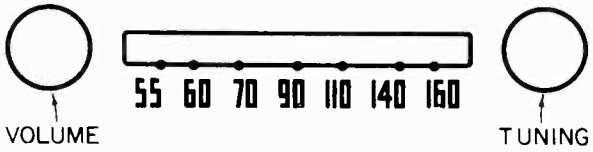
MODEL 55X4

Fig. 1 - Model 55X4



NOTE: OFF-ON SWITCH IS CONTROLLED BY POSITION OF FRONT DOOR.

BATTERY POWER MAY BE USED ONLY WHEN LINE CORD PLUG IS INSERTED INTO CHASSIS RECEPTACLE.

Fig. 2 - Control Layout

GENERAL

Connect line cord plug to correct power source (see Specifications) and allow receiver and any power operated test equipment to warm up for at least five minutes before attempting alignment. This portable chassis has a door switch and when set is out of the cabinet, the receiver can be turned on by merely plugging in the line cord. Depressing the door switch turns the receiver off.

Turn tuning gang fully closed (low end of band) and set dial pointer directly over point marked Reference (Fig. 4).

After warm up period, rotate tuning condenser fully open and adjust volume control to maximum. Place a low range output meter across voice coil and then follow instructions presented in the Alignment Chart.

SPECIFICATIONS

Power Requirements
Voltage . . . . . 105-120 AC or DC
. . . . 6 and 67V Batteries
Frequency. . . . . 60 Cps
Power Consumption . . . . . 15 Watts
Tuning Range. 540-1620KC
Intermediate Frequency. 455KC
Maximum Power Output
AC or DC 180MW
Battery. 110MW
Loudspeaker . . . . . PM 4"
Tube Complement
1R5, 1T4, 1U5, 1LB4, and Rectifier 117Z3.
Total 5 Tubes.
Overall Dimensions

Width	*Depth*	*Height*
9 3/4"	4 1/2"	8"

Connect signal generator to external antenna through the isolating capacitor designated in Alignment Chart. Be sure to adjust slugs at both top and bottom of IF cans beginning with T2. Keep input signal as low as practicable at all times and make all adjustments for maximum output meter reading.

PRECAUTIONS

Various interchangeable IF transformer cans are used in this receiver. The chassis is punched to accomodate either the small, slug tuned type or the larger, capacitor tuned IF cans. Before aligning this radio receiver, determine the type of IF can used and align set accordingly.

An isolating transformer should be used between the AC power line and the receiver for protection of any test equipment that must be operated from the same power line.

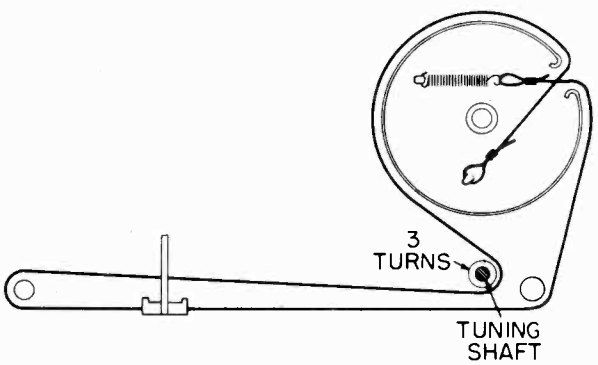


Fig. 6 - Dial Stringing Diagram

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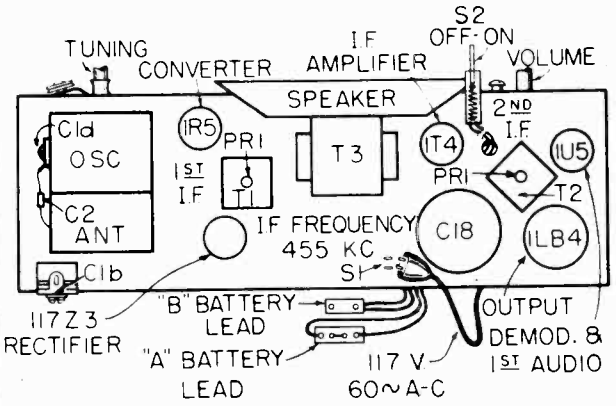


Fig. 3 - Trimmer Location Diagram

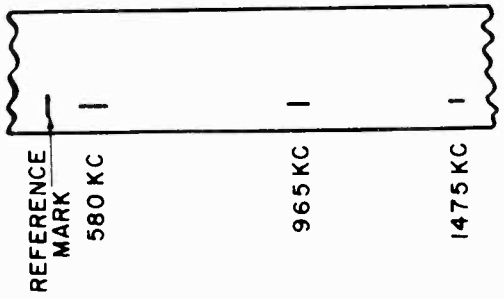


Fig. 4 - Dial Reference Points

ALIGNMENT CHART

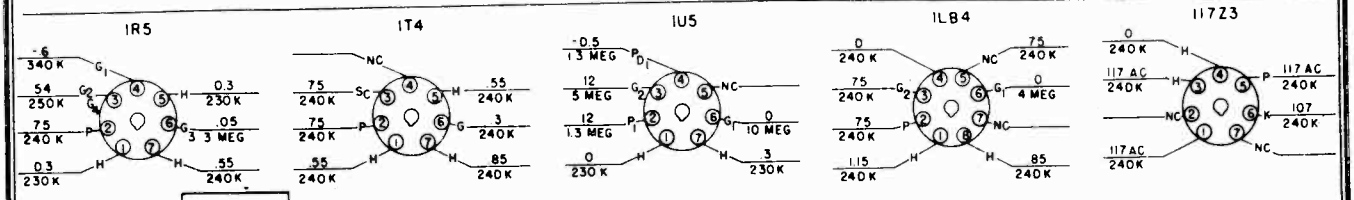
CIRCUIT ALIGNED	DIAL POINTER	INPUT FREQ.	APPLY THROUGH	ADJUST
IF	Max. To Right	†455KC	.01 mfd	SLUGS-Top & Bottom of T2 SLUGS-Top & Bottom of T1 (Fig. 3)
OSC. & ANT.	1475 Ref. Mark (Fig. 4)	1475KC	50 mmf	C1d;C1b (Fig. 3)
	965 Ref. Mark (Fig. 4)	965KC	50 mmf	* Check Calibration
	580 Ref. Mark (Fig. 4)	580KC	50 mmf	* Check Calibration

† If calibration does not check within the frequency mark, both oscillator and antenna sections of the gang condenser must be bent to correct tracking.

* Signal Generator connected to external antenna connection for complete alignment.

CONDITIONS OF MEASUREMENTS

LINE VOLTAGE 117 A.C. ZERO SIGNAL INPUT. VOL. CONT. MIN. SOCKET VOLTAGE / RESISTANCE TO CHASSIS GROUND. D.C. AT 20,000Ω/V. A.C. AT 1,000Ω/V. SWITCH S1 CLOSED.



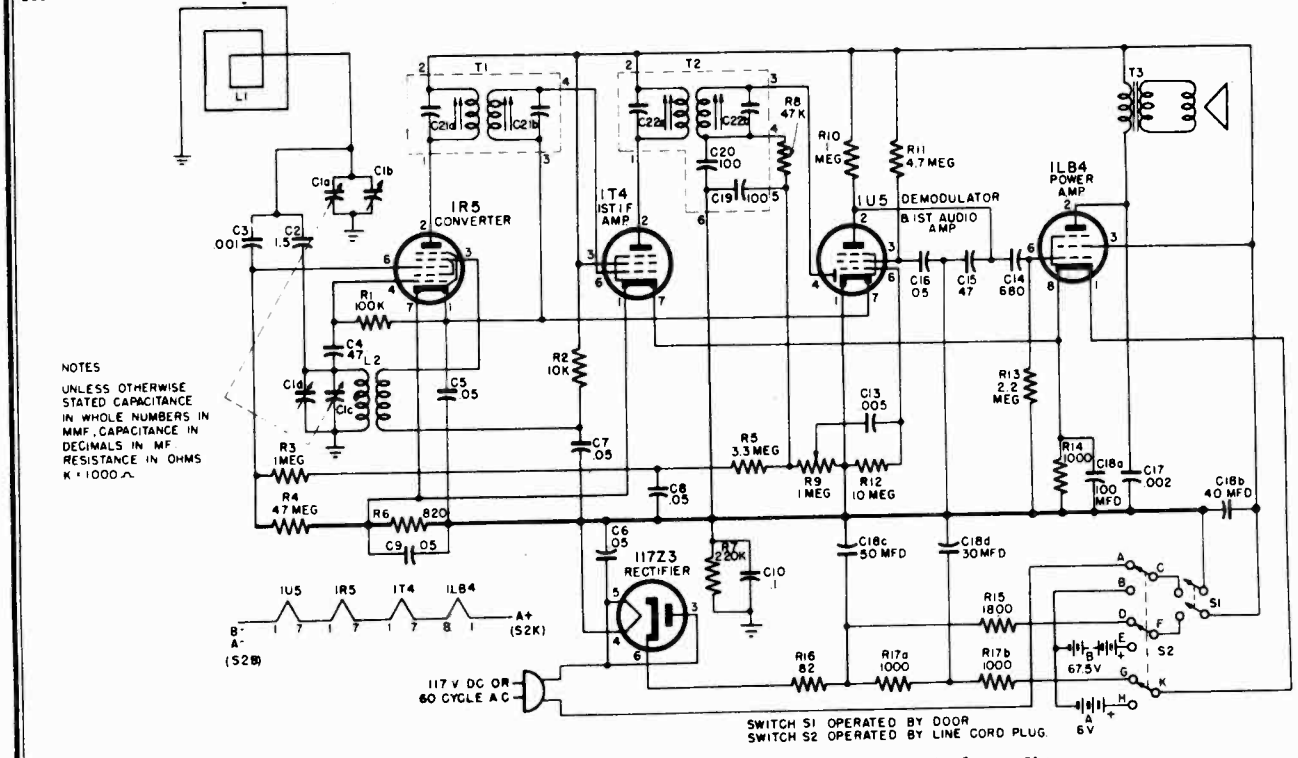


Fig. 5 - Schematic Diagram Model 55X4

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MODEL 55X4

REPLACEMENT PARTS LIST

Stock No.	Symbol Nos.	Description
	ELECTRICAL COMPONENTS	
CV0B06	C1a,c	CAPACITOR-Variable
CT1A19	C1b	CAPACITOR-Trimmer 1.6 - 18 mmf
CC9A12	C2	CAPACITOR-Ceramic 1.5 mmf 500V
CC9K50	C3	CAPACITOR-Ceramic .001 mfd 300V
CC6A30	C4,15	CAPACITOR-Ceramic 47 mmf 500V
CP2T40	C5,7,8,9,16	CAPACITOR-Paper .05 mfd 200V
CP3S40	C6	CAPACITOR-Paper .05 mfd 400V
CP4T51	C10	CAPACITOR-Paper .1 mfd 400V
CC0M00	C13	CAPACITOR-Ceramic .005 mfd 450V
CC9K44	C14	CAPACITOR-Ceramic 680 mmf 300V
CP6T12	C17	CAPACITOR-Paper .002 mfd 600V
CE4A00	C18	CAPACITOR-Electrolytic 50-40-30 mfd 150V 100 mfd 25V
RC22A104M	R1	RESISTOR-Comp. 100K 1/4W
RC22A103K	R2	RESISTOR-Comp. 10K ±10% 1/4W
RC22A105M	R3,10	RESISTOR-Comp. 1 meg 1/4W
RC22A475M	R4,11	RESISTOR-Comp. 4.7 meg 1/4W
RC22A335M	R5	RESISTOR-Comp. 3.3 meg 1/4W
RC22AB21K	R6	RESISTOR-Comp. 820 ohms ±10% 1/4W
RC22A224M	R7	RESISTOR-Comp. 220K 1/4W
RC22A473M	R8	RESISTOR-Comp. 47K 1/4W
RV4C06	R9	RESISTOR-Pot. 1 meg
RC22A106M	R12	RESISTOR-Comp. 10 meg 1/4W
RC22A225M	R13	RESISTOR-Comp. 2.2 meg 1/4W
RC22A102K	R14	RESISTOR-Comp. 1000 ohms ±10% 1/4W
RC23A182K	R15	RESISTOR-Comp. 1.8K ±10% 1/2W
RW2F0B	R16	RESISTOR-Wirewound 82 ohms ±10% 2W
RW2M00	R17	RESISTOR-Wirewound (2 Sections) 1000-1000 ohms ±5% 3W
AL0Z19	L1	ANTENNA-AM Loop
L05B05	L2	COIL-Broadcast Oscillator
T10C13	T1	TRANSFORMER-1st IF
T10D19	T2	TRANSFORMER-2nd IF
TA0013	T3	TRANSFORMER-Output
SS1S00	S1	SWITCH-DPDT Plunger Spring
SS1C01	S2	SWITCH-Slide
SP4R02		SPEAKER-PM 4"

Stock No.	Symbol Nos.	Description
	MECHANICAL COMPONENTS	
BT0C01		BOARD-Terminal (A Battery)
BT2S05		BOARD-Terminal 1 Lug 1 Mtg.
BT4S05		BOARD-Terminal 3 Lug 1 Mtg.
BT4S06		BOARD-Terminal 3 Lug 1 Mtg.
BT5S03		BOARD-Terminal 4 Lug 1 Mtg.
CD0C26		CABLE-Dial Tuning
CL0B00		CABLE-Battery (Chassis to B Battery)
GR0S09		GROMMET-Shockmount
HB0M78		BRACKET-Switch Mtg.
HC0S00		CLIP-Tuning Shaft Spring
HC0S60		CLIP-IF Can Mtg.
HP0D03		PLATE-Dial Back
HR0S01		RIVET-Shoulder .171 x .118 (Dial Cable Pulley)
HR0S08		RIVET-Shoulder
HS0C75		SPRING-Dial Cable
HS6F01		SPACER-Tuning Cable Mtg.
ID0M24		INDICATOR-Dial
MB0B00		BEARING-Brass Tuning Shaft
MP0100		PULLEY-Idler Fiber
MS0T17		SHAFT-Tuning
P10P04		PLATE-Line Cord Insulator
SM0C04		SHIELD-Switch
S08L03		SOCKET-Tube Molded Locktal
S07M06		SOCKET-Tube Molded Miniature
XS0C12		INSULATOR-Switch Shield
	CABINET COMPONENTS	
BT0C00		BOARD-Terminal
CS0P02		COVER-Front Panel Plastic Loop
HC0S10		CLIP-Knob Retainer Spring
HC0S65		CLIP-Knob Retainer Spring
HC0S66		CLIP-Spring Trim
HN9S01		NUT-Speed
HP0B11		COVER-Bottom
HP0M06		PLATE-Handle Reinforcing
HS0C76		SPRING-Antenna Lead
HS0X10		SPRING-Door Latch
HZ0H10		HINGE-Spring Type Door
HZ0P02		HANDLE-Brown Plastic
KC0L02		KNOB-Control Beige
NE0B00		NAMEPLATE-Bendix
ZC5P00		CASE-Cabinet
ZD5P00		DOOR-Cabinet
ZL5P00		LID-Cabinet
ZP0P00		CABINET-Plastic Portable

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FIG. 1 - MODEL 65P4

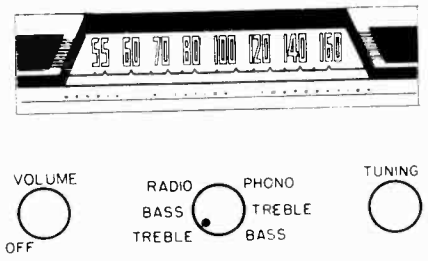

FIG. 2 - CONTROL LAYOUT

SPECIFICATIONS

POWER
- Voltage Rating, AC or DC....105-120
- Frequency-Cycles per second....50-60
- Power Consumption-Watts.....30

TUNING RANGE-FREQUENCY IN KC.540-1620
INTERMEDIATE FREQUENCY (KC).....455
MAXIMUM POWER OUTPUT IN WATTS.....1.2
LOUD SPEAKER-PM OVAL
- Cone diameter-inches.....4 x 6
- Voice Coil Impedance (ohms at 400 cycles).....3.2

TUBE COMPLEMENT
2-14A7, 1-14Q7, 1-14B6, 1-35A5, 1-35Y4
Two #47 dial lamps

OVERALL DIMENSIONS
12-3/4" x 8-1/16" x 8-3/16"

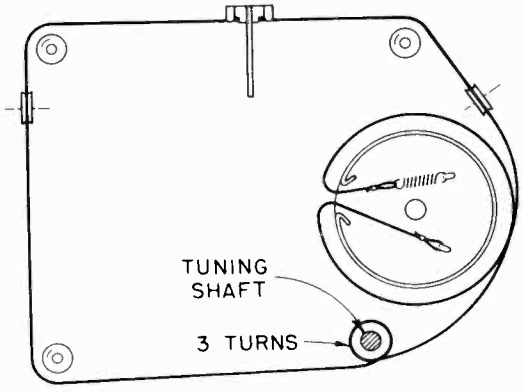

FIG. 3 - DIAL CORD STRINGING DIAGRAM

ALIGNMENT CHART

Circuit Aligned	Input Freq.	Dial Pointer Position	Adjustments
IF	*455 KC	Max. to right	C9b, C9a, C7b, C7a
OSC.	**1475 KC	1475 Ref. Mark	C1c
RF	**1475 KC **965 KC **580 KC	1475 965 580	C1e, C2 +Check Calibration

* Applied to Antenna Input through .1 mfd or less.

** Applied to Antenna Input through 50 mmf. or less.

\+ If dial pointer calibration is not within plus or minus 10 KC the gang rotor plates must be bent to cause correct tracking.

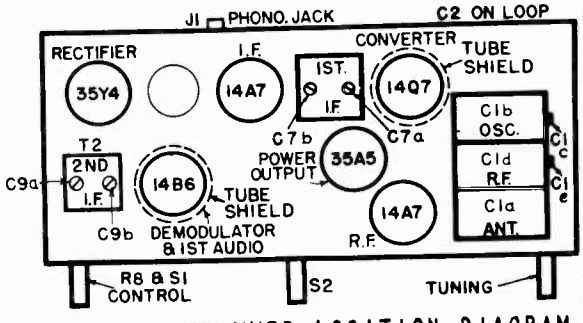

FIG. 5 - TRIMMER LOCATION DIAGRAM

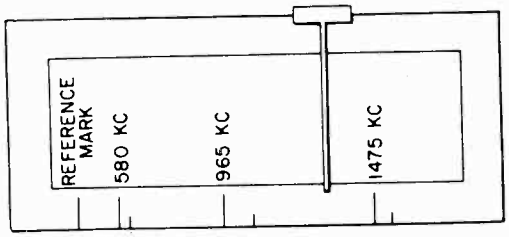

FIG. 6 - DIAL REFERENCE POINTS

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MODEL 65P4

ALIGNMENT PROCEDURE

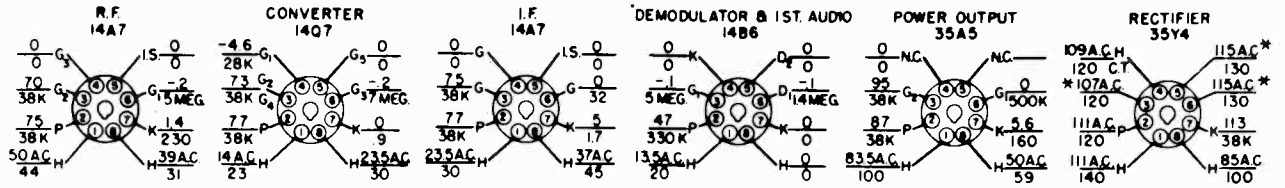
Connect line cord plug to 117 volt, 60 cycles AC power source. Set volume control at maximum clockwise position and tone control (S2) in counterclockwise position. Connect output meter across voice coil. Adjust dial pointer by turning tuning control fully counterclockwise and sliding dial pointer on dial cord to Reference Mark on dial back plate, (See Fig. 6). Make all adjustments in order given in ALIGNMENT CHART on opposite page and for maximum output. Keep input as low as possible at all times.

PRECAUTIONS

An isolating transformer should be used between the power supply and the receiver if any of the test equipment is AC operated. The use of isolating capacitors is not recommended as AC though the capacitor may introduce hum modulation, and if the capacitors should break down the test instruments will likely be damaged.

CONDITIONS OF MEASUREMENTS

LINE VOLTAGE 117 A.C. ZERO SIGNAL VOL. CONT. MIN. SOCKET VOLTAGE / RESISTANCE TO COMMON B MINUS D. C. AT 20,000Ω A. C. AT 1,000Ω / V.



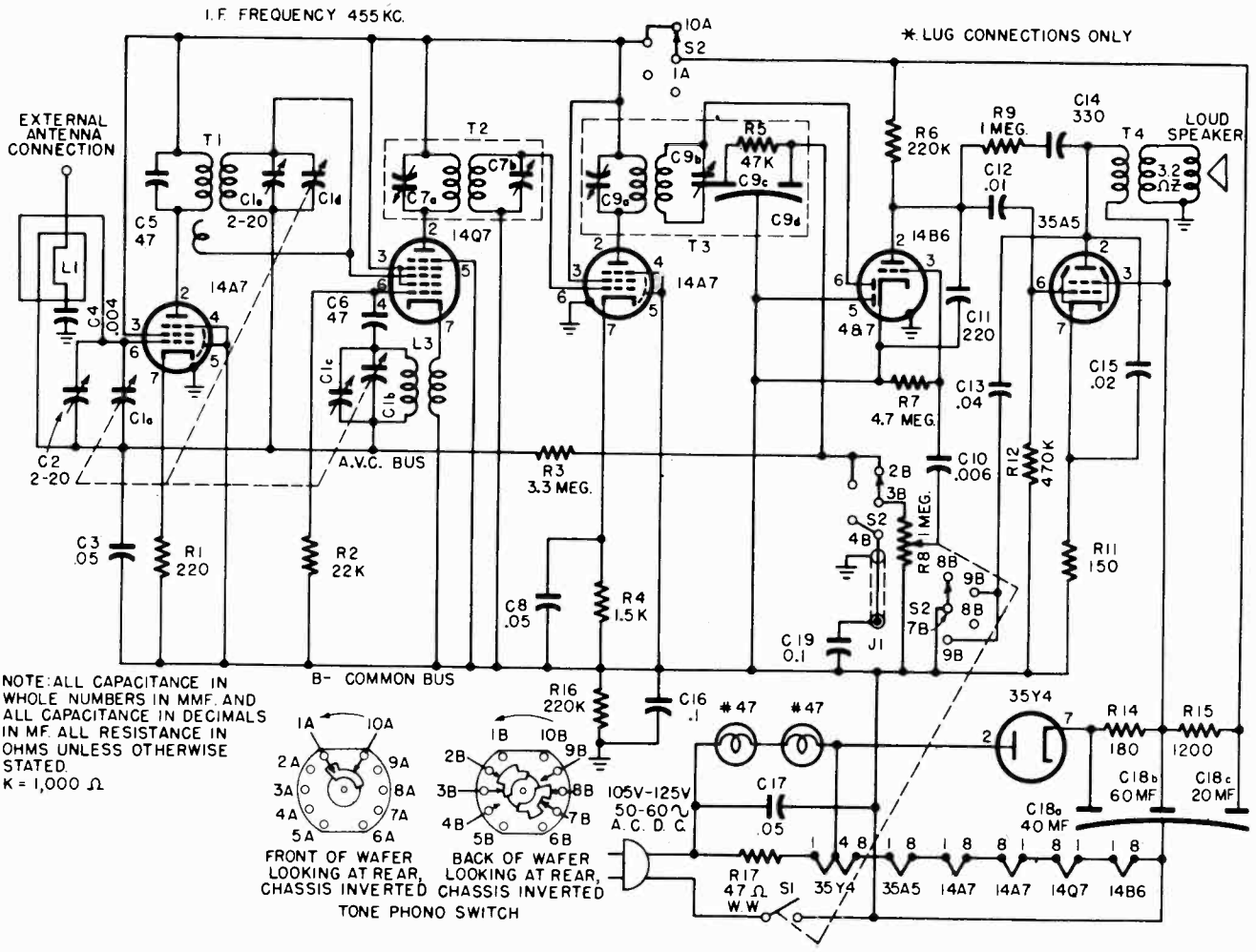


FIG. 4 - SCHEMATIC DIAGRAM - MODEL 65P4

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REPLACEMENT PARTS LIST

Stock Number	Symbol Number	Description
		ELECTRICAL COMPONENTS
CV0C04 +	(C1)	CAPACITOR-Variable 3 Sections
CP4T40 +	(C3,C8, C17)	CAPACITOR-Paper .05 mfd 400V
CP6T16 +	(C4)	CAPACITOR-Paper .004 mfd 600V
CM5A14 +	(C5,C6)	CAPACITOR-Mica 47 mmf
CT2A06 +	(C7a,b)	CAPACITOR-Trimmer
CT3A00	(C9a,b)	CAPACITOR-Trimmer
CP4T20 +	(C10)	CAPACITOR-Paper .006 mfd 400V
CM5A30 +	(C11)	CAPACITOR-Mica 220 mmf
CP4T31 +	(C12)	CAPACITOR-Paper .01 mfd 400V
CP4T38 +	(C13)	CAPACITOR-Paper .04 mfd 400V
CC8F40 +	(C14)	CAPACITOR-Ceramic 330 mmf
CP4T34 +	(C15)	CAPACITOR-Paper .02 mfd 400V
CP4T51 +	(C19, C16)	CAPACITOR-Paper .1 mfd 400V
CE3A00 +	(C18a, b,c)	CAPACITOR-Electrolytic 40-60-20 mfd
RC22A221M +	(R1)	RESISTOR-Comp. 220 ohms 1/4w
RC22A223M +	(R2)	RESISTOR-Comp. 22K 1/4w
RC22A335M +	(R3)	RESISTOR-Comp. 3.3 meg 1/4w
RC22A152M +	(R4)	RESISTOR-Comp. 1.5K 1/4w
RC22A473M +	(R5)	RESISTOR-Comp. 47K 1/4w
RC22A224M +	(R6,R16)	RESISTOR-Comp. 220K 1/4w
RC22A475M +	(R7)	RESISTOR-Comp. 4.7 meg 1/4w
RV4S03	(R8-S1)	RESISTOR-Pot. 1 meg (with switch)
RC22A105M +	(R9)	RESISTOR-Comp. 1 meg 1/4w
RC24A151K +	(R11)	RESISTOR-Comp. 150 ohms 1w
RC22A474M +	(R12)	RESISTOR-Comp. 470K 1/4w
RC25A181K	(R14)	RESISTOR-Comp. 180 ohms ±10% 2w
RC24A122K	(R15)	RESISTOR-Comp. 1.2K 1w
RW2S07	(R17)	RESISTOR-Wirewound 150 ohms 1w
TR6L00 +	(T1)	TRANSFORMER-RF Interstage
TI0C01 +	(T2)	TRANSFORMER-IF Input
TI0D03 +	(T3)	TRANSFORMER-IF Output

Stock Number	Symbol Number	Description
		ELECTRICAL COMPONENTS (CONT.)
TA0001	(T4)	TRANSFORMER-Audio Output
LO6B01 +	(L3)	COIL-Oscillator
AL0C06 +*	(L1)	ANTENNA-Loop
SP4000		SPEAKER-PM 4" x 6"
SR4C00	(S2)	SWITCH-3 Pole 4 Position
# 47 +*		LAMP-Bayonet Base
		MECHANICAL COMPONENTS
AD0C07		ASSEMBLY-Dial Back Plate
BT1S00 +		BOARD-Terminal (1 Lug, 1 Mtg.)
BT2S00 +		BOARD-Terminal (2 Lug. 1 Mtg.)
BT4S01 +		BOARD-Terminal (4 Lug, 1 Mtg.)
CD0N02		CABLE-Dial
GR0S00 +		GROMMET-Capacitor Shockmount
HB0M00 +		BRACKET-Variable Capacitor
HC0C00 +		CLIP-Coil Mounting
HC0C03 +		CLAMP-Cable
HC0S00		CLIP-Spring
HC0S62		CLIP-Window Spring
HC0T00 +		CLIP-Tube Shield Ring
HR0S01 +		RIVET-Shoulder
HS0C75		SPRING-Dial Cord
HS6P01 +		SLEEVE-Spacer
HZ0S08		STUD-Trimount (Dial Back Window Mtg.)
ID0M15		INDICATOR-Dial
JR1S00 +	(J1)	RECEPTACLE-Phono
MB0B00 +		BEARING-Tuning Shaft
MP0I00 +		PULLEY-Dial Cord Idler
MS0T02 +		SHAFT-Tuning

Stock Number	Symbol Number	Description
		MECHANICAL COMPONENTS (CONT.)
PI0C00 +		PLATE-Electrolytic Mounting
PI0P02 +		PLATE-Line Cord Insulating
RD0A00		REFLECTOR-Dial Fishpaper
SM0T00 +		SHIELD-Tube
SO0D11		SOCKET-Dial Light
SO6L03		SOCKET-Locktal Tube (Bakelite)
SO6L08		SOCKET-Locktal Tube (Phenolic)
WP0D02		WINDOW-Dial Back Plate
		CABINET COMPONENTS
BZ0D17		BAFFLE-Speaker
BZ0R00		BUMPER-Cabinet Rubber
CL2A07		CORD-Brown AC
DA0A35		DIAL-Scale
GZ0M21		GRILLE-Metal Front
HC0D00		CLIP-Dial Metal Retainer (R.H.)
HC0D01		CLIP-Dial Metal Retainer (L.H.)
HC0S01		CLIP-Spring (Baffle Retainer)
HK0R00		RING-Retainer Spring (.015)
HN9S00		NUT-Speed
HN9S01		NUT-Speed (Special)
HP0B01		PLATE-Metal Base
HS0F18		SPRING-Retainer (Front Panel Mtg.
KB0B04		KNOB-Control (Indexed)
KC0B00		KNOB-Control
NE0B00		NAMEPLATE-Bendix
ZP0B07		CABINET-(Bing. #3 Brown)

*Complete assembly—see separate manual for proper code. †Used on previous models

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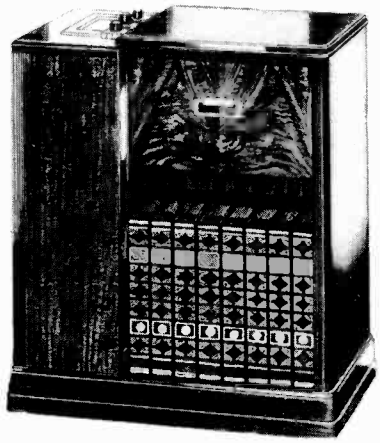
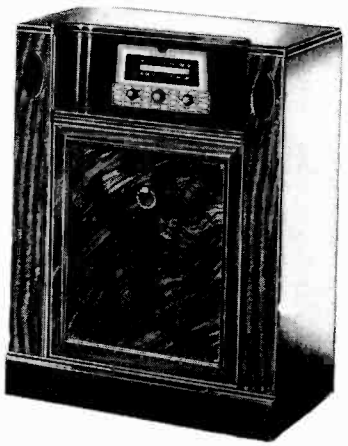
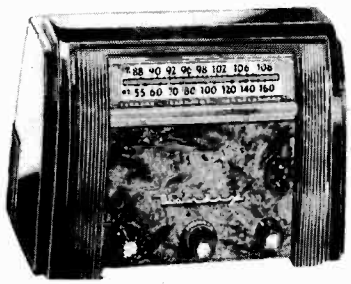
MODELS 75B5, 75M5, 75M8, 75P6, 75W5



75B5-Blond; 75W5-Walnut; 75M5-Mahogany



75M8



75P6

Fig. 1 - Models 75B5, 75W5, 75M5, 75P6, 75M8

GENERAL

The Bendix Radio Models 75P6, 75B5, 75W5, 75M5, and 75M8 employ six tubes and a selenium rectifier to provide reception of the FM band and AM standard broadcast band. The FM section of this receiver contains a tuned RF stage. This RF stage has its plate voltage removed when the range switch is in any but the FM position. The console models have B+ removed from the plates of the RF amplifier and mixer-oscillator tubes when the band switch is in the PH position. These models also have built-in AM and FM antennas; but while the Model 75P6 (table model) makes use of the AM built-in loop antenna, it uses a line coupler type of FM antenna. When using the line coupler antenna the link indicated in Fig. 6 should be connected as shown. However, should an external antenna be desired, disconnect the link by pivoting it on terminal (#1), and connect the external antenna to terminals #2 and #3 indicated in Fig. 6.

The Model 75M8 is similar to Models 75B5, 75W5, and 75M5, differing mainly in the speakers and associated parts. Model 75M8 has two six inch speakers connected in parallel. To match the impedance of both speakers, the output transformer has an impedance of 1.6 ohms. Each of the Models 75B5, 75W5, and 75M5 uses one eight inch speaker and the output transformer has, therefore, an impedance of 3.2 ohms.

The console models operate strictly on AC since a phono motor is used. The table model does not contain a record changer, and operates on either DC or 60 cycles AC power.

The multi-purpose 19T8 tube combines the functions of an AM demodulator, FM detector, and first audio amplifier, in one envelope. The 12AT7, a double triode, is used as a mixer-oscillator tube.

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MODELS 75B5, 75M5, 75M8, 75P6, 75W5

SPECIFICATIONS

Power Requirements
Model 75P6--105-120 V DC or 60 cycles AC
Models 75B5, 75W5, 75M5, 75M8--105-120 V 60 cycle AC
Power Consumption
Radio 50W Phono Turntable 25W
Tuning Frequency Range
AM 540-1620 KC
FM 88-108 MC
Intermediate Frequency
AM 455 KC -- FM 10.7 MC
Power Output
Maximum -- 2.5W
Tube Complement
3--12BA6, 12AT7, 19T8, 50L6---Total 6 Tubes Plus Selenium Rectifier
Loudspeaker
Model 75P6 - 4 x 6" PM
Loudspeaker
Models 75B5, 75W5, 75M5 - 8" PM
Model 75M8 - 2 - 6" PM
Record Changer (Models 75B5, 75W5, 75M5, 75M8)
Automatic, for Twelve 10-inch or Ten 12-inch Standard Lateral Cut Records
Overall Dimensions

	Height	*Width*	*Depth*
Model 75P6	8-5/8"	13"	8-5/8"
Models 75B5, 75W5 & 75M5	30"	27"	16-1/4"
Model 75M8	36"	28"	16-1/8"

Shipping Weight
Model 75P6 15 lbs.
Model 75B5 66 lbs.
Model 75W5 66 lbs.
Model 75M5 66 lbs.
Model 75M8 83 lbs.

ALIGNMENT PROCEDURE

The AM circuits should be aligned before the FM section because of possible interaction between the IF coils. Before attempting to align set allow receiver and test equipment to warm up for at least five minutes. Whenever possible, have a speaker connected to the output and use a 30% amplitude modulated signal in order to identify weak signals in a poorly tuned set. The antenna trimmer for AM in Models 75B5, 75W5, 75M5, and 75M8 must be adjusted when the chassis is replaced in the cabinet, since the antenna loop is installed on the back cover and cannot be removed with the chassis. It may be necessary to adjust the FM antenna slightly when the chassis is replaced in the cabinet.

TEST EQUIPMENT REQUIRED

Signal Generator
AM 455 KC to 106 MC
FM 10.7 MC & 88-108 MC
Vacuum Tube Voltmeter
(ground or minus must be isolated from power line)
Capacitors, .01 mfd and 100 mmf
Alignment Screwdrivers
Standard Output Meter

AM ALIGNMENT

PRELIMINARY PROCEDURE: With gang condenser closed, set dial pointer to coincide with reference mark etched into dial back plate. See Fig. 3. Place band switch in AM position and use a 30% modulated signal throughout. Connect an output meter across voice coil. Adjust Antenna Trimmer C3a after chassis is installed in the cabinet. Keep input as low as possible while obtaining a stable output meter reading.

GENERATOR FREQUENCY	GENERATOR COUPLING	DUMMY ANTENNA	SPECIAL CONDITIONS	DIAL SETTING	ADJUSTMENTS	REMARKS
1.) 455 KC AM	High Side--Term. #5 gang cond. Low side--common ground	.01 mfd capacitor	Short AM Osc. Term. #1 to common ground	Gang condenser fully open	Top Slug of T1, T2, T4 and bottom slug of T4	Adjust for maximum output. Repeat several times to insure maximum output
2.) 1475 KC AM	High side--Term. #3 gang cond. Low side--common ground	100 mmf capacitor	Remove short from Osc. Term #1	1475 KC Rer. mark	C79	Rock Tuning control while adjusting for maximum output
3.) 965 KC AM	"	"		965 KC Ref. mark		* Check Calibration
4.) 580 KC	"	"		580 KC Ref. mark		* Check Calibration

* If calibration does not check within tolerances denoted by etched lines on dial backplate, oscillator gang rotor plates must be bent to obtain proper calibration. This operation is very delicate and should be attempted only by properly trained personnel.

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MODELS 75B5, 75M5,
75M8, 75P6, 75W5

FM ALIGNMENT--CW METER METHOD

Preliminary Alignment Procedure: With gang condenser fully closed, adjust diel pointer to coincide with the reference mark etched into dial back plate. See Fig. 3. Place band switch in FM position. Use 30% amplitude modulated signals when possible.

GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR COUPLING	SPECIAL CONDITIONS	DIAL SETTING	VTVM CONNECTIONS	ADJUSTMENTS	REMARKS
1.)10.7 MC AM or CW	.01 mfd capacitor	High side-term. #4 Gang Condenser. Low side-common ground	Short FM Osc. Term. #2 of Gang Condenser to common ground.	Gang Condenser fully open	+Lead to B- -Lead to Pin #2 of tube 19T8	Bottom Slug of T1,T2, Top slug of T3	Adjust for maximum AVC reading on VTVM. Repeat adjustment several times to insure maximum reading
2.)Remove Signal Generator		Remove Signal Generator	Short FM Osc. term. #2 of gang condenser to common ground. Two 100K matched resistors in series connected between Pin #2 of tube 19T8 & B-	"	Center Tap of 100K resistors and term. #6 of switch S1C	Adjust VTVM for Zero	While connected to chassis, the VTVM is adjusted to zero by its zero centering control
3.)10.7 MC AM or CW	.01 mfd capacitor	High side-term. #3 of Gang condenser. Low side-Common Ground	"	"	"	Bottom slug of T3	Adjust bottom slug to produce zero reading on VTVM
4.) Repeat Steps 1, 2, and 3 until Step 1 produces no change in Step 3 adjustment and top of T3 produces no deflection in Step 3.							
5.)106 MC	FM Dummy Antenna (See Fig. 2)	FM Dummy Antenna (See Fig. 2)	Remove short from Term. #2 of gang condenser. Remove 100K Resistors	106 MC Ref. mark	+Lead to B- -Lead to Pin #2 of tube 19T8	Osc. trimmer C9, then RF, C3c & Ant., C36	Rock tuning control when adjusting C9 for maximum AVC reading, then adjust C3c and C3b respectively for maximum †
6.)97 MC AM or CW	"	"		97 MC Ref. mark	"		* Check Calibration
7.)90 MC AM or CW	"	"		90 MC Ref. mark	"		* Check Calibration

† Oscillator operates on high frequency side of incoming signal but it is possible to adjust to the low side. Set Signal Generator to 84.6 MC and if signal is heard readjust oscillator trimmer at signal generator frequency of 106 MC and check again at 84.6 MC. Signal should not be heard.

* If calibration is not within reasonable tolerance at these points, the inductance of the FM oscillator coil must be adjusted. If dial pointer reading is on low frequency side, inductance of oscillator coil is too low and turns of coil must be compressed slightly, If pointer reading is on high frequency side, the coil inductance is too high and coil turns must be spread slightly. Repeat steps 5, 6, and 7 until correct calibration is obtained.

To adjust RF coil, tune receiver to 90 MC and observe AVC reading. Insert into RF coil, the iron core of tuning wand (rod of insulating material one end of which contains an iron core slug and the other end contains a non-ferrous metallic slug). If reading increases, the inductance of coil is too low and, turns must be spread *slightly*. If reading decreases, insert opposite end (non-ferrous) of tuning wand into RF coil. Inductance of coil is too low if reading increases and, turns must be compressed *slightly*. Correct adjustment is obtained when insertion of either end of tuning wand causes the reading to decrease.

The antenna coil inductance is adjusted in the same manner as the RF coil.

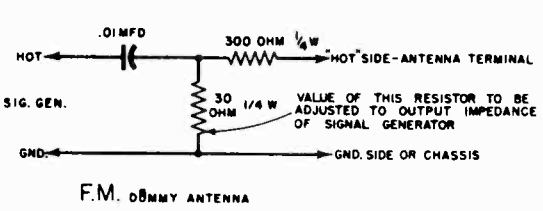

Fig. 2 - FM Dummy Antenna

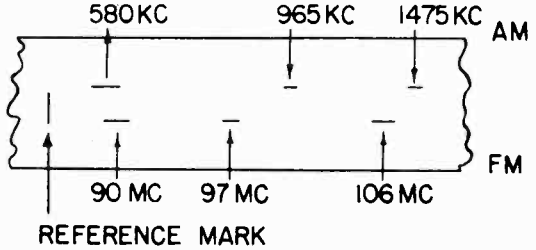

Fig. 3 - Dial Reference Points

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MODELS 75B5, 75M5, 75M8, 75P6, 75W5

VISUAL ALIGNMENT OF RATIO DETECTOR

The ratio detector in the FM section of this radio receiver can be aligned by the so-called Visual Alignment method. This method can be used in conjunction with the CW method by following the procedure outlined below:

1. Perform Step 1 indicated in CW Meter Method Chart.
2. Set Signal Generator to 10.7 MC, FM, with sweep width at maximum possible (should be a minimum of 200 KC). Connect output of generator to terminal #4 of gang condenser and B-.
3. Connect vertical input of cathode ray oscilloscope to terminal #6 of switch S1C and B-, and place a 60 cycle sine wave signal to horizontal input if oscilloscope does not have an internal 60 cycle sweep.

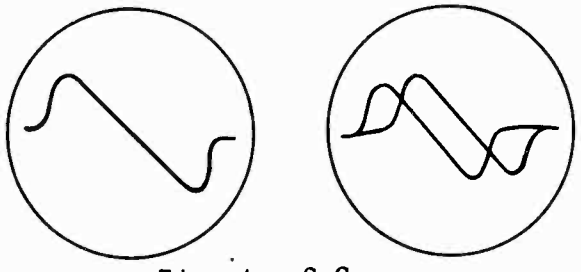


Fig. 4 - S Curves

4. Adjust signal generator frequency until 'S' curve (Fig. 4) is centered on the horizontal sweep. Curve may be reversed because of internal circuit of oscilloscope.
5. Adjust primary of T3 (top slug) and secondary (bottom slug) for maximum desired 'S' curve. A VTVM can be very useful at this point if connected to pin #2 of tube 19T8 and B-. The oscilloscope will then indicate the most linear curve and the VTVM will indicate the maximum AVC voltage.
6. Adjust bottom of slugs of T1 and T2 and then repeat step 5 to insure correct alignment.
7. Continue at this point with the alignment procedure starting with step 5 as outlined in the FM-CW Meter Method.

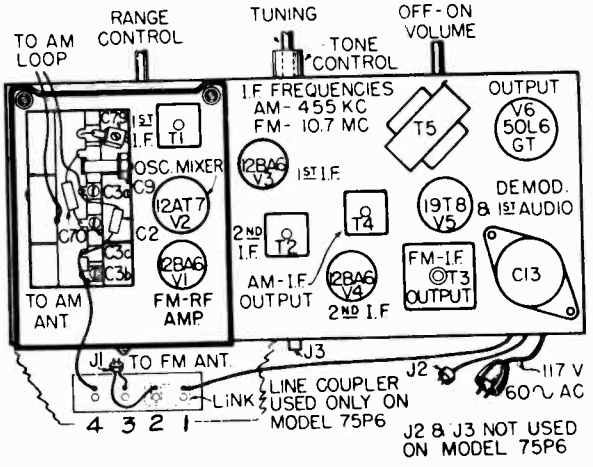
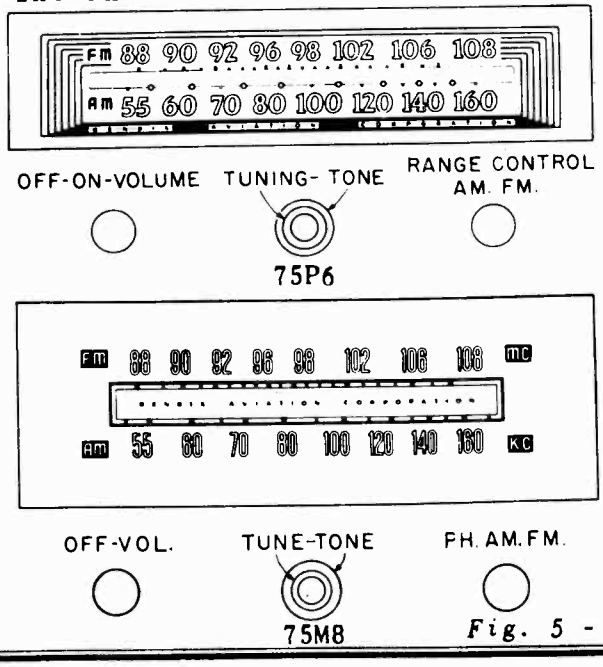


Fig. 6 - Trimmer Location



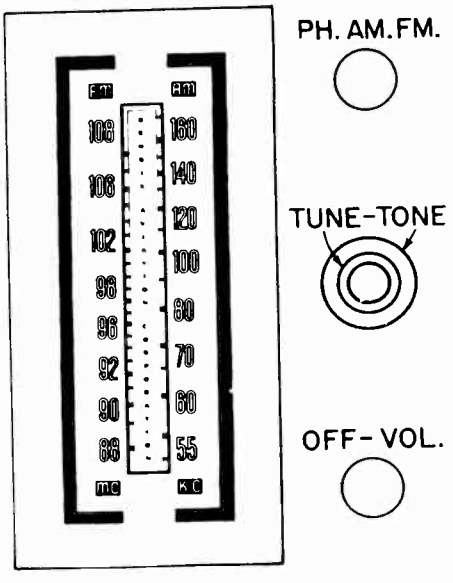


Fig. 5 - Control Layouts 75B5, 75M5, 75W5

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MODELS 75B5, 75M5,
75M8, 75P6, 75W5

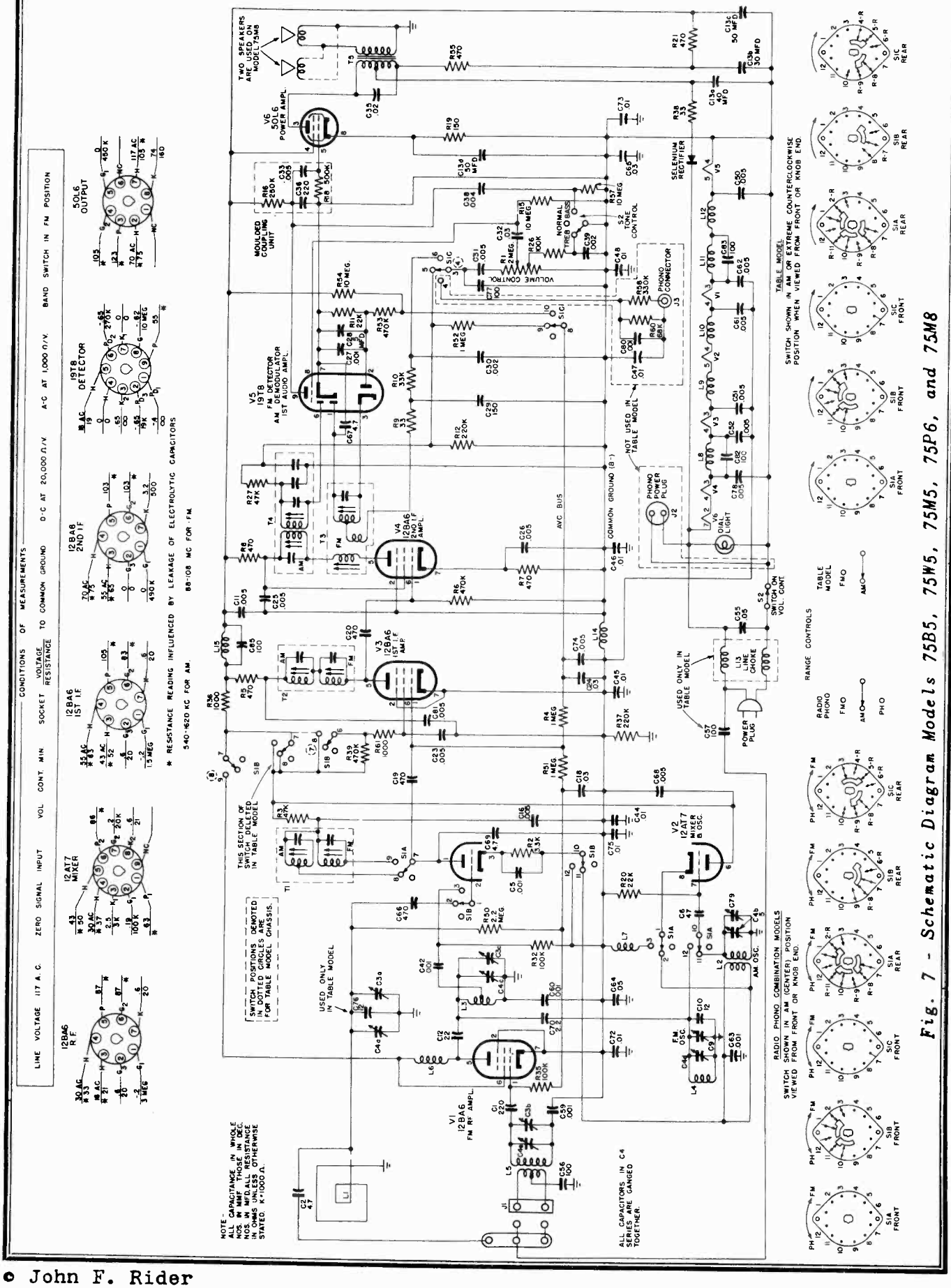

Fig. 7 - Schematic Diagram Models 75B5, 75W5, 75M5, 75P6, and 75M8

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FM ANTENNA

The FM antenna used in Models 75B5, 75W5, 75M5, and 75M8 will not be found in the Replacement Parts List since the service man, by following the specifications in the drawing below, can very easily and inexpensively make the antenna himself.

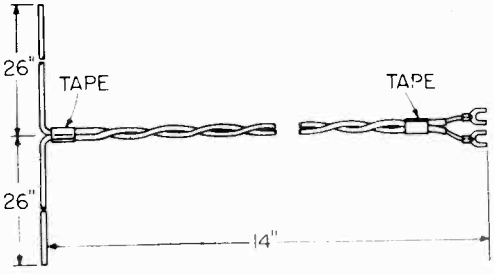
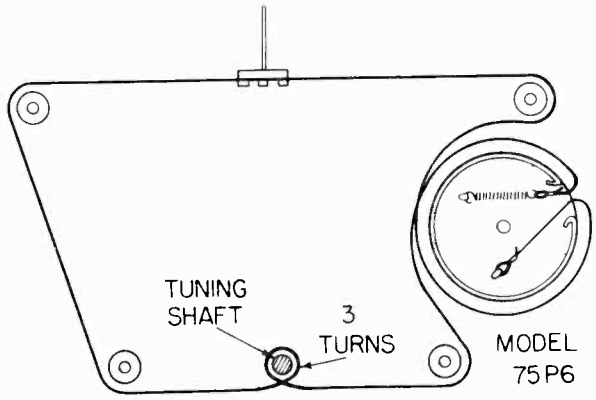


Fig. 8 - FM Antenna



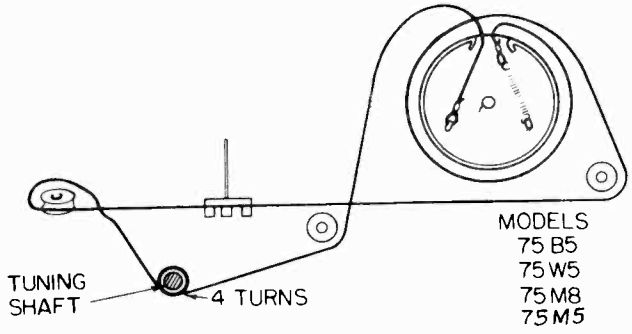


Fig. 9 - Dial Stringing Diagrams

REPLACEMENT PARTS LIST

Stock No.	Symbol	Description
ELECTRICAL COMPONENTS COMMON TO ALL MODELS		
AC0C01	C33,36; R16,18	ASSEMBLY-Capacitor, Resistor Coupling
CC9A38	C1	CAPACITOR-Ceramic 220 mmf 500V
CC0A18	C2,67,69	CAPACITOR-Ceramic 4.7 mmf 500V
CV0D01	C3a,b,c; C4a,b,c,d,e	CAPACITOR-Variable Air
CM5A46	C5	CAPACITOR-Mica .001 mfd 300V
CC8B30	C6	CAPACITOR-Ceramic 47 mmf ±10% 500V
CT1B05	C9	CAPACITOR-Trimmer 0.2-3.0 mmf
CC8B23	C10	CAPACITOR-Ceramic 12 mmf ±10% 500V
CC0M00	C11,16,23,25,26,31,50,51,52,61,62,68,74,78,81	CAPACITOR-Ceramic .005 mfd Min. Value 500V
CC0A26	C12	CAPACITOR-Ceramic 22 mmf 500V
ELECTRICAL COMPONENTS COMMON TO ALL MODELS (CONT'D)		
CE4A03	C13	CAPACITOR-Electrolytic 50-40-30 mfd 150V 50 mfd 25V
CP4T36	C18,24,32,65	CAPACITOR-Paper .05 mfd 400V
CC9M42	C19,20,66	CAPACITOR-Ceramic 470 mmf Min. Value 500V
CC9M50	C27,42,58,59,60,63	CAPACITOR-Ceramic .001 mfd Min. Value 500V
CE1T06	C28	CAPACITOR-Electrolytic 5 mfd 50V
CC9A36	C29	CAPACITOR-Ceramic 150 mmf 500V
CP6T12	C30,39	CAPACITOR-Paper .002 mfd 600V
CP4T34	C35	CAPACITOR-Paper .02 mfd 400V
CP6T16	C38	CAPACITOR-Paper .004 mfd 600V
CC9R80	C44,45,46,48,72,73,75	CAPACITOR-Ceramic .01 mfd 500V
CP4T40	C55,64	CAPACITOR-Paper .05 mfd 400V

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MODELS 75B5, 75M5, 75M8, 75P6, 75W5

Stock No.	Symbol	Description
ELECTRICAL COMPONENTS COMMON TO ALL MODELS (CONT'D)		
CC9A34	C56,77	CAPACITOR-Ceramic 100 mmf 500V
CC0A14	C70	CAPACITOR-Ceramic 2.2 mmf 500V
CT1A20	C79	CAPACITOR-Trimmer 4-40 mmf
RV4S13	R1 & S2	RESISTOR-Pot. with Switch 2 meg
RC23A332M	R2	RESISTOR-Comp. 3.3K 1/2W
RC22A473M	R3,27	RESISTOR-Comp. 47K 1/4W
RC22A105M	R4,51,52	RESISTOR-Comp. 1 meg 1/4W
RC23A471M	R5,7,8	RESISTOR-Comp. 470 ohms 1/2W
RC22A474M	R6,39,53	RESISTOR-Comp. 470K 1/4W
RC22A330M	R9	RESISTOR-Comp. 33 ohms 1/4W
RC22A333M	R10	RESISTOR-Comp. 33K 1/4W
RC22A223M	R11,20	RESISTOR-Comp. 22K 1/4W
RC22A224M	R12,37	RESISTOR-Comp. 220K 1/4W
RC22A106M	R15,54,57	RESISTOR-Comp. 10 meg 1/4W
RC23A151M	R19	RESISTOR-Comp. 150 ohms 1/2W
RC24A471M	R21,55	RESISTOR-Comp. 470 ohms 1W
RC22A104M	R26,32,35	RESISTOR-Comp. 100K 1/4W
RC23A102M	R36,61	RESISTOR-Comp. 1000 ohms 1/2W
RW1F06	R38	RESISTOR-Wirewound 33 ohms 1W
RM2F66	R50	RESISTOR-Metalized 2.2 meg 1/3W
L07B01	L2	COIL-Oscillator BC
L10F01	L3	COIL-RF FM
L07F00	L4	COIL-Oscillator FM
LA0F01	L5	COIL-Antenna FM
LF0A01	L6,7	COIL-RF Choke
LF0C00	L8,11,15	COIL-RF Choke
LF0A00	L9,10,12	COIL-RF Choke
LF0A07	L14	COIL-RF Choke
T10C12	T1	TRANSFORMER-1st IF
T10D20	T2	TRANSFORMER-2nd IF
T10D17	T3	TRANSFORMER-Ratio Detector
T10D18	T4	TRANSFORMER-AM 3rd IF
QR0S01		RECTIFIER-Selenium
SS1C02	S2	SWITCH-Tone Slide 2 Pole, 3 Position
C7		DIAL LIGHT
ELECTRICAL COMPONENTS USED ONLY ON MODEL 75P6		
CC9A34	C57	CAPACITOR-Ceramic 100 mmf 500V
CC8B23	C76	CAPACITOR-Ceramic 12 mmf ±10% 500V
AL0C09	L1	ANTENNA-AM Loop
LF0A04	L13	COIL-Line Choke
TA0016	T5	TRANSFORMER-Output
SR2F00	S1	SWITCH-Rotary 3 Section, 2 Position
SP4002		SPEAKER-PM 4" x 6"
ELECTRICAL COMPONENTS COMMON ONLY TO MODELS 75B5, 75W5, 75M5 & 75M8		
CP4T51	C47	CAPACITOR-Paper .1 mfd .400V
CC9M50	C80	CAPACITOR-Ceramic .001 mfd Min. Value 500V
RC22A334M	R58	RESISTOR-Comp. 330K 1/4W

Stock No.	Symbol	Description
ELECTRICAL COMPONENTS COMMON ONLY TO MODELS 75B5, 75W5, 75M5 & 75M8 (CONT'D)		
RC22A683M	R60	RESISTOR-Comp. 68K 1/4W
AL0Z15		ANTENNA-AM Loop
TA0016	T5	TRANSFORMER-Output (Models 75B5, 75W5, 75M5 Only)
TA0019	T5	TRANSFORMER-Output (Model 75M8 Only)
SP6R02		SPEAKER-PM 6" (Model 75M8 Only)
SP8R01		SPEAKER-PM 8" (Models 75B5, 75W5, 75M5 Only)
MECHANICAL COMPONENTS COMMON TO ALL MODELS		
BT1S03		BOARD-Terminal 1 Lug 1 Mtg.
BT3S06		BOARD-Terminal 3 Lugs 1 Mtg.
BT4S06		BOARD-Terminal 4 Lugs 1 Mtg.
BT6S04		BOARD-Terminal 6 Lugs 2 Mtg.
BT8S00		BOARD-Terminal 8 Lugs 2 Mtg.
GR0S09		GROMMET-Sub-chassis Mtg.
GR0S15		GROMMET-Sub-chassis Shock-mount
HB0M86		BRACKET-Sub-chassis Mtg.
HC0M08		SHIELD-Tube Base
HC0S00		CLIP-Tuning Shaft Spring
HC0S60		CLIP-IF Can
HC0S67		CLIP-Flange Skirted
HS0C75		SPRING-Dial Cord
HS0F19		SLEEVE-Spacer Sub-chassis Mtg.
HS0S13		STUD-Chassis Shockmount
JR2012	J2	RECEPTACLE-2 Contact
MB0B00		BEARING-Brass (Tuning Shaft)
ML0C04		LEVER-Tone Switch Actuating Control
MP0100		PULLEY-Fiber Idler
P10C01		PLATE-Electrolytic Mtg.
P10P01		PLATE-Line Cord Insulating
SM0T06		SHIELD-Miniature Tube
S00D12		SOCKET-Dial Light
S09M00		SOCKET-9 Prong
S07M09		SOCKET-Miniature 7 Prong
S07M10		SOCKET-Miniature Molded 7 Prong
S08S03		SOCKET-Octal Tube
XS0C11		STRIP-Insulating
XS0C13		STRIP-Ground Flat (Sub-chassis)
XS0C14		STRIP-Ground Flat (Main chassis)
MECHANICAL COMPONENTS USED ONLY ON MODEL 75P6		
AD0B03		ASSY-Dial Back Plate
CD0N00		CORD-Dial Nylon
CL2A07		CORD-AC Line
HB0M85		BRACKET-Loop & Dial Light Mtg.
HC0S62		CLIP-Spring Retainer Back Plate Window
ID0M25		INDICATOR-Metal Dial
MP0102		PULLEY-Metal Idler
MS0T19		SHAFT-Tuning
WP0D07		WINDOW-Back Plate

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MODELS 75B5, 75M5, 75M8, 75P6, 75W5

Stock No.	Symbol	Description
		MECHANICAL COMPONENTS COMMON ONLY TO MODELS 75B5, 75W5, 75M5 & 75M8
CD0N01		CORD-Dial Nylon
CL2A08		CORD-AC Line
HB0M74		BRACKET-Indicator Slide Rail
HB0M84		BRACKET-Dial Back Plate Mtg.
HB0M87		BRACKET-Dial Light Mtg.
ID0M21		INDICATOR-Metal Pointer & Carriage
JR1S00	J3	RECEPTACLE-Single Contact Phono
MS0T19		SHAFT-Tuning (Models 75B5, 75W5, 75M5 Only)
MS0T18		SHAFT-Tuning (Model 75M8)
PB0D06		PLATE-Dial Back
WF0100		WASHER-Insulating (Fish-paper 23/64 x 15/16 x .015)
XS0C15		STRIP-Ground (Main Chassis)
		CABINET COMPONENTS
		MODEL 75P6
BT4T01		BOARD-Terminal 4 Screw Lugs
BZ0D34		BAFFLE-Corrugated Paper
DS0C11		DIAL-Scale AM-FM
GZ0M18		GRILLE-Metal
HB0M80		BRACKET-Grille Mounting
HC0C14		CLIP-Spring Speed
HC0C15		CLIP-Grille Retainer Mounting
HC0D09		CLIP-Spring Dial Retainer
HC0S10		CLIP-Control Knob Retainer Ring
HC0S63		CLIP-Baffle Retainer Spring
HC0S68		CLIP-Concentric Knob Retainer Ring
HP0B09		PLATE-Base
HZ0G08		GLIDE-Furniture
KC0B16		KNOB-Control (Dark Brown)
WF0F17		WASHER-Brown Felt (5/8 x 13/16 x 1/16)
WF0F18		WASHER-Brown Felt (13/32 x 13/16 x 1/16)
XS0M01		STRIP-Bronze Trim
ZP0B06		CABINET-Plastic Table (Brown)
		MODELS 75B5, 75W5 & 75M5
BT3S06		BOARD-Terminal 3 Lugs 1 Mtg.
BT3T00		BOARD-Terminal 3 Screw Lugs
BZ0B14		BACK-Upper Cabinet Cover (Model 75W5 & 75M5)
BZ0B15		BACK-Lower Cabinet Cover (Model 75W5 & 75M5)
BZ0B16		BACK-Upper Cabinet Cover (Model 75B5)
BZ0B17		BACK-Lower Cabinet Cover (Model 75B5)
BZ0D31		BOARD-Wood Baffle
DS0C14		DIAL-Scale AM-FM
ED0M05		ESCUTCHEON-Dial Metal
GZ0M12		GRILLE-Walnut, Perforated (Model 75W5)
GZ0M13		GRILLE-Bleach, Perforated (Model 75B5)
		MODELS 75B5, 75W5 & 75M5 (CONT'D)
GZ0M30		GRILLE-Mahogany, Perforated (Model 75M5)
HC0S10		CLIP-Control Knob Retainer Ring
HC0S68		CLIP-Concentric Knob Retainer Ring
HC0S69		CLIP-Dial Retainer
HK0R11		KNOB-Drawer Pull (Models 75B5 & 75W5)
HK0R16		KNOB-Drawer Pull (Model 75M5)
HP0B07		PLATE-Bottom Mtg.
HZ0G00		GLIDE-Furniture (Drawer Side Rail)
HZ0G01		GLIDE-Cabinet
HZ0G05		GLIDE-Drawer Center Rail
JP2007	J1	PLUG-2 Contact
KC0B16		KNOB-Control (Models 75W5 & 75M5)
KC0L03		KNOB-Control (Model 75B5)
KY0B02		KNOB-Concentric (Models 75W5 & 75M5)
KY0L00		KNOB-Concentric (Model 75B5)
WF0F17		WASHER-Concentric Knob (Felt)
ZW7G01		CABINET-Walnut (Model 75W5)
ZW7G06		CABINET-Bleached (Model 75B5)
ZW7G07		CABINET-Mahogany (Model 75M5)
		MODEL 75M8
BT3S06		BOARD-Terminal 3 Lugs 1 Mtg.
BT3T00		BOARD-Terminal 3 Screw Lugs
BZ0B12		BACK-Upper Cabinet Cover
BZ0B13		BACK-Lower Cabinet Cover
BZ0D38		BOARD-Plywood Baffle
BZ0D39		BOARD-Cardboard Baffle
DS0C13		DIAL-Scale AM-FM
ED0P00		ESCUTCHEON-Plastic Dial & Control
GZ0M26		GRILLE-Perforated Metal
HB0M92		BRACKET-Am Antenna Loop
HB0M94		BRACKET-Chassis Shelf
HC0S10		CLIP-Control Knob Retainer Ring
HC0S68		CLIP-Concentric Knob Retainer Ring
HC0S69		CLIP-Dial Retainer
HC0S72		CLIP-Drawer Retainer
HK0R12		KNOB-Door Pull
HS0S14		STUD-Escutcheon Retainer
HW8C02		WASHER-#8 Cup-Type (Back Cover)
HZ0C07		CATCH-Bullet
HZ0G01		GLIDE-Cabinet
HZ0G06		GLIDE-Drawer Slide
HZ0H04		HINGE-Door
JP2007	J1	PLUG-2 Contact
KC0B16		KNOB-Control
KY0B02		KNOB-Concentric
WF0F17		WASHER-Concentric Knob (Felt)
ZW7G03		CABINET-Mahogany

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MODEL 79M7

Fig. 1 – Model 79M7

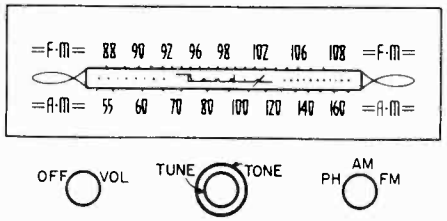

Fig. 2 – Control Diagram

SPECIFICATIONS

Power Requirements
105–120 Volts 60 cycle AC
Power Consumption
Radio–85 Watts; Phono-turntable–25 Watts
Tuning Frequency Range
AM 540–1620 KC – FM 88–108 MC
Intermediate Frequency
AM 455 KC – FM 10.7 MC
Power Output
Maximum – 4 Watts
Tube Complement
3–6AB6, 12AT7, 6T8, 6V6GT and
Rectifier 5Y3 –– Total 7 Tubes
Loudspeaker
10" PM
Record Changer
Automatic for Twelve 10-inch or Ten 12-inch Standard Lateral Cut or Long Play Microgroove Records

GENERAL

Bendix Radio Model 79M7 employs seven tubes including a rectifier to provide reception of the FM and AM standard broadcast bands. Two individual chassis are used in this receiver. The power supply is found in the smaller chassis. The FM section of this receiver contains a tuned RF stage of amplification which has the plate voltage removed from its tube when the band switch is in any but the FM position. Built-in AM and FM antennas are attached to the cabinet. An external AM antenna may be connected to the terminal board provided on the rear of the cabinet. When an external FM antenna is used, the built-in FM antenna must be disconnected from the binding screws located on the back of the cabinet and labelled "FM Dipole", and the external antenna connected to these two terminals. The power supply required for this model is 105–120 volts 60 cycle AC since a phono motor is included. The radio chassis itself is operative on AC or DC, but the phono motor would be damaged beyond repair if operated on DC. The multi-purpose 6T8 combines the functions of AM demodulator, FM detector, and first audio amplifier in one envelope. The 12AT7, a double triode, is used as a mixer-oscillator tube. The ten inch permanent magnet type speaker is driven by a 6V6GT audio output tube.

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PRELIMINARY ALIGNMENT PROCEDURE

The AM circuits should be aligned before the FM section because of possible interaction between the IF coils. Before attempting to align set allow receiver and test equipment to warm up for at least five minutes. Whenever possible, have a speaker connected to the output and use a 30% amplitude modulated signal in order to identify weak signals in a poorly tuned set. The antenna trimmer for AM which is attached to the loop antenna must be adjusted when the chassis is replaced in the cabinet, since the antenna loop is installed in the cabinet and cannot be removed with the chassis. It may be necessary to adjust the FM antenna trimmer slightly when the chassis is replaced in the cabinet.

TEST EQUIPMENT REQUIRED

Signal Generator
AM 455 KC to 106 MC
FM 10.7 MC & 88–108 MC
Vacuum Tube Voltmeter
(ground or minus must be isolated from power line)
Capacitors, .01 mfd and 100 mmf
Alignment Screwdrivers
Standard Output Meter

AM ALIGNMENT

PRELIMINARY PROCEDURE: With gang condenser closed, set dial pointer to coincide with reference mark etched into dial back plate. See Fig. 5. Place band switch in AM position and use a 30% modulated signal throughout. Connect an output meter across voice coil. Adjust Antenna Trimmer C67 after chassis is installed in the cabinet. Keep input as low as possible while obtaining a stable output meter reading.

GENERATOR FREQUENCY	GENERATOR COUPLING	DUMMY ANTENNA	SPECIAL CONDITIONS	DIAL SETTING	ADJUSTMENTS	REMARKS
1.) 455 KC AM	High Side—Term. #5 gang cond. Low side—common ground	.01 mfd capacitor	Short AM Osc. Term. #1 to common ground	Gang condenser fully open	Top slug of T1, T2, T4 and bottom slug of T4	Adjust for maximum output. Repeat several times to insure maximum output
2.) 1475 KC AM	High side—Term. #3 gang cond. Low side—common ground	100 mmf capacitor	Remove short from Osc. Term. #1	1475 KC Ref. mark	C17	Rock tuning control while adjusting for maximum output
3.) 965 KC AM	"	"		965 KC Ref. mark		* Check Calibration
4.) 580 KC	"	"		580 KC Ref. mark		* Check Calibration

* If calibration does not check within tolerances denoted by etched lines on dial backplate, oscillator gang rotor plates must be bent to obtain proper calibration. This operation is very delicate and should be attempted only by properly trained personnel.

FM ANTENNA

The FM antenna used with Model 79M7 will not be found in the Replacement Parts List since the service man, by following the specifications in the drawing, Fig. 3, can very easily and inexpensively make the antenna himself.

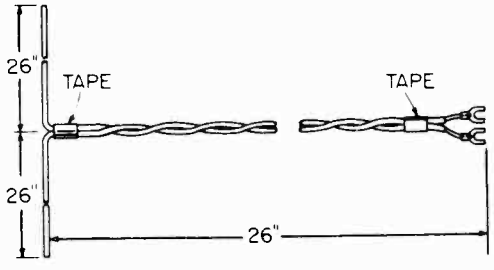

Fig. 3 – FM Antenna

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MODEL 79M7

FM ALIGNMENT

CW METER METHOD

PRELIMINARY ALIGNMENT PROCEDURE: With gang condenser fully closed, adjust dial pointer to coincide with the reference mark etched into dial back plate. See Fig. 5. Place band switch in FM position. Use 30% amplitude modulated signals when possible.

GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR COUPLING	SPECIAL CONDITIONS	DIAL SETTING	VTVM CONNECTIONS	ADJUSTMENTS	REMARKS
1.) 10.7 MC AM or CW	.01 mfd capacitor	High side—term. #4 Gang Condenser. Low side—chassis ground	Short FM Osc. Term. #2 of Gang Condenser to chassis ground	Gang Condenser fully open	+Lead to chassis ground —Lead to Pin 2 of tube 6T8	Bottom slug of T1, T2, Top slug of T3	Adjust for maximum AVC reading on VTVM. Repeat adjustment several times to insure maximum reading
2.) Remove Signal Generator		Remove Signal Generator	Short FM Osc. term. #2 of gang condenser to common ground. Two 100K matched resistors in series connected between Pin #2 of tube 6T8 & chassis ground	"	Center Tap of 100K resistors and term. #6 of switch S1C	Adjust VTVM for Zero	While connected to chassis, the VTVM is adjusted by its zero centering control
3.) 10.7 MC AM or CW	.01 mfd capacitor	High side—term. #4 of Gang condenser. Low Side—chassis Ground	"	"	"	Bottom slug of T3	Adjust bottom slug to produce zero reading on VTVM
4.) Repeat Steps 1, 2, and 3 until adjustment in Step 1 does not require a readjustment to produce a zero reading on the VTVM in Step 3.							
5.) 106 MC	FM Dummy Antenna (See Fig. 4)	FM Dummy Antenna Terminals (See Fig. 4)	Remove short from Term. #2 of gang condenser. Remove 100K Resistors	106 MC Ref. mark	+Lead to chassis ground —Lead to Pin 2 of tube 6T8	Osc. trimmer C3, then RF, C2c & Ant., C2a	Rock tuning control when adjusting C3 for maximun AC reading, then adjust C2c and C2a respectively for max.†
6.) 97 MC AM or CW	"	"		97 MC Ref. mark	"		* Check Calibration
7.) 90 MC AM or CW	"	"		90 MC Ref. mark	"		* Check Calibration

† Oscillator operates on high frequency side of incoming signal but it is possible to adjust to the low side. Set Signal Generator to 84.6 MC (with receiver set to 106 MC); if signal is heard, readjust oscillator trimmer at signal generator frequency of 106 MC and check again at 84.6 MC. Signal should not be heard.

* If calibration is not within reference mark at these points, the inductance of the FM oscillator coil must be adjusted. If dial pointer reading is on low frequency side, inductance of oscillator coil is too low and turns of coil must be compressed slightly. If pointer reading is on high frequency side, the coil inductance is too high and coil turns must be spread slightly. Repeat steps 5, 6, and 7 until correct calibration is obtained.

To adjust RF coil, tune receiver to 90 MC and observe AVC reading. Insert into RF coil, the iron core of tuning wand (rod of insulating material one end of which contains an iron core slug and the other end contains a non-ferrous metalic slug). If reading increases, the inductance of coil is too low and turns must be spread *slightly*. If reading decreases, insert opposite end (non-ferrous) of tuning wand into RF coil. Inductance of coil is too low if reading increases and turns must be compressed *slightly*. Correct adjustment is obtained when insertion of either end of tuning wand causes the reading to decrease.

The antenna coil inductance is adjusted in the same manner as the RF coil.

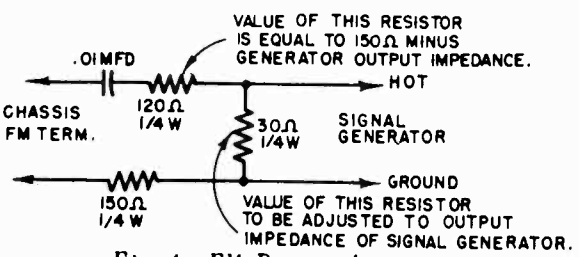

Fig. 4—FM Dummy Antenna

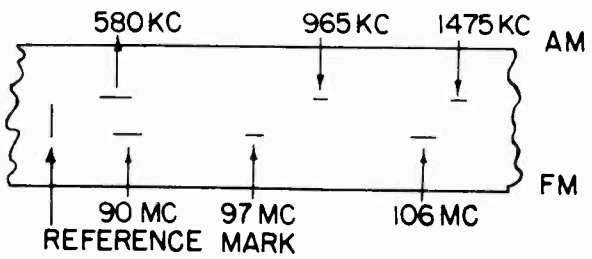

Fig. 5—Dial Reference Points

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VISUAL ALIGNMENT

The ratio detector in the FM section of this radio receiver can be aligned by the so-called Visual Alignment method. This method can be used in conjunction with the CW method by following the procedure outlined below:

1. Perform Step 1 indicated in CW Meter Method Chart.

2. Set Signal Generator to 10.7 MC, FM, with sweep width at maximum possible (should be a minimum of 200 KC). Connect output of generator to terminal #4 of gang condenser and B–.

3. Connect vertical input of cathode ray oscilloscope to terminal #6 of switch S1C and B–, and place a 60 cycle sine wave signal to horizontal input if oscilloscope does not have an internal 60 cycle sweep.

4. Adjust signal generator frequency until "S" curve (Fig. 6) is centered on the horizontal sweep. Curve may be reversed because of internal circuit of oscilloscope.

5. Adjust primary of T3 (top slug) and secondary (bottom slug) for maximum desired "S" curve. A VTVM can be very useful at this point if connected to pin #2 of tube 6T8 and B–. The oscilloscope will then indicate the most linear curve and the VTVM will indicate the maximum AVC voltage.

6. Adjust bottom of slugs of T1 and T2 and then repeat step 5 to insure correct alignment.

7. Continue at this point with the alignment procedure starting with step 5 as outlined in the FM-CW Meter Method.

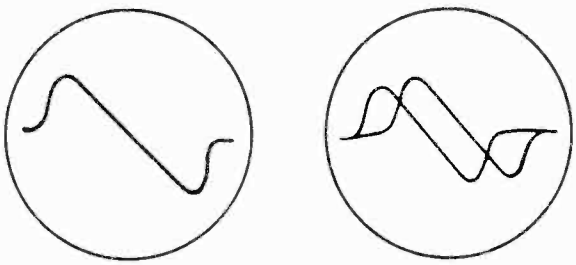


Fig. 6 – S Curves

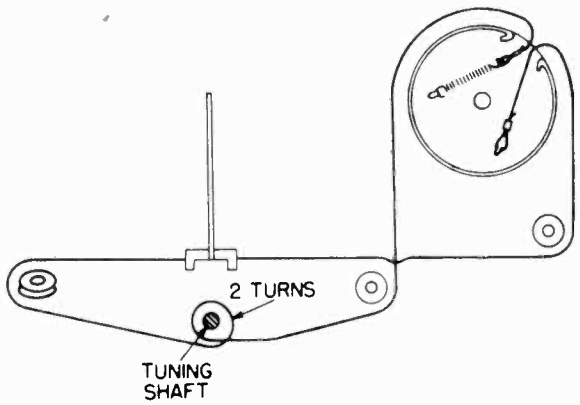
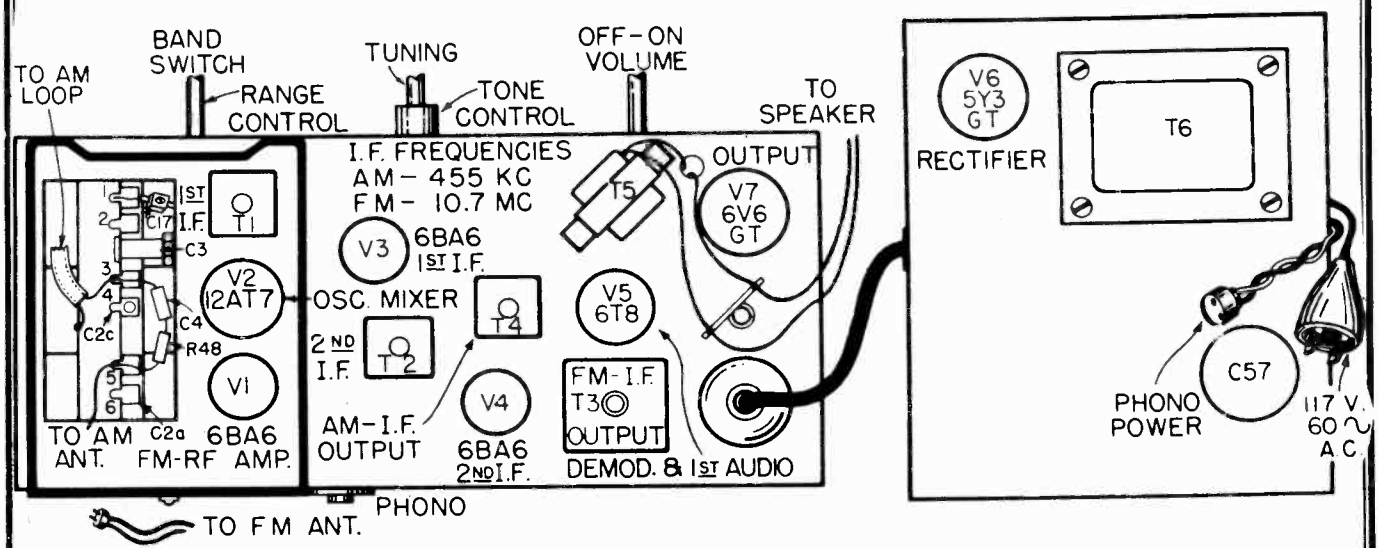


Fig. 7 – Dial Stringing Diagram



Gang Condenser Top Terminals:

#1 – AM Osc; #2 – FM Osc; #3 – AM Ant; #4 – FM RF; #5 – NC; #6 – FM Ant

Fig. 8 – Trimmer Location Diagram

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MODEL 79M7

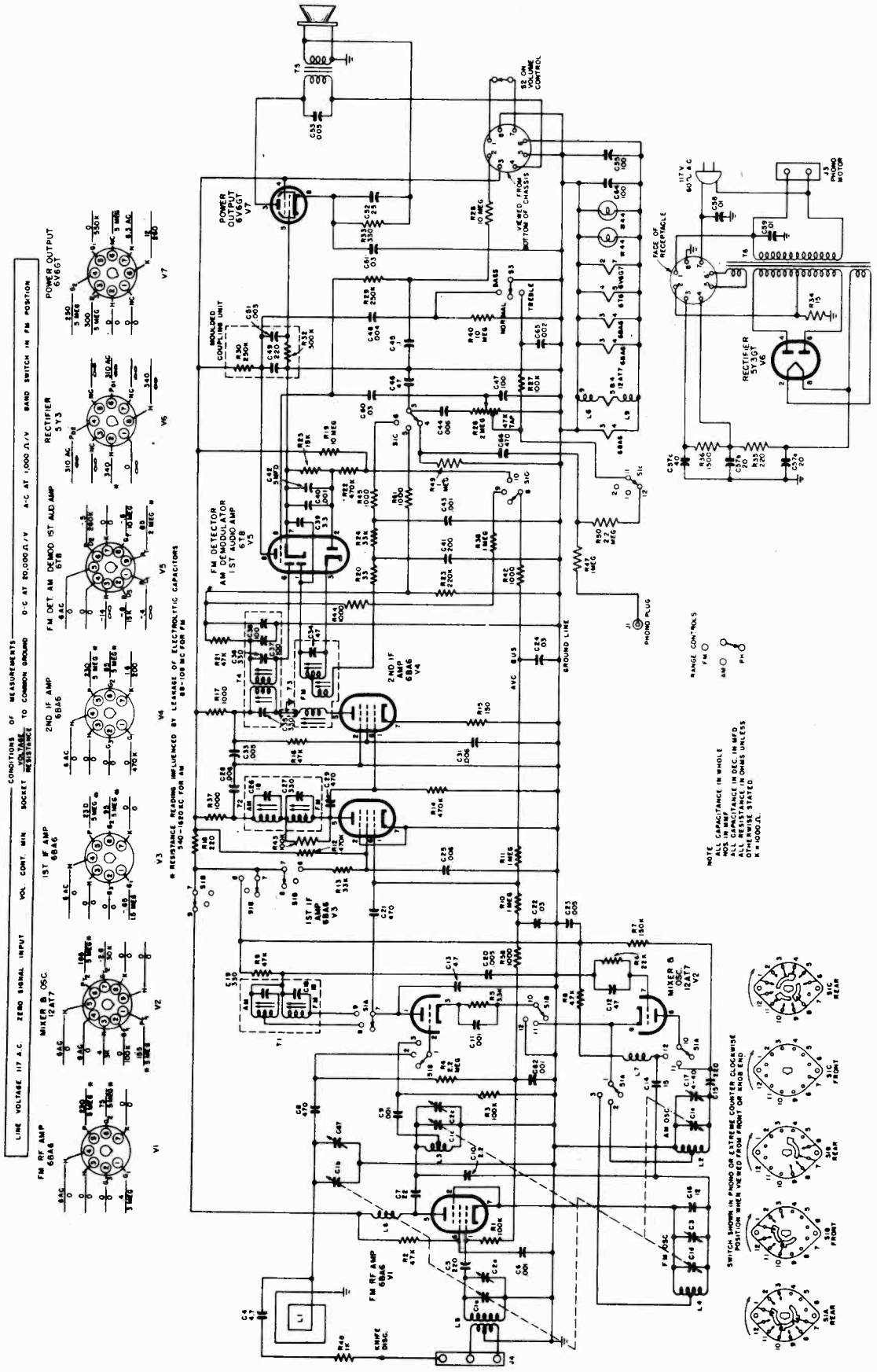

Fig. 9 – Schematic Diagram Model 79M7

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REPLACEMENT PARTS LIST

Used On Chassis Codes	Stock No.	Symbol No.	Description
	ELECTRICAL COMPONENTS		
ALL	AC0C01	R30,R32; C49, C51	ASSY—Capacitor Resistor Coupling Plate
ALL	CV0D01	C1,a,b,c,d, e, C2a,c	CAPACITOR—Variable
ALL	CT1B05	C3	CAPACITOR—Midget Trimmer 1-8 mmf
ALL	CC0A18	C4, C13	CAPACITOR—Ceramic 4.7 mmf ±20%
ALL	CC9A38	C5, C15	CAPACITOR—Ceramic 220 mmf ±20%
ALL	CC9M50	C6,9,40, 43,62	CAPACITOR—Ceramic 1000 mmf Min.
ALL	CC0A26	C7	CAPACITOR—Ceramic 22 mmf
ALL	CC9M42	C8,21,29	CAPACITOR—Ceramic 470 mmf Min.
ALL	CC0A14	C10	CAPACITOR—Ceramic 2.2 mmf ±20%
ALL	CM5A46	C11	CAPACITOR—Mica 1000 mmf ±20%
ALL	CC8B30	C12	CAPACITOR—Ceramic 47 mmf ±10%
ALL	CC0A24	C14	CAPACITOR—Ceramic 15 mmf ±20%
ALL	CC8B23	C16	CAPACITOR—Ceramic 12 mmf ±10% 500V
ALL	CT1A20	C17	CAPACITOR—Trimmer 4-40 mmf
ALL	CC0M00	C20,23,30, 33,53	CAPACITOR—Ceramic .005 mfd Ins. Disc
ALL	CP4T36	C22,24, 60,61	CAPACITOR—Paper .03 mfd 400V +30%—10%
ALL	CP6T20	C25,28, 31,44	CAPACITOR—Paper .006 mfd 600V +40%—20%
ALL	CC9B64	C41	CAPACITOR—Ceramic 200 mmf ±10%
ALL	CE1T06	C42	CAPACITOR—Electrolytic 5 mfd 50V
ALL	CP2T51	C45	CAPACITOR—Paper .1 mfd 200V
ALL	CM5A14	C46	CAPACITOR—Mica 47 mmf 500V
ALL	CC9A34	C47,55,64	CAPACITOR—Ceramic 100 mmf
ALL	CP3S16	C48	CAPACITOR—Paper .004 mfd 400V +30%—10%
ALL	AC0C01	C49,C51; R30,R32	ASSY—Capacitor Resistor Coupling Plate
ALL	CE1T02	C52	CAPACITOR—Electrolytic 20 mfd 25V
ALL	CE3A03	C57a,b,c	CAPACITOR—Electrolytic 20-20-40 mfd 450V
ALL	CP9S31	C58,C59	CAPACITOR—Paper .01 mfd 600V
ALL	CP6T12	C65	CAPACITOR—Paper .002 mfd 600V +40%—20%
B	CM5A38	C66	CAPACITOR—Mica 470 mmf 500V
ALL	RC22A104M	R1,3,27,43	RESISTOR—Comp. 100K 1/4W
ALL	RC22A473M	R2,9,16	RESISTOR—Comp. 47K 1/2W
ALL	RM2F66	R4	RESISTOR—Metallized 2.2 meg. 1/3W
ALL	RC23A332M	R5	RESISTOR—Comp. 3300 ohms 1/2W
ALL	RC22A223M	R6	RESISTOR—Comp. 22K 1/4W
ALL	RC22A154M	R7	RESISTOR—Comp. 150K 1/4W
ALL	RC24A472M	R8	RESISTOR—Comp. 4700 ohms 1W
ALL	RC22A105M	R10,11,38, 47	RESISTOR—Comp. 1 meg. 1/4W
ALL	RC22A474M	R12,14,22	RESISTOR—Comp. 470K 1/4W
ALL	RC24A333M	R13	RESISTOR—Comp. 33K 1W
ALL	RC22A151M	R15	RESISTOR—Comp. 150 ohms 1/4W
ALL	RC22A102M	R17,37,41, 42,44, 45,48	RESISTOR—Comp. 1000 ohms 1/4W
ALL	RC22A106M	R19,28,29, 40	RESISTOR—Comp. 10 meg. 1/4W
ALL	RC22A330M	R20	RESISTOR—Comp. 33 ohms 1/4W
ALL	RC22A473M	R21	RESISTOR—Comp. 47K 1/4W
ALL	RC22A224M	R23	RESISTOR—Comp. 220K 1/4W
ALL	RC22A333M	R24	RESISTOR—Comp. 33K 1/4W
ALL	RC22A153M	R25	RESISTOR—Comp. 15K 1/4W
ALL	RV4S13	R26; S2	POTENTIOMETER—2 meg with AC Switch Tapped at 1 meg.
ALL	AC0C01	R30,32; C49,51	ASSY—Capacitor Resistor Coupling Plate
ALL	RC24A331M	R33	RESISTOR—Comp. 330 ohms 1W
ALL	RC23A150M	R34	RESISTOR—Comp. 15 ohms 1/2W
ALL	RC22A221M	R46	RESISTOR—Comp. 220 ohms 1/4W
B	RC22A105M	R49	RESISTOR—Comp. 1 meg. 1/4W
B	RC22A225M	R50	RESISTOR—Comp. 2.2 meg. 1/4W
ALL	AL0Z15	L1;C67	ANTENNA—Loop AM
ALL	LO7B00	L2	COIL—BC Oscillator
ALL	LI0F01	L3	COIL—RF FM
ALL	LO7F00	L4	COIL—FM Oscillator
ALL	LA0F01	L5	COIL—FM Antenna
ALL	LF0A01	L6	COIL—RF Choke
ALL	LF0A08	L7	COIL—RF Plate Choke
ALL	LF0A00	L8, L9	COIL—RF Filament Choke 100 MC
ALL	TI0C12	T1	TRANSFORMER—1st IF Input
ALL	TI0D20	T2	TRANSFORMER—2nd IF
ALL	TR0R00	T3	TRANSFORMER—Ratio Detector
ALL	TI0D23	T4	TRANSFORMER—3rd IF Output

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MODEL 79M7

REPLACEMENT PARTS LIST—Continued

Used On Chassis Codes	Stock No.	Symbol No.	Description
	ELECTRICAL COMPONENTS—(Continued)		
ALL	TA0O21	T5	TRANSFORMER—Output
ALL	TP0H02	T6	TRANSFORMER—Power
A	SR3F00	S1	SWITCH—Rotary 3 Sec. 3 Pos.
B	SR3F01	S1	SWITCH—Rotary 3 Sec. 3 Pos.
ALL	SS1C02	S3	SWITCH—Slide 2 Pole 3 Pos.
ALL	SP0R01		SPEAKER—10" PM Round
ALL	#44		LAMP—Dial 6-8V
	MECHANICAL COMPONENTS		
	BT2S05		BOARD—Terminal 2 Lug 1 Mtg.
	BT3S06		BOARD—Terminal 3 Lug 1 Mtg.
	BT4S06		BOARD—Terminal 4 Lug 1 Mtg.
	BT5S03		BOARD—Terminal 5 Lug 1 Mtg.
	BT8S00		BOARD—Terminal 8 Lug 2 Mtg.
	CD0N01		CORD—Dial 35 3/8"
	CL2A08		CORD—AC Line (Brown)
	GR0S09		GROMMET—Rubber Shockmount
	GR0S15		GROMMET—Rubber Shockmount
	HB0M74		BRACKET—Indicator Slide Rail
	HB0M83		BRACKET—Dial Light
	HB0M84		BRACKET—Dial Back Plate
	HB0M86		BRACKET—Sub-chassis Mtg.
	HC0M08		CLAMP—Tube Shield Base
	HC0S00		CLIP—Spring, Tuning Shaft
	HC0S60		CLIP—Spring Retainer Mtg.
	HC0S67		CLIP—Spring, Flange Skirt
	HP0P11		PIN—Shockmount (Main)
	HS0C75		SPRING—Coil, Dial Cord
	HS0C88		SPRING—Coil, Tension
	HS0F19		SLEEVE—Spacer, Sub-chassis Mtg.
	HS0S13		PIN—Shockmount (Sub-chassis)
	ID0M21		INDICATOR—Dial, with Carriage
	JR1S00	J1	JACK—Receptacle 1 Contact Phono
	JP8S00	J2	JACK—Plug 8 Prong
	JR2O15	J3	JACK—Receptacle 2 Contact Power
	JR2O12	J4	JACK—Receptacle 2 Contact FM Antenna

Used On Chassis Codes	Stock No.	Symbol No.	Description
	MECHANICAL COMPONENTS—(Continued)		
	MB0B00		BEARING—Tuning Shaft
	ML0C04		LEVER—Tone Control
	MP0I00		PULLEY—Idler
	MS0T19		SHAFT—Tuning
	PB0D06		PLATE—Dial Back
	SM0T10		SHIELD—Metal, Min. Tube
	SO7M09		SOCKET—Miniature Tube
	SO7M10		SOCKET—Miniature Tube
	SO9M00		SOCKET—Min. Tube 9 Prong
	SO0D13		SOCKET—Dial Light
	SO8S01		SOCKET—Octal
	XS0C17		STRIP—Copper .002 x 1 3/8 x 1/16
	XS0C19		STRIP—Copper .002 x 1 3/16 x 5/16
	CABINET COMPONENTS		
	BT3S09		BOARD—Terminal 3 Lug 2 Mtg.
	BZ0B29		BACK—Cabinet Cover
	BZ0D47		BAFFLE—Cardboard & Cloth
	DS0C16		DIAL—Glass Scale 550-1600 KC, 88-108 MC
	ED0M06		ESCUTCHEON—Dial, Metal
	GR0S18		GROMMET—Chassis Shockmount
	HB0M89		BRACKET—Chassis Shockmount
	HB0M93		BRACKET—Chassis Shockmount
	HC0S10		CLIP—Knob Spring Retainer
	HC0S69		CLIP—Dial Retainer
	HK0R18		KNOB—Door Pull
	HK0T00		KNOB—Tray Pull
	HZ0C12		CATCH—Bullet
	HZ0G01		GLIDE—Metal
	HZ0H04		HINGE—Door
	KC0B16		KNOB—Control (Brown)
	KY0B02		KNOB—Concentric (Brown)
	RD0F01		REFLECTOR—Dial Light
	SM0P03		SHIELD—Metal Plate, Heat Insulator
	WF0F17		WASHER—Felt, Concentric Knob
	XS0Z08		STRIP—Fishpaper 1 x 3 3/4 x .015
	XS0Z14		STRIP—Loop Support with Terminal Board
	ZW7G11		CABINET—Console Comb. Mahogany

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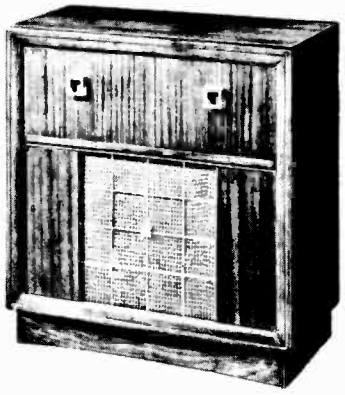
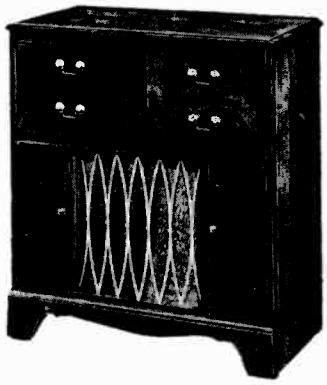
MODELS 95B3, 95B3 Rev., 95B4, 95M3, 95M3 Rev., 95M4, 95M9, 95M9 Rev.



95M3 - Mahogany; 95B3 - Blonde



95M9 - Mahogany

Fig. 1 - Models 95M3, 95B3 and 95M9

SPECIFICATIONS

Power Requirements
105-120 Volts 60 cycle AC
Power Consumption
Radio-90 Watts; Phono-turntable-25 Watts
Tuning Frequency Range
AM 540-1620 KC -- FM 88-108 MC
Intermediate Frequency
AM 455 KC -- FM 10.7 MC
Power Output
Maximum -- 8 Watts
Tube Complement
3--6AB6, 12AT7, 6T8, 6SN7GT, 2--6K6GT, and Rectifier 5Y3--Total 9 Tubes
Loudspeaker -- 12" PM
Record Changer
Automatic, for twelve 10-inch or ten 12-inch standard lateral cut records. Plug-in receptacle on rear cover for use of Long Playing record player.
Overall Dimensions

Model	*Height*	*Width*	*Depth*
95M3	34"	31-3/4"	16-1/4"
95B3	34"	31-3/4"	16-1/4"
95M9	34"	31-1/4"	15-5/8"

Shipping Weight
Model 95M3 88 lbs.
Model 95B3 88 lbs.
Model 95M9 85 lbs.

GENERAL

Bendix Radio Models 95M3, 95B3, and 95M9 employ nine tubes including a rectifier to provide reception of the FM and AM standard broadcast bands. Two individual chassis are used in each of these radio receivers. The power supply and the push-pull audio output circuit are found on the smaller chassis. The FM section of this receiver contains a tuned RF stage of amplification which has the plate voltage removed from its tube when the band switch is in any but the FM position. Built-in AM and FM antennas are attached to the cabinet. A power supply of 105-120 volts 60 cycle AC is required for the operation of these radio receivers. The multi-purpose 6T8 tube combines the functions of AM demodulator, FM detector, and first audio amplifier in one envelope. The 12AT7, a double triode, is used as a mixer-oscillator tube; and push-pull audio output is provided by two 6K6GT tubes. A plug on the cabinet back cover provides for the use of Long Playing record players. The switch associated with this plug on the back cover is used to connect to the radio chassis either the standard record player installed in the cabinet or a separate Long Playing record player.

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MODELS 95B3, 95B3 Rev., 95B4, 95M3, 95M3 Rev., 95M4, 95M9, 95M9 Rev.

PRECAUTION NOTES

Hum may be introduced if the leads connected to switch, S2, on the volume control are dressed toward the base of 12AT7 tube. The leads should be pushed directly against the side of the chassis to a point approximately half an inch from the bottom edge of the chassis and adjacent to the volume control and then led along the sides of the chassis to plug J2.

The capacitor, C28, should be dressed under R18 with the capacitor leads as short as possible. In addition, the filament lead of V2, 12AT7, should be as short as possible and connected directly between pin 9 of V2 and the terminal board.

Oscillation may occur if the AM oscillator coil (L2) is not positioned correctly. The recommended spacing is:

9/16" between osc. coil and front of sub-chassis
3/4" between osc. coil and bottom of sub-chassis
1/2" between osc. coil and end of main chassis.

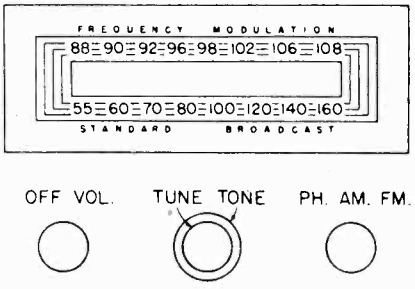

Fig. 2 - Control Diagram

ALIGNMENT PROCEDURE

The AM section should be aligned before the FM section because of possible interaction between the coils in the IF cans. Before attempting to align set allow receiver and test equipment to warm up for at least five minutes. Whenever possible, have a speaker connected to the output and use a 30% amplitude modulated signal in order to identify weak signals in a poorly tuned set. It may be necessary to adjust the FM antenna trimmer slightly when the chassis is replaced in the cabinet.

TEST EQUIPMENT REQUIRED

Signal Generator
AM 455 KC to 106 MC
FM 10.7 MC & 88-108 MC
Vacuum Tube Voltmeter
(ground or minus must be isolated from power line)
Capacitors, .01 mfd and 100 mmf
Alignment Screwdrivers made from a high dielectric, non-metallic material
Standard Output Meter

AM ALIGNMENT

PRELIMINARY PROCEDURE: With gang condenser closed, set dial pointer to coincide with reference point etched into dial back plate. See Fig. 4. Place band switch in AM position and use a 30% modulated signal throughout. Connect an output meter across voice coil. Adjust Antenna Trimmer C2b again after chassis is installed in the cabinet.

GENERATOR FREQUENCY	GENERATOR COUPLING	DUMMY ANTENNA	SPECIAL CONDITIONS	DIAL SETTING	ADJUSTMENTS	REMARKS
1. 455 KC AM	High Side--Term. #5 gang cond. Low side--chassis ground	.01 mfd capacitor	Short AM Osc. Term. #1 to chassis ground	Gang condenser fully open	Top Slug of T1, T2, T4 and bottom slug of T4	Adjust for maximum output. Repeat several times to insure maximum output
2. 1475 KC AM	High side--Term. #3 gang cond. Low side--chassis ground	100 mmf capacitor	Remove short from Osc. Term #1	1475 KC Ref. mark	C17	Rock Tuning Control while adjusting for maximum output
3. 965 KC AM	"	"		965 KC Ref. mark		* Check calibration
4. 580 KC AM	"	"		580 KC Ref. mark		* Check calibration

* If calibration does not check within tolerances denoted by etched lines on dial backplate, oscillator gang rotor plates must be bent to obtain proper calibration. This operation is very delicate and should be attempted only by properly trained personnel.

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MODELS 95B3 Rev., 95B4, 95M3 Rev., 95M4, 95M9 Rev.

FM ALIGNMENT
CW METER METHOD

Preliminary Alignment Procedure: With gang condenser fully closed, adjust dial pointer to coincide with the reference mark etched into dial back plate. See Fig. 4. Place band switch in FM position. Use 30% amplitude modulated signals when possible.

GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR COUPLING	SPECIAL CONDITIONS	DIAL SETTING	VTVM CONNECTIONS	ADJUSTMENTS	REMARKS
1. 10.7 MC AM or CW	.01 Mfd Capacitor	High side--Term. #4 Gang Cond. Low side--chassis ground	Short FM Osc. Term. #2 of Gang Cond. to chassis ground	Gang condenser fully open	+Lead to chassis ground -Lead to Pin 2 of tube 6T8	Bottom slug of T1, T2, Top slug of T3	Adjust for maximum AVC reading on VTVM. Repeat adjustment several times to insure maximum reading
2. Remove Signal Generator		Remove Signal Generator	Short FM Osc. Term. #2 of gang cond. to common ground Two 100K matched resistors in series connected between Pin 2 of tube 6T8 & chassis ground	"	Center tap of 100K resistor and Term. #6 of switch S1C	Adjust VTVM for Zero	While connected to chassis, the VTVM is adjusted by its zero centering control
3. 10.7 MC AM or CW	.01 Mfd capacitor	High side--term #3 of Gang cond. Low side--chassis ground	"	"	"	Bottom slug of T3	Adjust bottom slug to produce zero reading on VTVM
4. Repeat Steps 1, 2, and 3 until adjustment in Step 1 does not require a readjustment to produce a zero reading on the VTVM in Step 3.							
5. 106 MC	FM Dummy Antenna (See Fig. 3)	FM Dummy Antenna Terminals (See Fig. 3)	Remove short from Term. #2 of gang cond. Remove 100K Resistors	106 MC Ref. mark	+Lead to chassis ground -Lead to Pin 2 of tube 6T8	Osc. trimmer C3 then RF, C2c & Ant., C2a	Rock tuning control when adjusting C3 for maximum AC reading, then adjust C2c and C2a respectively for maximum †
6. 97 MC AM or CW	"	"		97 MC Ref. mark	"		* Check calibration
7. 90 MC AM or CW	"	"		90 MC Ref. mark	"		* Check calibration

† Oscillator operates on high frequency side of incoming signal but it is possible to adjust to the low side. Set Signal Generator to 84.6 MC (with receiver set to 106 MC); if signal is heard, readjust oscillator trimmer at signal generator frequency of 106 MC and check again at 84.6 MC. Signal should not be heard.

* If calibration is not within reference mark at these points, the inductance of the FM oscillator coil must be adjusted. If dial pointer reading is on low frequency side, inductance of oscillator coil is too low and turns of coil must be compressed slightly. If pointer reading is on high frequency side, the coil inductance is too high and coil turns must be spread slightly. Repeat steps 5, 6, and 7 until correct calibration is obtained.

To adjust RF coil, tune receiver to 90 MC and observe AVC reading. Insert into RF coil, the iron core of tuning wand (rod of insulating material one end of which contains an iron core slug and the other end contains a non-ferrous metallic slug). If reading increases, the inductance of coil is too low and turns must be spread *slightly*. If reading decreases, insert opposite end (non-ferrous) of tuning wand into RF coil. Inductance of coil is too low if reading increases and turns must be compressed *slightly*. Correct adjustment is obtained when insertion of either end of tuning causes the reading to decrease.

The antenna coil inductance is adjusted in the same manner as the RF coil.

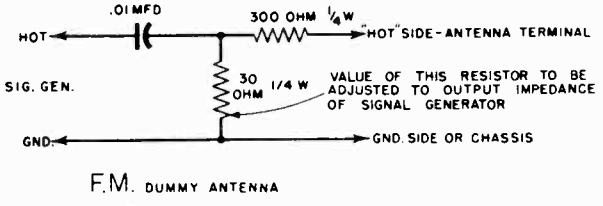

Fig. 3 - FM Dummy Antenna

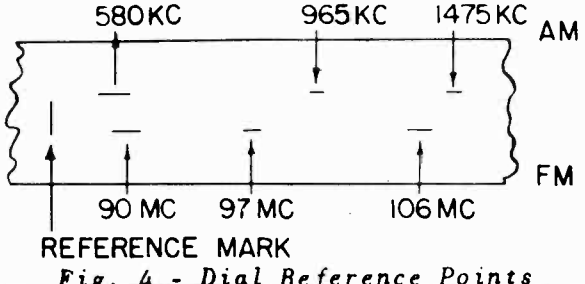

Fig. 4 - Dial Reference Points

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MODELS 95B3, 95B3 Rev., 95B4, 95M3, 95M3 Rev., 95M4, 95M9, 95M9 Rev.

VISUAL ALIGNMENT OF RATIO DETECTOR

The ratio detector in the FM section of this radio receiver can be aligned very accurately by Visual Alignment. This method can be used in conjunction with the CW method by following the procedure outlined below.

1. Perform Step 1 indicated in CW Meter Method Chart.

2. Set Signal Generator to 10.7 MC, FM, with sweep width at maximum possible (should be a minimum of 200 KC). Connect output of generator to terminal #4 of gang condenser and ground.

3. Connect vertical input of cathode ray oscilloscope to terminal #6 of switch S1C and 'ground'; place a 60 cycle sine wave signal to horizontal input if oscilloscope does not have an internal 60 cycle sweep.

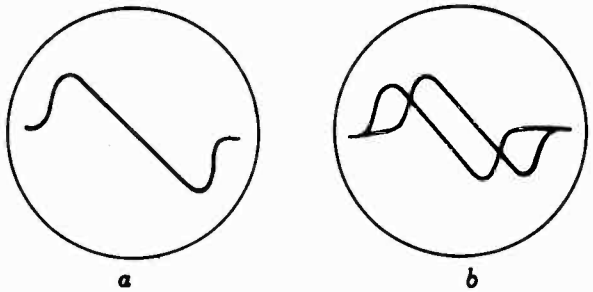

Fig. 5 - S Curves

4. Adjust signal generator frequency until 'S' curve (Fig. 5) is centered on the horizontal sweep. Curve may be reversed because of internal circuit of oscilloscope. Fig. 5b indicates when 'Phase Control' of oscilloscope is incorrectly adjusted.

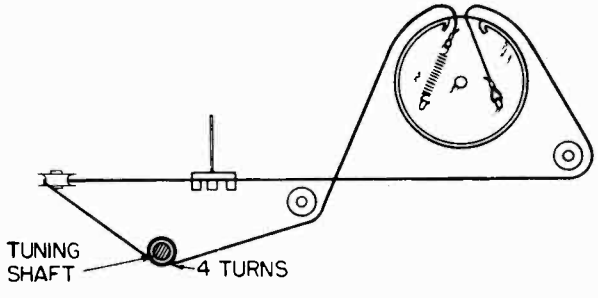

Fig. 6 - Dial Stringing Diagram

5. Adjust primary of T3 (top slug) and secondary (bottom slug) for maximum desired 'S' curve. A VTVM can be very useful at this point if connected to pin 2 of tube 6T8 and ground. The oscilloscope will then indicate the most linear curve and the VTVM will indicate the maximum AVC voltage.

6. Adjust bottom slugs of T1 and T2 and then repeat step 5 to insure correct alignment.

7. Continue at this point, with the alignment procedure starting with step 5 as outlined in the FM CW Meter Method.

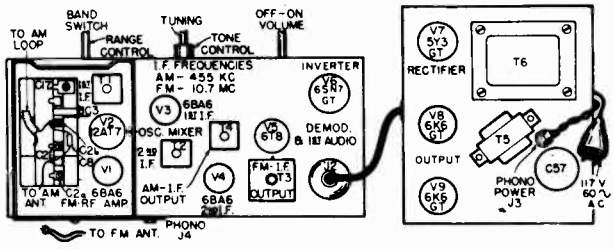

Fig. 7 - Trimmer Location

FM ANTENNA

The FM antenna used in Models 95M3, 95B3, and 95M9 will not be found in the Replacement Parts List since the serviceman, by following the specifications in the drawing below, can very easily and inexpensively make the antenna himself.

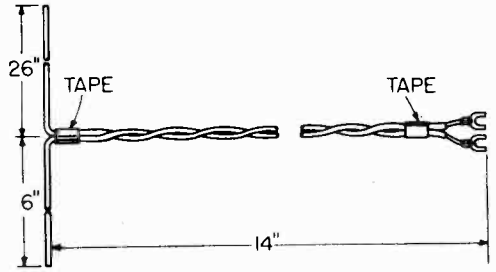

Fig. 8 - FM Antenna

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MODELS 95B3, 95M3, 95M9

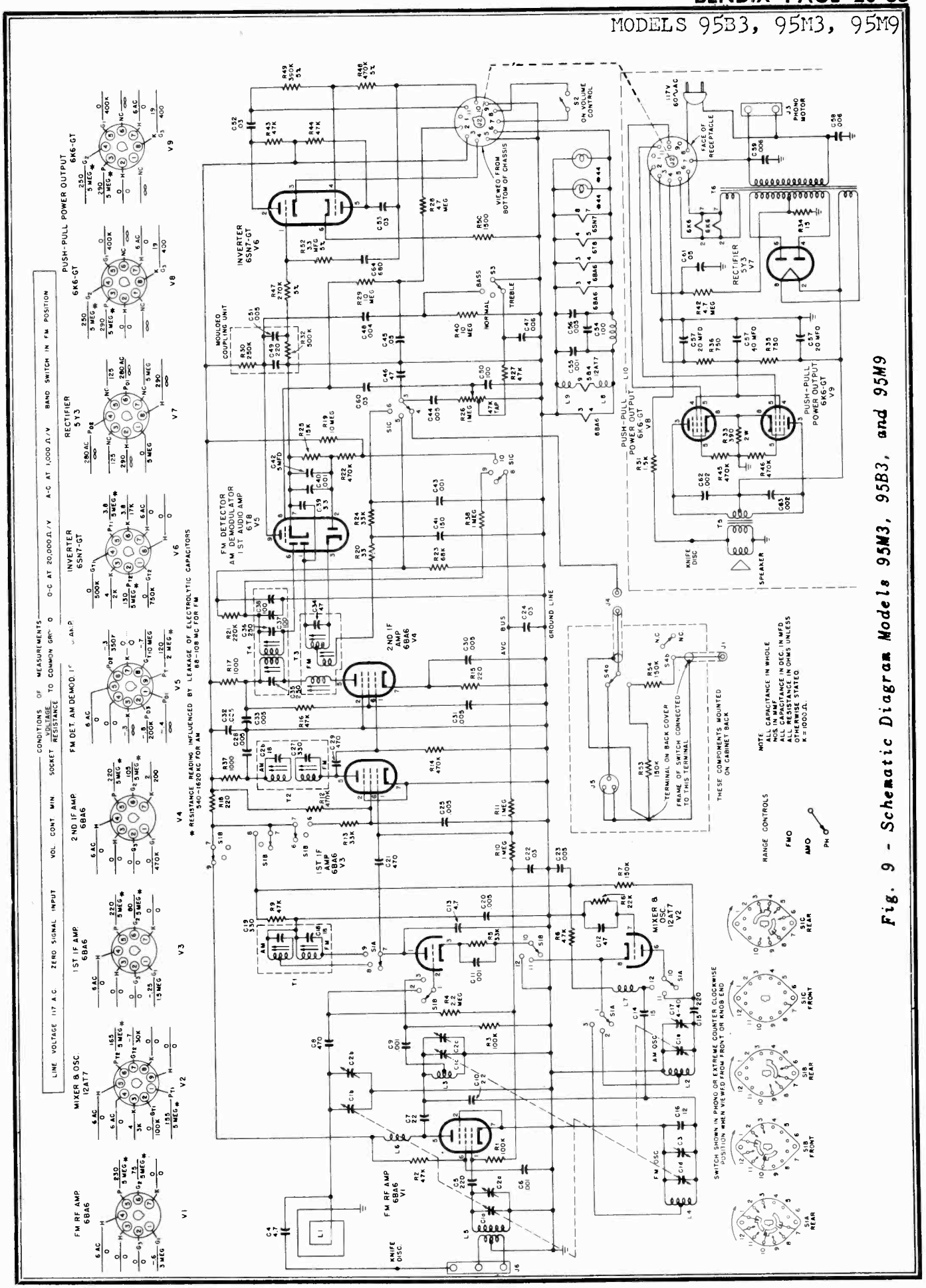

Fig. 9 - Schematic Diagram Models 95M3, 95B3, and 95M9

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MODELS 95B3, 95B3 Rev., 95B4, 95M3, 95M3 Rev., 95M4, 95M9, 95M9 Rev.

REPLACEMENT PARTS LIST

Stock No.	Symbol No.	Description
	ELECTRICAL COMPONENTS	
AC0C01	C49,51; R30,32	ASSEMBLY-Capacitor, Resistor Coupling
CV0D01	C1a,b,c, d,e; C2a, b,c	CAPACITOR-Variable Air
CT1B05	C3	CAPACITOR-Trimmer 0.2-3.0 mmf
CC0A18	C4,13	CAPACITOR-Ceramic 4.7 mmf 500V
CC9A38	C5,15	CAPACITOR-Ceramic 220 mmf 500V
CC9M50	C6,9,40, 43,55	CAPACITOR-Ceramic .001 mfd Min. Value 500V
CC0A26	C7	CAPACITOR-Ceramic 22 mmf 500V
CC9M42	C8,21,29	CAPACITOR-Ceramic 470 mmf Min. Value 500V
CC0A14	C10	CAPACITOR-Ceramic 2.2 mmf 500V
CM5A46	C11	CAPACITOR-Mica .001 mfd 300V
CC8B30	C12,46	CAPACITOR-Ceramic 47 mmf ±10% 500V
CC0A24	C14	CAPACITOR-Ceramic 15 mmf 500V
CC8B23	C16	CAPACITOR-Ceramic 12 mmf ±10% 500V
CT1A20	C17	CAPACITOR-Trimmer 4-40 mmf
CC0M00	C20,23,25, 28,30,31, 32,33,44, 56	CAPACITOR-Ceramic .005 mfd 450V
CP4T36	C22,24,52, 53,60	CAPACITOR-Paper .03 mfd 400V
CC0A16	C39	CAPACITOR-Ceramic 3.3 mmf 500V
CC9B36	C41	CAPACITOR-Ceramic 150 mmf ±10% 500V
CE1T06	C42	CAPACITOR-Electrolytic 5 mfd 50V
CP4T40	C45,61	CAPACITOR-Paper .05 mfd 400V
CP6T20	C47,58,59	CAPACITOR-Paper .006 mfd 600V
CP3S16	C48	CAPACITOR-Paper .004 mfd -20% +40% 400V
CM5A22	C50	CAPACITOR-Mica 100 mmf 300V
LF0C00	C54	CAPACITOR-See Coil L10
CE3A03	C57a,b,c	CAPACITOR-Electrolytic 20-20-40 mfd 450V
CP6T12	C62,63	CAPACITOR-Paper .002 mfd 600V
CM3A42	C64	CAPACITOR-Mica 680 mmf 300V
RC22A104M	R1,3	RESISTOR-Comp. 100K 1/4W
RC23A473M	R2,9,16	RESISTOR-Comp. 47K 1/2W
RM2F66	R4	RESISTOR-Metalized 2.2 meg 1/3W
RC23A332M	R5	RESISTOR-Comp. 3.3K 1/2W
RC22A223M	R6	RESISTOR-Comp. 22K 1/4W
RC22A154M	R7,53,54	RESISTOR-Comp. 150K 1/4W
RC24A472M	R8	RESISTOR-Comp. 4.7K 1W
RC22A105M	R10,11,38	RESISTOR-Comp. 1 meg 1/4W
RC22A474M	R12,14,22, 45,46	RESISTOR-Comp. 470K 1/4W
RC24A333M	R13	RESISTOR-Comp. 33K 1W
RC22A221M	R15	RESISTOR-Comp. 220 ohms 1/4W
RC22A102M	R17,37	RESISTOR-Comp. 1000 ohms 1/4W
RC23A221M	R18	RESISTOR-Comp. 220 ohms 1/2W
RC22A106M	R19,29,40	RESISTOR-Comp. 10 meg 1/4W
RC22A330M	R20	RESISTOR-Comp. 33 ohms 1/4W
RC22A224M	R21	RESISTOR-Comp. 220K 1/4W
RC22A683K	R23	RESISTOR-Comp. 68K ±10% 1/4W
RC23A333M	R24	RESISTOR-Comp. 33K 1/2W
RC22A153K	R25	RESISTOR-Comp. 15K ±10% 1/4W
RV4S14	R26 & S2	RESISTOR-Pot. With Switch
RC22A473M	R27,43,44	RESISTOR-Comp. 47K 1/4W
RC22A475M	R28,42	RESISTOR-Comp. 4.7 meg 1/4W
RC25A391K	R33	RESISTOR-Comp. 390 ohms ±10% 2W
RC23A150M	R34	RESISTOR-Comp. 15 ohms 1/2W
RW2M03	R35,36	RESISTOR-Wirewound 750-750 ohms 3W
RC22A274J	R47	RESISTOR-Comp. 270K ±5% 1/4W
RC22A474J	R48	RESISTOR-Comp. 470K ±5% 1/4W
RC22A394J	R49	RESISTOR-Comp. 390K ±5% 1/4W
RC22A152K	R50,51	RESISTOR-Comp. 1.5K ±10% 1/4W
RC22A245J	R52	RESISTOR-Comp. 2.4 meg ±5% 1/4W
AL0Z15	L1	ANTENNA-AM Loop
L07B00	L2	COIL-BC Osc.
L10F01	L3	COIL-RF FM
L07F00	L4	COIL-FM Osc.
LA0F01	L5	COIL-FM Antenna
LF0A01	L6,7	COIL-RF Choke (Plate)
LF0A00	L8,9	COIL-RF Choke (Filament)
LF0C00	L10 & C54	COIL-RF Choke
T10C12	T1	TRANSFORMER-1st IF
T10D20	T2	TRANSFORMER-2nd IF
T10D17	T3	TRANSFORMER-Ratio Detector
T10D18	T4	TRANSFORMER-AM 3rd IF
TA0014	T5	TRANSFORMER-Output
TP0H01	T6	TRANSFORMER-Power
SR3F00	S1	SWITCH-Rotary 3 Section, 3 Position

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MODELS 95B3, 95B3 Rev., 95B4, 95M3, 95M3 Rev., 95M4, 95M9, 95M9 Rev.

REPLACEMENT PARTS LIST (Cont'd)

Stock No.	Symbol No.	Description
		ELECTRICAL COMPONENTS (CONT'D)
RV4S14	S2	SWITCH-Volume Control See R26
SS1C02	S3	SWITCH-Tone Slide 2 Pole, 3 Position
SPIR02		SPEAKER-PM 12"
#44		DIAL LIGHT
		MECHANICAL COMPONENTS
BT1S03		BOARD-Terminal 1 Lug 1 Mtg.
BT2S05		BOARD-Terminal 2 Lug 1 Mtg.
BT3S06		BOARD-Terminal 3 Lug 1 Mtg.
BT4S06		BOARD-Terminal 4 Lug 1 Mtg.
BT6S02		BOARD-Terminal 6 Lug 2 Mtg.
BT8S00		BOARD-Terminal 8 Lug 2 Mtg.
CD0N01		CABLE-Dial Tuning
CL0A00	J2	CABLE-Power, With Receptacle
CL2A08		CORD-AC Brown
GR0S09		GROMMET-Top RF Sub-chassis Rubber Shockmount
GR0S15		GROMMET-Rear RF Sub-chassis Rubber Shockmount
HB0M74		BRACKET-Indicator Slide Rail
HB0M83		BRACKET-Dial Light
HB0M84		BRACKET-Dial Back Plate
HC0C09		CLIP-Power Supply Cable
HC0M08		CLAMP-Tube Shield Base (1-1/8" Mtg. Dim.)
HC0S00		CLIP-Spring Tuning Shaft
HC0S60		CLIP-IF Can Mtg.
HC0S67		CLIP-Trimmer Spring
HC0T01		CLAMP-Tube
HP0P11		PIN-Chassis Shockmount
HR0S02		RIVET-Shoulder .218 x .083
HS0C75		SPRING-Dial Cord
HS0C88		SPRING-Tension
HS0F19		SLEEVE-RF Sub-chassis Shockmount Mtg.
HS0S13		STUD-RF Sub-chassis Shockmount
ID0M21		INDICATOR-Metal Pointer & Carriage
JP0S00	J2	PLUG-11 Contact
JR2001	J3	RECEPTACLE-2 Contact Phono Power
JR2012	J6	RECEPTACLE-2 Contact FM Ant.
JR1S00	J4	RECEPTACLE-1 Contact Phono
MB0B00		BEARING-Tuning Shaft Brass
ML0C04		LEVER & BUSHING-Tone Control
MP0100		PULLEY-Idler Fiber
MS0T18		SHAFT-Tuning
PB0D06		PLATE-Dial Back
PI0P01		PLATE-Line Cord Insulator
SM0T06		SHIELD-Miniature Tube
S00D13		SOCKET-Dial Light
S07M09		SOCKET-7 Prong Miniature Laminated Plate
S07M10		SOCKET-7 Prong Miniature Molded Base
S09M00		SOCKET-9 Prong Miniature
S08S01		SOCKET-Octal (Bottom Mtg.)
		CABINET COMPONENTS
AM0L09		ASSEMBLY-Drop Front Lever
BT3S06		BOARD-Terminal 3 Lug 1 Mtg.
BT3T00		BOARD-Terminal 3 Screw Lugs
BZ0B18		BACK-Upper Cabinet Cover Model 95M3
BZ0B19		BACK-Lower Cabinet Cover Model 95M3
BZ0B20		BACK-Upper Cabinet Cover Model 95B3
BZ0B22		BACK-Lower Cabinet Cover Model 95B3
BZ0B23		BACK-Upper Cabinet Cover Model 95M9
BZ0B24		BACK-Lower Cabinet Cover Model 95M9
BZ0D40		BOARD-Baffle Model 95M9
BZ0D41		BOARD-Baffle Models 95M3 & 95B3
BZ0D42		BOARD-Baffle (Cardboard & Cloth) Model 95M9
CL1D01	J4	CABLE-Phono Connector & Plug (Switch to Chassis)
CL1D02	J1	CABLE-Phono Connector & Receptacle (Switch to Phono Lead)
DS0C09		DIAL-Scale AM-FM
ED0P00		ESCUTCHEON-Plastic Dial & Control
GR0S18		GROMMET-Shockmount for Chassis
GZ0B00		BAR-Vertical, End (Grille) Models 95M3 & 95B3
GZ0B01		BAR-Vertical, Center (Grille) Models 95M3 & 95B3
GZ0B02		BAR-Horizontal, End (Grille) Models 95M3 & 95B3
GZ0B03		BAR-Horizontal, Center (Grille) Models 95M3 & 95B3
GZ0C08		GRILLE-Cloth Model 95B3
GZ0C09		GRILLE-Cloth Model 95M3
GZ0M28		GRILLE-Metal Model 95M9
HB0M88		BRACKET-Rear Chassis Shockmount
HB0M89		BRACKET-Front Chassis Shockmount
HB0M90		BRACKET-Cabinet Mtg.
HC0S10		CLIP-Control Knob Retainer Spring
HC0S68		CLIP-Concentric Knob Retainer Spring
HC0S69		CLIP-Dial Retainer
HC0S76		CLIP-Lever Assy Spring

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MODELS 95B3, 95B3 Rev., 95B4, 95M3, 95M3 Rev., 95M4, 95M9, 95M9 Rev.

Stock No.	Symbol No.	Description
		CABINET COMPONENTS (CONT'D)
HKOK00		KNOB-Key Pull Model 95M9
HKOR09		KNOB-Door Pull (1 Machine Screw Mtg.) Model 95B3
HKOR15		KNOB-Door Pull (2 Machine Screws Mtg.) Model 95M3
HOOM00		ORNAMENT-Metal Grille Models 95M3 & 95B3
HPOE00		PLATE-L.H. End (Rear View)
HPOE01		PLATE-R.H. End (Rear View)
HPOS00		PIN-Steel, Cabinet Mtg.
HSOC78		SPRING-Lever Arm
HSOS14		STUD-Escutcheon Retainer
HSOS16		STUD-Lever Arm
HSOT00		STUD-Speaker Mtg.
HT0000		TACK-Ornamental (Metal) Models 95M3 & 95B3
HTOT01		TRACK-Record Changer Model 95M9
HTOT02		TRACK-Center Record Changer Model 95M9
HW8C02		WASHER-#8 Cuptype (Back Cover)
HZOC08		CATCH-Bullet Models 95M3 & 95B3
HZOC09		CATCH-Bullet Model 95M9
HZOG00		GLIDE-Metal, Cabinet Tray Model 95M9
HZOG01		GLIDE-Cabinet
		CABINET COMPONENTS (CONT'D)
HZOG06		GLIDE-Changer Models 95M3 & 95B3
HZOH08		HINGE-Door Model 95B3
HZOH09		HINGE-Door Models 95M3 & 95M9
HZOH11		HANDLE-Door Model 95M9
HZOP01		PAD-Felt Lid Bumper
JP2007	J6	PLUG-2 Contact, FM Ant.
JR3002	J5	RECEPTACLE-3 Contact Long Playing
KC0B16		KNOB-Control Models 95M3 & 95M9
KC0L03		KNOB-Control Model 95B3
KS0B02		KNOB-Phono Switch
KY0B02		KNOB-Concentric Models 95M3 & 95M9
KY0L00		KNOB-Concentric Model 95B3
RD0F01		REFLECTOR-Dial Light
SC0T01		SHIELD-Record Changer Tray Models 95M3 & 95B3
SC0T02		SHIELD-Record Changer Tray Model 95M9
SR2B04		SWITCH-Standard Changer-Long Playing Phono
ZW7G07		CABINET-Model 95M9
ZW7G08		CABINET-Model 95M3
ZW7G09		CABINET-Model 95B3

This supplement provides a revised schematic for 95 Series Models, and incorporates revisions made for 95M4 and 95B4 Models, and record of production changes effected to date.

Stock No.	*Symbol No.*	*Description*
CM5A38	C65	CAPACITOR-Mica 470 mmf 500V
CM5A05	C66	CAPACITOR-Mica 22 mmf 500V
CC9M50	C67	CAPACITOR-Ceramic .001 mfd Min. Value 500V
CC9A34	C68	CAPACITOR-Ceramic 100 mmf 500V
RC22A151M	R15	RESISTOR-Comp. 150 ohms 1/4 W
RC22A245J	R52	RESISTOR-Comp. 2.4 meg ±5% 1/4 W
RC22A225M	R55	RESISTOR-Comp. 2.2 meg 1/4 W
RC22A102M	R56,58,59,60,61	RESISTOR-Comp. 1000 ohms 1/4 W
RW0L00	R57	RESISTOR-Wirewound 0.47 ohms 1/2 W
RC22A104M	R62	RESISTOR-Comp. 100K 1/4 W

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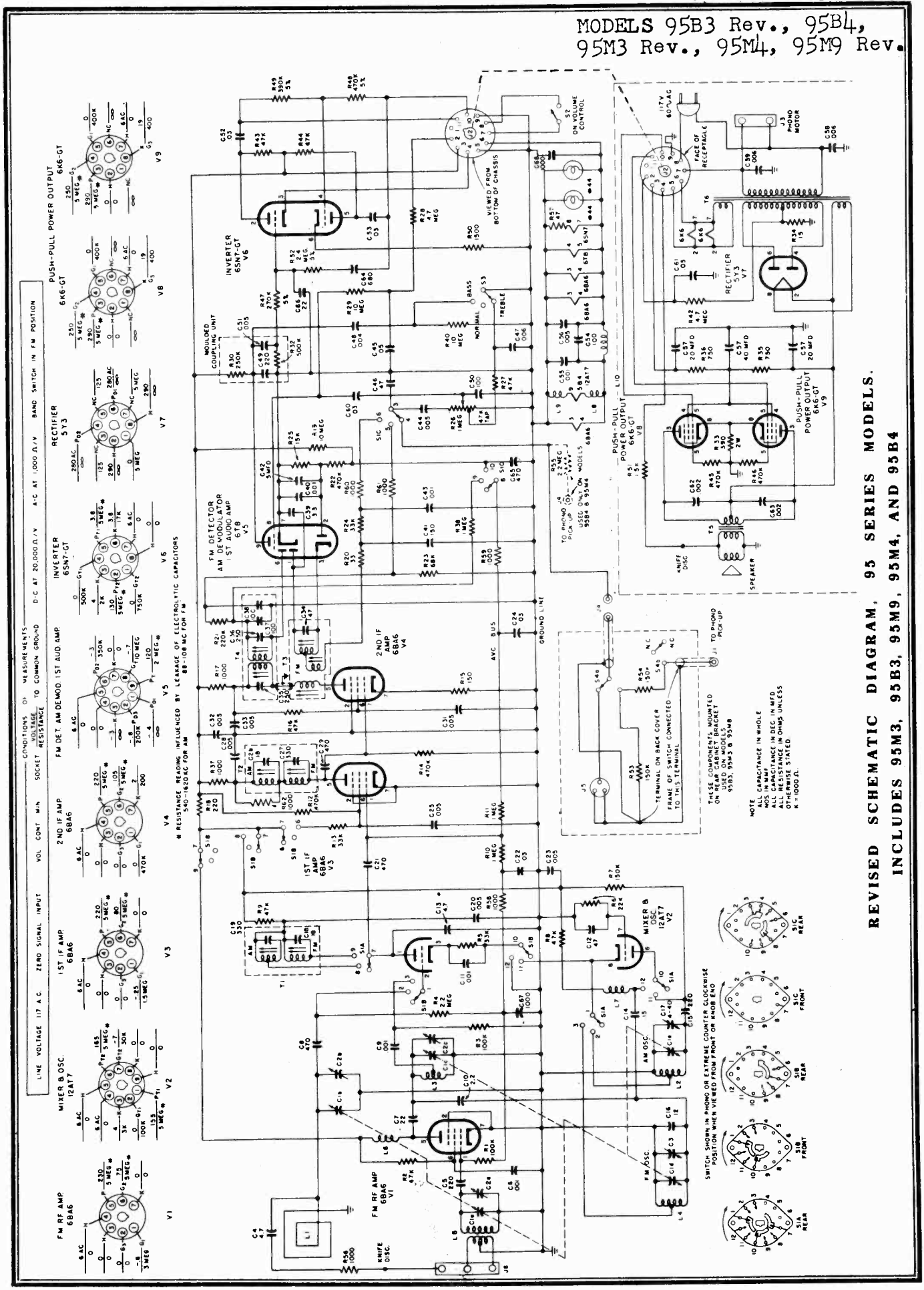

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BROWNING UNIVERSAL FM-AM TUNERS—MODEL RJ-20 AND MODEL RJ-22

These tuners are designed to please the most discriminating listener. Truly high fidelity reception of FM and AM broadcasting has been engineered into these tuners which are specifically intended for custom receiving installations. The AM section features variable I.F. bandwidth with a broad high fidelity position and a narrow, interference reducing position. The FM section uses Major Armstrong's circuit and features dual limiters for best noise elimination. Bass and treble controls provide 20 db of boost at either end of the audio band and the associated audio amplifiers assure output commensurate with phonograph pickups. The power supply is self-contained and the chassis is styled for ease of mounting in bookshelves, cupboards, drawers and other confined locations.

INSTALLATION:

In mounting the unit, due consideration must be given to ventilation. Approximately 100 watts of heat must be dissipated. Position of mounting is not important.

If the speaker is to be located in or very near the cabinet in which the tuner is located, it may be necessary to shock mount the tuner on rubber or felt pads to entirely eliminate mechanical feedback.

The output of the tuner may be fed directly into the input of any high quality amplifier and speaker system. The gain of the amplifier should be such that 0.5 volt RMS will provide the desired output.

Antenna connections must be made as shown in the drawing "RJ-20 Antenna Connections". As may be seen, all ordinary possibilities have been foreseen and any good commercial FM antenna may be used. For those who wish to make their own antenna, the drawing "RJ-20 antenna constructed of 300 ohm twin lead" is supplied. Careful adherence to this drawing will provide a very satisfactory antenna.

Shielded leads from the tuner to the amplifier and also from the phonograph pickup to the connectors at the rear of the chassis are essential. The two male connectors will be found plugged into the female chassis connectors in the RJ-20 and several feet of shielded wire is packed with each tuner. It is advisable to make these leads as short as possible in order not to impair the high frequency response. Since individual installations vary, this wire is supplied uncut.

When making up the cables, the center conductor should be stripped and tinned, inserted in the center sleeve of the connector and heated until the solder flows making a good joint. Bring the braid up on the outside shell of the plug and solder all the way around.

There are some cases where the shield braid on the lead between the audio output of the RJ-20 and the amplifier employed may not be sufficient ground bond between the two. In cases where there is any hum (not present in the amplifier itself), try bonding the RJ-20 chassis to the audio amplifier with heavy copper braid or number 16 or larger wire.

A panel layout of the RJ-20 appears on the next page to facilitate cutting the panel to fit the unit. The shaft lengths are such that panel thickness up to 1/4" may be used.

OPERATION:

After proper installation, the tuner may be put into operation by turning the ON-OFF switch clockwise; the dial should be immediately illuminated. Within a minute, the tuning eye should emit a bright green glow. The tuner is ready to operate on AM. Allow two minutes warmup for FM

CONTROLS:

1. ON-OFF switch - Power switch independent of controls so they may be left in any desired position.
2. VOLUME - Controls audio output from FM, AM, or PHONO source.
3. AM-FM-PHONO - Bandswitch which selects type of reception desired.
4. NARROW-BROAD - Controls bandwidth of the AM I.F. amplifier. BROAD position is for high fidelity reception of strong, clear stations. NARROW position for best reception of weak stations or in crowded portions of the band. When tuning AM stations always tune in NARROW position switching to BROAD after tuning is complete.
5. TUNING - Selects stations on either FM or AM bands. Tune slowly and exactly using the tuning indicator as shown in drawing "RJ-20 Tuning Eye".
   Note: When tuning AM stations have NARROW-BROAD switch in NARROW position. After correct tuning is achieved, turn switch to BROAD if desired.
6. TREBLE - Provides 20 db of treble boost in full clockwise position.
7. BASS - Provides 20 db of bass boost in full clockwise position.

For flat response, both BASS and TREBLE should be fully counterclockwise.

For those who wish to incorporate phonograph connection to the tuner, a phono input connector is provided at the rear of the chassis. By turning the selector switch to PHONO, the phonograph input is connected to the amplifier through the tone and volume controls of the tuner. Bass and treble content as well as volume can be controlled directly with the tuner knobs.

It should be noted that while tuning between stations, both on FM and AM, the rushing noise is normal for the tuner. The extremely high sensitivity is responsible for picking up random atmospherics, but this will be eliminated when a station is tuned in provided the signal exceeds the noise voltage at the antenna.

ADJUSTMENT:

No adjustment should be made on the tuner aside from the panel controls. Adjustments and alignment on the FM portion should only be made by experienced personnel with the proper visual alignment equipment. Ordinary meters or aural methods are in general unsatisfactory for alignment. Replacement of tubes can usually be made without realignment.

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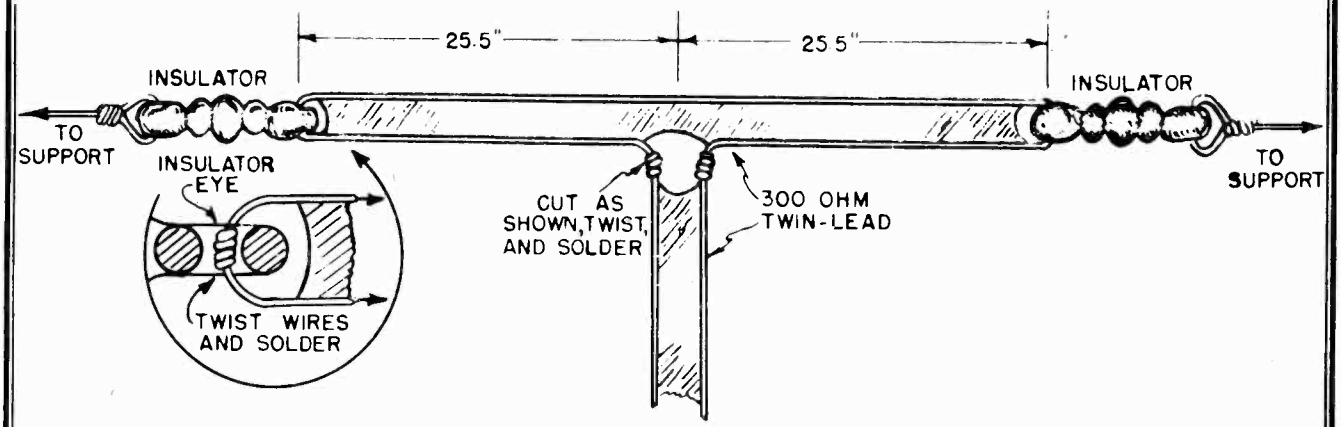
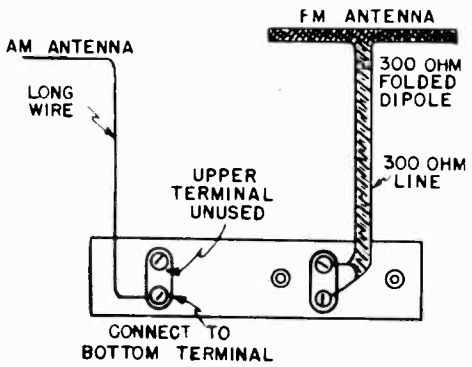
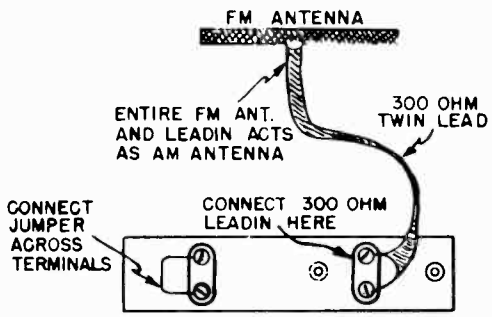
MODELS RJ-20,
RJ-22, Tuners



RJ-20 FM ANTENNA CONSTRUCTED
OF 300 OHM TWIN LEAD

CONNECTIONS WHERE 300 OHM FM ANTENNA AND SEPARATE AM ANTENNA IS TO BE USED

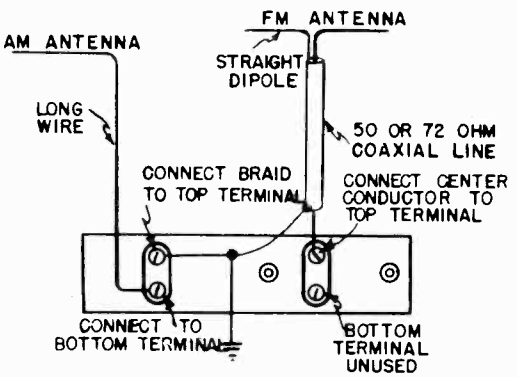




CONNECTIONS WHERE 300 OHM FM ANTENNA IS TO BE USED FOR BOTH FM & AM RECEPTION

RJ-20 ANTENNA CONNECTIONS

CONNECTIONS FOR SEPARATE ANTENNAS WHERE 50 OR 72 OHM FM ANTENNA IS USED



NOTE: "IN CASES WHERE 300 OHM FM ANTENNA IS TO BE USED FOR BOTH FM AND AM RECEPTION."

If 300 ohm twin lead from FM antenna to tuner is longer than about 25 ft., use condenser supplied as jumper. (This condenser is externally connected to the terminals when the tuner is received.)

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INSTRUCTIONS FOR ALIGNMENT OF BROWNING MODELS RJ-20 AND RJ-22 FM-AM TUNER

Visual alignment of both FM and AM sections is to be preferred, but in case apparatus is not available, the following point-to-point method may be used. Visual alignment data are given in "DATA ON BROWNING MODEL RV-10 FM TUNER", which can be applied to the RJ-20 and the RJ-12A

EQUIPMENT EMPLOYED: FM SECTION

a. Signal generator covering 8,200 to 8,300 KC. with a sufficiently large dial so that 25 KC. can be accurately read.
b. Signal Generator from 88 to 108 MC.
c. A DC vacuum tube voltmeter which has an input resistance of more than three megohms.

IF-FM ALIGNMENT - Band Switch to FM Position.

1. Connect output of signal generator to ground and to pin #8 of the 7F8 mixer oscillator tube. (This point is most conveniently reached by connection to the stator plates of the mid-section of the three gang variable FM condenser - see instructions on RJ-20 for location of parts.) Set signal generator at 8,250 KC.
2. Connect vacuum tube voltmeter between ground and the lower end of the 1. meg. resistor, R53.
3. Tune primary and secondary of first, second and third FM IF transformers for substantially maximum limiter voltage as indicated by VTVM. Increase or decrease the output of the signal generator as required so that VTVM maximum reading is about 5 volts.
4. Set signal generator at 8,200 KC. The limiter voltage should be about the same as above (at 8,250 KC.)
5. Set signal generator at 8,300 KC. The limiter voltage should be about the same as at 8,250 KC.
6. If the FM IF response is not symmetrical, make adjustments on the FM IF transformers until a curve is obtained similar to that shown in Fig. 4 in "DATA ON BROWNING MODEL RV-10 FM TUNER".

FM DISCRIMINATOR ALIGNMENT

7. Connect DC VTVM between ground and the terminal of the 1 meg. resistor (R50) which is connected to the condenser C45. Set VTVM on 5 volt scale.
8. Connect signal generator as in No. 1. Set signal generator to 8,250 KC. and the output for about 5 volts on the limiter.
9. Adjust secondary of discriminator to zero voltage on VTVM. Use insulated screwdriver. Changing the tuning of the discriminator secondary should give positive and negative voltages either side of zero. Adjustment is critical.
10. Change signal generator from 8,200 to 8,300 KC., keeping signal voltage constant. Adjust primary of discriminator (see instructions of RJ-20 for location) so that equal and opposite voltages are developed.
11. Set signal generator at 8,250 KC. and check to see if VTVM reads zero as the primary adjustment may have changed the secondary. Readjust for zero.

ALTERNATE METHOD OF ADJUSTING THE PRIMARY OF THE DISCRIMINATOR

10A. Connect VTVM between ground and the junction of R47 and R48. Set signal generator at 8,250 KC. Adjust primary of discriminator for maximum DC voltage as read by VTVM.
11A. With signal generator set at 8,250 KC. and VTVM connected between ground and junction of R50 and C45, check to see that secondary of the discriminator transformer is tuned so that VTVM reads zero.

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MODELS RJ-20,
RJ-22, Tuners

ADJUSTMENTS OF FM OSCILLATOR, RF, AND MIXER CIRCUITS

12. Feed a signal of about 105 MC. from a signal generator to the antenna of the receiver. With the VTVM connected between ground and the lower end of the 1. meg. resistor (R53), see if the oscillator frequency is so set that the dial reading is in accordance with the received frequency; that is, maximum VTVM reading should be obtained when receiver dial is set at the same frequency as the signal generator. If not, adjust padder (see RJ-20 instructions for position) slightly so that frequencies marked on dial correspond to that of the signal generator (it is assumed that the signal generator is on frequency - this can be checked with FM stations.)
13. Adjust RF and mixer (for location see RJ-20 Tube Layout) trimmers for maximum reading. The RF stage will be found to be much broader than the mixer which is relatively sharp.

AM SECTION

EQUIPMENT EMPLOYED:

a. Signal generator covering 465 KC. and frequencies from 500 to 1600 KC.
b. A DC vacuum tube voltmeter which has an input resistance of more than three megohms.

IF-AM ALIGNMENT - Band Switch to AM Position.

14. Set "Broad" - "Narrow" Switch to "Narrow" (position counter-clockwise).
15. Connect signal generator between ground and pin 8 of 6SA7 (this point is most conveniently reached by connecting to the stator plates of the middle section of the three gang AM tuning condenser). Set signal generator to 465 KC.
16. Connect VTVM between ground and the lower end of R16 (?.2 meg. resistor for AVC).
17. Adjust AM-IF transformers for maximum response. It will be found that the adjustment of T2 is quite sharp. T3 is much broader.
18. Switch "Broad" -"Narrow" switch to "Broad" position. Change signal generator 3. KC. either side of 465. KC., i.e. from 462. to 468 KC. Observe VTVM reading as signal is changed. The IF response should be nearly symmetrical with two peaks and a small valley between them. If not, slight adjustments may be made on T3.
19. Switch to "Narrow" position and set signal at 465 KC. and see if sharp resonance curve has been altered. If necessary, peak again by adjustments on T2. Successive adjustments of 18 and 19 may be required. If visual method is used, observation makes adjustments relatively easy.

ADJUSTMENTS OF AM OSCILLATOR, RF, AND MIXER CIRCUITS

20. Feed a signal from signal generator into the AM antenna. Set signal generator at 1300 KC. With VTVM connected on AVC circuit as per 16, set oscillator trimmer, if necessary, so that dial reads 1,300 KC. when maximum response is obtained.
21. Set signal generator at 1400 KC. and adjust RF and mixer trimmers for maximum response. Keep signal low enough so AVC voltage will not exceed 3 or 4 volts.
22. Set signal generator to about 600 KC. Adjust AM padder for maximum response by changing the frequency from signal generator a few KC. either way and observing VTVM.

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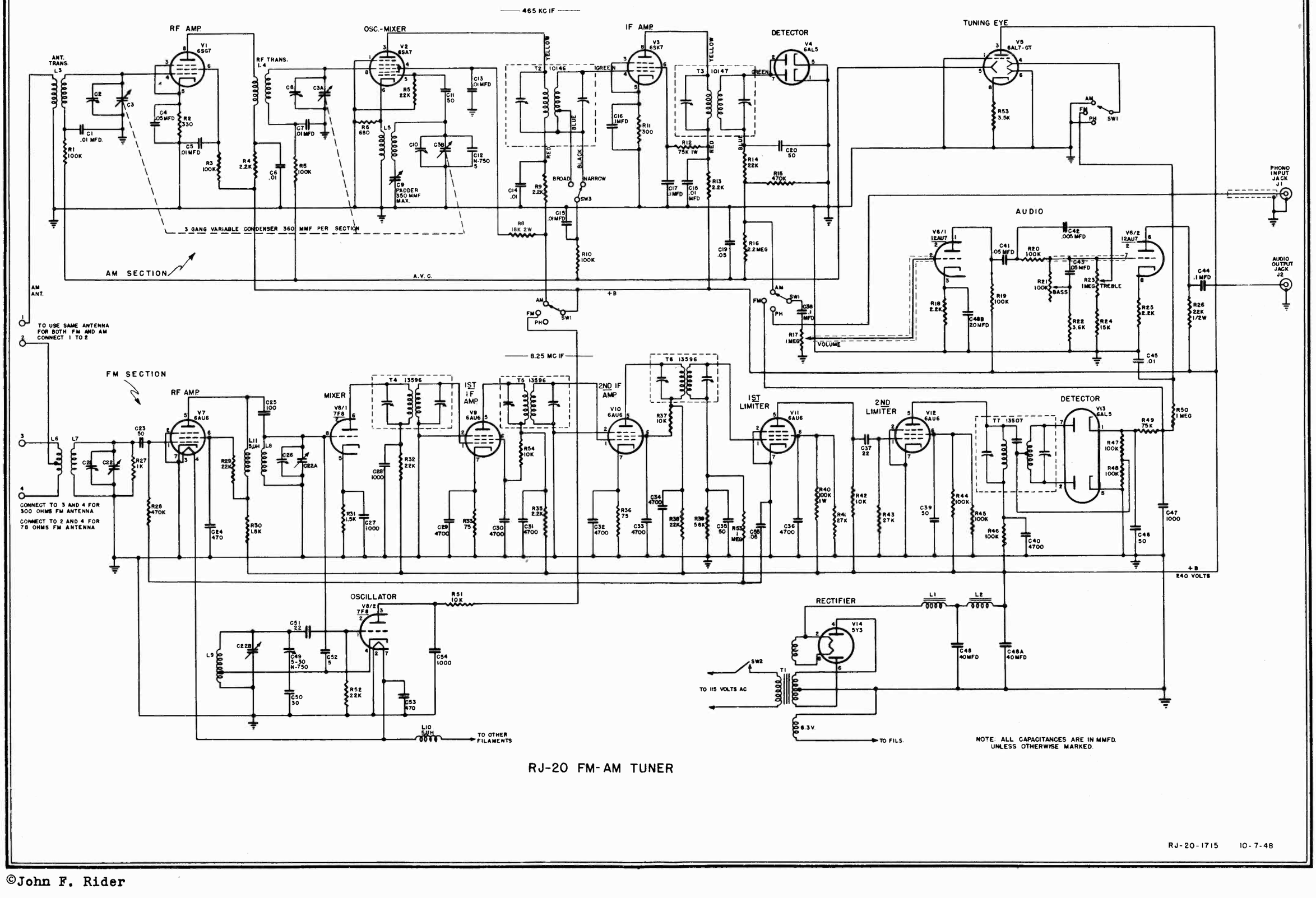
MODELS RJ-20,
RJ-22, Tuners



RJ-20 FM-AM TUNER

RJ-20-1715 10-7-48

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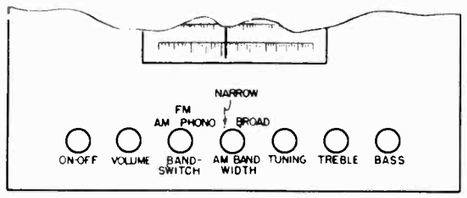
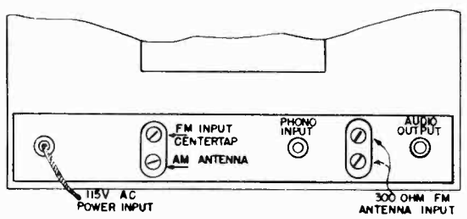
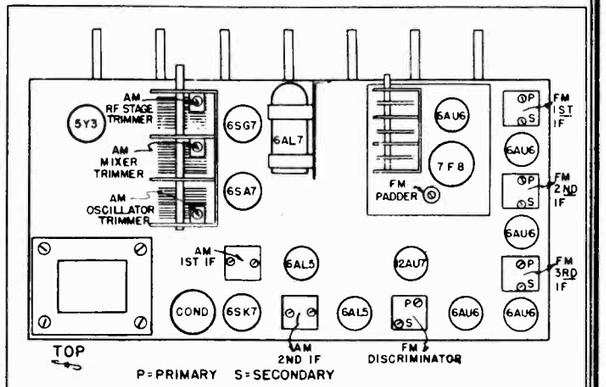
MODELS RJ-20, RJ-22, Tuners

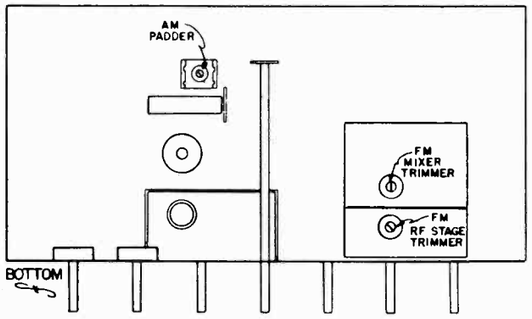


RJ-20 CONTROL LAYOUT



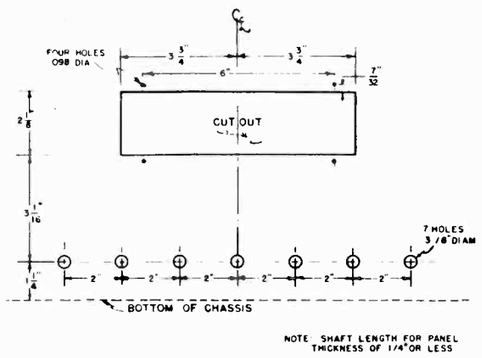
RJ-20 REAR VIEW



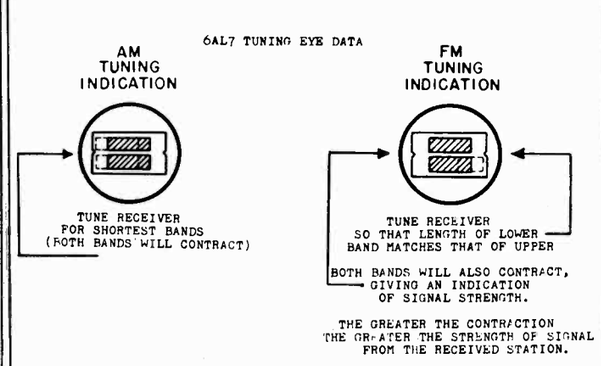


USE 6.3 VOLT BAYONET BASE #47 PILOT LAMPS

RJ-20 TUBE LAYOUT



RJ-20 PANEL LAYOUT



RJ-20 TUNING EYE

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MODELS M-2FM, M-3FM Series:
M-2 220, M-2 260, M-3 175,
M-3 220

ELECTRICAL SPECIFICATIONS

WATTS AT 117 VOLTS A.C. - 100 SERIES M-2 260, M-3 220 - PANAMUSE M-2 220, M-3 175

VOLTAGE A.C. 105 - 125

M-2 20 TUBE, M-3 17 TUBE A.C. FOUR BAND SUPERHETERODYNES

BROADCAST BAND	540 - 1600 K.C.
SHORT WAVE BAND	5.4 - 18 MC
BAND SPREAD	9.48 - 12 MC
F.M. BAND	41.9 - 51 MC

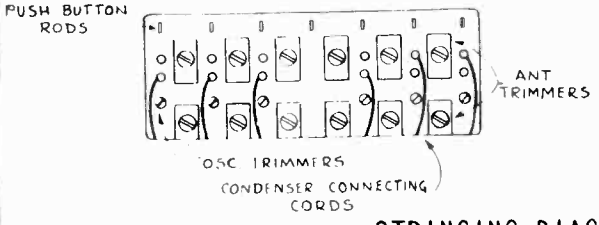
TUBE COMPLEMENT

6SK7 R.F.	6SJ7 LIMITER	M-3 AMP. A-9	M-2 AMP. A-10
6SA7 CONVERTER	6H6 DISCRIMINATOR	6R7 VOLTAGE AMP.	6R7 VOLTAGE AMP.
6J5 OSCILLATOR	6Q7 DET. & 1ST AUDIO	6SC7 DUO DRIVER	6C8G DUO DRIVER
6SG7 1ST I.F. AM, FM	2 6J5 TUNING EYE AMP.	2 - 6V6G OUTPUT	4 - 6V6 OUTPUT
6SG7 2ND I.F. FM	6AF6G TUNING EYE	2 - 5Y3G RECTIFIER	3 - 5Y3G RECTIFIER

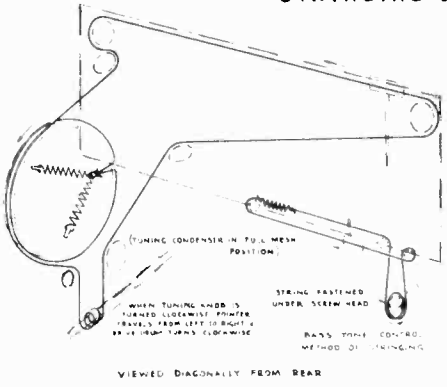
PUSH BUTTON SET UP

1. If the station you select for one of the buttons falls between 1600 to 1000 kilocycles be sure that the pin jack is in the upper strip.
2. Adjust the brass screw at the side of the lower trimmer until the wanted station is heard most clearly.
3. Adjust the lower trimmer screw for maximum volume.
4. Press Manual button making certain the station is still tuned in; check this reception against the reception on the button just set up. If it is the same proceed with the next station on the list.
5. If the station you desire to pick up falls between 1000 and 550 kilocycles, you must remove the pin jack and place in the hole provided at the bottom edge of the upper trimmer (see figure 1).
6. Turn the upper trimmer screw back until the screw is off the trimmer plates.
7. Adjust the brass screw until the wanted station is heard most clearly.
8. Then adjust the lower trimmer until maximum volume is secured; if maximum volume cannot be had and the lower trimmer screw is down tight you must finish tuning with the upper trimmer screw.

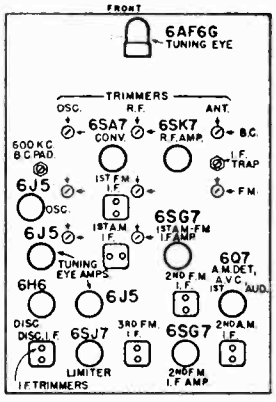
BUTTON LAYOUT

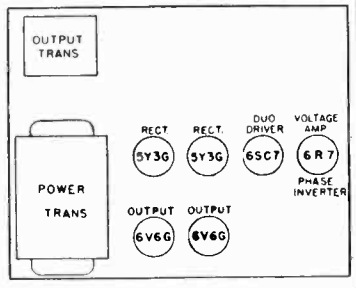


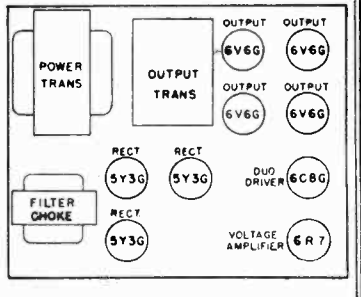
STRINGING DIAGRAM



CHASSIS LAYOUT







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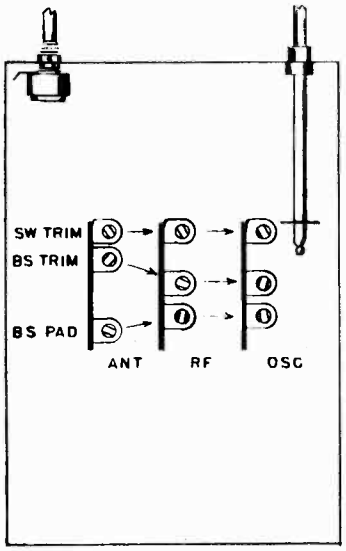
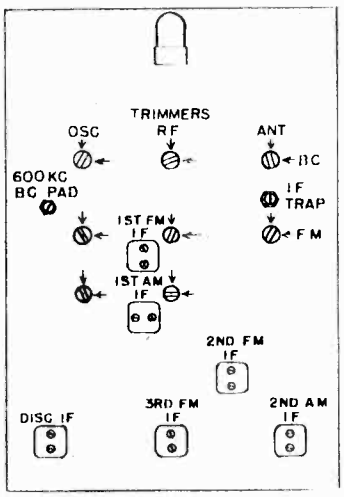
MODELS M-2FM,
M-3FM Series





ALIGNMENT INSTRUCTIONS

An output meter and a signal generator are required for proper alignment of these sets. The oscillator should be calibrated at the following points, 455 Kc, 600 Kc, 900 Kc, 1400 Kc, 1600 Kc, 2.0 Mc, 5 Mc, 5.5 Mc, 6 Mc, 9.5 Mc, 12 Mc, 16 Mc, and 18.0 Mc. Always keep the output of the signal generator as low as possible to prevent A.V.C. action and false settings. Connect the high side of the generator to the antenna terminal and the low side of it to the ground terminal.

TABULATION FOR ALIGNMENT

STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	250 M.M.F.	455 Kc.	Note A	2nd I.F. Trimmers	Top of I.F. Trans.	Max. Output
2				1st I.F. Trimmers		
3			Push Station Button	Wave Trap Trimmer	See Fig.	Min. Output
4		1600 Kc.	1600 Kc.	B.C. Osc. Trimmer	SEE FIG.	MAXIMUM OUTPUT
5		1400 Kc.	1400 Kc.	B.C. Mixer Trimmer		
6				B.C. Ant. Trimmer		
7		600 Kc.	Note B	600 Kc. Pad		
8	RECHECK	1400 Kc.				
9	400 Ohms	18 Mc.	18 Mc.	S.W. Osc. Trimmer *		
10		16 Mc.	16 Mc.	S.W. Mixer Trimmer **		
11				S.W. Ant. Trimmer **		
12	CHECK	6 Mc.				
13	400 Ohms	12 Mc.	12 Mc.	B.S. Osc. Trimmer *		
14				B.S. Mixer Trimmer **		
15				B.S. Ant. Trimmer **		
16		9.5 Mc.	9.5 Mc.	B.S. Osc. Padder		
17				B.S. Mixer Padder		
18				B.S. Ant. Padder		
19	RECHECK	12 Mc.				

*Tighten oscillator trimmer screw for maximum capacity, then unscrew until second peak is secured.
**Tighten R.F. trimmer screw for maximum capacity, then unscrew until first peak is secured.

NOTE A. Set gang at minimum.
NOTE B. Strongest signal and rock gang.

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ALIGNMENT OF M-2, M-3 FM BAND

Following are described two (2) methods for the Alignment of the F.M. Band.

Method 1 will require the use of a Cathode Ray Oscilloscope, a sweep frequency generator providing a fundamental frequency at 4.3 Mc and a deviation of at least 150 Kc and also a signal generator with a fundamental high frequency range of 42-50 Mc.

As an indicating device, a meter with at least 10 Meg. ohm internal resistance can be used or as a second choice - a low range micro-ammetor with a 1 Meg. ohm resistor in series.

Method 2 will require the same equipment with the exception of the Oscilloscope and the 4.3 Mc sweep generator.

ALIGNMENT BY METHOD 1

Connect the vertical deflection input of the oscilloscope with a 1 Meg. ohm resistor in series to the grid of the limiter tube. Care must be exercised to maintain the connection of the resistor to the grid of the limiter tube as short as possible to avoid regeneration. The ground terminal of the oscilloscope must be connected to the chassis.

Limiter Alignment - Connect the ground terminal of the 4.3 Mc I.F. sweep generator to the chassis. Connect the output of the signal generator to the grid of the second I.F. tube with a .1 Mfd. paper condenser in series, adjust the deviation control of the generator for a usable picture on the oscilloscope screen, with the input control of the oscilloscope set at maximum gain. Detune the secondary trimmer of the limiter transformer, adjust the primary trimmer until you obtain a pattern as shown in Figure 1 of the oscilloscope photos. Then adjust the secondary trimmer until you obtain a pattern as shown in Figure 2. The pattern should be kept centered in the oscilloscope screen.

Align 2nd I.F. - Move the signal generator to the grid of the 1st I.F. tube and repeat the same procedure as just described for the limiter stage.

Align 1st I.F. - Move the signal generator to the grid of the Mixer tube and repeat the same procedure as just described for the limiter stage.

Align Discriminator - Connect the oscilloscope to the Cathode of the 6H6 F.M. detector which is not grounded. Connect the signal generator to the secondary of the limiter transformer as indicated by A in Figure 6. Adjust the secondary trimmer of the discriminator transformer with an insulated screw driver, for pattern as in Figure 2, then adjust the primary trimmer to obtain symetrical and linear trace and centering the picture on the oscilloscope screen. It will be necessary to go over the primary and secondary trimmer several times to adjust the stage accurately.

R.F. Alignment F.M. Band - Connect the high frequency generator to the regular terminal with a 400 ohm carbon resistor in series. Make certain the F.M. antenna Selector Switch is in regular position.

Set the signal generator at 50 Mc and adjust the Oscillator trimmer for correct dial calibration at this frequency. Connect high resistance Voltmeter to point A, Figure 4 and then adjust the signal generator to 49.5 Mc adjust the mixer and the R.F. Trimmers for maximum deflection of the meter.

Another indicating device for the R.F. alignment - connect a 0-1 millameter between point A and ground or a low range micro-ammeter with a 1 Meg. ohm resistor as series between C and ground. Tune for maximum deflection of the meter.

Lacking the above meters, the R.F. and Mixer alignment may be trimmed for minimum noise on signal. To avoid false peak when aligning the Mixer and the R.F. Trimmers the gang condenser must be rocked through the signal.

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MODELS M-2FM,
M-3FM Series

ALIGNMENT OF M-2, M-3 FM BAND (Continued)

ALIGNMENT BY METHOD 2

Limiter Alignment - Connect one of the indication meters as shown in Figure 4 or Figure 5.

Feed a 4.3 Mc signal through .1 Mfd. paper condenser to the grid of the second I.F. tube. Place a 1000 ohm carbon resistor across the secondary of the limiter transformer then tune the primary for maximum meter deflection. Remove the 1000 ohm carbon resistor from the secondary and place it across the primary and tune the secondary maximum meter deflection.

To check how accurate this stage has been aligned tune the signal generator 75 Kc each side of 4.3 Mc. Only a slight loss in maximum meter deflection should be noted.

Align 2nd I.F.F.M. - Move the signal generator to the grid of the 1st I.F. tube and repeat the same procedure described above for the limiter stage.

Align 1st I.F.F.M. - Move the signal generator to the grid of the mixer tube and repeat the same procedure as described above for the limiter stage.

Discriminator Alignment - Connect a meter to Point A as shown in Figure 6 to the ungrounded Cathode.

Feed a 4.3 Mc signal to the grid of the second I.F. tube.

With an insulated screw driver turn the the secondary trimmer screw for maximum and minimum capacity. You will note that there are two points where you have maximum meter deflection. Tune to the point between the the maximum meter deflections where the meter will read as near zero as possible.

Tune the signal about 150 Kc each side of 4.3 Mc. You will note that the meter deflection rises about equal distance each side of 4.3. Mc. Tune the primary trimmer until you have maximum meter deflection and equal distance each side of 4.3 Mc.

Note: The meter will have to be reversed when reading the other side of the signal.

It will be necessary to go over the primary and secondary trimmers several times to accurately align this stage.

R.F. Alignment FM Band - Connect the high frequency generator to the regular terminal with a 400 ohm carbon resistor in series. Make certain the FM antenna Selector Switch is in regular position.

Set the signal generator at 50 Mc and adjust the Oscillator trimmer for correct dial calibration at this frequency. Connect high resistance Voltmeter to point A, Figure 4 and then adjust the signal generator to 49.5 Mc adjust the mieer and the RF Trimmer for maximum deflection of the meter.

Another indicating device for the RF alignment - connect a 0-1 millameter between point A and ground or a low range micro-ammeter with a 1 Meg. ohm resistor as series between C and ground. Tune for maximum deflection of the meter.

Lacking the above meters, the RF and Mixer alignment may be trimmed for minimum noise on signal. To avoid false peak when aligning the Mixer and the RF Trimmers the gang condenser must be rocked through the signal.

Note: If a high frequency signal generator is not available a standard signal generator which will give good harmonic output between 42 - 50 Mc can be used.

Several methods of using a micro-ammeter or a V.T. voltmeter may be used for the alignment of the discriminator are shown in figure 7.

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MODELS M-2FM,
M-3FM Series

I.F. BEFORE ALIGNMENT FM

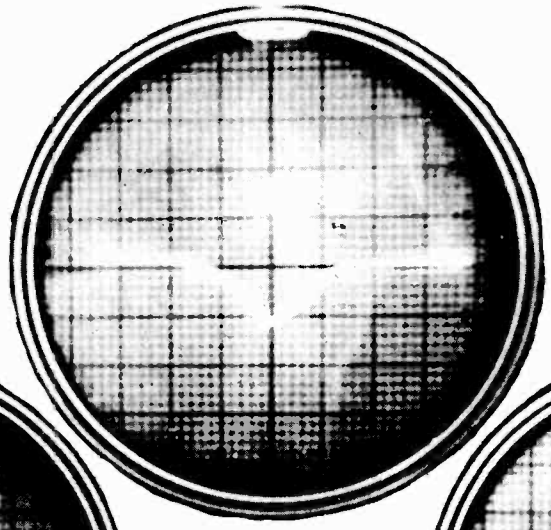

FIG. 1

I.F AFTER ALIGNMENT FM

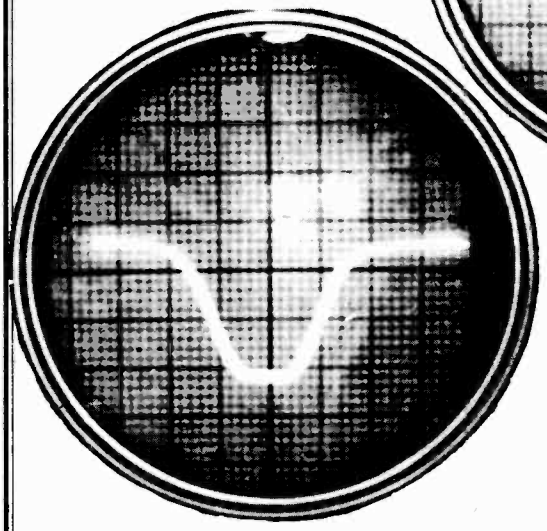

FIG. 2

ALIGNMENT OF THE DISCRIMINATOR

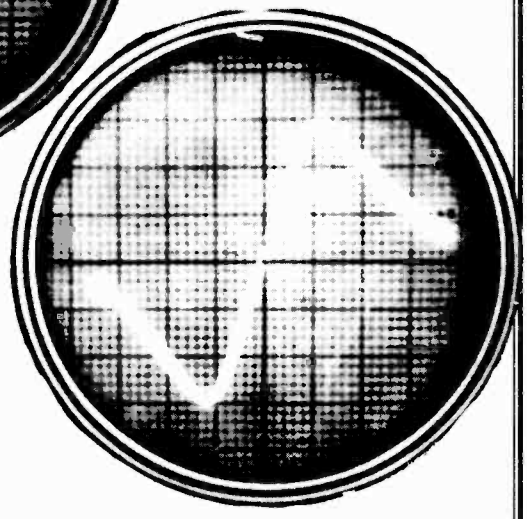

FIG. 3

METHODS OF MEASURING LIMITER GRID VOLTAGE.

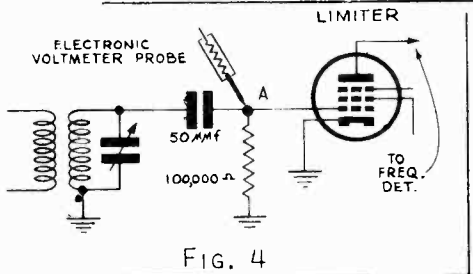

FIG. 4

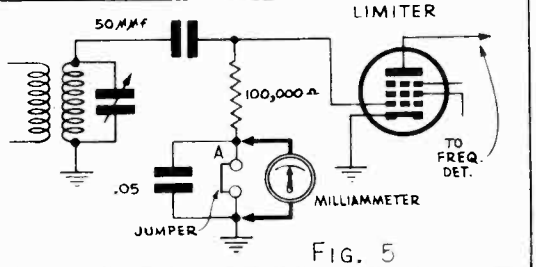

FIG. 5

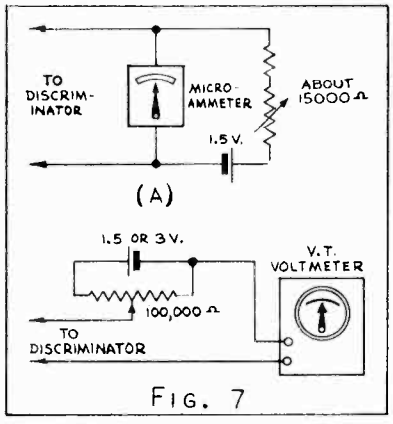

FIG. 7

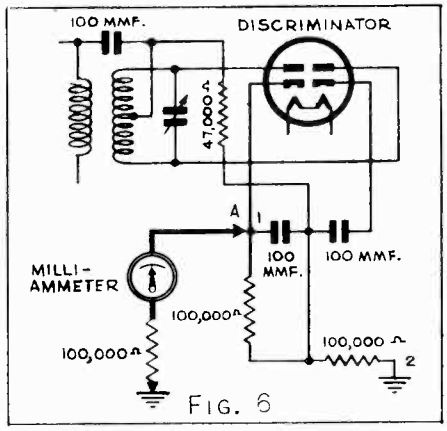

FIG. 6

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MODELS M-2FM,
M-3FM Series

PARTS LIST — **M-2FM and M-3FM**

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
1	773-49	77214	100M Ohm
2	773-35	77270	2.2 Meg.
3	773-43	77211	4700 Ohm
4	77-40	77263	1500 Ohm
5	773-54	77218	1 Meg.
6	77-69	77266	22 M Ohms
7	773-36	77209	220 Ohm ½ W. Early Production
8	773-4	77258	100 Ohms
9	773-80	77215	150 M Ohms
10	773-40	77213	47 M Ohms
11	773-56	77271	3.3 Meg.
12	77-98	77305	6800 Ohms
13	773-39	77262	1000 Ohms
14	773-42	77210	3300 Ohms
15	773-11	77264	2200 Ohms
16	773-53	77217	470 M ½ W. Early Production Phono Input
17	773-52	77268	330M Ohms
18	773-51	77216	220M Ohms
19	25-134	25196	.05 Mfd. 600 V.
20	25-80	25196	.05 Mfd. 600 V.
21	25-81	25215	.1 Mfd. 600 V.
22	254-2	25194	.01 Mfd. 600 V.
23	25-97	25194	.01 Mfd. 600 V.
24	253-4	25192	25 MMF
25	253-5	25193	50 MMF
26	25-136	25136	80 MMF Silver Mica
27	253-1	25188	100 MMF Mica
28	25-52	25052	200 MMF Silver Mica
29	253-2	25187	250 MMF Mica
30	253-3	25189	500 MMF Mica
31	258-2	25210	350 MMF Silver Mica
32	25-133	25133	5000 MMF Mica
33	78-15	78015	Volume Control 3 Meg.
34	78-20	78020	Treble Control 4 Meg.
35	78-21	78021	Bass Control 3 Meg.
36	38-371	38371	Loop Antenna Assembly M-2 & M-3
36	13-208	13208	Antenna Control Assembly 100 M-2 & 100 M-3
37	38-327	38327	FM Antenna Coil
38	38-318	38318	S.W. Antenna Coil
39	38-132	38132	B.C. Mixer Coil
40	38-328	38328	40 FM Mixer Coil
41	38-319	38319	S.W. Mixer Coil
42	38-246	38246	B.C. Oscillator Coil
43	38-329	39329	FM Oscillator Coil
44	38-320	38320	S.W. Oscillator Coil
45	38-82	38082	I.F. Trap Coil
46	38-127	38127	1st. I.F. Transformer AM
47	38-128	38128	2nd. I.F. Transformer AM
48	38-237	38237	1st. I.F. Transformer FM
49	38-238	38238	2nd. I.F. Transformer FM
50	38-239	38239	Limiter Transformer FM
51	38-240	38240	Discriminator Transformer FM
52	26-151	26151	BC & FM Antenna & Mixer Trimmer
52	26-147	26147	BC & FM Oscillator Trimmer
53	26-140	26140	S.W. Trimmer Ceramic
54	26-141	26141	Band Spread Padder Ceramic
55	26-142	26142	Band Spread Trimmer Ceramic
56	263-1	26196	B.C. Oscillator Padder
57	26-50	26050	I.F. Trap Trimmer
58	11-145	11145	Phono Motor Socket & Cable Assembly
59	25-50	25050	Electrolytic Condenser
60	11-75	11075	A.C. Plug to Amp.
61	11-74	11074	Amp. Input Plug & Cord
62	805-1	80267	Phono Jack
63	80-169	80169	A & G Terminal Strip
64	80-104	80104	D & D Terminal Strip
65	22-101	22101	Tuner Power Supply Cable & Plug Assembly
66	90-96	90096	Antenna Change Over Switch
67	90-83	90083	Band Switch
68	90-81	90081	Push Button Switch
69	38-316	38316	Push Button Oscillator Coil Strip
70	36-149	36149	Push Button Trimmer Strip—Lower
70	26-148	26148	Push Button Trimmer Strip—Upper
71	26-137	26137	Three Gang Condenser
72	31-178	31178	Dial Scale
	11-63	11063	Treble Pointer
	11-62	11062	Bass Pointer
	07-85	07085	Tone Control Drive Cord Assembly
	11-71	11071	Dial Pointer
	07-146	07146	Dial Drive Cord Assembly

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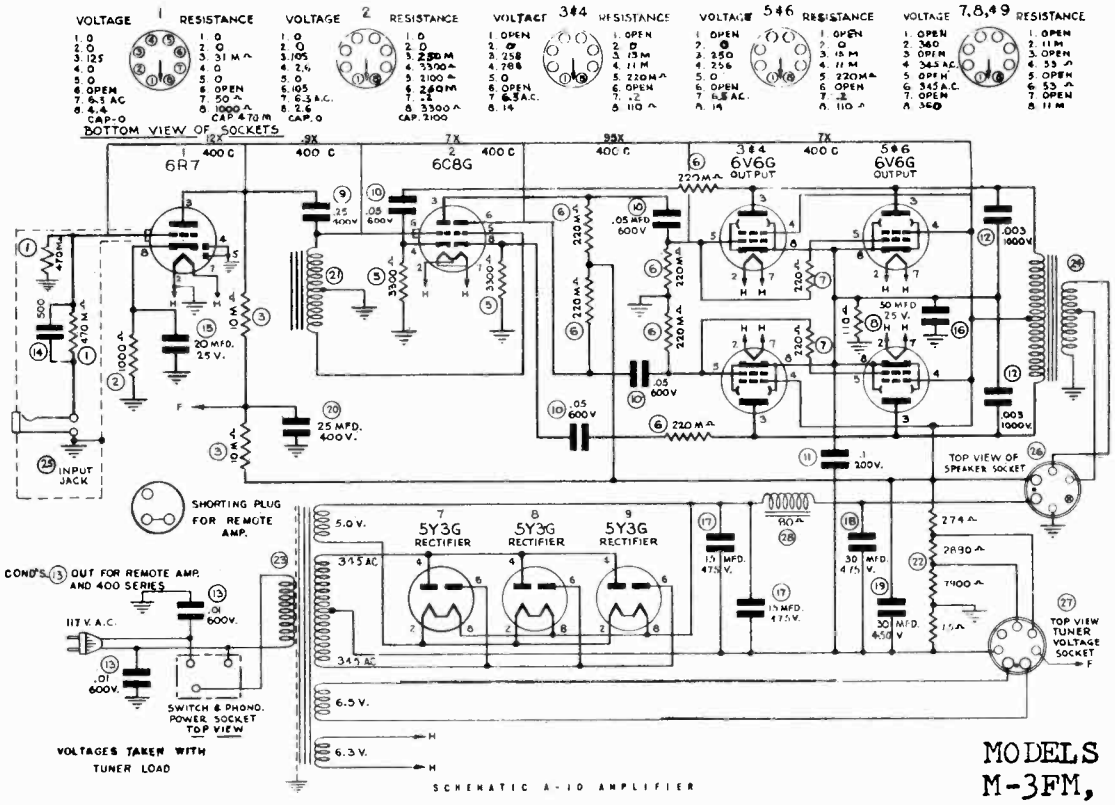
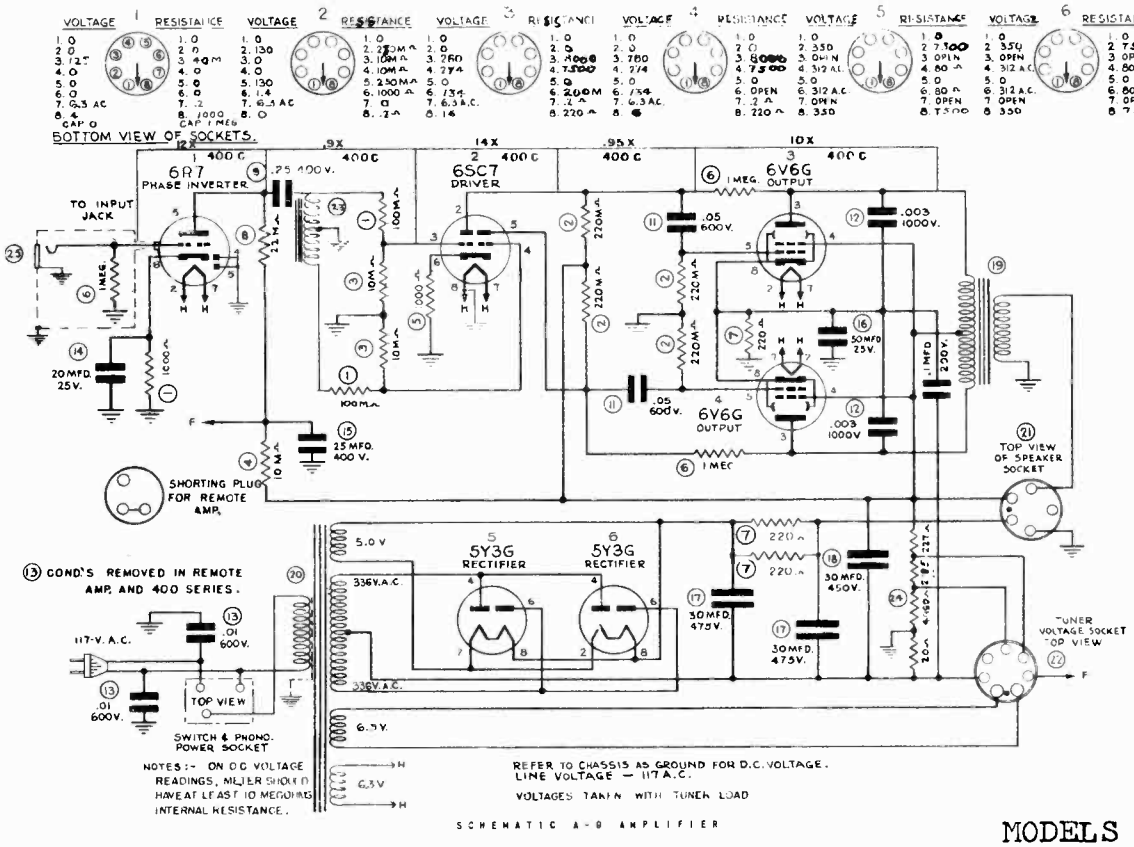
MODELS M-2FM, M-3FM, M-2AM, M-3AM, Series



MODELS M-2FM, M-3FM, Series



MODELS M-2AM, M-3AM, Series

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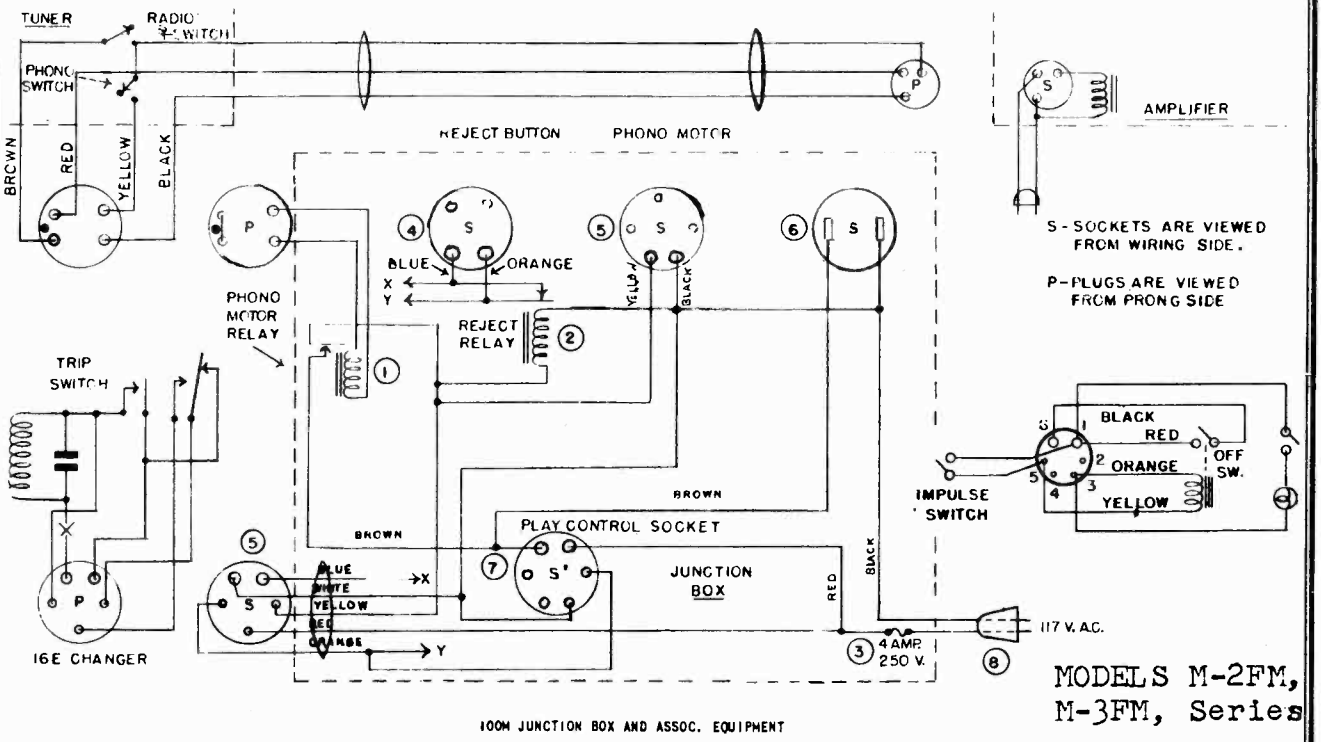
MODELS M-2FM, M-3FM,
M-2AM, M-3AM, Series



MODELS M-2FM,
M-3FM, Series

PARTS LIST

JUNCTION BOX 100 M-2, 100 M-3

MODELS M-2AM,
M-3AM, Series

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
1	90-63	90063	Phono Motor Relay
2	90-109	90109	Reject Relay
3	48-5	48005	4 Amp. 250 V. Fuse
4	80-77	80077	4 Prong Socket
5	80-57	80057	5 Prong Socket
6	80-69	80069	2 Prong Socket
7	80-61	80061	6 Prong Socket
8	27-134	27134	A.C. Line Cord

CABINET

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
	59-106	59106	Dial Escutcheon
	59-115	59115	Dial Escutcheon, Blonde
	59-105	59105	Push Button Knobs
	59-129	59129	Push Button Knobs, Blonde
	6060	67391	Tone Control Knobs
	67-81	67081	Tone Control Knobs, Blonde
	6058	67389	Tuning Knob
	67-80	67080	Tuning Knob, Blonde
	67-209	67209	Range Knob
	67-210	67210	Range Knob, Blonde
	31-158	31158	Wave Band Decal
	31-62	31062	Tuning & Treble Decal
	31-63	31063	Volume & Bass Decal
	41-78	41078	Station Call Letter Kit
	73-518	73518	Operating Instructions M-2 & M-3
	73-520	73520	Operating Instructions 100 M-2 & M-3
	2769	90194	Reject Button
	66399	66399	Gear Box 100 M Series
	21156	21156	Drive Motor 100 M Series
	81-57	81057	Speaker for M-3
	81-64	81064	Speaker for M-2
	81-78	81078	Cone & Voice Ass'y for 81-57 Speaker
	81-77	81077	Cone & Voice Coil Ass'y for 81-64 Speaker

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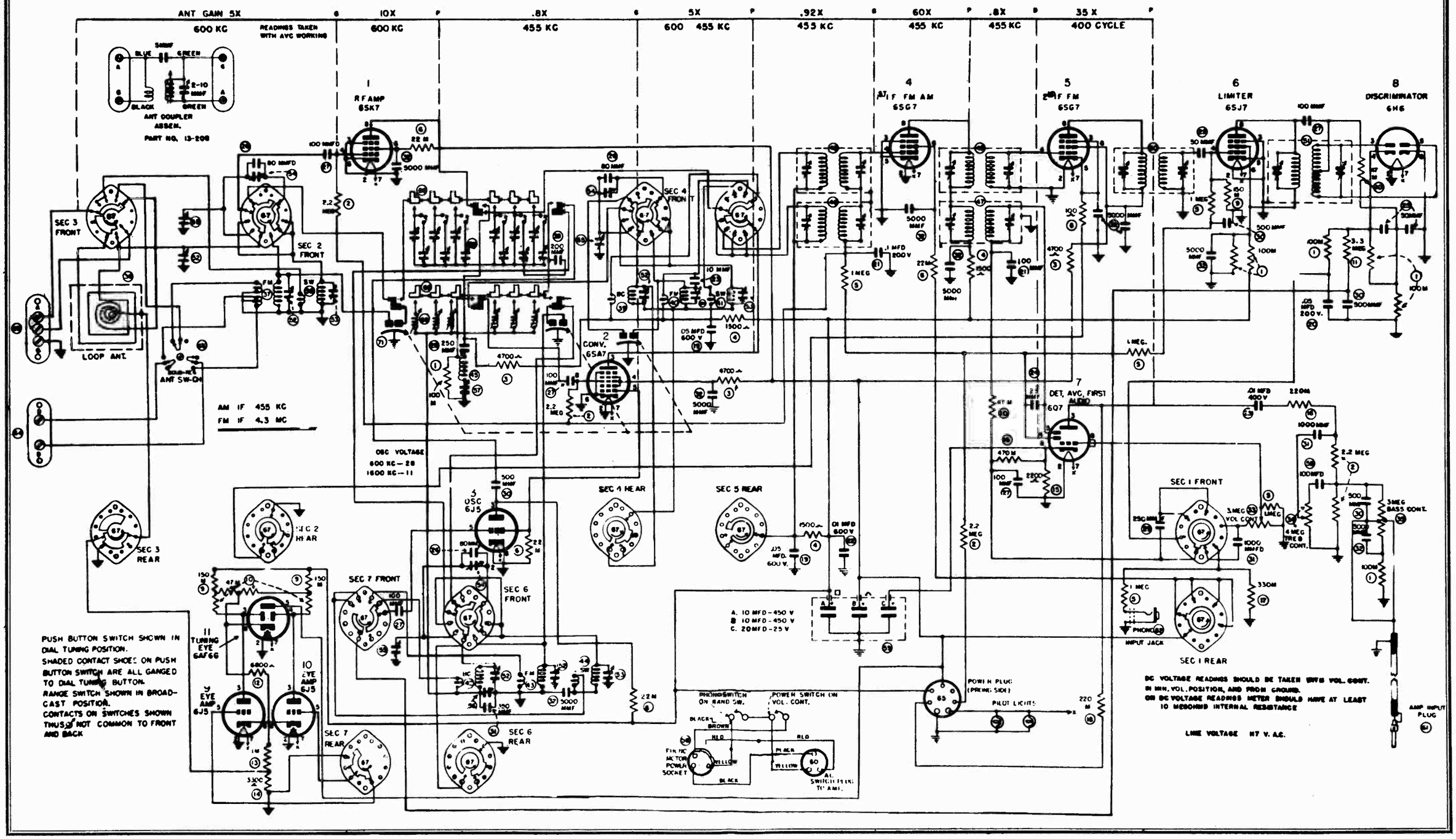
MODELS M-2FM, M-3FM,
M-2AM, M-3AM, Series

	1	2	3	4	5	6	7	8	9	10	11
VOLTAGE	1.0 2.8 3.0 4-1.3 5.0 6.115 7 6.3 AC 8 245	1.0 2.0 3.230 4.98 5-11 6.0 7 6.3 AC 8-1.3	1.0 2.0 3.185 4.230 5-11 6 OPEN 7 6.3 AC 8.0	1.0 2.0 3.0 4-1.3 5.0 6.100 7 6.3 AC 8 250	1.0 2.0 3.34 4.0 5.4 6.80 7 6.3 AC 8.85	1.0 2.0 3.0 4.25 5.0 6.30 7 6.3 AC 8.75	1.0 2.0 3.115 4.1.5 5-1.8 6-1.5 7 6.3 AC 8 1.5 CAP O	1.0 2.0 3.35 4.1 5-5 6-5 7 6.3 AC 8.0	1.0 2.0 3.40 4.20 5-1. 6.85 7 6.3 AC 8.0	1.0 2.0 3.40 4.20 5-1 6.85 7 6.3 AC 8.0	1.0 2.0 3.40 4.40 5.125 6.0 7 6.3 AC 8.0
RESISTANCE	1.0 2.0 3.0 4-4.5 MEG. 5.0 6.10 M. 7.2 8 6800	1.0 2.0 3.6500 4.10 M 5.2.5 M 6.0 7.2 8 4.5 MEG.	1.0 2.0 3.30 M 4.7000 5.2.2 M 6 OPEN 7.0 8.0	1.0 2.0 3.0 4.2.5 MEG 5.0 6.2.2 M 7.0 8 7500	1.0 2.0 3.100 4.0 5.100 6.10 M 7.0 8 6000	1.0 2.0 3.0 4.150 M 5.0 6.50 M 7.0 8	1.0 2.0 3.250 M 4.600 M 5.150 M 6.150 M 7.0 8 4560 CAP O	1.0 2.0 3.0 4.150 M 5.0 6.50 M 7.0 8	1.0 2.0 3.100 M 4.800 M 5.150 M 6.100 M 7.0 8.0	1.0 2.0 3.90 M 4.6000 5 4.5 MEG 6.40 M 7.0 8 1000	1.0 2.0 3.390 M 4.6000 5 4.5 MEG 6.40 M 7.0 8 1000	1.0 2.0 3.105 M 4.105 M 5.7000 6.175 M 7.0 8 4560



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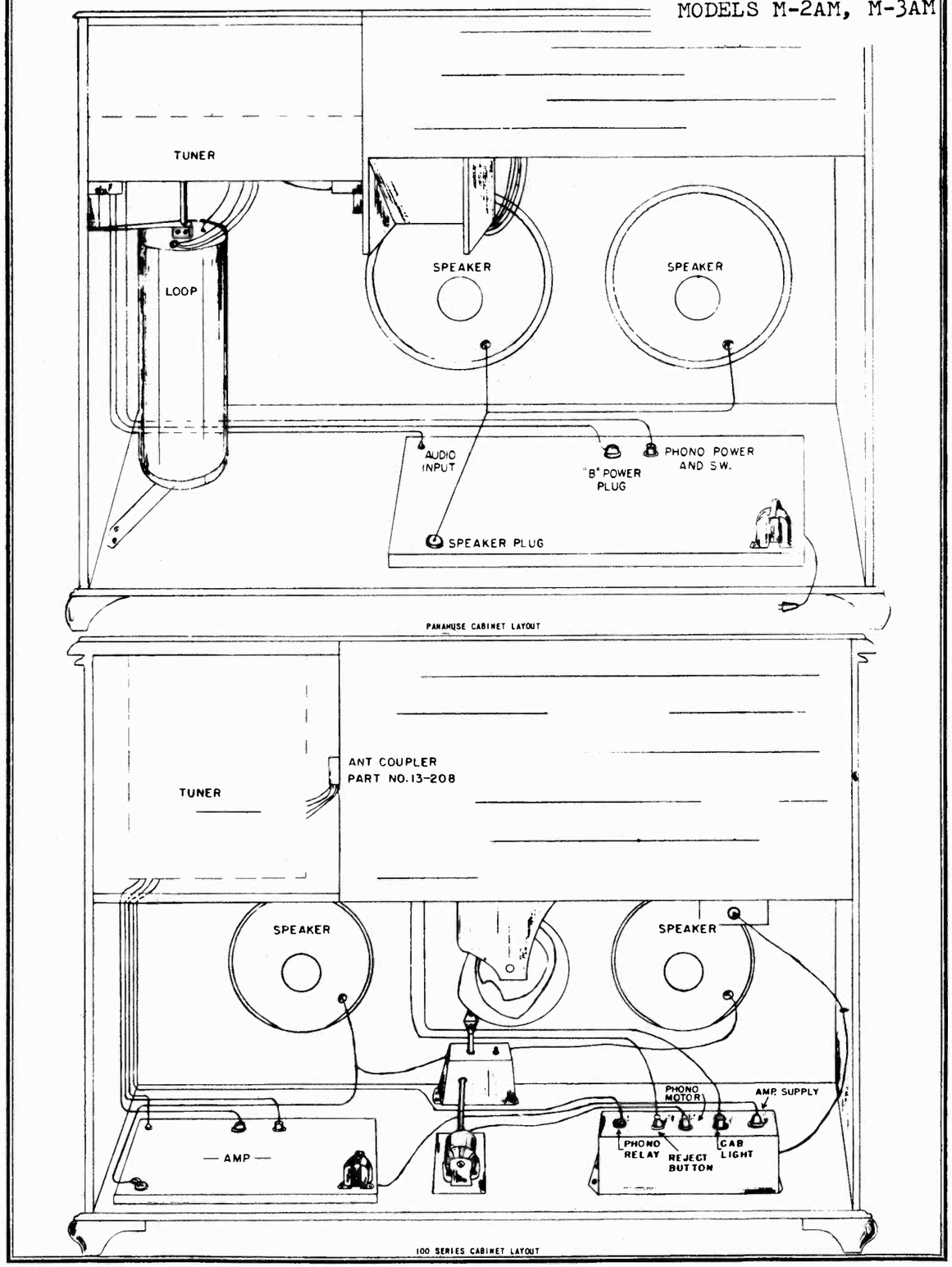
MODELS M-2FM,
M-3FM, Series
MODELS M-2AM, M-3AM



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MODELS M-2FM,
M-3FM, Series

PARTS LIST

AMPLIFIER A-9 M-3

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
1	773-83	77214	100 M Ohms ½ Watt
2	773-79	77216	220 M Ohms ½ Watt
3	773-74	77212	10 M Ohms ½ Watt
4	77-22	77022	10 M Ohms 1 Watt
5	773-39	77262	1000 Ohms ½ Watt
6	773-84	77218	1 Meg ½ Watt
7	77-104	77104	220 Ohms 4 Watt
8	77-69	77069	22 M Ohms 1 Watt
9	25-133	25054	.25 Mfd. 400 V.
10	254-6	25195	.02 Mfd. 600 V.
11	254-8	25196	.05 Mfd. 600 V.
12	25-46	25046	.003 Mfd. 1000 V.
13	257-2	25209	.01 Mfd. 600 V. Line Buffer
14 & 15	25-42	25042	25 Mfd. 400 V. 20 Mfd. 25 V.
16	25-38	25038	50 Mfd. 25 V.
17	25-139	25139	30 Mfd. 475 V.
18	25-146	25146	30 Mfd. 450 V.
19	94-34	94034	Output Transformer
20	94-62	94062	Power Transformer
21	80-57	80057	Speaker Socket
22	80-50	80050	Tuner Voltage Socket
23	94-85	94085	Phase Connector Reactor
24	77-103	77103	Voltage Divider
25	8054	80030	Phono Input Jack

AMPLIFIER A-10 M-2

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
1	773-53	77217	470 M Ohms ½ Watt
2	773-39	77262	1000 Ohms ½ Watt
3	77-32	77212	10 M Ohms ½ Watt
4	773-41	77264	2200 Ohms ½ Watt
5	773-72	77210	3300 Ohms ½ Watt
6	773-81	77216	220 M Ohms ½ Watt
7	773-51	77209	220 Ohms ½ Watt
8	77-71	77071	110 Ohms 10 Watt
9	25-54	25054	.25 Mfd. 400 V.
10	254-8	25196	.05 Mfd. 600 V.
11	256-2	25210	.1 Mfd. 600 V.
12	25-46	25046	.003 Mfd. 1000 V.
13	257-2	25209	.001 Mfd. 600 Line Buffer
14	253-3	25189	500 MMF Mica
16	25-38	25038	50 Mfd. 25 V.
17	25-138	25138	15 Mfd. 475 V.
18	25-139	25139	30 Mfd. 475 V.
19	25-146	25146	30 Mfd. 450 V.
15 & 20	25-42	25042	25 Mfd. 400 V. 20 Mfd. 25 V.
21	94-85	94085	Phase Connector Reactor
22	77-102	77102	Voltage Divider
23	94-61	94061	Power Transformer
24	94-32	94032	Output Transformer
25	805-1	80267	Input Jack
26	80-57	80057	Speaker Socket
27	80-50	80050	Tuner Voltage Socket
28	94-65	94065	Choke
	27-118	27118	A.C. Line Cord

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ELECTRICAL SPECIFICATIONS

WATTS AT 117 VOLTS A.C. – 100 SERIES M-2 240, M-3 200 – PANAMUSE M-2 200, M-3 155
VOLTAGE A.C. 105 – 125
M-2 15 TUBE, M-3 12 TUBE A.C. FOUR BAND SUPERHETERODYNES

BROADCAST BAND	540 – 1600 K.C.
SHORT WAVE BAND	5.4 – 18 MC
SPECIAL SERVICE	1.6 – 5.4 MC
BAND SPREAD	9.48 – 12 MC

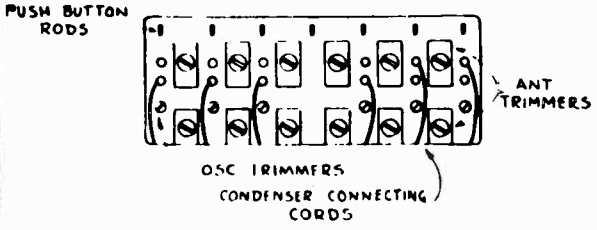
TUBE COMPLEMENT

6SK7	R.F. AMPLIFIER	6U5 TUNING EYE	M-3 AMP. A-9	M-2 AMP. A-10
6SA7	CONVERTER		6R7 VOLTAGE AMP.	6R7 VOLTAGE AMP.
6J5	OSCILLATOR		6SC7 DUO DRIVER	6C8G DUO DRIVER
6SK7	I.F. AMPLIFIER		2 – 6V6G OUTPUT	4 – 6V6 OUTPUT
6Q7	DET A.V.C. 1ST AUDIO		2 – 5Y3G RECTIFIER	3 – 5Y3G RECTIFIER

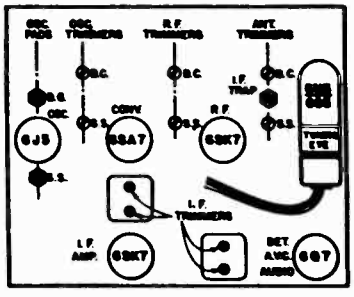
PUSH BUTTON SET UP

1. If the station you select for one of the buttons falls between 1600 to 1000 kilocycles be sure that the pin jack is in the upper strip.
2. Adjust the brass screw at the side of the lower trimmer unitl the wanted station is heard most clearly.
3. Adjust the lower trimmer screw for maximum volume.
4. Press Manual button making certain the station is still tuned in; check this reception against the reception on the button just set up. If it is the same proceed with the next station on the list.
5. If the station you desire to pick up falls between 1000 and 550 kilocycles, you must remove the pin jack and place in the hole provided at the bottom edge of the upper trimmer (see figure 1).
6. Turn the upper trimmer screw back until the screw is off the trimmer plates.
7. Adjust the brass screw until the wanted station is heard most clearly.
8. Then adjust the lower trimmer until maximum volume is secured; if maximum volume cannot be had and the lower trimmer screw is down tight you must finish tuning with the upper trimmer screw.

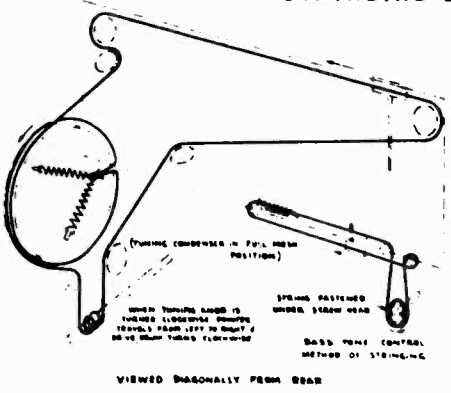
BUTTON LAYOUT

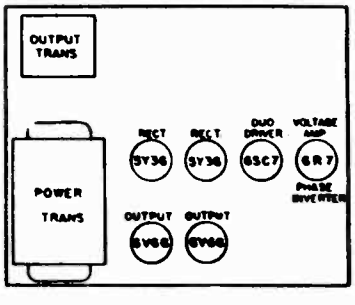


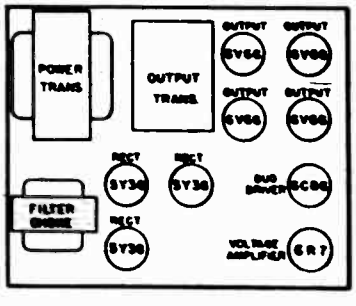
CHASSIS LAYOUT



STRINGING DIAGRAM







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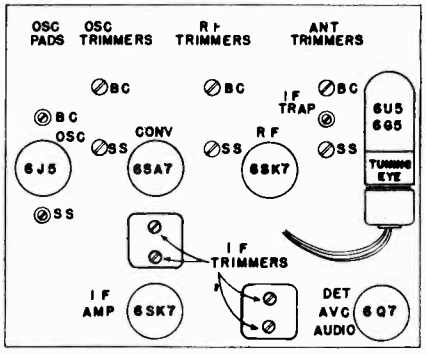
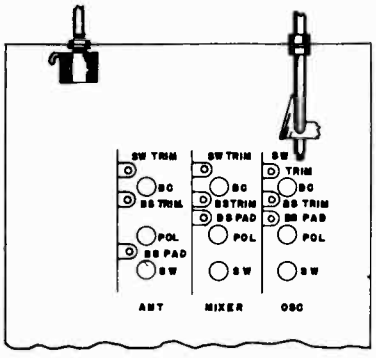
MODELS M-2AM, M-3AM



TOP VIEW



BOTTOM VIEW

ALIGNMENT INSTRUCTIONS

An output meter and a signal generator are required for proper alignment of these sets. The oscillator should be calibrated at the following points, 455 Kc, 600 Kc, 900 Kc, 1400 Kc, 1600 Kc, 2.0 Mc, 5 Mc, 5.5 Mc, 6 Mc, 9.5 Mc, 12 Mc, 16 Mc, and 18.0 Mc. Always keep the output of the signal generator as low as possible to prevent A.V.C. action and false settings. Connect the high side of the generator to the antenna terminal and the low side of it to the ground terminal.

TABULATION FOR ALIGNMENT

STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	250 M.M.F.	455 Kc.	Note A	2nd I.F. Trimmers	Top of I.F. Trans.	Max. Output
2.				1st I.F. Trimmers		
3.			Push Station Button	Wave Trap Trimmer	See Fig.	Min. Output
4.		1600 Kc.	1600 Kc.	B.C. Osc. Trimmer	SEE FIG.	MAXIMUM OUTPUT
5.		1400 Kc.	1400 Kc.	B.C. Mixer Trimmer		
6.				B.C. Ant. Trimmer		
7.		600 Kc.	Note B	600 Kc. Pad		
8.	RECHECK	1400 Kc.				
9.	400 Ohms	5.5 Mc.	5.5 Mc.	Police Osc. Trimmer *		
10.		5 Mc.	5 Mc.	Police Mixer Trimmer **		
11.				Police Ant. Trimmer **		
12.		2 Mc.	Note B	2 Mc. Pad.		
13.	RECHECK	5 Mc.				
14.	400 Ohms	18 Mc.	18 Mc.	S.W. Osc. Trimmer *		
15.		16 Mc.	16 Mc.	S.W. Mixer Trimmer **		
16.				S.W. Ant. Trimmer **		
17.	CHECK	6 Mc.				
18.	400 Ohms	12 Mc.	12 Mc.	B.S. Osc. Trimmer *		
19.				B.S. Mixer Trimmer **		
20.				B.S. Ant. Trimmer **		
21.		9.5 Mc.	9.5 Mc.	B.S. Osc. Padder		
22.				B.S Mixer Padder		
23.				B.S. Ant. Padder		
24.	RECHECK	12 Mc.				

*Tighten oscillator trimmer screw for maximum capacity, then unscrew until second peak is secured.
**Tighten R.F. trimmer screw for maximum capacity, then unscrew until first peak is secured.
NOTE A. Set gang at minimum.
NOTE B. Strongest signal and rock gang.

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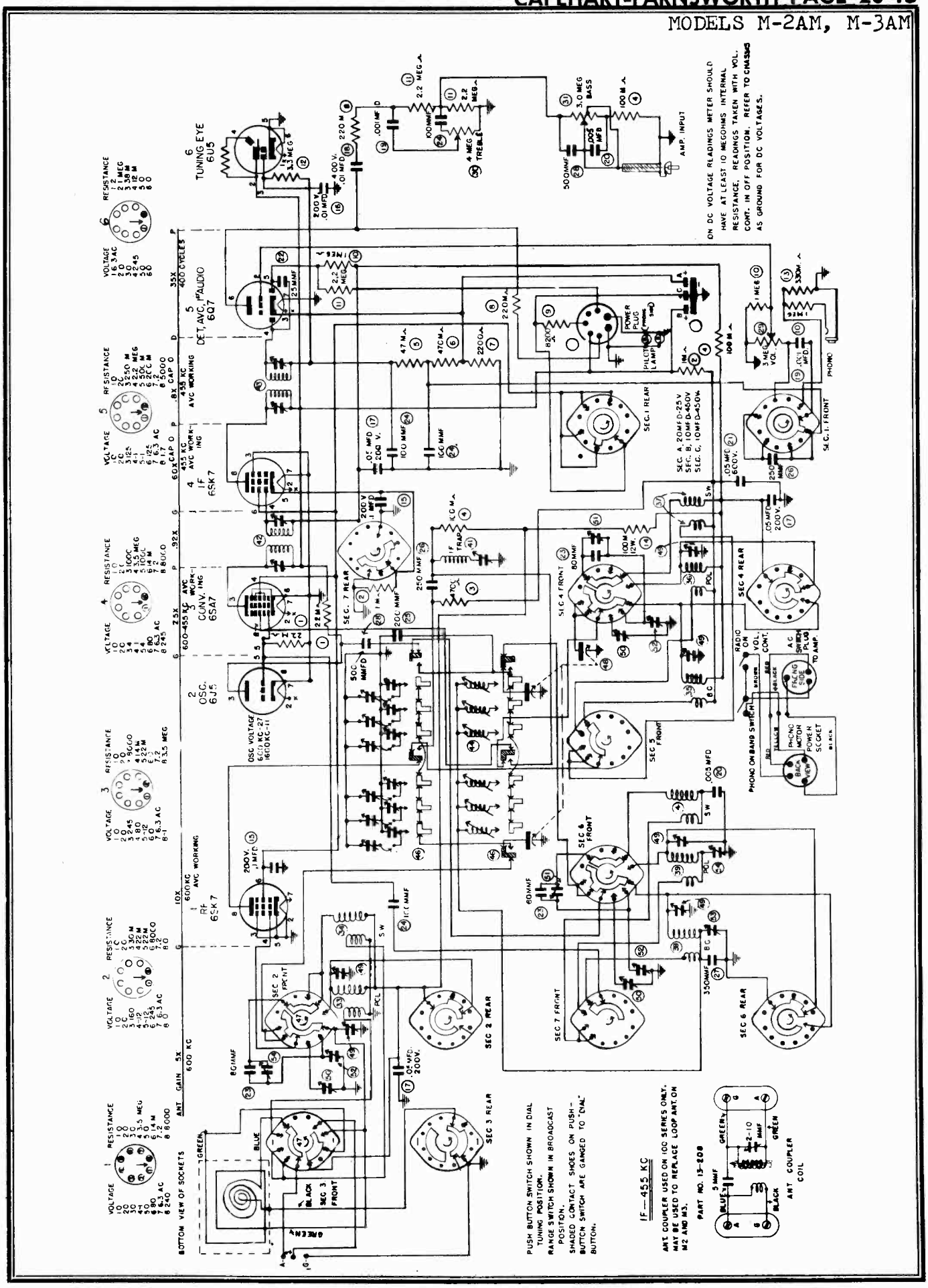
MODELS M-2AM, M-3AM



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MODELS M-2AM, M-3AM

TUNER PARTS LIST

Reference Number	Part Number	Description
1	77-69	22 M Ohm ½ watt
2	773-39	1000 Ohm ½ watt
3	773-43	4700 Ohm ½ watt
4	773-49	100 M Ohm ½ watt
5	773-40	47 M Ohm ½ watt
6	773-53	470 M Ohm ½ watt
7	773-11	2200 Ohm ½ watt
8	773-51	220 M Ohm ½ watt
9	77-146	8200 Ohm 1 watt
10	773-54	1 Meg. Ohm ½ watt
11	773-55	2.2 Meg. Ohm ½ watt
12	773-56	3.3 Meg. Ohm ½ watt
13	773-52	330 M Ohm ½ watt
14	773-49	100 M Ohm ½ watt
15	25-81	.1 Mfd. 200 V.
16	25-97	.01 Mfd. 400 V.
17	25-80	.05 Mfd. 200 V.
18	25-97	.01 Mfd. 400 V.
19	25-53	1000 M.M.F. Mica
20	2513-3	5000 M.M.F. Mica
21	25-134	.05 Mfd. 600 V.
22	253-4	25 M.M.F. Mica
23	25-136	80 M.M.F. S.M.
24	253-1	100 M.M.F. Mica
25	25-52	200 M.M.F. S.M.
26	253-2	250 M.M.F. Mica
27	258-2	350 M.M.F. S.M.
28	253-3	500 M.M.F. Mica
29	78-15	Volume Control 3 Meg.
30	78-20	Treble Control 4 Meg.
31	78-21	Bass Control 3 Meg.
32	38-371	Loop Antenna Ass'y M-2 & M-3
32	13-208	Antenna Coil Ass'y 100 M-2 & 100 M-3
33	38-129	Police Antenna Coil
34	38-318	S.W. Antenna Coil
35	38-132	B.C. Mixer Coil
36	38-133	Police Mixer Coil
37	38-319	S.W. Mixer Coil
38	38-246	B.C. Osc. Coil
39	38-317	Police Osc. Coil
40	38-320	S.W. Osc. Coil
41	38-82	I.F. Trap Coil
42	38-127	1st I.F. Trans.
43	38-128	2nd I.F. Trans.
44	38-316	Push Button Osc. Coil Strip
45	26-148	Push Button Trimmer Strip, Upper
45	26-149	Push Button Trimmer Strip, Lower
46	90-81	Push Button Switch
47	90-83	Band Switch
48	26-42	Three Gang Tuning Condenser
49	26-151	B.C. & Police Antenna & Mixer Trimmer
49	26-147	B.C. & Police Osc. Trimmer
50	26-140	S.W. Trimmer Ceramic
51	26-141	Band Spread Padder Ceramic
52	26-142	Band Spread Trimmer Ceramic
53	263-1	B.C. Padder
54	26-52	Police Padder
55	26-50	I.F. Trap Trimmer
56	25-50	Elect. Condenser
	11-71	Dial Pointer
	07-146	Drive Cord Ass'y
	31-173	Dial Scale

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MODEL M-4

ELECTRICAL SPECIFICATIONS

WATTS	AT 117 VOLTS A.C.	112
VOLTAGE	A.C.	105–125

ELEVEN TUBE A.C. THREE BAND SUPERHETERODYNE

BROADCAST BAND	540 – 1720 K.C.
SPREAD BAND	9.4 – 12.1 MC.
SHORT WAVE BAND	5.4 – 18.1

TUBE COMPLEMENT

6SK7 R.F. AMPLIFIER
6SA7 MIXER
6J5GT OSCILLATOR
6SK7 I.F. AMPLIFIER
6J5GT DETECTOR
6J5GT A.V.C.
6SQ7 1ST AUDIO
6SQ7 INVERTER
6V6G OUTPUT
6V6G OUTPUT
5Y3G RECTIFIER

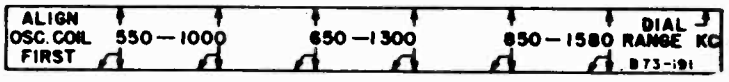
PUSH BUTTON SET UP

TO PREVENT THE BUTTONS FROM BEING SET UP ON THE WRONG STATIONS A SIGNAL GENERATOR SHOULD BE USED.

THE BUTTON TO THE EXTREME RIGHT IS THE MANUAL TUNING BUTTON.

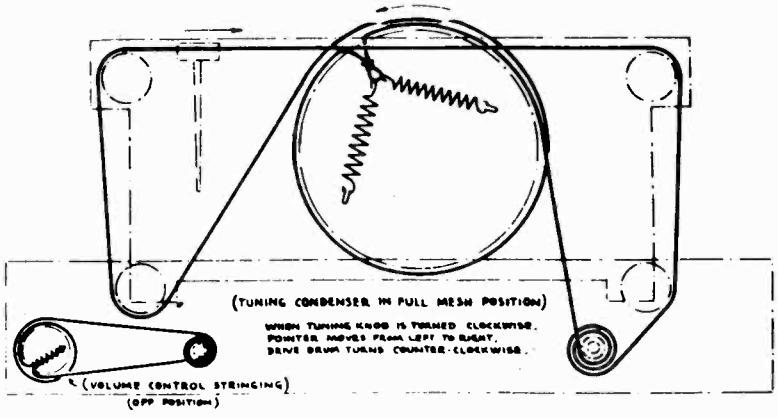
ADJUST THE LOWER SCREW (SEE FIG.) FIRST AS THIS IS THE OSCILLATOR; THEN ADJUST THE UPPER SCREW FOR MAXIMUM OUTPUT.

BUTTON LAYOUT

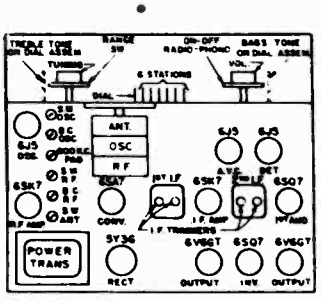


OSCILLATOR TRIMMERS — BOTTOM ROW

STRINGING DIAGRAM



CHASSIS LAYOUT



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MODEL M-4

ALIGNMENT INSTRUCTIONS

AN OUTPUT METER AND A SIGNAL GENERATOR ARE REQUIRED FOR PROPER ALIGNMENT OF THESE SETS. THE OSCILLATOR SHOULD BE CALIBRATED AT THE FOLLOWING POINTS, 455 Kc, 600 Kc, 900 Kc, 1500 Kc, 1720 Kc, 9.5 Mc, 12 Mc, 16 Mc AND 18.1 Mc. ALWAYS KEEP THE OUTPUT OF THE SIGNAL GENERATOR AS LOW AS POSSIBLE TO PREVENT A.V.C. ACTION AND FALSE SETTINGS. CONNECT THE HIGH SIDE OF THE GENERATOR TO THE ANTENNA TERMINAL AND THE LOW SIDE OF IT TO THE GROUND TERMINAL MAKING CERTAIN JUMBER ON TERMINAL STRIP IS DISCONNECTED. BEFORE ALIGNING TIGHTEN WAVE TRAP TRIMMER SCREW.

TABULATION FOR ALIGNMENT

STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	250 M.M.F.	455 Kc.	Note A	2nd I.F. Trimmers	Top of I.F. Trans.	Max. Output
2				1st I.F. Trimmers		
3			Push Station Button	Wave Trap Trimmer	See Fig.	Min. Output
4		1720 Kc.	1720 Kc.	B.C. Osc. Trimmer	SEE FIG.	MAXIMUM OUTPUT
5		1500 Kc.	1500 Kc.	B.C. Mixer Trimmer		
6				B.C. Ant. Trimmer		
7		600 Kc.	Note B	600 Kc. Pad		
8	RECHECK	1400 Kc.				
9	400 Ohms	18 Mc.	18 Mc.	S.W. Osc. Trimmer *		
10		16 Mc.	16 Mc.	S.W. Mixer Trimmer **		
11				S.W. Ant. Trimmer **		
12	CHECK	6 Mc.				
13	400 Ohms	12 Mc.	12 Mc.	B.S. Osc. Trimmer *		
14				B.S. Mixer Trimmer **		
15				B.S. Ant. Trimmer **		
16		9.5 Mc.	9.5 Mc.	B.S. Osc. Padder		
17				B.S. Mixer Padder		
18				B.S. Ant. Padder		
19	RECHECK	12 Mc.				

AFTER POINTER HAS BEEN SET ON BC AND CALIBRATION CHECKED: WITH RANGE SWITCH ON BAND SPREAD (FULL CCW) SET CONDENSER SO POINTER IS ON 12 Mc ON "FOREIGN SPREAD BAND." SET "SPREAD BAND" OSC. TRIMMER FOR MAXIMUM OUTPUT. CHECK FOR IMAGE ON 11.1 Mc (A WEAK SIGNAL SHOULD BE HEARD). ALIGN RF AND ANTENNA BAND SPREAD TRIMMERS FOR MAXIMUM SIGNAL. TURN CONDENSER SO POINTER IS ON 9.5 Mc, ADJUST SPREAD BAND OSC. PADDER FOR MAXIMUM SIGNAL. CHECK FOR IMAGE. (NO SIGNAL SHOULD BE HEARD ON 10.4 Mc). ALIGN RF AND ANTENNA BAND SPREAD PADDER FOR MAXIMUM SIGNAL. GO BACK TO 12 Mc AND REPEAT ABOVE. IF SUCH READJUSTMENT HAS TO BE MADE ON TRIMMERS, THE PADDERS MUST BE CHECKED AGAIN. GREAT CARE MUST BE TAKEN IN ADJUSTING BAND SPREAD TRIMMERS. IMAGES MUST BE CHECKED. A FIBRE SCREWDRIVER MUST BE USED TO ADJUST BAND SPREAD.

*TIGHTEN OSCILLATOR TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL SECOND PEAK IS SECURED.

**TIGHTEN RF TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL FIRST PEAK IS SECURED.

NOTE A. SET GANG AT MINIMUM.

NOTE B. STRONGEST SIGNAL AND ROCK GANG.

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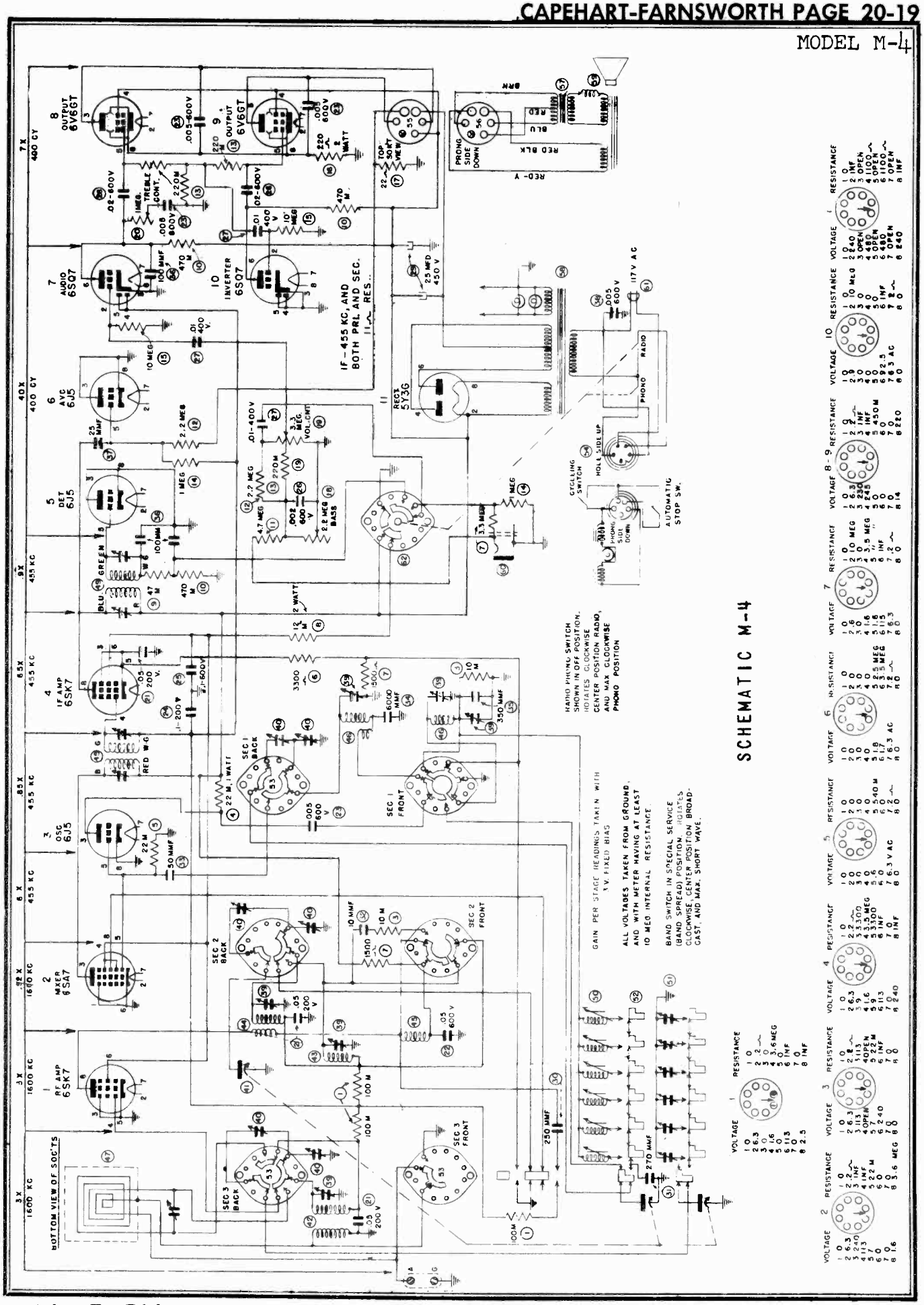
MODEL M-4



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MODEL M-4

PARTS LIST

Reference Number	Part Number	Description
1	77-39	100 M Ohms
2	77-50	1500 Ohms
3	77-49	10 M Ohms
4	77-52	22 M Ohms 1 watt
5	77-30	22 M Ohms
6	77-55	3300 Ohms
7	773-26	3.3 Meg.
8	77-53	12 M 2 watt
9	77-38	47 M Ohms
10	77-31	470 M Ohms
11	773-57	4.7 Meg.
12	77-32	2.2 Meg.
13	77-48	220 M Ohms
14	77-40	1 Meg.
15	77-33	10 Meg.
16	77-61	220 Ohms 2 watt
17	774-3	22 Ohms
18	78-11	2.2 Meg. Bass Cont.
19	78-12	3.3 Meg. Vol. Cont.
20	78-10	1 Meg. Treble Cont.
21	256-1	.05 Mfd., 200 V.
22	254-8	.05 Mfd., 600 V.
23	254-1	.005 Mfd., 600 V.
24	256-2	.1 Mfd., 200 V.
25	254-7	.1 Mfd., 600 V.
26	255-4	.002 Mfd., 400 V.
27	255-1	.01 Mfd., 400 V.
28	254-6	.02 Mfd., 600 V.
29	2511	2 - 25 Mfd. 450 V. Electrolytic Cond.
30	253-2	250 Mmf. (Silver Mica)
31	258-1	270 Mmf.
32	25-49	10 Mmf.
33	253-5	50 Mmf.
34	2514-1	6000 Mmf.
35	258-2	350 Mmf. Silver Mica
36	253-1	100 Mmf.
37	253-4	25 Mmf.
38	25-31	.005 Mfd., 600 V. (Moulded Line Buffer)
39	26-161	6 Gang Trimmer
40	26-162	2 Gang Trimmer
41	26-159	3 Gang Condenser
42	38-364	S.W. Ant. Coil
43	38-367	Amp. Filter
44	38-363	S.W. Mixer Coil
45	38-362	B.C. Mixer Coil
46	38-365	S.W. and B.C. Oscillator Coils
47	38-398	15M4 Loop Antenna
47	38-399	16M4 Loop Antenna
48	38-86	1st I.F. Transformer
49	38-87	2nd I.F. Transformer
50	38-63	Push Button Coil
51	26-30	Push Button Trimmers
52	90-116	Push Button Switch
53	90-113	Band Switch
54	11-227	5 Prong Female Plug and Lead
55	804-2	6 Prong Socket
56	80-79	6 Prong Plug
57	948-1	Output Transformer
58	944-1	Power Transformer
59	81-56	Speaker
	81-80	Voice Coil and Cone Assembly
60	805-1	Phono Jack
61	27-118	Line Cord
62	90-19	Radio Phono Switch
	07-268	Drive Cord Assembly
	07-269	Volume Control Line Cord Assembly
	11-47	Dial Pointer
	31-194	Dial Scale
	41-78	Station Call Letter Kit
	59-106	Escutcheon
	60-60	Tone Control Knob
	59-60	Band Switch Knob
	59-61	Tuning Knob
	59-105	Push Button Knob
		15M4 Walnut
		15M4 Mahogany
		16M4 Walnut

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MODEL 400-K Series

WATTS	AT 117 VOLTS A.C.	400
VOLTAGE	A.C. 60 CYCLES	105–125

30 TUBE A.C. THREE BAND SUPERHETERODYNE

BROADCAST BAND	540 – 1600 Kc
SHORT WAVE BAND	5.4 – 18 Mc
F.M. BAND	41.9 – 51 Mc

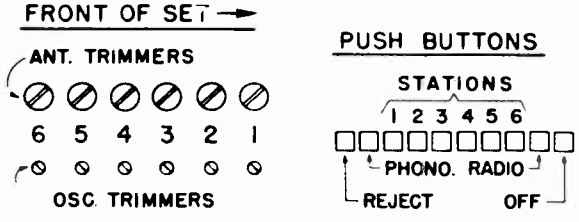
TUBE COMPLEMENT

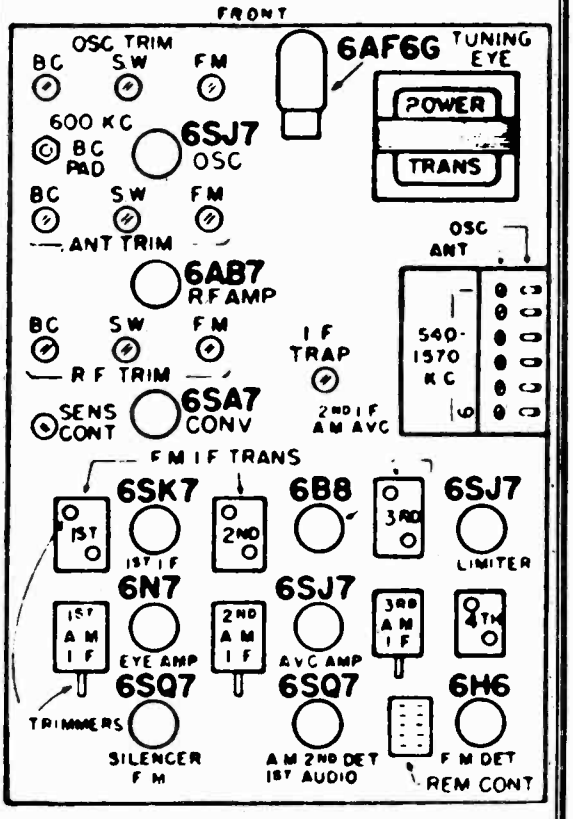
TUNER

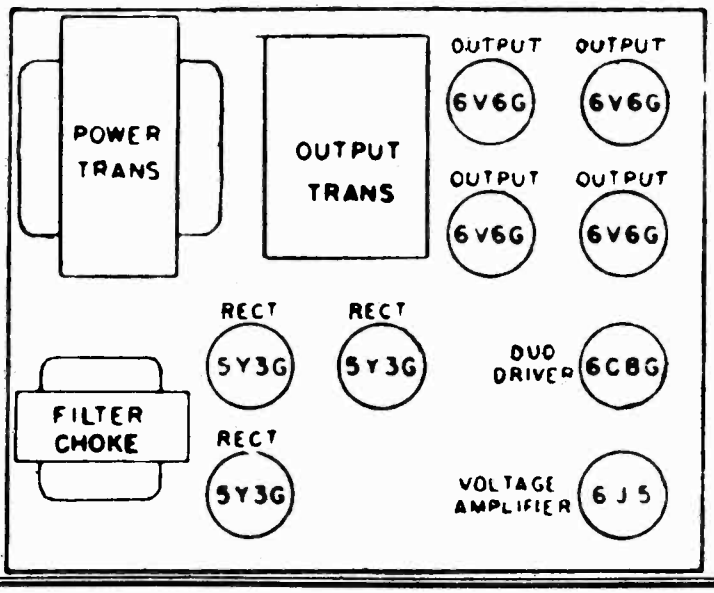
6AB7 R.F. AMPLIFIER
6SA7 CONVERTER
6SJ7 OSCILLATOR
6SK7 1ST I.F. AMPLIFIER
6B8 2ND I.F. AMPLIFIER
6SJ7 LIMITER
6N7 EYE AMPLIFIER
6SJ7 A.V.C. AMPLIFIER
6H6 DISCRIMINATOR FM
6SQ7 SILENCER FM
6SQ7 2ND DET. & 1ST AUDIO
6AF6G TUNING EYE
2 – A-7 AMPLIFIER
6J5 VOLTAGE AMPLIFIER
6SC7 DUO DRIVER
4 – 6V6G OUTPUT
3 – 5Y3G RECTIFIERS

TO SET PUSH BUTTONS

ALLOW SET TO WARM UP BEFORE SETTING UP THE BUTTON TUNING. EACH BUTTON COVERS THE ENTIRE BROADCAST BAND. TO SET ANY STATION BUTTON PRESS THE STATION BUTTON ON THE CONTROL PANEL. ADJUST THE LOWER ONE OF THE TWO SCREWS BEARING THE SAME NUMBER AS THE STATION BUTTON, UNTIL THE DESIRED STATION IS HEARD MOST CLEARLY. ADJUST UPPER SCREW UNTIL MAXIMUM VOLUME IS OBTAINED.







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MODEL 400-K Series

ALIGNMENT INSTRUCTIONS A M BANDS

AN OUTPUT METER AND A SIGNAL GENERATOR ARE REQUIRED FOR PROPER ALIGNMENT OF THESE SETS. THE OSCILLATOR SHOULD BE CALIBRATED AT THE FOLLOWING POINTS, 455 Kc, 600 Kc, 900 Kc, 1400 Kc, 1600 Kc, 6 Mc, 10 Mc, 16 Mc, AND 18.0 Mc. ALWAYS KEEP THE OUTPUT OF THE SIGNAL GENERATOR AS LOW AS POSSIBLE TO PREVENT A.V.C. ACTION AND FALSE SETTINGS. CONNECT THE HIGH SIDE OF THE GENERATOR TO THE ANTENNA TERMINAL AND THE LOW SIDE OF IT TO THE GROUND TERMINAL.

A SIGNAL GENERATOR AND OUTPUT INDICATOR ARE ALL THE EQUIPMENT WHICH IS NECESSARY FOR THE ALIGNMENT OF THIS TUNER ON THE TWO AMPLITUDE MODULATED BAND.

TABULATION FOR ALIGNMENT

STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST AND SEE FIGURE	TO OBTAIN
1	250 MMFD	455 Kc.	QUIET POINT	3RD I. F. TRIMMER	MAXIMUM OUTPUT
2				2ND I. F. TRIMMER	
3				1ST I. F. TRIMMER	
4		1500 Kc.	1500 Kc.	B. C. OSC. TRIMMER	
5				B. C. ANT. TRIMMER	
6				B. C. RF. TRIMMER	
7		600 Kc.	600 Kc.	600 Kc. PAD	
8		455 Kc.	PRESS ANY STATION BUTTON	I. F. TRAP	MINIMUM OUTPUT
9	400 OHMS	15 Mc.	15 Mc.	S. W. OSC. TRIMMER	MAXIMUM OUTPUT
10				S. W. ANT. TRIMMER	
11				S. W. RF. TRIMMER	
12	CHECK AT		6 Mc.		

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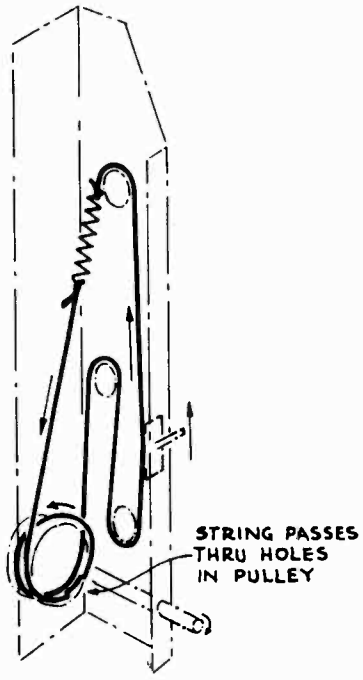
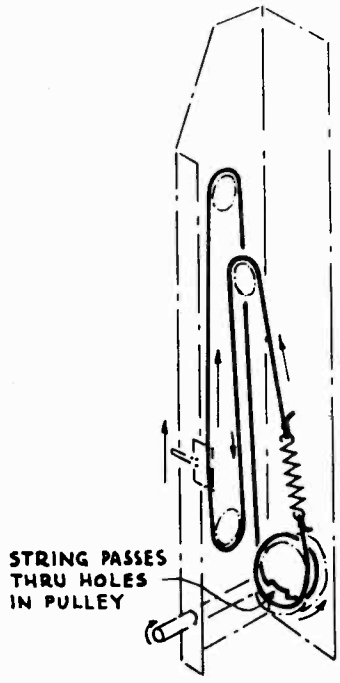


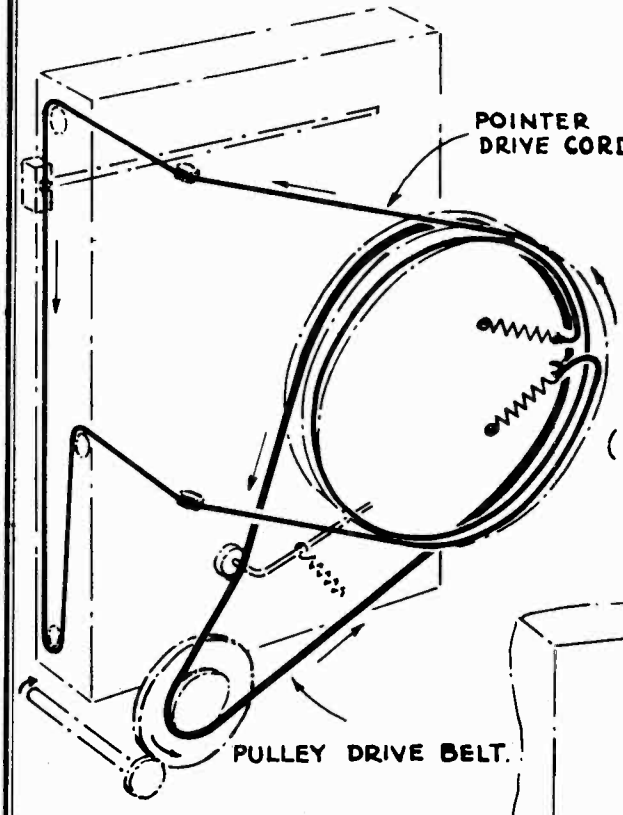
BASS TONE CONTROL

SHAFT GEARED TO TONE CONTROL. TURNING KNOB IN CLOCKWISE DIRECTION CAUSES POINTER TO MOVE UPWARD.



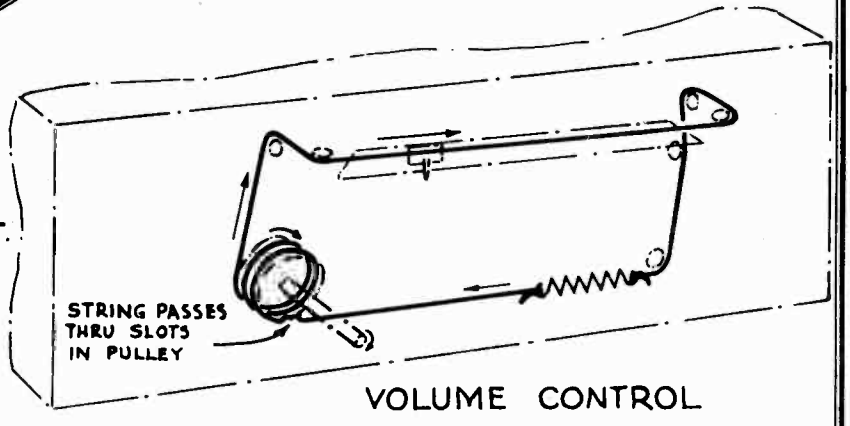
TREBLE TONE CONTROL

SHAFT GEARED TO TONE CONTROL. TURNING KNOB IN CLOCKWISE DIRECTION CAUSES POINTER TO MOVE UPWARD.



METHOD OF DIAL STRINGING.

TURNING TUNING KNOB COUNTER-CLOCKWISE MOVES POINTER FROM TOP TO BOTTOM, DRIVE DRUM TURNS CLOCKWISE, VIEWED FROM SHAFT END.



VOLUME CONTROL

TURNING KNOB IN CLOCKWISE DIRECTION CAUSES POINTER TO MOVE TO RIGHT.

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MODEL 400-K Series

ALIGNMENT OF FM BAND 400-K

An oscilloscope and a frequency modulated signal generator, which includes the range of 42 to 50 MC on fundamentals and has provisions for sweeping the signal 150 KC (75 KC each side) of the fundamental are necessary for proper alignment.

Connect the oscilloscope to the output cathode of the 6H6 discriminator tube (See A & B). Feed a 4.3 MC signal to the grid of the limiter tube through a .1 Mfd. paper condenser; adjust the input signal until some indication is apparent on the oscilloscope; then adjust the secondary trimmer of the discriminator transformer until the scope pattern crosses in the center of the cross section area. Adjust the primary trimmer until both halves of the pattern are equal in amplitude and as symmetrical as possible, show expected curve. Re-adjust the secondary so the pattern crosses in the center of the cross section area.

Connect the oscilloscope to the grid terminal of the limiter tube through a 1 Meg. resistor. Feed a 4.3 MC signal to the grid of the second I.F. tube through a .1 Mfd. condenser. Detune the secondary of the limiter transformer by loosening the trimmer screw, then adjust the primary for resonance hump, center on the vertical center line of the scope. Adjust the secondary trimmer until the pattern on the scope becomes flat topped and centered, show expected curve.

Advance the signal generator to the grid of the first I.F. tube, detune the secondary of the second I.F. transformer. Adjust the primary for maximum scope output still maintaining symmetrical pattern. Adjust the secondary for maximum output maintaining the flat topped pattern on the scope screen.

Advance the signal generator to the grid of the converter tube and repeat the above operations for the first I.F. F.M. transformer.

Care must be taken and not adjust the A.M. I.F. transformers after they have been aligned for A.M.

Apply a 50 MC signal to the antenna terminal through a 100 ohm carbon resistor and tune the receiver to this frequency. Adjust the oscillator mixer and the antenna trimmers for maximum output on the scope.

Check for calibration at 42 MC and 50 MC.

If the above equipment is not available, the following equipment may be used:

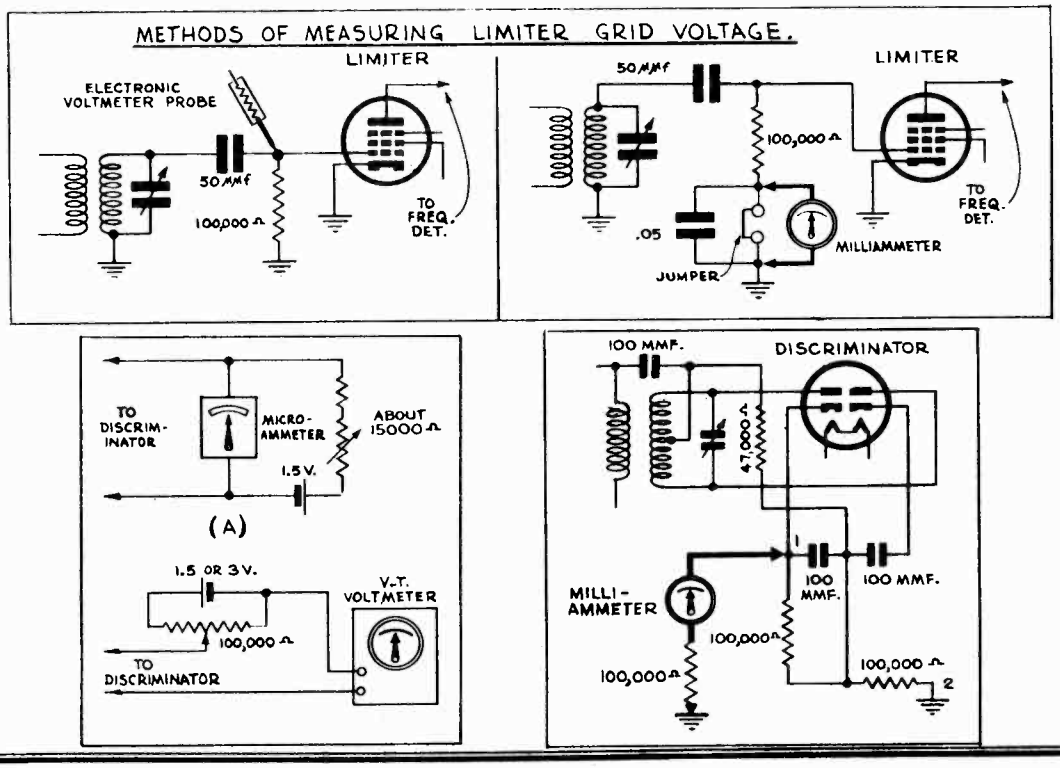
A standard signal generator.
A D.C. type vacuum tube voltmeter.
A 0-1 milliammeter or micro-ameter may be used for an output indicator.

When aligning the discriminator the output indicator must be placed in the circuit as shown in the diagram. The secondary of the discriminator must be detuned by placing a small mica (100 MMF) condenser across the secondary of the discriminator transformer. The primary of the discriminator may be adjusted for maximum output. Then remove the condenser across the secondary and tune for minimum output.

The balance of the alignment may be carried out in the same manner as before described, aligning for maximum leaving the output indicator in the limiter grid circuit.

When using a standard signal generator, the signal should be unmodulated.

Drawings below indicate the method of connecting the meters for alignment of the limiter and discriminator stages.



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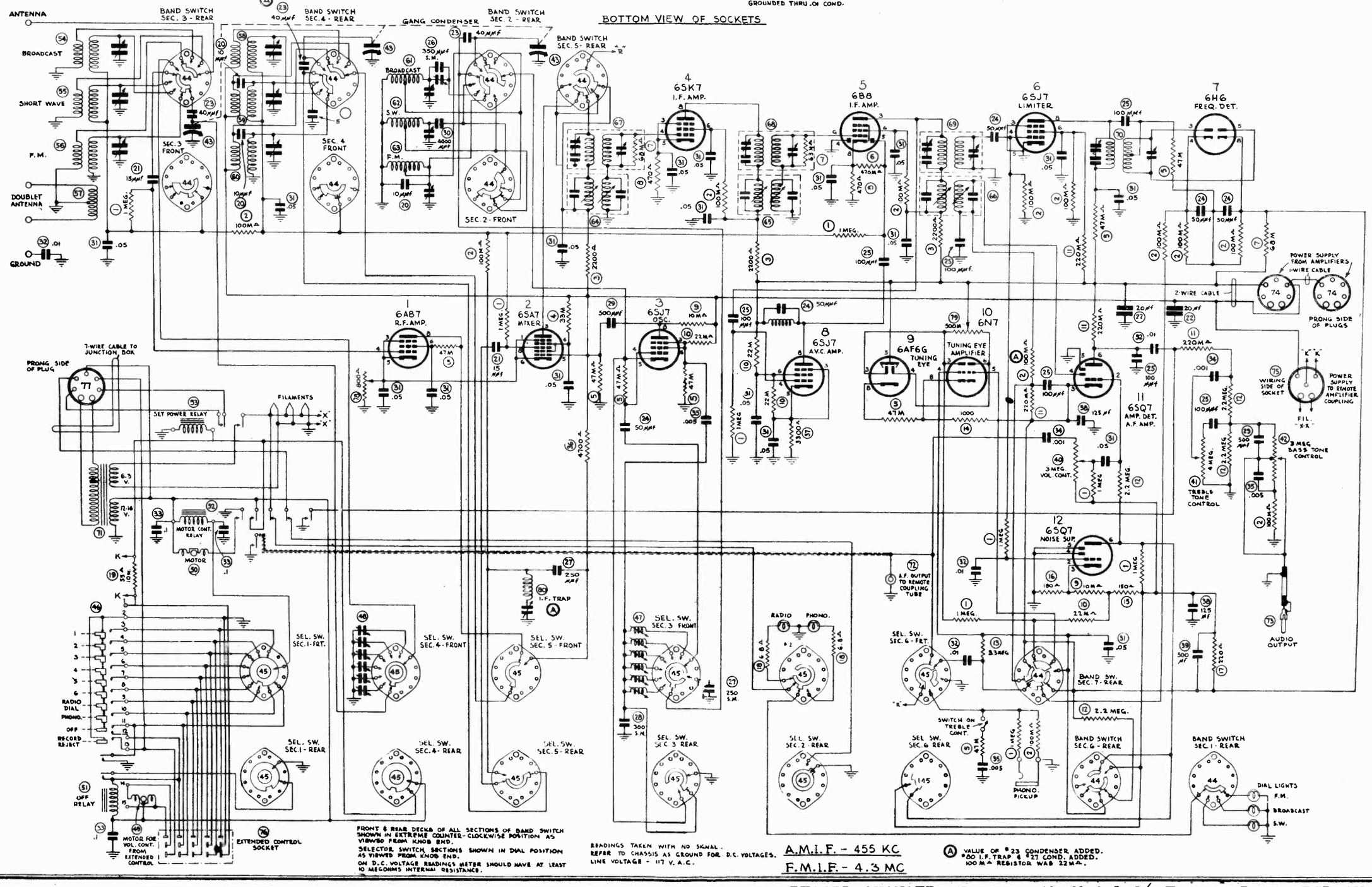
MODEL 400-K Series

	1		2		3		4		5		6		7		8		9		10		11		12	
	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1. INF.	1.0	1.0	1. OPEN	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.63AC	2..4Ω	2.32	2.2MEG	2.-3	2.1MEG
3	..6	3.60Ω	3.210	3.1200Ω	3.125	3.22MΩ	3.190	3.470Ω	3.9MΩ	3.9MΩ	3.0	3.120MΩ	3.15	3.220Ω	3.39	3.3300Ω	2.63AC	3.220Ω	3.59	3.8500Ω	3..8	3.170Ω
4	-4.5	4.2.6MEG	4.55	4.42MΩ	4.-7.5	4.47MΩ	4.0	4.14Ω	4.0	4.0	4..3	4.70MΩ	3.39	4.2/0MΩ	4.39	4.1MEG	4.125	4.3.6MEG.	4.38	4.280MΩ	4.0	4.0
5	..6	5.60Ω	5.-21	5.47MΩ	5.0	5.0	5.-4.6	5.470Ω	5.470MΩ	5.470MΩ	5.0	5.120MΩ	3.39	5.7MΩ	5.39	5.3300Ω	5.205	5.3.6 MEG.	5.0	5.0	5.0	5.0
6	187	6.60MΩ	6..6	6.550Ω	6.125	6.22MΩ	6.85	6.115MΩ	6.100MΩ	6.100MΩ	6.30	6.70MΩ	6.39	6.INF.	6.105	6.13MΩ	6.OPEN	6.210MΩ	6.140	6.180MΩ	6.95	6.8500Ω
7	0	7.9MΩ	7.0	7.0	7.0	7.20MΩ	7.0	7.9M	7.0	7.1MΩ	7.0	7.0	7.39	7.0	7.0	7.0	7.0	7.0	7.6.3AC	7..4Ω	7.6.3AC	7.4Ω
8	203		-4.6	8.2.4MEG	8.165		8.2.6 CAP 0		8.9M	8.460Ω CAP 6.5Ω	8.122		8. SHIELD OF 6H6 (TUBE #7) GROUNDED THRU .01 COND.	8.Ω	8.190	8.9MΩ	8.88	8.9200Ω	8.0	8.40	8.0	8.0	8.0	8.0



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RECORD CHANGER: Farnsworth Model 16-E, see Pages RCD.CH. 19-11 through RCD.CH. 19-44

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MODEL 400-K Series

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
1	773-24	77218	1 Meg. ½ Watt
2	773-49	77214	100 M. Ohms ½ Watt
3	773-11	77264	2200 Ohms ½ Watt
4	773-47	77267	33 M. Ohms ½ Watt
5	773-48	77213	47 M. Ohms ½ Watt
6	773-32	77208	47 Ohms ½ Watt
7	77-10	77010	68 M. Ohms 1 Watt
8	773-38	77261	470 Ohms ½ Watt
9	773-44	77212	10 M. Ohms ½ Watt
10	773-46	77266	22 M. Ohms ½ Watt
11	773-21	77216	220 M. Ohms ½ Watt
12	773-55	77270	2.2 Megs. ½ Watt
13	773-26	77271	3.3 Megs. ½ Watt
14	773-39	77262	1000 Ohms ½ Watt
15	773-65	77259	150 Ohms ½ Watt
16	77-97	77097	180 Ohms ½ Watt
17	773-66	77209	220 Ohms ½ Watt
18	77-95	77095	6.8 Ohms ½ Watt
19	77-96	77096	55 Ohms 10 Watt
20	25-64	25064	10 M.M.F. Mica
21	25-92	25092	15 M.M.F. Mica
22	25-67	25067	20 Mfd. Elec. 20 Mfd. 450 V.
23	25-60	25060	40 M.M.F. Mica
24	253-5	25193	50 M.M.F. Mica
25	253-1	25188	100 M.M.F. Mica
26	258-2	25210	350 M.M.F. Mica S. M.
27	25-27	25027	250 M.M.F. S.M.
28	25-68	25068	300 M.M.F. S.M.
29	253-5	25193	500 M.M.F. Mica
30	25-25	25025	4000 M.M.F. Mica
31	256-1	25196	.05 Mfd. 600 V.
32	254-2	25194	.01 Mfd. 600 V.
33	256-2	25215	.1 Mfd. 600 V.
34	254-9	25197	.001 Mfd. 600 V.
35	254-1	25183	.005 Mfd. 600 V.
36	773-43	77211	4700 Ohms ½ Watt
37	773-42	77210	3300 Ohms ½ Watt
38	25-66	25066	125 Mfd. Elec. Cap. 125-75 V.
39	25-90	25090	500 Mfd. 500 Mfd. 3 V.
40	78-32	78032	3 Meg. Volume Control
41	78-36	78036	4 Meg. Treble Control
42	78-35	78035	4 Meg. Bass Control
43	26-67	26067	Gang Tuning Condenser
44	90-53	90053	Band Switch Wafer #1
44	90-54	90054	Band Switch Wafer #2
44	90-55	90055	Band Switch Wafer #3
44	90-56	90056	Band Switch Wafer #4
44	90-57	90057	Band Switch Wafer #5
44	90-58	90058	Band Switch Wafer #6
44	90-59	90059	Band Switch Wafer #7
45	90-47	90047	Selector Switch Wafer #1
45	90-48	90048	Selector Switch Wafer #2
45	90-49	90049	Selector Switch Wafer #3
45	90-50	90050	Selector Switch Wafer #4
45	90-51	90051	Selector Switch Wafer #5
45	90-52	90052	Selector Switch Wafer #6
46	90-46	90046	Push Button Switch
47	13-170	13170	Push Button Osc. Coil Assy. & Cap
48	26-66	26066	Push Button Trimmer Condenser Assy.
49	44-20	44020	Volume Control Motor
50	44-21	44021	Selector Switch Motor
51	90-69	90069	Off Relay
52	90-60	90060	Motor Control Relay
53	90-69	90069	Set Power Relay
54	38-226	38226	Antenna Coil B.C.
55	38-130	38130	Antenna Coil S.W.
56	38-228	38228	Antenna Coil F.M.
58	38-132	38132	Mixer Coil B.C.
59	38-134	38134	Mixer Coil S.W.
60	38-231	38231	Mixer Coil F.M.
61	38-223	38223	Oscillator Coil B.C.
62	38-224	38224	Oscillator Coil S.W.
63	38-225	38225	Oscillator Coil F.M.
64	38-214	38214	First I.F. Transformer AM
65	38-215	38215	Second I.F. Transformer AM
66	38-216	38216	Third I.F. Transformer AM
67	38-217	38217	First I.F. Transformer FM
68	38-218	38218	Second I.F. Transformer FM
69	38-219	38219	Limiter Transformer FM
70	38-220	38220	Discriminator Transformer FM
71	94-54	94054	16 V.A.A.C. & 6.3 Volt AC Trans.

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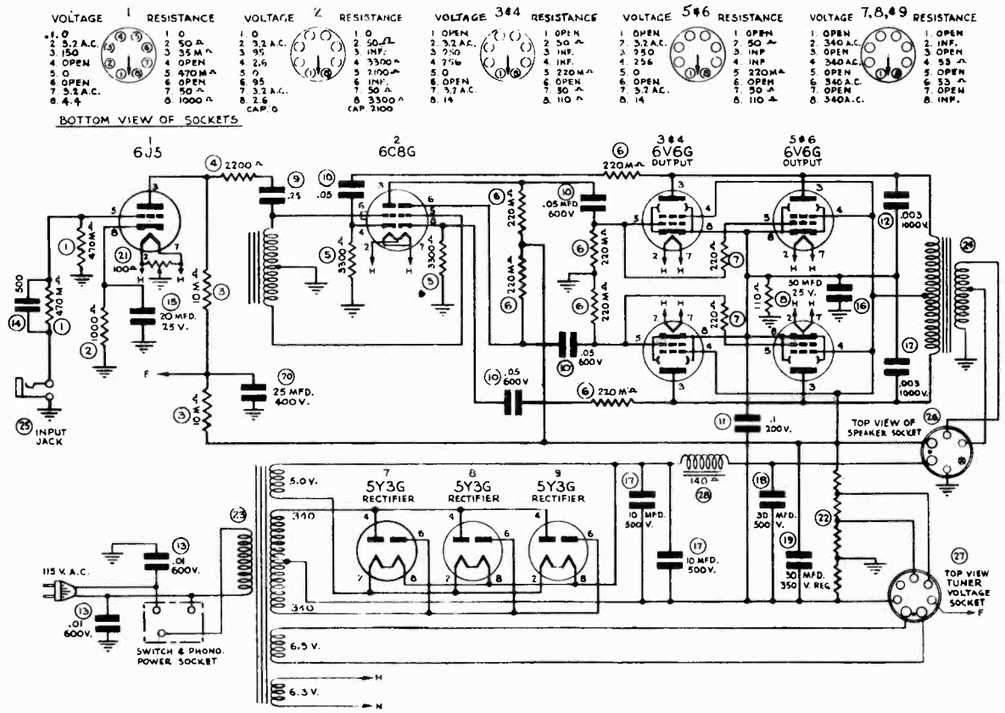
MODEL 400-K Series

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
72	11-74	11074	Audio Output Cable #1
73	22-16	22016	Audio Output Cable #2
74	22-14	22014	Cable and Plug Assembly
75	80-132	80132	Special 5 Socket
76	61250	61250	15 Prong Socket
77	22-17	22017	Phono Pickup Cable
78	78-31	78031	800 Ohms Sensitivity Control
79	78-34	78034	Eye Adj. Control ½ Meg.
80	38-82	38082	I.F. Trap
	80-82	80082	Octal Ceramic Socket
	80-81	80081	Octal Socket
	26-68	26068	Trimmer Condenser
	38-212	38212	Plate Choke
	31-100	31100	Dial Scale
	31-97	31097	Dial Glass Window
	56-462	56462	Dial Pointer
	07-136	07136	Bass Control Drive Cord Assembly
	07-137	07137	Treble Control Drive Cord Assembly
	07-134	07134	Volume Control Drive Cord Assembly
	07-135	07135	Tuning Drive Cord Assembly
	56-453	56453	Tone Control Pointer
	56-598	56598	Volume Control Pointer
	92-82	92082	Endless Belt
	80-84	80084	Antenna Terminal Strip
	59-77	59077	Pulley For Tone and Volume Cont., Sm.
	59-78	59078	Pulley For Tuning Pointer, Large
	13-175	13175	Split Gear Assembly



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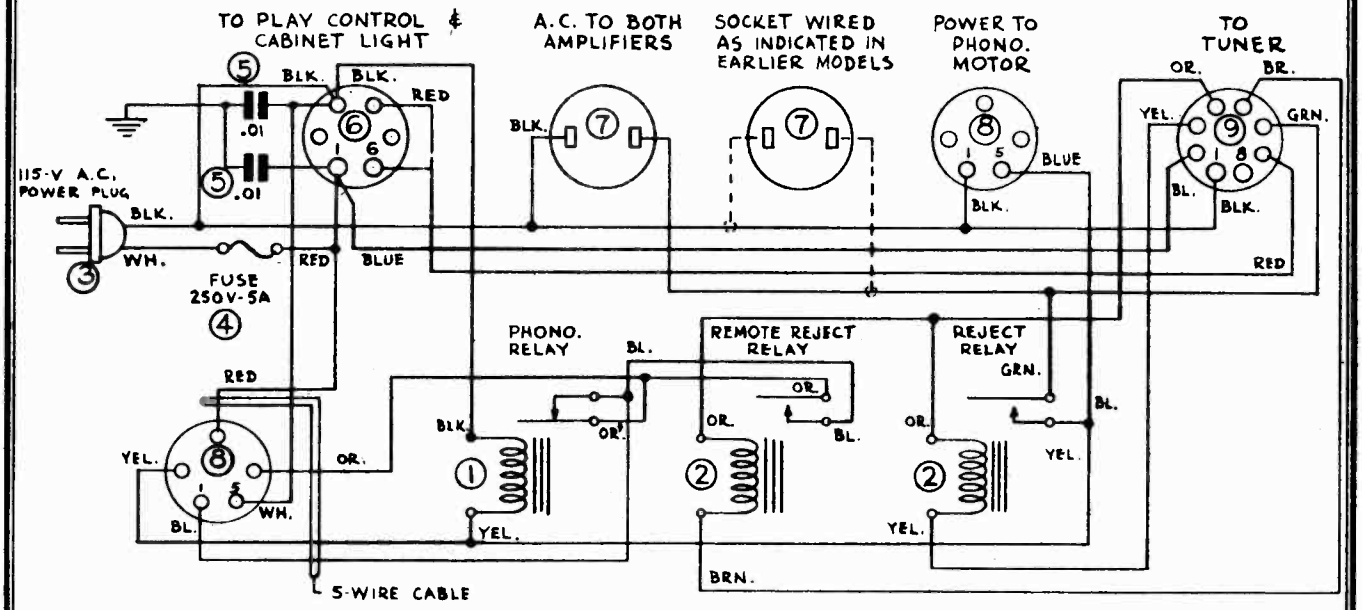
MODEL 400-K Series,
Amplifier A-7

PARTS LIST AMPLIFIER A-7 LARGE

Refer. No.	Old Part No.	New Part No.	DESCRIPTION
1	773-53	77217	470 M Ohms ½ Watt
2	773-39	77262	1000 Ohms ½ Watt
3	77-32	77212	10 M Ohms ½ Watt
4	774-41	77264	2200 Ohms ½ Watt
5	773-72	77210	3300 Ohms ½ Watt
6	773-81	77216	220 M Ohms ½ Watt
7	773-36	77209	220 Ohms ½ Watt
8	77-71	77071	110 Ohms 10 Watt
9	25-54	25054	.25 Mfd. 400 V.
10	254-8	25196	.05 Mfd. 600 V.
11	256-2	25215	.1 Mfd. 600 V.
12	25-46	25046	.003 Mfd. 1000 V.
13	257-2	25209	.01 Mfd. 600 Line Buffer
14	253-3	25187	500 M.M.F. Mica
15	25-42	25042	20 Mfd. 25 V.
16	25-38	25038	50 Mfd. 25 V.
17	25-56	25056	10 Mfd. 500 V.
18	25-57	25057	30 Mfd. 500 V.
19	25-45	25045	30 Mfd. 350 V.
20	25-42	25042	25 Mfd. 400 V.
21	78-33	78033	100 Ohm Hum Control
22	77-102	77102	Voltage Divider
23	94-61	94061	Power Transformer
24	94-32	94032	Output Transformer
25	805-1	80267	Input Jack
26	80-57	80057	Speaker Socket
27	80-50	80050	Tuner Voltage Socket
28	94-65	94065	Choke
	27-118	27118	H.C. Line Cord
	94-51	94051	Phase Corrector Reactor



JUNCTION BOX CIRCUIT

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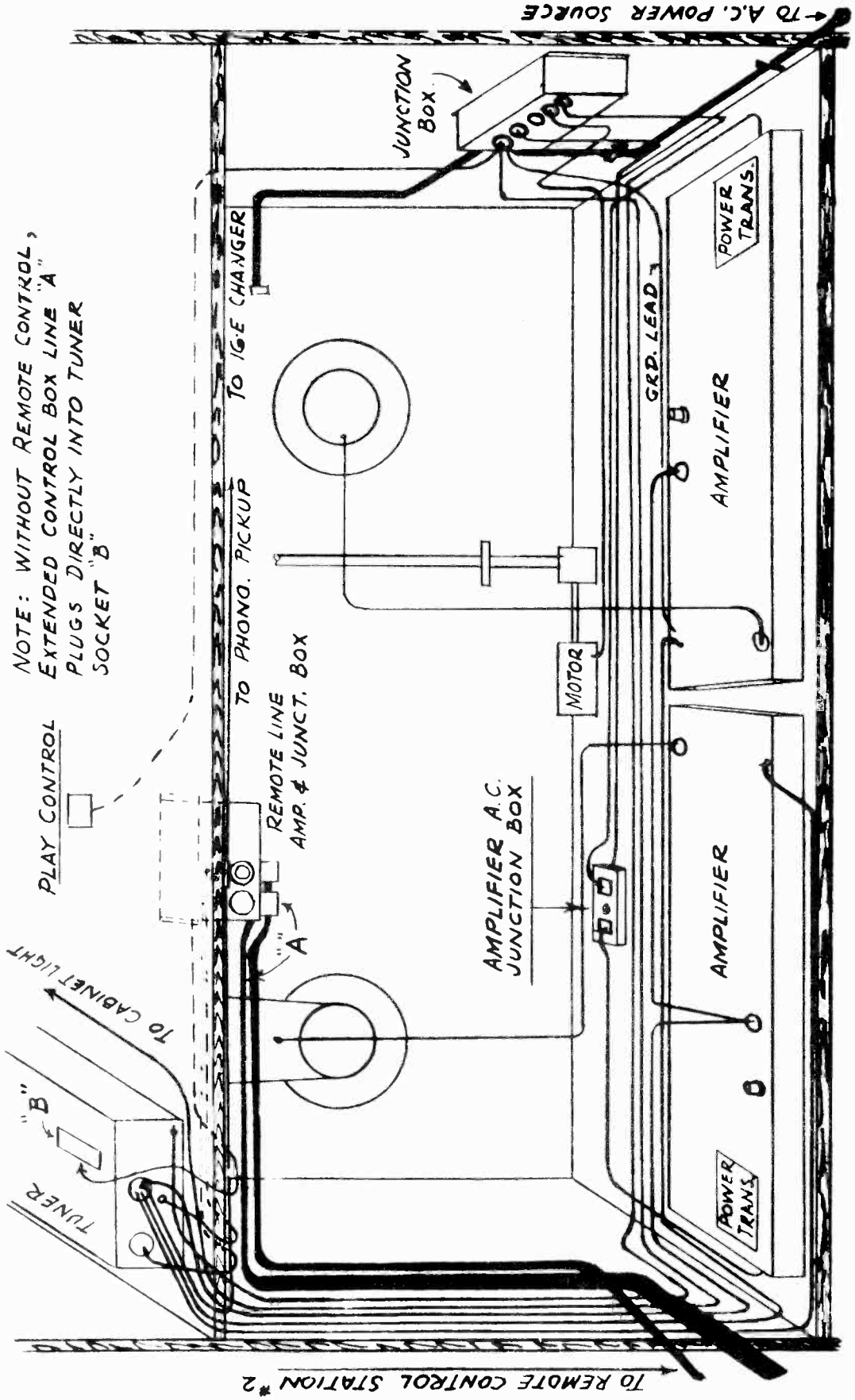
MODEL 400-K Series



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PARTS LIST
CABINET ASSEMBLY 400K

Old Part No.	New Part No.	DESCRIPTION
31-95	31095	Capehart Decal
31-96	31096	Deluxe Decal
59-58	59058	Dial Escutcheon
59-71	59071	Dial Escutcheon (Blonde)
59-62	59062	Push Button Knob
59-74	59074	Push Button Knob (Blonde)
6058	67389	Tuning Knob
67-176	67176	Tuning Knob (Blonde)
6060	67391	Bass & Treble Knob
67-177	67177	Bass & Treble Knob (Blonde)
67-178	67178	Band Switch Knob
67-179	67179	Band Switch Knob (Blonde)
61238	61238	Compartment Light Socket
2722	90186	Switch
5421	57214	Light Shade Bracket
61163	61163	Compartment Lamp
6172	58270	Reflector
31-93	31093	Push Button Trimmer Cover
61262	61262	3 Prong Cable Connector (Female)
61263	61263	3 Prong Cable Connector (Male)
80-79	80079	6 Prong Plug
66397	66397	Play Control
66399	66399	Gear Box 60 Cycle
66435	66435	Gear Box (25-50) Cycle
21156	21156	Motor 60 Cycle
21157	21157	Motor 50 Cycle
21158	21158	Motor 25 Cycle
13-150	13150	Friction Drive Assembly
66105	66105	Flex. Coupling Assembly
81-72	81072	Speaker 12"
81-73	81073	Speaker 14"

JUNCTION BOX PARTS LIST 400K

Refer No.	Old Part No.	New Part No.	DESCRIPTION
1	61228	61228	Reject Relay 60 Cycle
1	61229	61229	Reject Relay 25 Cycle
2	61224	61224	2 Motor Relay 60 Cycle
2	61226	61226	2 Motor Relay 25 Cycle
3	27-134	27134	A.C. Line Cord
4	48-6	48006	Fuse 250V 5A
5	257-2	25209	.01 Mfd. 600 V. Condenser
6	80-61	80061	6 Prong Socket
7	80-69	80069	7 A.C. Socket
8	80-57	80057	5 Prong Socket
9	80-71	80071	9 Octal Socket
	22-9	22009	Cable & Socket Assembly
	80-68	80068	Fuse Socket

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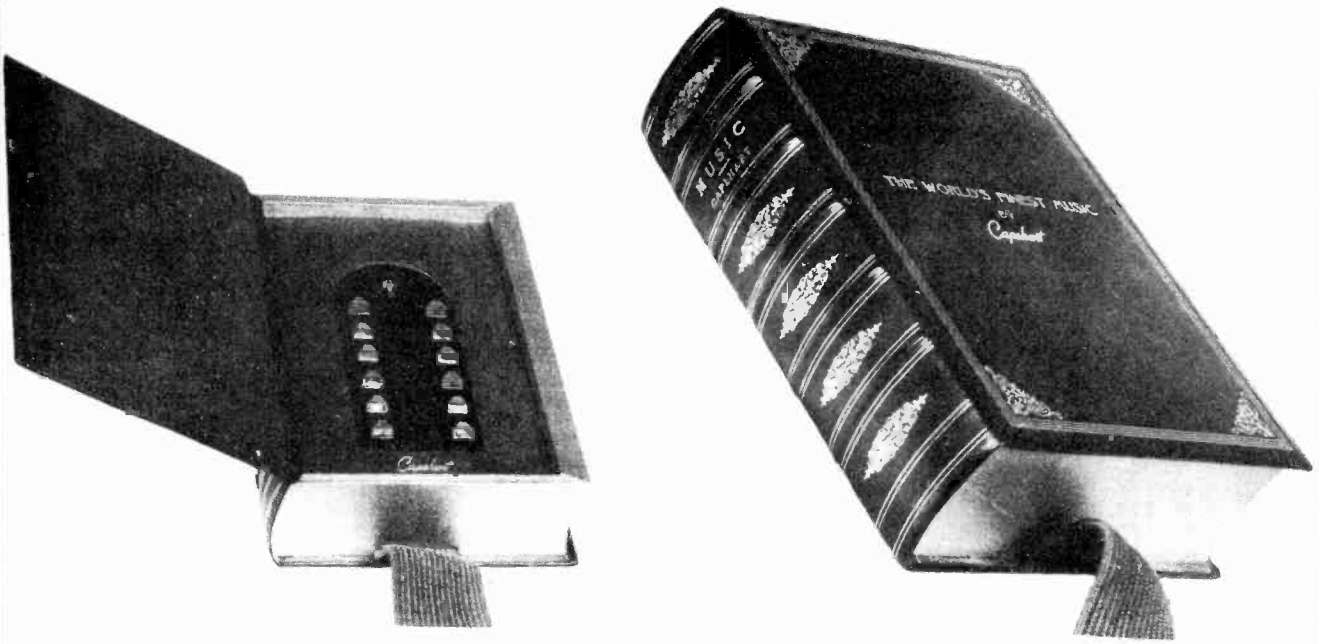
MODEL 400M, Extended
and Remote Control



These illustrations show the leather bound Book Cover available to conceal the Control Station Unit. This is covered with genuine red snuffed cowhide with gold leaf decorations and letters. The construction is rigid and the binding servicable. Its styling is such that it is a fitting accessory for the most luxurious livingroom or library, music room or bedside.

EQUIPMENT TABULATION

PART NO.	DESCRIPTION	WHERE USED	ASSOCIATED EQUIPMENT	QUANTITY PER INSTALLATION
MR-1	Line Amplifier Junction Box	In Instrument Cabinet	1 ESM up to 3 RSM	1
MR-2	Auxiliary Junction Box	In Instrument Cabinet	With MR-1 Up to 6RSM	1
MR-2A	Auxiliary Junction Box	In Instrument Cabinet	With MR-2 Up to 10 RSM	1
61251	15 Prong Plug	RSM Patch Cords	Patch Cords	2 Per Patch Cord
80-171	Pol. "A" 15 Prong Plug	ESM Patch Cords	Patch Cords	2
66344	15 Prong Female Box Cover	In wall at Inst.	ESM Patch Cord	1 Per Patch Cord
80-194	Pol. "A" 15 Pr. Female Box Cover	In wall at Inst.	RSM Patch Cord	1
80-85 *	18 Pr. Plug	At MR-3	RSM	1 Per Room
80-140*	18 Pr. Female Box	In wall	RSM	1 Per Room

*These last two items are only required when it is desirable to locate the RSM away from the MR-3 Control Unit and employ concealed wiring, instead of the flat cable.

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For additional service information: See Model 400M, Pages 19-34 through 19-54.

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MODEL 400M, Extended and Remote Control

CAPEHART CONTROL SYSTEMS

For many years it has been possible to adapt Capehart DeLuxe instruments for either Extended or Remote Control, i.e., facilities for operating the instrument from another location in the room or the use of extension speakers in other parts of the home with associated controls for tuning, regulating volume and changing from radio to phonograph, etc. In all instruments prior to the "K" Series the output transformer of the Bass and Treble amplifiers were designed to permit the use of additional speakers and by means of relays the program was distributed to the various extension speakers. The main disadvantage to this system was that the volume at a remote position could never exceed the volume at the instrument and no control of tone was possible except at the instrument.

All previous design limitations were corrected in the development of the "K" Series Instruments. In the "K" and the "M" Series the tuner supplies a signal to a line amplifier, the output of this amplifier (low voltage and low current) is fed to the various remote amplifiers each of which is equipped with Volume, Bass and Treble Controls so at any Remote Position the program may be reproduced at any volume and tone blending the listener desires.

CAPEHART EXTENDED CONTROL

The Extended Control Station is available in a molded plastic case or this unit may be concealed in a genuine leather "Book Cover." The Extended Control Station is regularly equipped with a 20' length of flat cable for ease of installation under rugs or carpet. This unit may be quickly plugged into a receptacle provided on all the 400M Series tuners if no remote control stations are desired or into the Line Amplifier and Junction Box if remote control equipment is used. This Junction Box is mounted in the cabinet.

Each Extended Control Station is equipped with the following control buttons:

1 for Turning Instrument On
6 for Preselected Radio Stations
1 for Phonograph
1 for Record Reject
1 for Increasing Volume
1 for Decreasing Volume
1 for Turning the Entire System Off

The Extended Control Station affords complete control of the instrument from any position in the room with the exception of Bass Volume and Treble Volume. Special lengths of cable for the Extended Control Station up to 200' will be supplied on special order. We advise against the practice of installing an outlet box and cover for the Extended Control Station connected to the junction box by a 16 wire conductor round cable run through the walls as this circuit is not fused and, therefore, does not meet Underwriters requirements.

The leather Book Covers for either the Extended or Remote Control Station units are finished in a dark red genuine snuffed cowhide binding decorated with gold leaf banding and lettering. These Book Covers are done in excellent taste and will satisfy the most discriminating buyer. We recommend they be supplied with all extended and remote control stations.

CAPEHART REMOTE CONTROL

The Remote Control Station employs the same push button control as the Extended Control unit. This is also regularly furnished with a 20' length of flat cable. The difference being that it incorporates a different connecting plug and circuit. The buttons on the Remote Control station affords the following controls:

1 to turn Remote Control On (and instrument if it is off)
6 Buttons for Preselected Stations
1 Button for Phonograph
1 Button for Record Reject
*1 Button for Increasing Volume
*1 Button for Decreasing Volume
1 Button for Turning Entire System Off

NOTE: The two buttons so marked * do not affect the main instrument or any other remote position which may be operating at the same time.

When the main instrument is on, pressing the "On" button at a remote station, lights the pilot light in the Remote Control Station and only then are the other eleven buttons active. When the system is turned off, either from the instrument or a remote control station, all remote positions are disconnected from the line, to restore the same program at any station it is only necessary to press the "On" button at that Remote Station.

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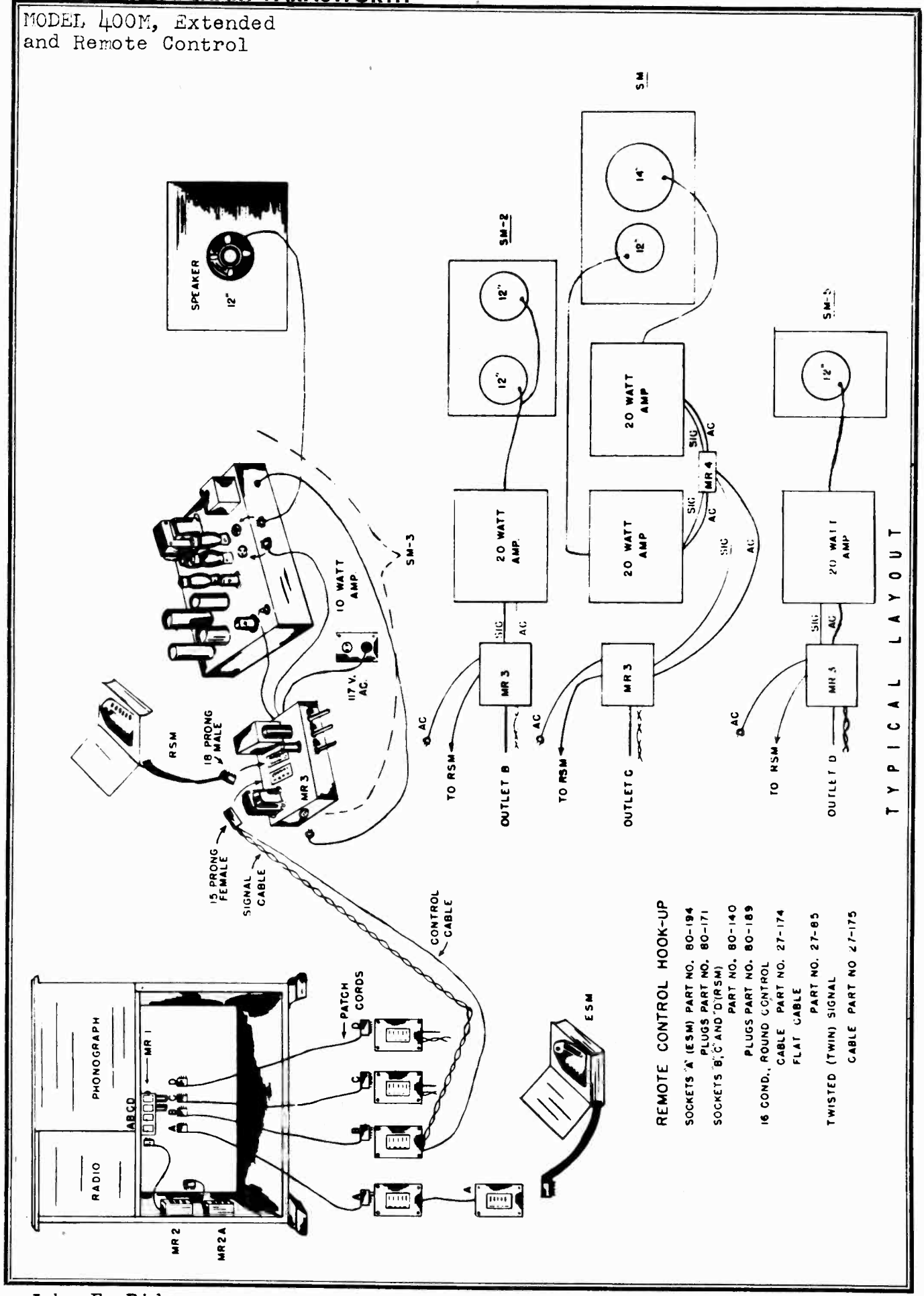
MODEL 400M, Extended
and Remote Control



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MODEL 400M, Extended and Remote Control

EXPLANATION OF LAYOUT

A rear view of the 400 instrument is given to show the location of the MR-1, Junction Box and Line Amplifier. The letters A, B, C, and D designate the type sockets and their uses (A - Extended Control, B, C and D Remote Controls). Thus the MR-1 allows the operation of an Extended Control Station (ESM) and up to three Remote Control Stations. If more than three Remote Stations are desired it is necessary to add a MR-2 for the next group of three Remote Controls and for an additional group of four a MR-2A. Ten Remote Stations being the maximum possible from one instrument.

From each socket in the MR-1 or MR-2's a patch cord of 16 wire round cable terminated in the proper plugs runs to a wall socket from each position. From the wall sockets a 16 wire round cable runs to each Remote Control Station. In addition a two wire twisted pair (for the signal) is used from each of the wall sockets to the Remote Control Stations. At Remote Control Station the 16 wire cable and the signal pair terminate in a 15 wire female plug, which is furnished with the MR-3. The MR-3 is an intergal part of the SM-3, SM-2, SM or SM-5 equipment. An 18 wire female socket is incorporated in the MR-3 for the Remote Control Station. The Remote Control Station may be used in another part of the room (away from the Speaker and Amplifier), in this event a length of 16 wire cable and an 18 prong plug and an 18 prong wall outlet will be required.

REMOTE STATION EQUIPMENT

Each Remote Control Station consists of a MR-3; an amplifier, SM-3 is 10 watts, SM-2 is 20 watts, SM is 40 watts, SM-5 is 20 watts, and a speaker unit with the baffle, SM-3 uses the 12" speaker as used in the Panamuse M-3, the SM-2 uses the two 12" speakers as in the M-2, the SM uses the 12" and 14" speakers from the 400-M and the SM-5 uses the 12" speaker from the 400-M, in each case a 24" x 24" baffle is furnished cut to fit the speaker or speakers supplied.

In other words the SM equipment consists of the two amplifiers and the two speakers as used in the 400-M. With the SM equipment an MR-4 junction box is supplied, this plugs into the MR-3 and has two A.C. outlets and two signal cables (one for each of the two amplifiers) this is necessary as the MR-3 has but one AC outlet for an amplifier and one signal cable.

The Extended Control Station may be plugged into the instrument, if no remote equipment is used. It is terminated in a 15 prong polarized male plug, this is to prevent plugging it into a Remote Socket by accident or plugging a Remote plug into the Extended Socket. The Extended Control Stations, and Remote Control Stations are equipped with a 20' flat cable and may if desired be enclosed in a book cover. See Illustration. Extra length cable will be supplied, on special order although excessive lengths are impractical; 200 feet is the maximum recommended for Extended Controls, Remote Controls should be planned for shorter lengths. This limitation is imposed by the voltage drop which prevents positive operation of the relays under low line voltage conditions.

INSTALLATION SUGGESTIONS

The question of installation of the units in walls is often raised; where space is a factor it is often possible to mount the speaker (or speakers) behind a grill let into the wall and the amplifiers on shelves in either the basement, attic or adjacent closet running leads from the speakers back to the amplifiers.

Unless a Service Department has available the services of a skilled electrician who is accustomed to installing wiring in the better homes, it is best to avail yourselves of the services of a good electrical contractor to install the concealed wiring. This results in a fixed price which can be secured before the installation is started, and which can be included in the quotation to the customer. The contractor will of course be responsible for any damage and will insure a neat

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MODEL 400M, Extended and Remote Control

INSTALLATION SUGGESTIONS

and workmanlike job which will pass the local wiring code requirements.

In the event you have a prospect for a Remote Control Installation, and you are not sure of the specifications you have prepared if a floor plan of the home, with the proposal, is sent the Service Department, Marion, Indiana, we will gladly review the installation, making such recommendations as are indicated by our national experience.

It is also possible to arrange for the services of a Field Engineer to supervise the actual installation or the final acceptance tests. Inquiries should of course be made to the Service Department.

CIRCUIT DISCUSSION

A jack is provided in the tuner to supply a signal (radio or phonograph) to the Line Amplifier and Junction Box. This unit has a power supply cable which plugs into a 5 prong socket at the rear of the tuner and also a 16 conductor cable with a polarized 15 prong plug which goes into a socket on the top of the tuner, this carries the control circuits. The signal, in the tuner is taken off ahead of the volume and tone control circuits.

In the Line Amplifier and Junction Box, MR-1, is a 6J5 amplifier tube with a plate to line transformer. The line is 33 ohms, to eliminate hum pickup and to keep the voltage low. The plate to line transformer is connected to the three remote control sockets and the socket for the Auxiliary Junction Box MR-2 which is used when more than three Remote Control Stations are used. The MR-2 does not have an amplifier as it uses the output from the MR-1, it does have, however, three sockets for Remote Control Stations and a socket for a MR-2A auxiliary junction box, which has sockets for four Remote Control Stations. Thus a total of ten Remote Stations which is the maximum that can be operated from one instrument is had by using 1 MR-1, 1 MR-2 and 1 MR-2A.

We recommend the use of a patch cord for each line from the junction box and auxiliary junction boxes to the cable outlets in the wall.

At the instrument end of each remote station cable a 15 prong outlet box cover should be installed.

Two cables are run from each outlet box to each remote position, a two wire twisted pair for the signal (this is the 33 ohm line) and the 16 wire round cable. Only 13 conductors of the 16 are used so there are three spares in case of breakage when pulling the cable in.

These two cables terminate at the Remote Amplifier and Control Unit, MR-3, in a 15 prong female plug which is furnished with the MR-3.

The MR-3 is a line to grid amplifier to drive the power amplifier. It has a line to grid transformer working into a triode thru a volume control, the bass and treble volume controls are in the plate circuit of this tube. Power for the tube is supplied by the power amplifier. In the MR-3 there is a three circuit relay, one circuit holds the relay closed after it is energized by the "On" button of the Remote Control Station. The second circuit closes the 117 Volts to the power amplifier while the third circuit interrupts all the button circuits except the "On" button, so unless the Remote position is turned on the other buttons are not effective. The volume control is motor driven so that it may be controlled either manually at the control unit or electrically from the Remote Control Station. The MR-3 is plugged into the 117 Volt and thru its relay supplies the power amplifier, which plugs into the MR-3.

TYPES OF EQUIPMENT

There are four types of power amplifier and speaker combinations.

SM is 2 - 20 watt amplifiers and a 12" speaker and a 14" speaker a 24" x 24" baffle and a MR-3. The speakers and amplifiers are identical with those used in a 400-M.

SM-5 is a 1 - 20 watt amplifier and a 12" speaker with a 24" x 24" baffle and a MR-3. The speaker is the same as the 12" used in the 400-M.

SM-3 is a 10 watt amplifier, 12" speaker and 24" x 24" baffle and a MR-3. The Amplifier and speaker are the same as those used in the M-3 Panamuse.

SM-2 is a 20 watt amplifier, twin 12" speakers with a 24" x 24" baffle and a MR-3. This equipment is identical with that used in the M-2 Panamuse.

With the SM equipment (40 watts) a MR-4 Junction Box is used, this plugs into the MR-3 and has two signal cables and two 117 Volt outlets. These are to permit the use of two amplifiers as the MR-3 has only single outlets for 117 Volts and the signal.

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MODEL 400M, Extended and Remote Control

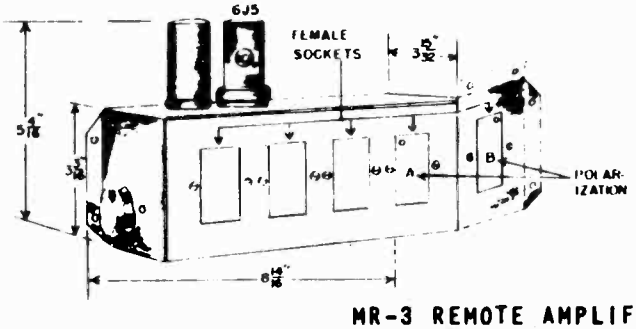
MR-1 LINE AMPLIFIER AND JUNCTION BOX

The MR-1 is called the Line Amplifier and Junction Box. It is equipped with three cables and plugs for connection to the tuner. This furnishes the heater and plate voltages for the amplifier tube through one cable which plugs into the five prong socket in the rear of the 400 tuner. The shielded cable plugs into a jack, also in the rear of the tuner, this furnishes a signal taken off before the volume or tone control circuits, thus the signal, furnished the remote speakers is unmodified by the volume or tone controls of the tuner. The 15 prong plug goes into the top of the tuner and supplies the voltages to the various control circuits, these are distributed by the five sockets in the MR-1. On one side of the unit are four 15 prong sockets, three standard and one polarized. The polarized socket is for an Extended Control Station, the other three are for Remote Positions, these three sockets are fused by a 2.5 Amp. Fusestat. On one end is another polarized socket, this is for the use of a MR-2 Auxiliary Junction Box. The supply voltage for this socket is taken off ahead of the Fusestat as the additional drain of more than three Remote Positions would blow the Fusestat.

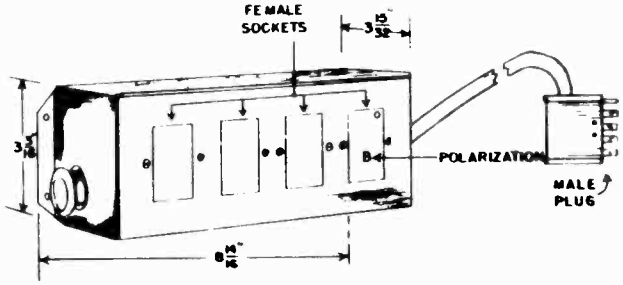
The MR-2 Auxiliary Junction Box is similar to the MR-1 except it has no Extended Control Socket or amplifier. It does have a cable and plug to connect it into the MR-1, three sockets for Remote Positions protected by a 2.5A Fusestat and a polarized socket for use with a MR-2A in the event more than six Remote Positions are required. (3 in MR-1 and 3 in MR-2). The MR-2A has four sockets for Remote Positions and is properly fused.

One MR-1 is required for each 400M instrument used with Remote Control Equipment. If the installation has more than three positions but less than seven a MR-2 is required in addition, if more than six positions are required a MR-2A is also needed. In no case should the number of speaker positions exceed ten.

MR-1 LINE AMPLIFIER and JUNCTION BOX



MR-2 JUNCTION BOX



MR-3 REMOTE AMPLIFIER AND CONTROL UNIT

The MR-3 is called the Remote Amplifier and Control Unit. It is mounted at the remote speaker position and permits control of volume, bass and treble manually at the MR-3 or the volume automatically at the Remote Control Station. This is equipped with a 15 prong male plug to terminate the signal (two wire) and control (16 wire) cables, an 18 prong socket for the Remote Control Station. A line to grid transformer feeds the grid of the triode through the motor driven volume control. Power for the triode is supplied by the power amplifier through a cord and plug. A shielded cord supplies the amplified signal to the power amplifier, which plugs into the AC receptacle in the MR-3. The MR-3 has an AC supply cord which is connected through a three pole relay to the AC receptacle and the 16 Volt transformer which operates the volume control motor, the remote station pilot lamp and holds the relay closed until the Off button is pushed which opens the relay holding circuit thus opening the AC supply to the power amplifier and the 16 Volt transformer. Thus when the system is in use pressing any button at a Remote Position, with the exception of the On button, has no effect on the system unless the position is On, this condition is indicated by the pilot light being lighted. Another feature is that when the system is turned Off all remote positions are disconnected from the line and when the instrument is restarted only the positions where the On button has been pushed again are reconnected.

Due to the fact that the MR-3 has only one signal output cable the SM Concealed Speaker Unit includes a MR-4 junction box.

This unit has a 117 Volt supply cord which plugs into the AC socket in the MR-3 and terminals in two AC outlets, a signal jack to receive the output of the signal cable from the MR-3 and terminates in two signal cables.

Thus Signal and AC Supply is furnished for each of the two power amplifiers. A power cable in the MR-4 connected to a bleeder is plugged into the amplifier not supplying the power for the MR-3 thus the voltages are equalized in the two amplifiers.

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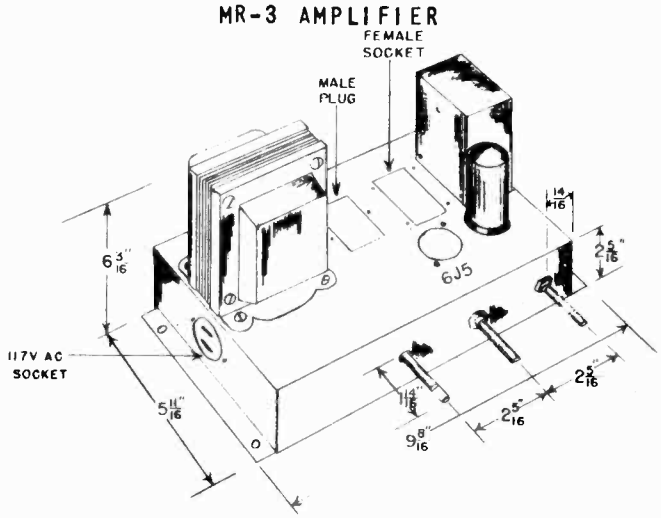
MODEL 400M, Extended
and Remote Control

MR-3 AMPLIFIER



M-2 AMPLIFIER

This nine tube, 20 watt amplifier has a 6R7 input feeding a center tapped choke for phase inverting to drive a 6C8 dual triode in push pull. This tube is resistance coupled to the push pull parallel output stage. Degeneration is carried out over two stages, from the output plates to the unbypassed cathodes of the 6C8. This degeneration minimizes the changes in impedance reflected by the output transformer from the speaker to the output tube plates, or, in other words, results in a flatter overall response from the amplifier and loudspeaker.

Three 5Y3 rectifiers are used in parallel to maintain good regulation and longer tube life as the current requirements are quite high.

A two section filter employing a 30 mfd. condenser (2 - 15 mfd., 475 Volts) a choke, another 30 mfd. condenser, speaker field (or fields) terminated in a 30 mfd. condenser, this results in a direct current supply with an exceedingly small a. c. component and no tendency to motor boat on sustained bass passages.

The M-2 amplifier is supplied in the SM-2 and SM-5 units, while two are furnished with the SM.

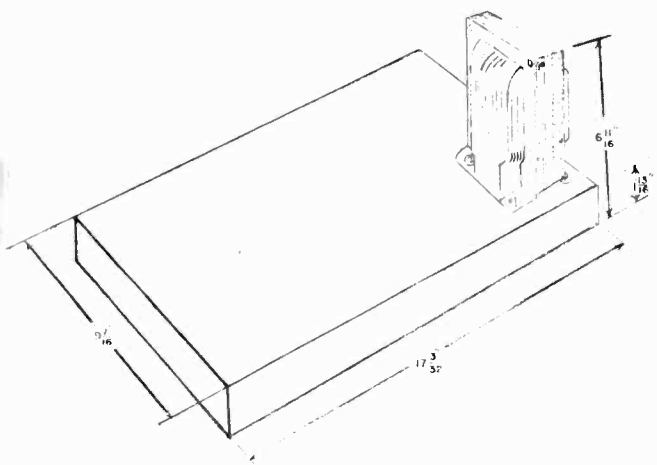
M-3 AMPLIFIER

This six tube, 10 watt amplifier has a 6R7 triode feeding a center tapped choke for phase inverting to drive a 6SC7 dual triode used in push pull which is resistance coupled to the push pull 6V6 output stage. Degeneration is carried over one stage, from the plate circuit of each the 6V6's to it's grid circuit.

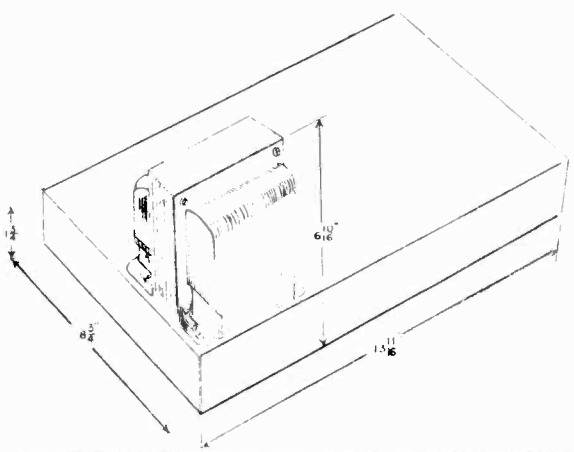
Two 5Y3 rectifiers are used to insure good regulation and as in the case of the M-2 an adequate filter is supplied.

The M-3 is only supplied with the SM-3 unit.

M-2 AMPLIFIER



M-3 AMPLIFIER



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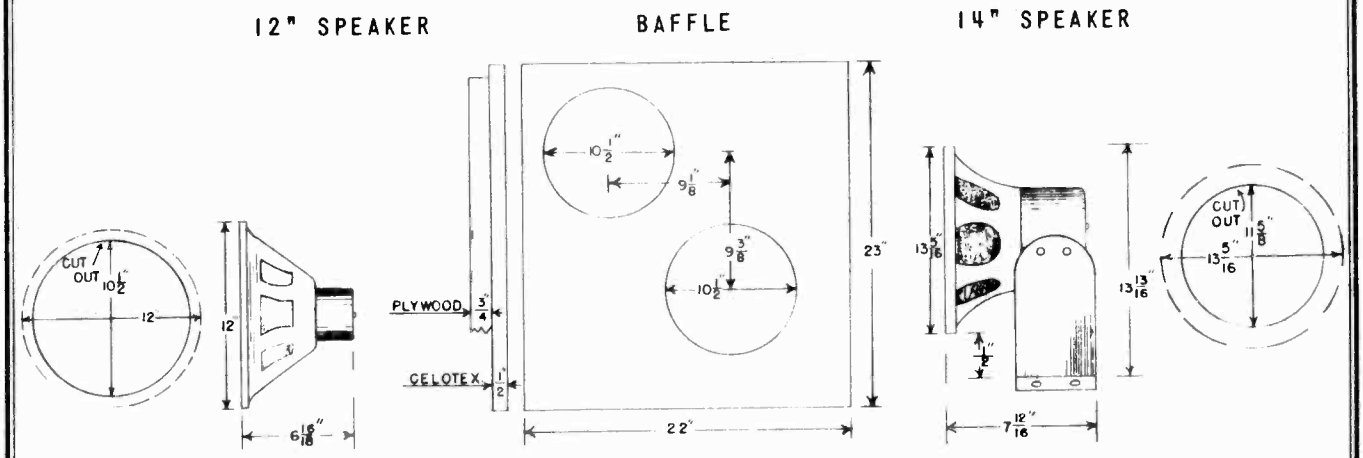
MODEL 400M, Extended and Remote Control



CODE	MODEL	DESCRIPTION
RAPID	ESM	Extended Control Station 20' Flat Cable & 15 Prong Plug.....
RATIO	RSM	Remote Control Station 20' Flat Cable & 15 Prong Plug.....
RABID	MR-1	Junction Box & Line Amplifier for 1 Extended Control Station and up to 3 Remote Control Stations.....
RACES	MR-2	*Auxiliary Junction Box for more than 3 and less than 7 Remotes.
	MR-2A	**Auxiliary Junction Box for more than 6 and less than 11 Remotes
		*A MR-1 must be employed with a MR-2
		**A MR-1 and MR-2 must be employed with the MR-2A
RAISE	SM-2	Concealed Speaker Unit..... 1 20 Watt - 9 Tube Amplifier; 2 12" Electrodynamic Speakers & Baffle; 1 MR-3 Remote Amplifier
RAJAH	SM-3	Concealed Speaker Unit..... 1 10 Watt 6 Tube Amplifier; 1 12" Electrodynamic Speaker & Baffle; 1 MR-3 Remote Amplifier
RALLY	SM-5	Concealed Speaker Unit..... 1 20 Watt - 9 Tube Amplifier; 1 12" Heavy Duty, wide range Speaker & Baffle; 1 MR-3 Remote Amplifier
RANCH	SM	Concealed Speaker Unit..... 2 20 Watt - 9 Tube Amplifiers; 1 12" Heavy Duty, wide range speaker; 1 14" Extra Heavy Duty bass speaker; 1 Baffle for above speakers; 1 MR-3 Remote Amplifier; 1 MR-4 Junction Box from MR-3 to two amplifiers
PLUGF	27-174	16 Conductor Round Cable.....
PLUGG	27-85	16 Conductor Flat Cable.....
PLUGH	27-175	Twisted Twin Conductor.....
PLUGA	61251	15 Prong Plug & Cap.....
PLUGB	80-85	18 Prong Plug & Cap.....
PLUGC	66344	15 Prong Socket & Cover.....
PLUGD	80-140	18 Prong Socket & Cover.....
PLUGE	80-130	15 Prong Female & Cap.....
PLUGJ	80-171	15 Pr. Plug & Cap Pol. A.....
PLUGK	80-194	15 Pr. Socket & Cover Pd. A.....
REBEL	80-378	Book Cover Only.....
REBAR	13-379	ESM in Book.....
REBES	13-380	RSM in Book.....
ROSES	41-79	DeLuxe Antennas.....
ROTOR	41-80	Inverted "L" Antennas.....
		Form 112-C Direct Mailing Piece.....

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MODEL 400M, Extended and Remote Control

EXTENDED CONTROL

The "M" Series Extended Control is similar in all respects to previous Extended Controls except an "On" Button is used to turn the set on. No "Dial" button provided, however the other eleven buttons correspond with those on the set: 6 Radio Stations, Off, Phono, Record Reject, Volume Increase and Volume Decrease and "On."

REMOTE CONTROL

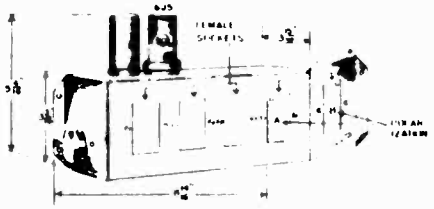
The Series "M" Remote Control is similar to that previously used in the "K" series. In the tuner the signal either from the detector (AM or FM) or the crystal pickup is fed to a 33 ohm line thru a 6J5 tube and a plate to line transformer before it is affected by the bass, treble or master volume control. The low impedance line runs to one or more control units which have a line to grid transformer feeding the volume control for a 6J5. In the plate circuit of this tube are the bass and treble controls. This tube drives either an SM3 unit 10 watt amplifiers and a 12" and a 14" speaker, or an SM5 unit having a 20 watt amplifier and one 12" heavy duty speaker. Physically the Remote Control Station is identical with the Extended Control Station, the difference is in wiring the plug termination. The remote station uses an 18 prong plug while the Extended Station uses a 15 prong polarized plug.

We have recommended the use of a 16 wire round cable for the cable runs between the instrument and each remote amplifier, although only 13 conductors are used, this is to allow spares in case of insulation breaks or wire breaks when the cable is pulled in. A careful examination of the male and female plugs furnished with our equipment discloses the facts that the terminals are numbered so #1 of a male socket connects to #1 of a female socket, etc. Thus in making up a system, if a short piece of cable 6" or 8" long is connected to a plug it can be carried about and used for a sample at each position needing a connection.

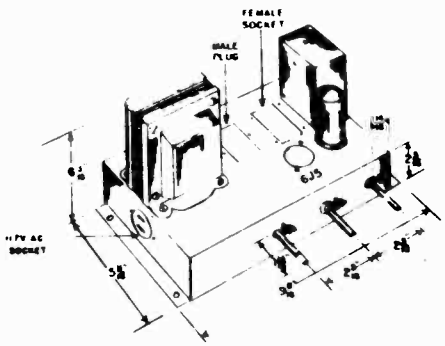
Occasionally a tuneable hum is present in some Remote Control installations when certain positions are plugged into the Junction Box, often removing the ground connected to the blue lead on prong 14 in the 15 prong male socket will remove this condition (of course a good ground should be provided for each Remote Position). The use of a twisted pair as the signal line is recommended to prevent hum pick up which might happen if the signal lines were run in the same cable as the operating lines.

With the SK unit a Special Junction Box for use with two amplifiers is furnished.

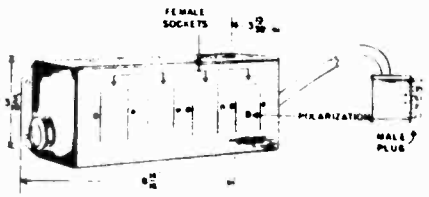
MR-1 AMPLIFIER & JUNCTION BOX



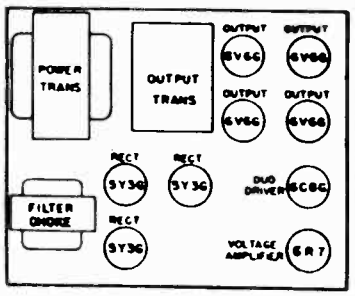
MR-3 AMPLIFIER



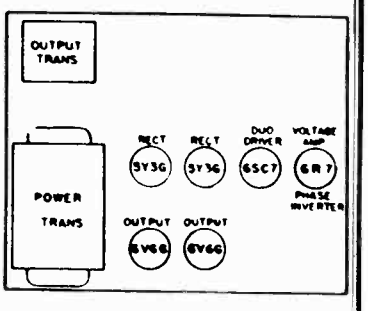
MR-2 JUNCTION BOX



M-2 AMPLIFIER



M-3 AMPLIFIER



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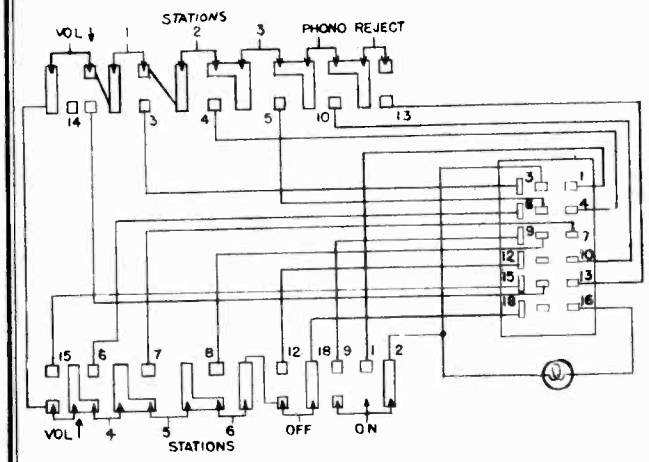
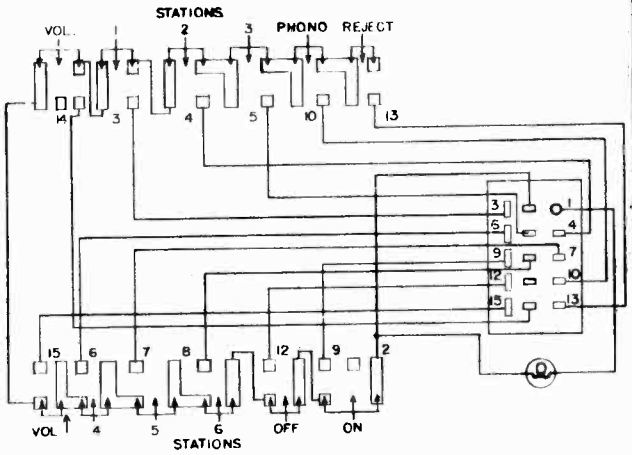
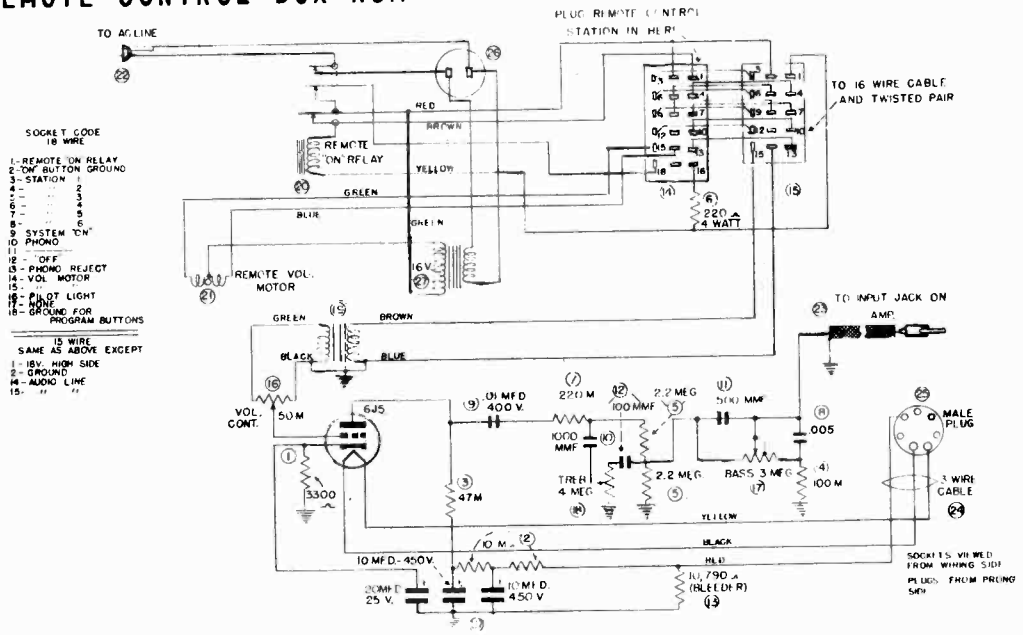
MODEL 400M, Extended and Remote Control





REMOTE CONTROL BOX RSM

EXTENDED CONTROL BOX ESM

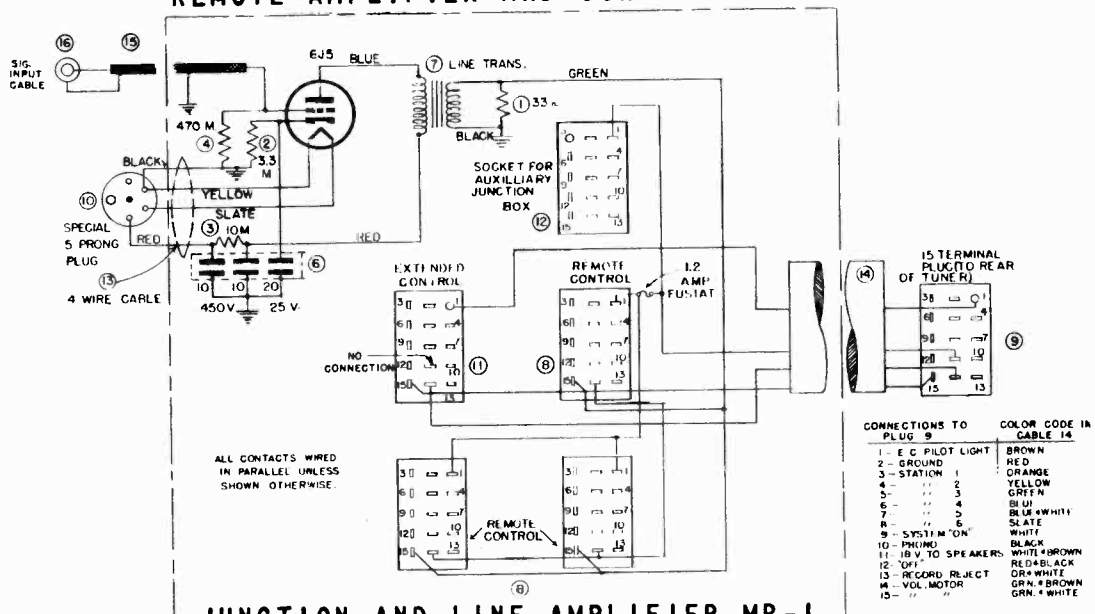


SOCKET CODE
18 WIRE

1 - REMOTE "ON" RELAY
2 - "ON" BUTTON GROUND
3 - STATION 1
4 - " " 2
5 - " " 3
6 - " " 4
7 - " " 5
8 - " " 6
9 - SYSTEM "ON"
10 - PHONO
11 -
12 - "OFF"
13 - PHONO REJECT
14 - VOL. MOTOR
15 -
16 - PILOT LIGHT
17 - NONE
18 - GROUND FOR PROGRAM BUTTONS

15 WIRE
SAME AS ABOVE EXCEPT
1 - 18V. HIGH SIDE
2 - GROUND
14 - AUDIO LINE
15 - " "

REMOTE AMPLIFIER AND CONTROL UNIT MR-3



CONNECTIONS TO PLUG 9	COLOR CODE IN CABLE 14
1 - E C PILOT LIGHT	BROWN
2 - GROUND	RED
3 - STATION 1	ORANGE
4 " " 2	YELLOW
5 " " 3	GREEN
6 " " 4	BLUE
7 " " 5	BLUE+WHITE
8 " " 6	SLATE
9 - SYSTEM "ON"	WHITE
10 - PHONO	BLACK
11 - 18 V. TO SPEAKERS	WHITE+BROWN
12 - "OFF"	RED+BLACK
13 - RECORD REJECT	ORANGE+WHITE
14 - VOL. MOTOR	GRN.+BROWN
15 - " "	GRN.+WHITE

JUNCTION AND LINE AMPLIFIER MR-1

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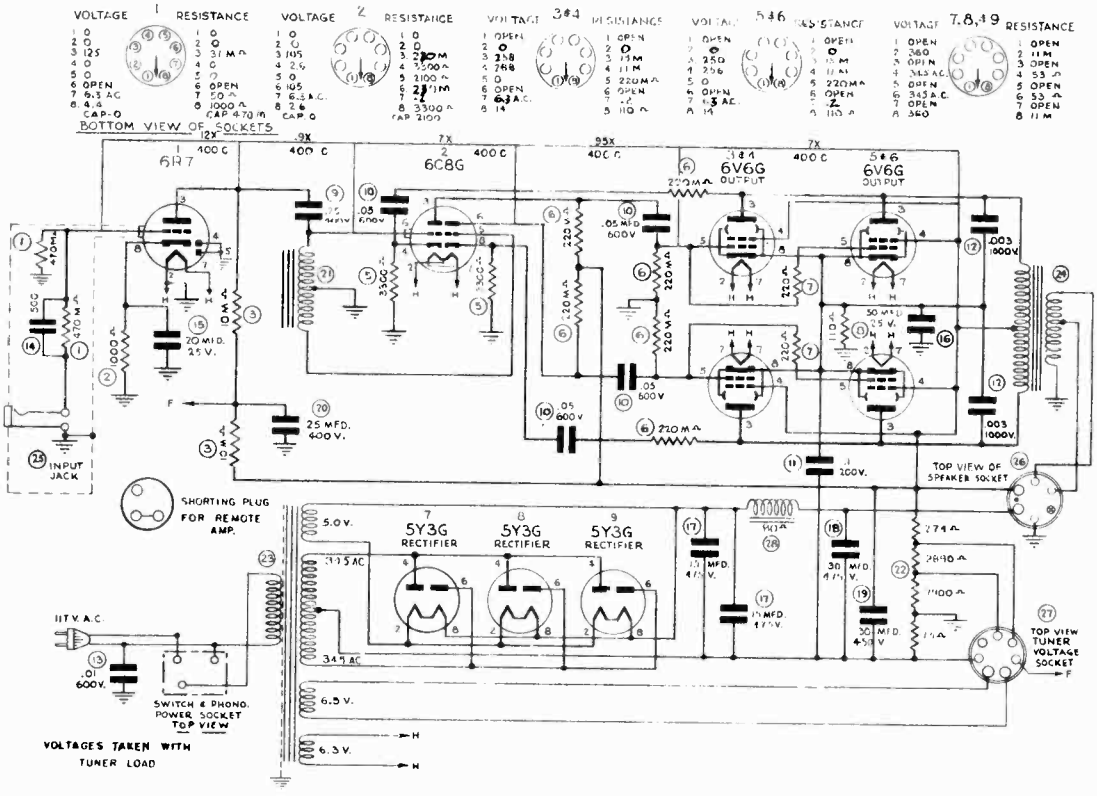
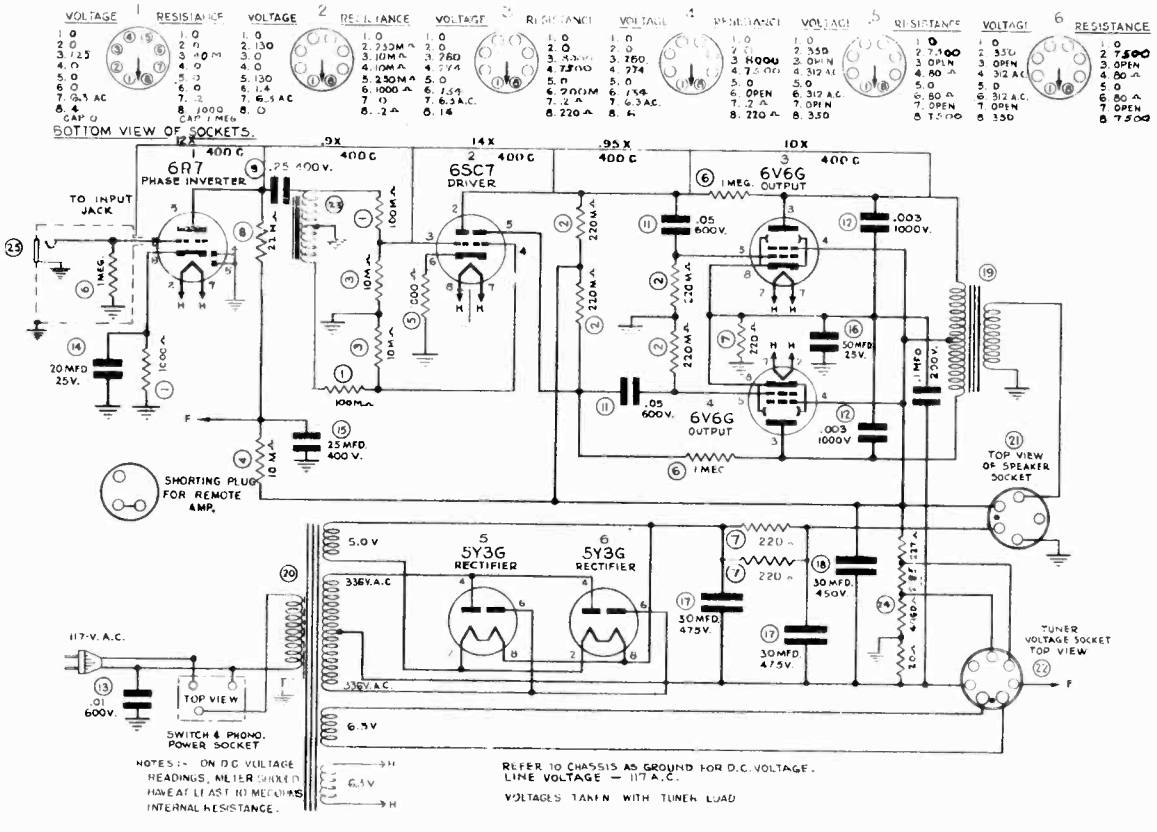
MODEL 400M, Extended and Remote Control



M-2



M-3

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MODEL 400M, Extended and Remote Control

PARTS LIST

Reference Number	Part Number	Description
		RSM AND ESM PARTS LIST
	59-69	RSM and ESM Control Box Only
	90-94	Push Button Switch
	27-85	16 Wire Cable Per Ft.
	80-85	18 Wire Plug and Cap
	80-171	15 Wire Plug Pol A
	59-68	Push Buttons
	73-512	"ON" Tab
	73-398	"PHONO" Tab
	73-395	"LOW" Tab
	73-396	"HIGH" Tab
	73-389	"REJECT" Tab
	73-387	"OFF" Tab
	41-17	Station Call Letter Kit
		JUNCTION BOX AND LINE AMPLIFIER MR-1
1	773-31	33 Ohm 1/2 Watt
2	773-72	3300 Ohm 1/2 Watt
3	773-84	10 M Ohm 1/2 Watt
4	773-53	470 M 1/2 Watt
6	25-50	Elec. Cond.
7	94-66	Line Trans.
8	61250	15 Wire Plain Socket
9	80-171	15 Wire Plug and Cap Pol A
10	80-122	5 Prong Plug
11	90-170	15 Prong Socket Pol A
13	27-161	4 Wire Cable Power Cable
14	27-160	15 Wire Cont. Cable
15	27-88	Single Shield Sig. Cable
16	61269	1 Prong Plug
		MR-3 STATION AMPLIFIER CONTROL UNIT
1	773-82	3300 Ohms 1/2 Watt
2	773-84	10 M Ohms
3	773-88	47 M Ohms
4	773-89	100 M Ohms
5	773-55	2.2 Megs.
6	77-104	220 Ohms 4 Watt
7	773-51	220 M Ohms 10 Watt
8	254-1	.005 Mfd. 600 V.
9	255-1	.01 Mfd. 400 V.
10	25-53	1000 MMF Mica
11	253-3	500 MMF Mica
12	253-1	100 MMF Mica
13	77-102	10790 Ohms
14	80-86	18 Wire Socket
15	80-128	15 Wire Socket
16	78-81	Volume Control
17	78-21	Bass Control
18	78-20	Treble Control
19	94-70	Line Transformer
20	90-69	Relay
21	44-20	Volume Control Motor
22	27-118	AC Line Cord
23	11-154	Amp. Input Cable Ass'y.
24	11-155	Line Amp. Lower Cord Ass'y.
25	80-129	Prong Plug and Cap
27	94-69	16 V. Transformer
		AMPLIFIER A-10 M-2
1	773-53	470 M Ohms 1/2 Watt
2	773-39	1000 Ohms 1/2 Watt
3	77-32	10 M Ohms 1/2 Watt
4	773-81	2200 Ohms 1/2 Watt
5	773-72	3300 Ohms 1/2 Watt
6	773-81	220 M Ohms 1/2 Watt
6	773-51	220 Ohms 1/2 Watt
8	77-71	110 Ohms 10 Watt
9	25-58	.25 Mfd. 600 V.
10	254-8	.05 Mfd. 600 V.
11	256-2	.1 Mfd. 200 V.
12	25-86	.003 Mfd. 1000 V.
13	257-2	.01 Mfd. 600 Line Buffer
14	253-3	500 M.M.F. Mica
15	25-82	20 Mfd. 25 V.
16	25-39	50 Mfd. 25 V.
17	25-138	15 Mfd. 475 V.
18	25-139	30 Mfd. 475 V.
19	25-146	30 Mfd. 450 V.
20	25-82	25 Mfd. 400 V.
21	94-85	Phase Connector Reactor
22	77-102	Voltage Divider
23	94-61	Power Transformer
24	94-32	Output Transformer
25	805-1	Input Jack
26	80-57	Speaker Socket
27	80-50	Tuner Voltage Socket
28	94-65	Choke
	27-118	A.C. Line Cord
		AMPLIFIER A-9 M-3
1	773-83	100 M Ohms 1/2 Watt
2	773-79	220 M Ohms 1/2 Watt
3	773-74	10 M Ohms 1/2 Watt
4	77-22	10 M Ohms 1 Watt
5	773-39	1000 Ohms 1/2 Watt
6	773-84	1 Meg. 1/2 Watt
7	77-104	220 Ohms 4 Watt
8	77-69	22 M Ohms 1 Watt
9	25-133	.25 Mfd. 400 V.
10	254-6	.02 Mfd. 600 V.
11	254-8	.05 Mfd. 600 V.
12	25-86	.003 Mfd. 1000 V.
13	257-2	.01 Mfd. 500 V. Line Buffer
14	25-82	20 Mfd. 25 V.
15	25-82	25 Mfd. 400 V. 20 Mfd. 25 V.
16	25-39	50 Mfd. 25 V.
17	25-139	30 Mfd. 475 V.
18	25-146	30 Mfd. 450 V.
19	94-34	Output Transformer
20	94-62	Power Transformer
21	80-57	Speaker Socket
22	80-50	Tuner Voltage Socket
23	94-85	Phase Connector Reactor
24	77-103	Voltage Divider
25	805A	Phono Input Jack

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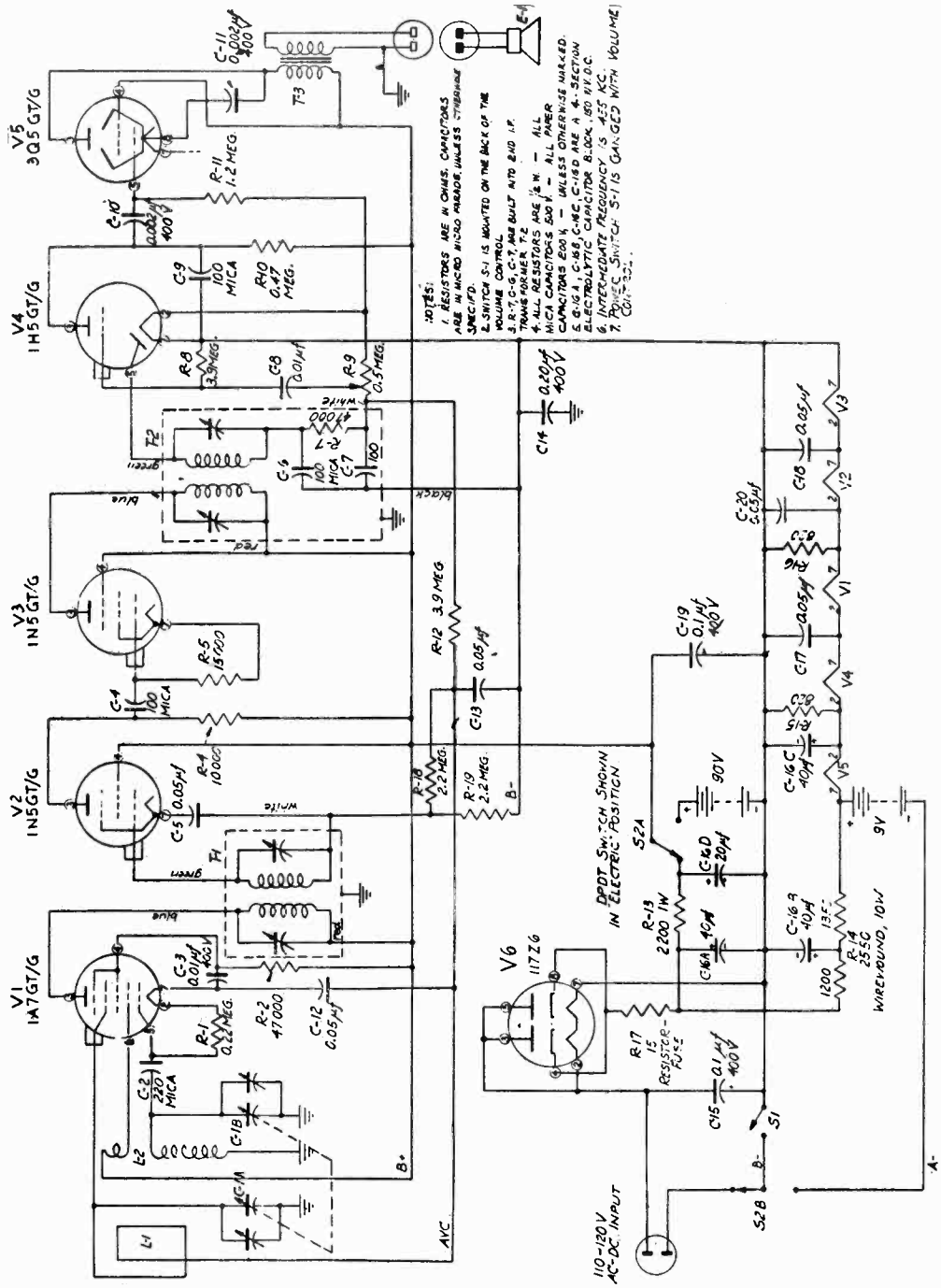
MODEL ME8



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MODEL ME8

Model ME8 Portable Radio is a 6-tube, 3-way portable superheterodyne receiver using the latest octal type of low-drain electronic tubes.

OPERATION: The set operates from 105 to 120 volts, A.C. or D.C. power supply or from self-contained batteries. Power drain is approximately 25 watts on electric operation.

When operated on direct current (D.C.), if no reception is obtained after approximately one minute of warm-up time, reverse the line plug in the power outlet.

RANGE: Model ME8 covers the broadcast band from 532 to 1700 kilocycles. Since the scale is calibrated 54 to 160, the actual frequency of the station received is obtained by adding zero to the dial calibration.

CONTROLS: Three controls are provided. The left hand control puts the set into operation and increases the volume with clockwise rotation. The right-hand control tunes the dial to the desired station. The center slide switch selects electric operation in the left position. and battery operation in the right position.

ANTENNA: No outside aerial is required as more than adequate pickup is obtained by the self-contained loop antenna. In areas of poor reception or for weak or distant stations the loop antenna has a directional effect. The set may be turned to the direction of maximum reception.

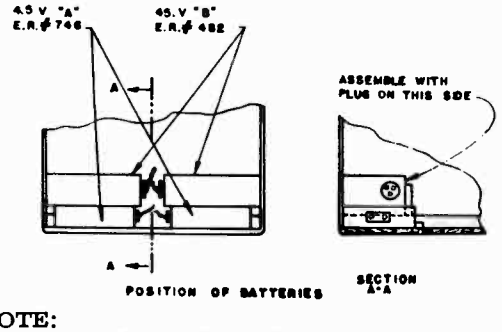
BATTERIES: The batteries comprise: two 4½ volt "A" units. Eveready type 746 or equivalent, and two 45 volt "B" units. Eveready type 482 or equivalent.

They should be mounted in the compartment provided in the bottom of the cabinet, as shown in sketch. Batteries should be removed when they are dead or if the set is not to be used on battery operation for several months.

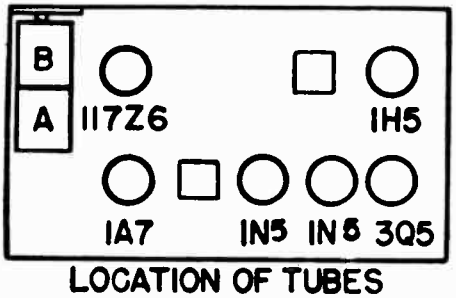
ALIGNMENT: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug on RF section A of tuning capacitor. Connect ground clip of generator to a convenient B-minus point (such as the case of the electrolytic capacitor, or one of the switch terminals on the back of the volume control). An output meter may be clipped directly across the voice control lugs. Align the I.F. trimmers to 455 kc, using least possible input from Signal Generator to avoid developing A.V.C. voltage which would make the tuning adjustments very broad.

To align RF trimmers, remove the 0.01 mf capacitor and connect the Signal Generator leads to two or three turns of heavy wire, forming a self-supporting loop of about 7 or 8 inches diameter, placed about a foot away from the receiver's loop antenna. Again, use the least possible input from the Signal Generator. With the tuning capacitor plates completely out of mesh, and pointer at extreme right end of travel, adjust the oscillator trimmer (B) (on front section of tuning capacitor) to 1700 kc. Readjust both Signal Generator and tuning capacitor to 1550 kc and adjust the RF trimmer (A) (on rear section) for maximum response.



NOTE:
BE SURE TO REMOVE BOLT FROM BOTTOM OF CABINET BEFORE ATTEMPTING TO INSERT BATTERIES.



LOCATION OF TUBES

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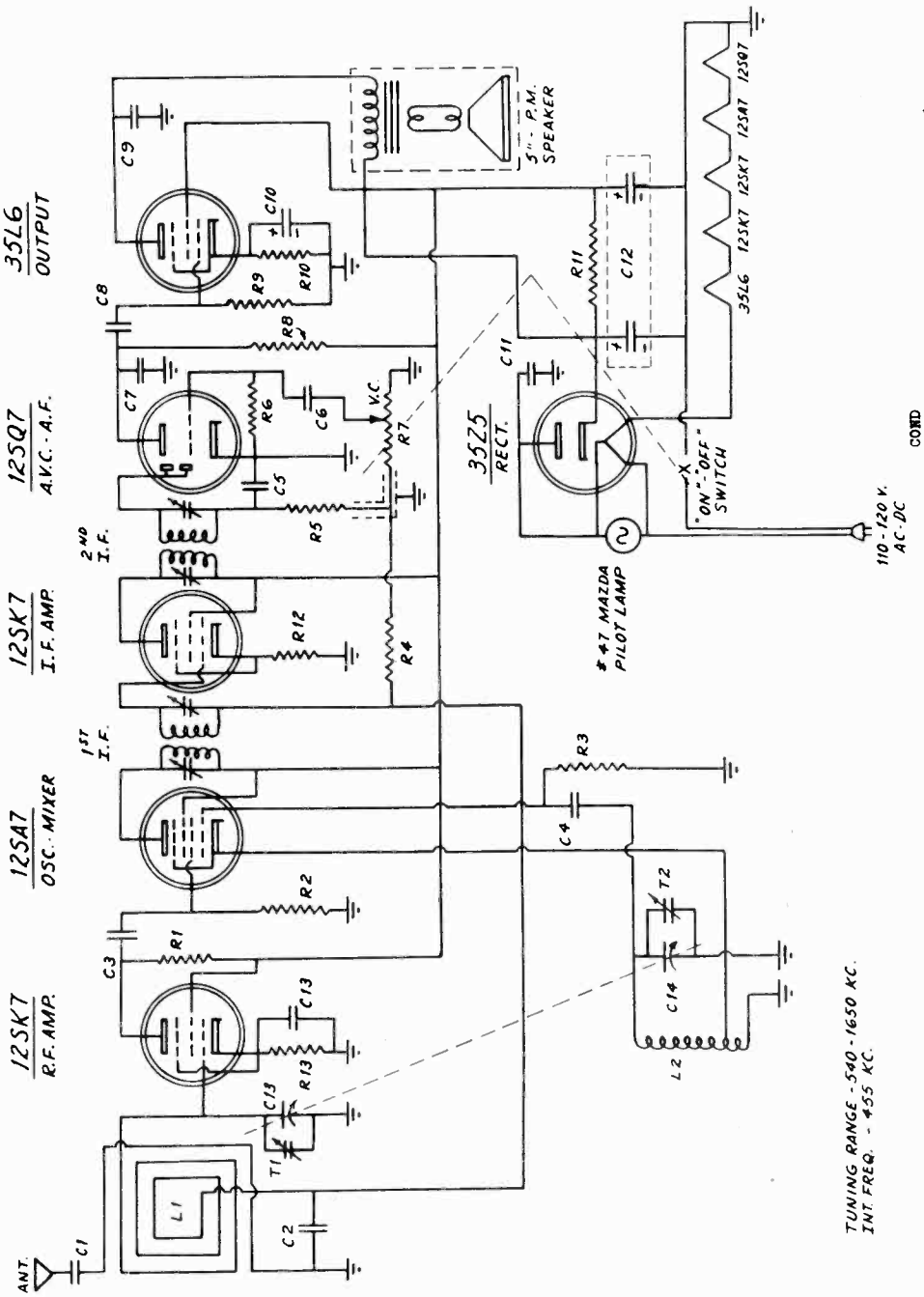
MODEL 6B1



ITEM	RATING	VALUE
RES.		
R1	1/3 to	4700-51000
R2,R8	"	220K-250K
R3	"	22K-2MK
R4,R6	"	1.5 MEG-2 MEG.
R5	"	47K-51K
R7	VOL.CONT.	500K
R9	1/3 W.	470K - 510K
R10,12,13	"	1500 - 1800
R11	2W.	10000

COND		
C1	200V	.002 - .005MFD.
C2,11,13	"	.05 "
C3,7	"	.00018 "
C4	"	.00082 "
C5	"	.0002-.0003 "
C6,8	"	.005 "
C9	"	.01 "
C10	25V	49 (CAN)
C12	150V	40 - 40
MISC.		
L1		ANT. LOOP
L2		OSC. COIL
T1,2	MOUNTED ON	3-15 MMFD.
	C13 - C14	
C13	VAR.COND.	420 "
C14	GANG	162 "

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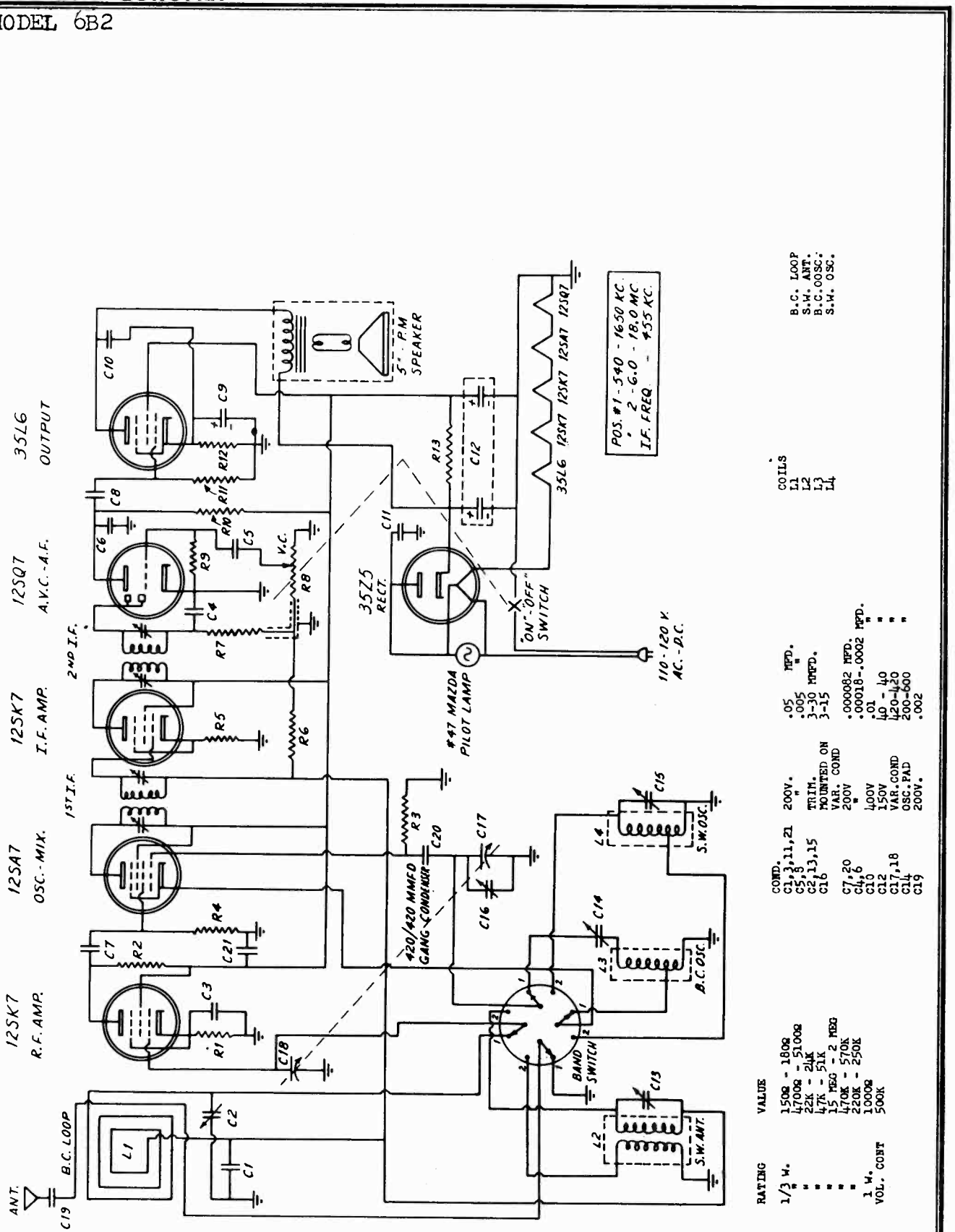
MODEL 6B2



ITEM	RATING	VALUE	COND.			
RES.						
R1,5,12	1/3 W.	150Ω - 180Ω	C1,3,11,21	200V.	.05	MFD.
R2	"	4700Ω - 5100Ω	C5,8	"	"	"
R3	"	22K - 24K	C2,13,15	TRIM.	.005	MMFD.
R4,7	"	47K - 51K	C16	MOUNTED ON	3-30	MMFD.
R6,9	"	15 MEG - 2 MEG		VAR. COND	3-15	
R11	"	470K - 570K	C7,20	200V	.000082	MFD.
R10	"	220K - 250K	C4,6	"	.00018-.0002	MFD.
R13	1 W.	1000Ω	C10	400V	.01	"
R8	VOL. CONT	500K	C12	150V	40 - 40	"
			C17,18	VAR.COND	420-420	"
			C14	OSC.PAD	200-600	"
			C19	200V.	.002	

COILS

L1	B.C. LOOP
L2	S.W. ANT.
L3	B.C.OOSC.;
L4	S.W. OSC.

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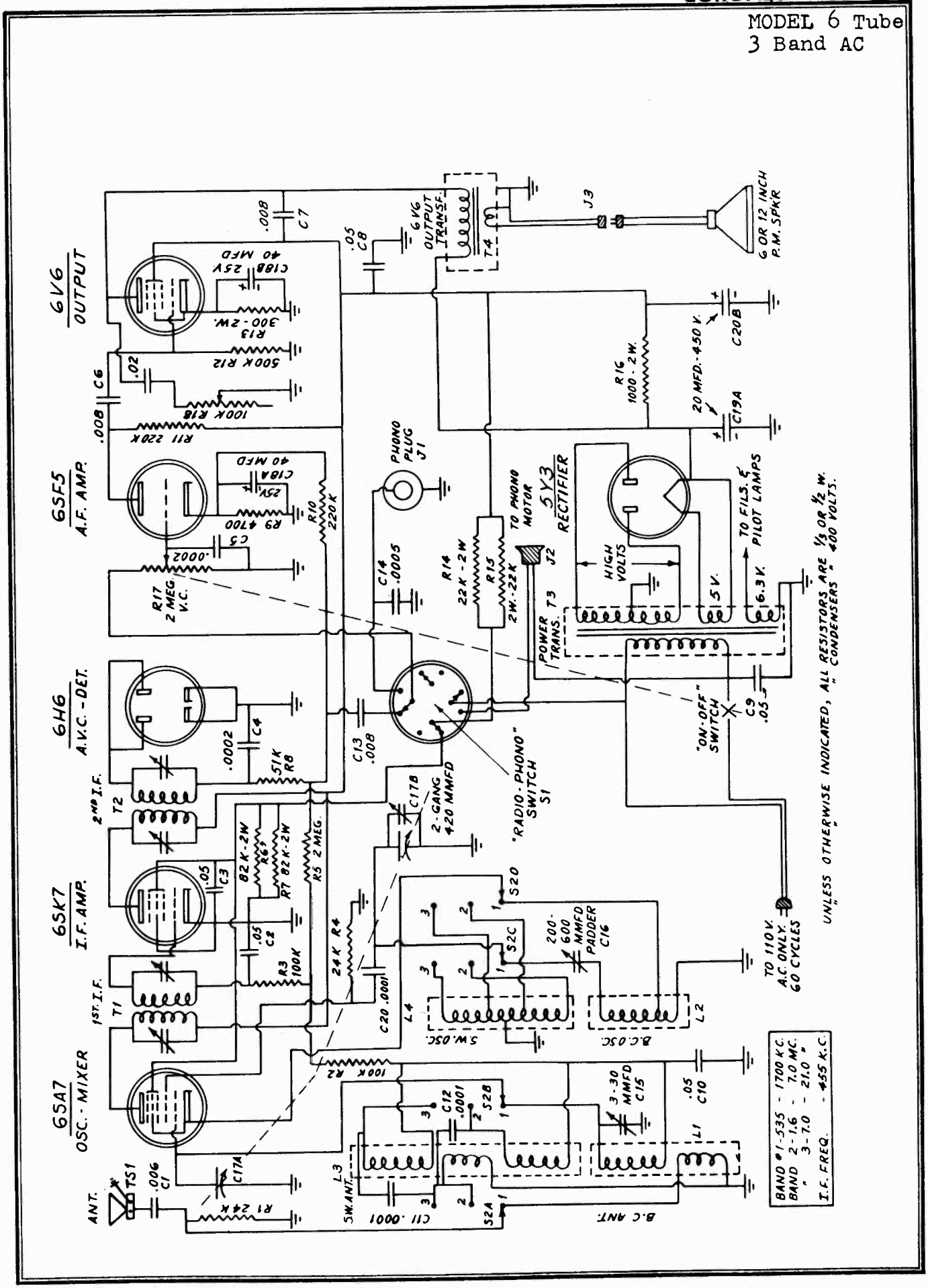
MODEL 6 Tube
3 Band AC



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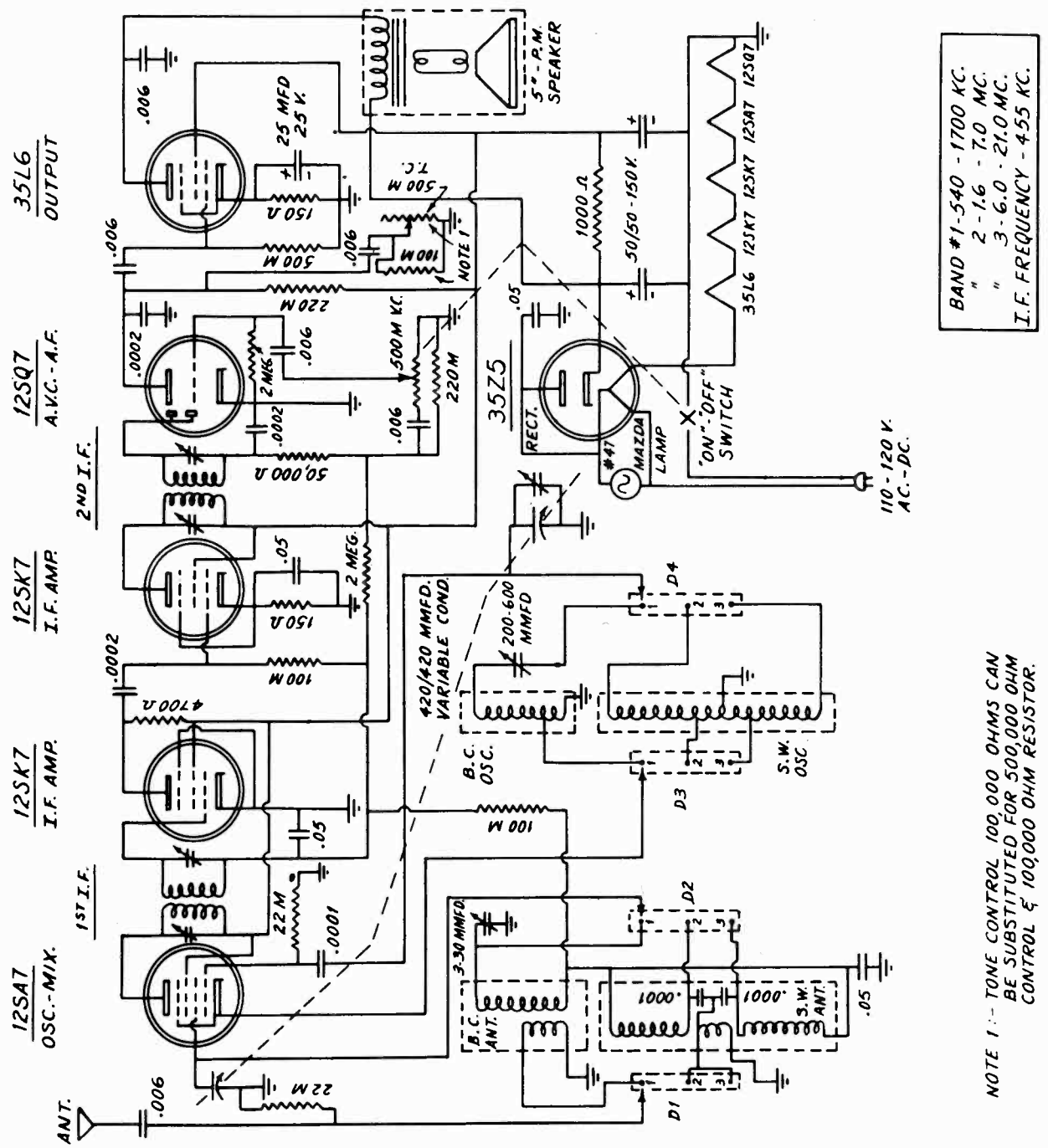
MODEL 1405



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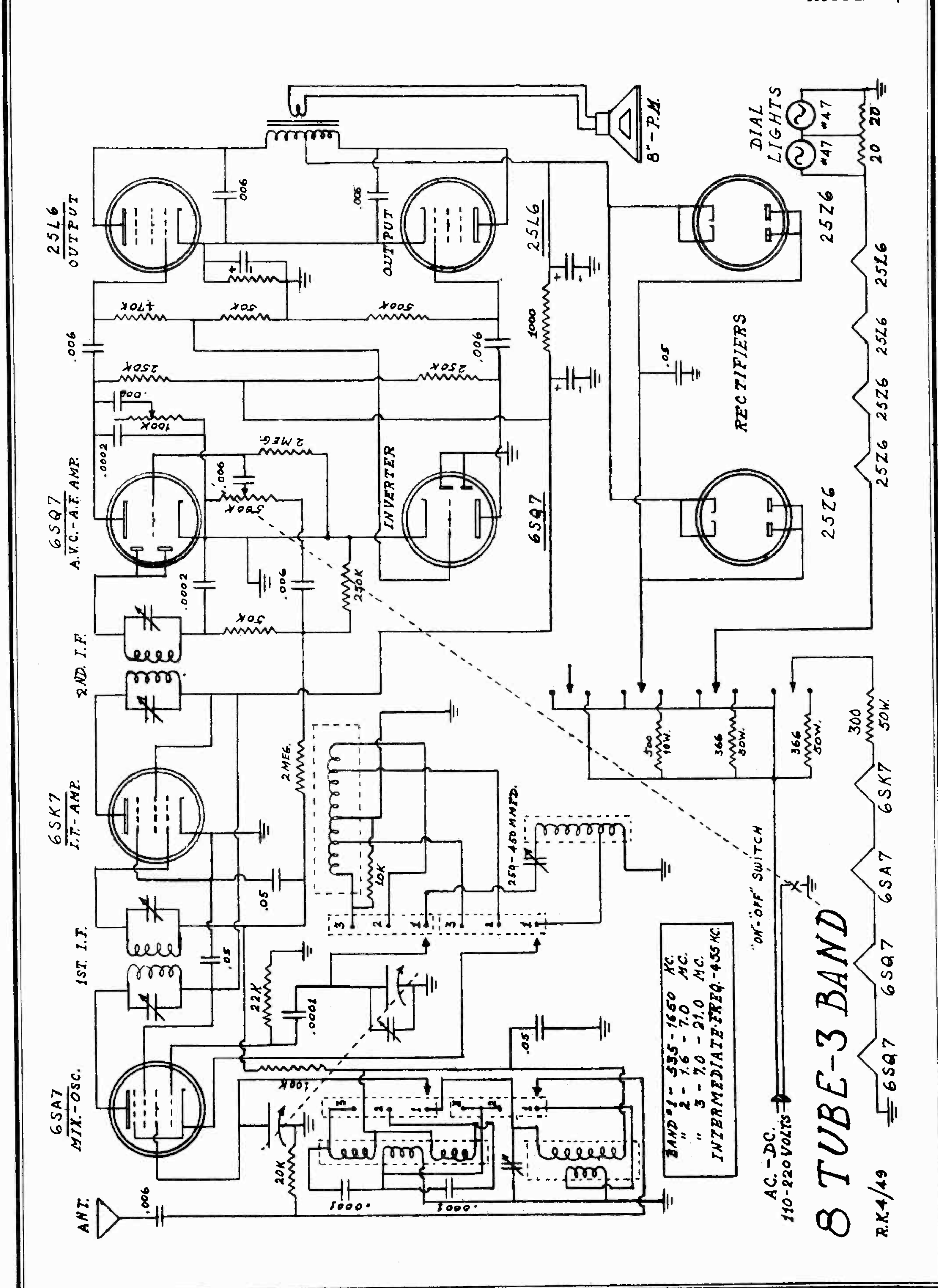
MODEL 1481



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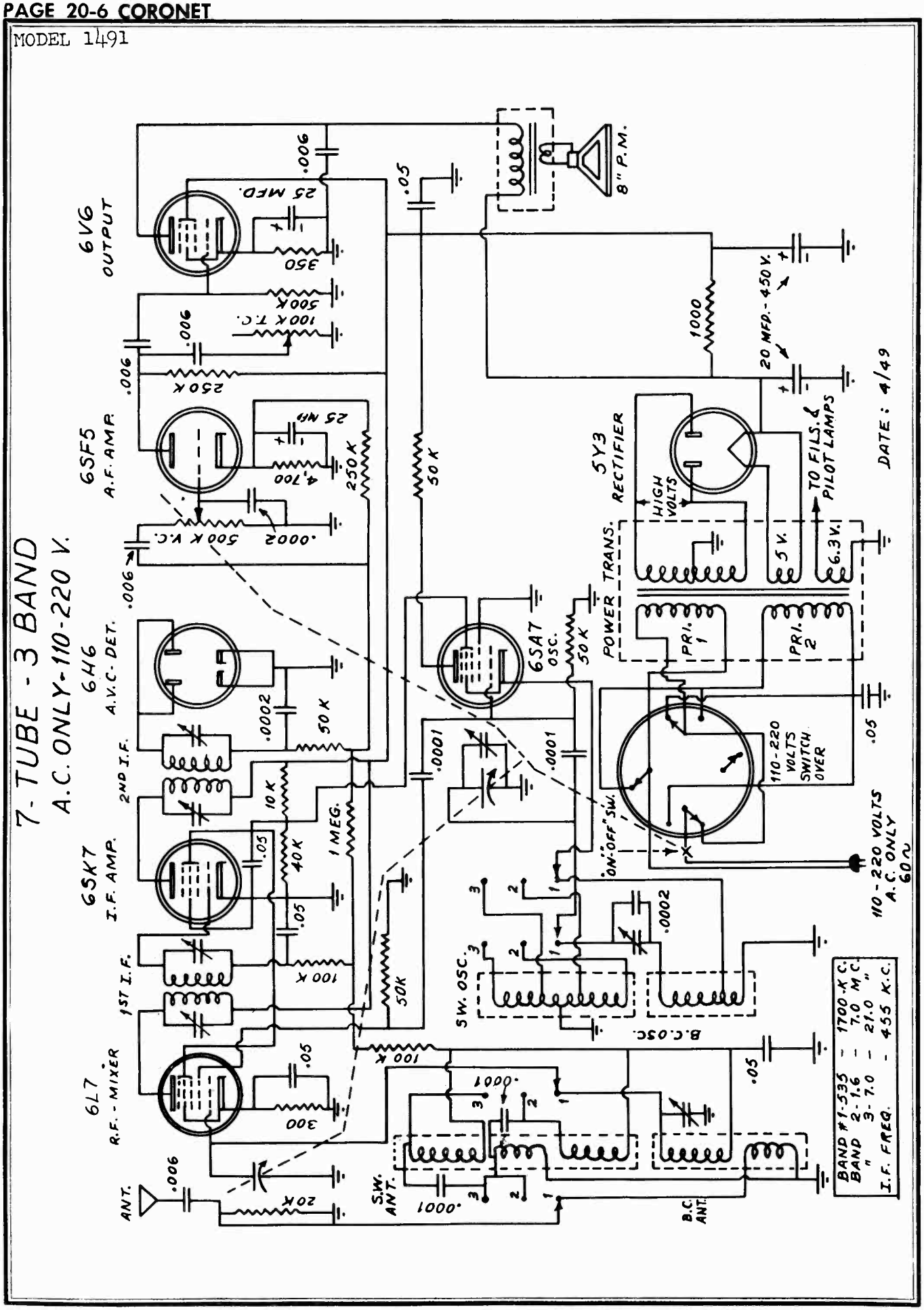
MODEL 1491



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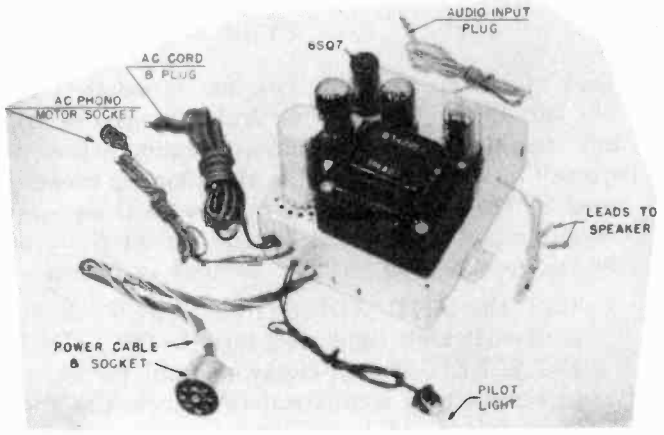
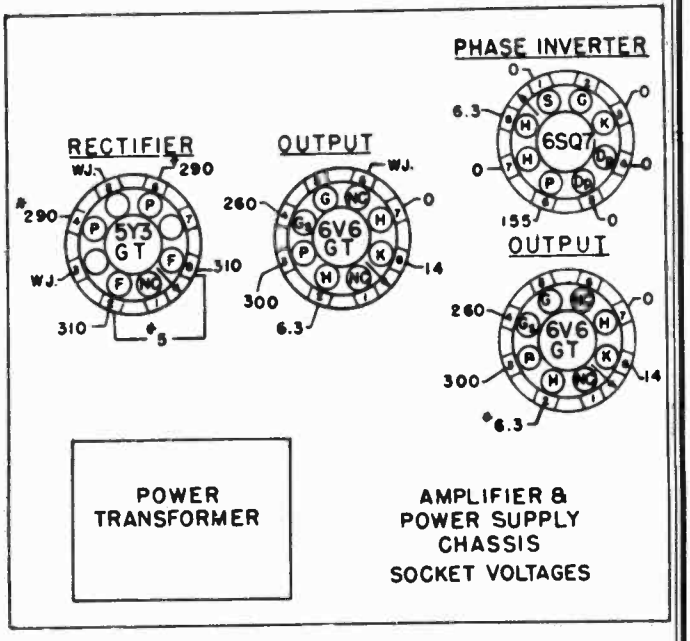
SOCKET VOLTAGE NOTES

1. Bottom view of Sockets.
2. Voltage measured from Socket Lug to Chassis with an Electronic Voltmeter.
3. Voltage measured with Switch in BC position except where marked with delta(▲)
4. ▲=Selector Switch in F.M. position.
5. W.J.=Wiring Junction.
   N.C.=No Connection.
   *=A.C. Voltage.
6. All Voltages taken at Nominal Operating Voltage 117 V., 60 cycles.
7. Socket Voltage Tolerance ± 10%.



POWER SUPPLY & POWER AMPLIFIER CHASSIS.



DESCRIPTION

TYPE: Eleven-tube, three-band, Superheterodyne.

FREQUENCY RANGE: Standard Broadcast Band; 540 to 1600 kc. (Selector Switch at AM position).

Short-wave Band; 9.45 to 11.9 mc. (Selector Switch at SW position).

Frequency Modulated Band: 88 to 108 mc., Channels 201 to 300 (Selector Switch at FM position).

INTERMEDIATE FREQUENCY: Standard Broadcast Band and Short-wave Band; 455 kc. Frequency Modulated Band: 10.7 mc.

POWER SUPPLY: 60 cycle a.c. only.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 100 watts maximum; 20 watts additional for record changer.

POWER OUTPUT: 10 watts maximum.

TUBE COMPLEMENT

Type	Function
6SG7	R.F. Amplifier
7F8	Oscillator
6AC7	Mixer
6SG7	I.F. Amp., A.M. & F.M.
6SG7	2nd I.F. Amp. F.M.
6AL5	Ratio Det. F.M.
6SQ7	Det.—AVC. A.M. 1st A.F. Amp., A.M. & F.M.
6SQ7	Phase Inverter
6V6GT/G (2)	Push Pull Output
5Y3GT/G	Rectifier

DIAL BULBS: Type 47, 6.3 v., .15 amp.

NOTE:
The above model uses the Model "W156" (Part No. 143833) automatic record changer.

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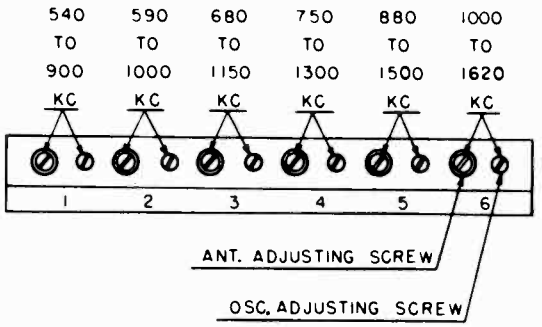
PUSH BUTTON ADJUSTMENT PROCEDURE

Each of the six push buttons, for automatic tuning, has two adjusting screws by which it may be set to any nearby American broadcast station whose frequency in kilocycles is within the kilocycle range covered by that button. To gain access to these screws, carefully pull off the push button. To set No. 1 push button to a desired position, proceed as follows:



1. Turn the ANT. ADJUSTING SCREW clockwise until moderately tight, then turn the OSC. ADJUSTING SCREW counter-clockwise until the threaded portion extends approximately $^3/_4$ inch. **Use a small screw-driver and do not exert pressure.**
2. Turn the band selector switch to the "AM" position and manually tune in the station to which the push button is to be set. The frequency of the station selected must be between 540 and 900 kilocycles. Carefully adjust the tuning control to the point of clearest reception.
3. Turn the band selector switch to the "AUTO" position and slowly turn the OSC. ADJUSTING SCREW clockwise until the same station is heard. Adjust the screw for maximum volume.
4. Adjust the ANT. ADJUSTING SCREW for maximum volume.

   NOTE: In localities where the receiver is near the transmitting station, it may be necessary to detune the ant. adjusting screw (but not the osc. adjusting screw) of the push-button slightly to keep the receiver from overloading on this station.
5. Turn the band selector switch from "AUTO" to "AM" and back again to check if the adjustment has been correctly made. There should be no change in tone quality when switched from one to the other.
6. Place the tab with the call letters of the station, to which the push button has been set, in a celluloid "V" and slide it into the button from the side.
7. The remaining push buttons may be set in a similar manner.

ALIGNMENT PROCEDURE

1. This receiver has been aligned at the factory for best performance, and no attempt should be made to re-align it unless the proper test equipment is available.
2. Turn the tuning condenser to full mesh, against stop, and set the dial pointer at the edge of the clear section of the dial, left of "55."
3. Connect an output meter across the voice coil of the speaker (3.2 ohms).
4. Turn the volume control knob to maximum clockwise position and adjust the signal generator output to produce a noticeable output meter reading. Keep the signal generator output as low as possible to prevent excessive AVC action in the receiver.
5. Feed an R.F. amplitude modulated signal modulated 30% at 400 cycle to the receiver as indicated in the alignment procedure chart. Connect signal generator ground terminal to the chassis of the receiver. When F.M. generator is used, a 30% modulated signal is equal to a deviation of 22.5 kc.
6. Both bass and treble tone controls are to be set for maximum treble response.
7. When aligning the broadcast band, the build-in loop antenna or a suitable dummy antenna, consisting of a coil with 19.1 u h. inductance shunted with a 66 mmf. capacitor must be used.
8. While aligning the set, the shorting link on the antenna terminal strip should be removed. After alignment replace the link, unless an external antenna is to be used.

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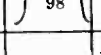
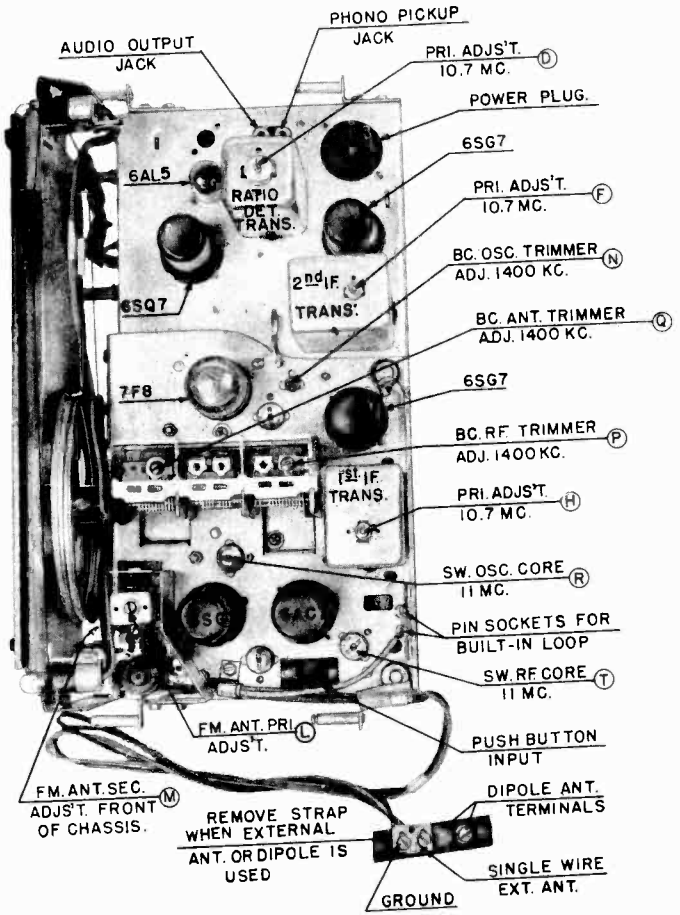
ALIGNMENT CHART I (SCOPE METHOD)

	Signal Generator Output		To	Range Switch	Tuning Dial or Tuning Cap	Adjust	Curve	Remarks
	Frequency	In Series With						
1	455 KC	.01 mfd.	1st IF. grid	AM	Gang open	A		Note 1
2	455 KC	.01 mfd.	Stator 21 plate sect. rear of gang	AM	Gang open	B		Note 1
3	10.7 MC	1000 mmf.	2nd IF grid	FM	Gang closed	C	Zero Volts	Note 2
4	10.7 MC	1000 mmf.	2nd IF grid	FM	Gang closed	D	Max.DC output	Note 3
5	RF sweep 10.7 marker	1000 mmf.	1st IF grid	FM	Gang closed	E & F		Align for max. output & symetry note 4
6	RF sweep 10.7 marker	1000 mmf.	Stator 3 plate sect. rear of gang	FM	Gang closed	G & H		Align for max. output & symetry note 5
7	FM-RF 98MC	FM dummy antenna	Dipole Ant. Term.	FM	98MC	I	Peak	Note 6
8	104MC	FM dummy antenna	Dipole Ant. Term.	FM	104MC	J	Peak	Note 7
9	92MC	FM dummy antenna	Dipole Ant. Term.	FM	92MC	Form RF Coil "K"	Peak	Note 8
10	Repeat steps 8 and 9 until no further improvement in sensitivity is noted.							
11	FM sweep Gen. 92-98-104 MC markers.	FM dummy antenna	Dipole Ant. Term.	FM	Gang closed	L & M		Note 9 or 9a
12	AM-RF Gen. 1400 KC	200 mmf.	BC Ant. Term. and ground	AM	1400 KC	N		Note 10
13	AM-RF Gen. 1400 KC	200 mmf.	BC Ant. Term. and ground	AM	1400 KC	P & Q		Note 1
14	AM-RF Gen. 11 MC	400 ohms	FM Ant. Term. and ground	SW	11 MC	R		Note 1
15	AM-RF Gen. 11 MC	400 ohms	FM Ant. Term. and ground	SW	11 MC	S & T		Note 1

CHASSIS TOP VIEW



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MODEL 9-207M

ALIGNMENT CHART I NOTES (SCOPE METHOD)

1. Align for peak on output meter.
2. Connect two 100,000 ohm resistors in series and connect these resistors from the No. 2 lug of the 6AL5 to the chassis. Connect an electronic voltmeter from the center of these resistors to the shielded lead junction of the 39,000 ohm resistor (98) and the .002 mfd. condenser, (34). Adjust the ratio detector transformer secondary (C) for zero volts on the electronic voltmeter. Remove the two 100,000 ohm resistors.
3. Connect the electronic voltmeter across the 27,000 ohm load resistor (99) and adjust primary of core (D) of the ratio detector transformer (11) for maximum DC output.
4. Connect output of marker generator across sweep generator output. Connect CRO across the 22,000 ohm resistor (104) in the grid circuit of the second I.F. amplifier.
5. CRO connections same as note 4.
6. For dummy antenna see figure 1.
7. Rock gang condenser if necessary while making adjustment.
8. Tune in signal and adjust for greatest sensitivity by forming FM.—R.F. coil.
9. Connect CRO in series with 100,000 ohm resistor to grid (pin 4) of R.F. amplifier and chassis. Remove 7F8 oscillator tube. Connect output of marker generator across output of sweep generator. Adjust (L-M) until pattern and markers approximate figure in alignment chart.

9a. Shunt primary of FM antenna transformer with a 10 ohm carbon resistor and adjust (M) for maximum output. Remove shunt and place it across FM antenna transformer secondary and adjust (L) for maximum output. Remove shunt.

10. Connect BC. dummy loop (Fig. 2) across loop terminals on rear of chassis.

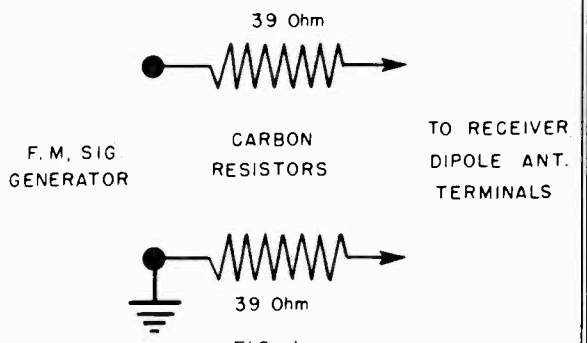


FIG. 1

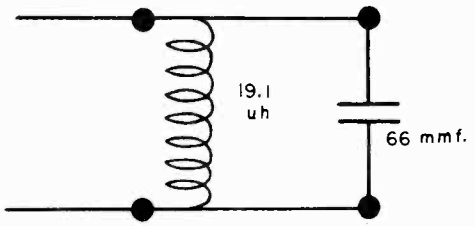
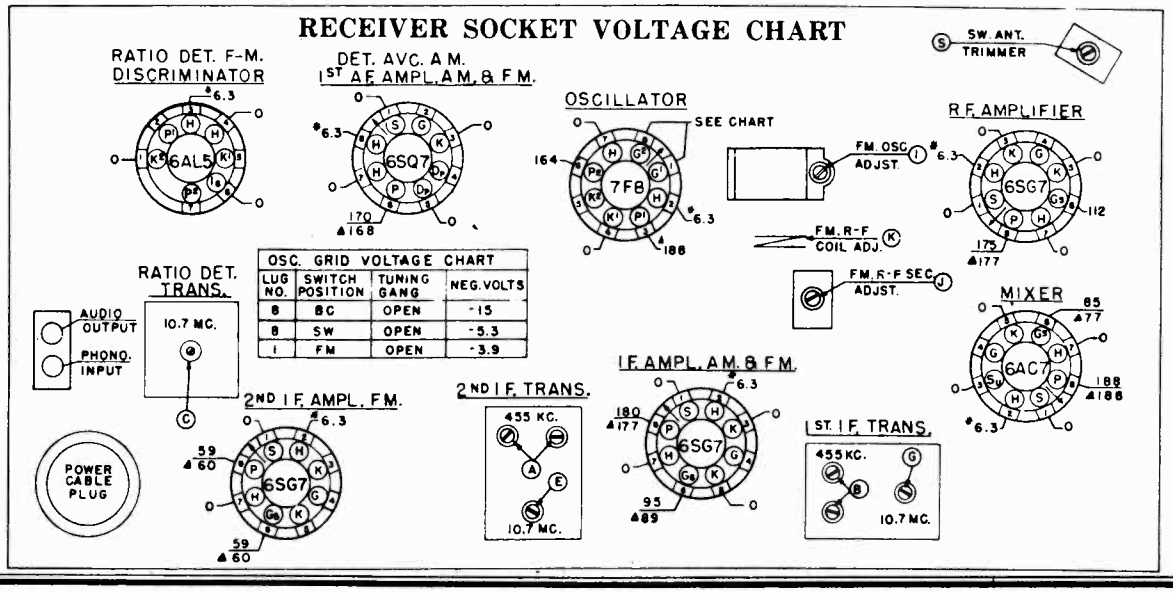


FIG. 2

RECEIVER SOCKET VOLTAGE CHART



OSC. GRID VOLTAGE CHART

LUG NO.	SWITCH POSITION	TUNING GANG	NEG. VOLTS
8	BC	OPEN	-1.5
8	SW	OPEN	-5.3
1	FM	OPEN	-3.9

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ALIGNMENT CHART II

(Using output meter and electronic voltmeter)

Alignment Sequence	Signal Gen. Output		To	Position of		Adjust	Remarks
	Frequency	In Series With		Range Switch	Tuning Dial or Tun. Cap.		
1	455 KC	.01 mfd.	1st IF grid	AM	Gang open	A	Align for peak on output meter
2	455 KC	.01 mfd.	Stator 21 plate sect. rear of gang	AM	Gang open	B	Align for peak on output meter
3	10.7 MC	1000 mmf	2nd IF grid	FM	Gang closed	C	Adjust for zero volts on electronic voltmeter Note 1 & 2
4	10.7 MC	1000 mmf	2nd IF grid	FM	Gang closed	D	Adjust for max. DC. output on Elect. voltmeter Note 3
5	10.7 MC	1000 mmf	1st IF grid	FM	Gang closed	E & F	Adjust for max. DC. output Note 4
6	10.7 MC	1000 mmf	Stator 3 plate sect. rear of gang	FM	Gang closed	G & H	Adjust for max. DC. output Note 4
	Repeat steps 3 and 4, 5 and 6 if necessary.						
7	98 MC	FM dummy antenna	Dipole Ant. Terminals	FM	98 MC	I	Adjust for max. reading on output meter.
8	104 MC	FM dummy antenna	Dipole Ant. Terminals	FM	104 MC	J	Adjust for max. reading on output meter, rock gang if necessary while making adjustments
9	92 MC	FM dummy antenna	Dipole Ant. Terminals	FM	92 MC	K	Adjust for max. sensitivity, the inductance of FM.RF. coil "K" by forming
	Repeat steps 8 and 9 until no further improvement in sensitivity is noted.						
10	98 MC	FM dummy antenna	Dipole Ant. Terminals	FM	98 MC	L & M	See Note 5
11	AM-RF Gen. 1400 KC	200 mmf	BC Ant. Term.	AM	1400 KC	N	See Note 6
12	AM-RF Gen. 1400 KC	200 mmf	BC Ant. Term. and ground	AM	1400 KC	P & Q	Note 6. Adj. for max. reading on output meter.
13	AM-RF Gen. 11 MC	400 ohms	FM Ant. Term. and ground	SW	11 MC	R	Note 6. Adj. for max. reading on output meter.
14	AM-RF Gen. 11 MC	400 ohms	FM Ant. Term. and ground	SW	11 MC	S & T	Note 6. Adj. for max. reading on output meter.

ALIGNMENT CHART II NOTES

1. Use an unmodulated signal generator, with approximately 100,000 mv. output.

2. Connect two 100,000 ohm resistors in series and connect these resistors from the No. 2 lug of the 6AL5 to the chassis. Connect an electronic voltmeter from the center of these resistors to the shielded lead junction of the 39,000 ohm resistor (98) and the .002 mfd. condenser, (34). Adjust the ratio detector transformer secondary (C) for zero volts on the electronic voltmeter. Remove the two 100,000 ohm resistors.

3. Connect the electronic voltmeter across the 27,000 ohm load resistor (99) and adjust the primary of the core (D) of the ratio detector transformer (11) for maximum DC output.

4. Limit output of signal generator so that the reading on the electronic voltmeter will not exceed 4 volts.

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5. Shunt the FM antenna transformer primary with a 10 ohm carbon resistor, and adjust the FM antenna secondary trimmer (M) for maximum output meter reading. Transfer the 10 ohm shunt to the secondary of FM antenna transformer. Adjust FM antenna primary trimmer (L) for maximum output meter reading. Remove the 10 ohm shunt resistor.

6. Connect the BC dummy loop antenna across the loop terminals on the rear of the chassis (see Figure 2

REPLACEMENT PARTS LIST—MODEL 9-207M

Figures in first column correspond to figures in Schematic Diagram.

Item No.	Part Number	Description
1	143784	Coil, Antenna, (F.M.)
2	143076	Coil, Antenna, (S.W.)
3	143267	Coil, Antenna Loading, (B.C.)
4	143402	Transformer, R.F., (B.C.)
5	143646	Coil, R.F., (F.M.)
6	143085	Coil, R.F., (S.W.)
7	143090	Transformer, 1st I.F.
8	143095	Coil, Oscillator, (S.W.)
9	143945	Coil, Oscillator, (B.C.)
10	143105	Transformer, 2nd I.F.
11	143378	Transformer, Ratio Det.
12	143752	Choke, R.F.
13	143837	Choke, R.F., (F.M. Osc.)
14	143373	Choke, R.F.
15	143934	Choke, Filament
16	143934	Choke, Filament
17	143305	Coil Assy., Oscillator, (F.M.)
18A	142848	Condenser, Variable (Four Section)
18B		Condenser, Variable (Four Section)
18C		Condenser, Variable (Four Section)
18D		Condenser, Variable (Four Section)
19	136327-43	Condenser, Trimmer
20	136327-36	Condenser, Trimmer
21	137727-12	Condenser, 120 mmf., 300 v.,Ceramic
22	143686-2	Condenser, 33 mmf., 500 v., Ceramic
23	39001-11	Condenser, .005 mfd., 600 v., Paper
24	137727-73	Condenser, 40 mmf., 500 v., Ceramic
25	137727-20	Condenser, 91 mmf., 300 v., Ceramic
26	137727-25	Condenser, 100 mmf., 500 v., Ceramic
27	39001-11	Condenser, .005 mfd., 600 v., Paper
28	39001-11	Condenser, .005 mfd., 600 v., Paper
29	39001-11	Condenser, .005 mfd., 600 v., Paper
30	39001-13	Condenser, .01 mfd., 600 v., Paper
31	137727-8	Condenser, 1000 mmf., 300 v., Ceramic
32	39001-80	Condenser, .02 mfd., 600 v., Paper
33	39001-80	Condenser, .02 mfd., 600 v., Paper
34	39001-74	Condenser, .002 mfd., 600 v., Paper
35	137727-75	Condenser, 180 mmf., 500 v., Ceramic
36	137727-31	Condenser, 47 mmf., 300 v., Ceramic
37	137398-5	Condenser, 3.3 mmf., Ceramic
38	39001-13	Condenser, .01 mfd., 600 v., Paper
39	137727-8	Condenser, 1000 mmf., 300 v., Ceramic
41	137727-8	Condenser, 1000 mmf., 300 v., Ceramic
42	137727-45	Condenser, 56 mmf., 500 v., Ceramic
43	137499-24	Condenser, 164 mmf., 500 v., Silver Mica
44	137727-76	Condenser, 60 mmf., 500 v., Ceramic
45	39001-17	Condenser, .05 mfd., 600 v., Paper
46	137499-23	Condenser, 200 mmf., 500 v., Silver Mica
47	137499-20	Condenser, 680 mmf., 400 v., Silver Mica
48	137498-4	Condenser, 3300 mmf., 500 v., Mica
50	39001-13	Condenser, .01 mmf., 600 v., Paper
51	39001-13	Condenser, .01 mmf., 600 v., Paper
52	137727-71	Condenser, 96 mmf., 300 v., Ceramic
53	143014	Condenser, Trimmer
54	137727-8	Condenser, 1000 mmf., 500 v., Ceramic
55	143686-1	Condenser, 50 mmf., 500 v., Ceramic
56	39001-11	Condenser, .005 mfd., 600 v., Paper
57	143686-2	Condenser, 33 mmf., 500 v., Ceramic
58	39001-11	Condenser, .005 mfd., 600 v., Paper
59	39001-11	Condenser, .005 mfd., 600 v., Paper
60	143686-1	Condenser, 50 mmf., 500 v., Ceramic
61	137727-8	Condenser, 1000 mmf., 500 v., Ceramic
62	39001-13	Condenser, .01 mfd., 600 v., Paper
63	39001-11	Condenser, .005 mfd., 600 v., Paper
64	137727-53	Condenser, 33 mmf., 500 v., Ceramic
65	137727-53	Condenser, 33 mmf., 500 v., Ceramic
66	39001-11	Condenser, .005 mfd., 600 v., Paper
67	137727-31	Condenser, 47 mmf., 300 v., Ceramic
68	137727-8	Condenser, 1000 mmf., 500 v.. Ceramic
69	39001-11	Condenser, .005 mfd., 600 v., Paper
70	39001-76	Condenser, .003 mfd., 600 v., Paper
71	39001-76	Condenser, .003 mfd., 600 v., Paper
72	39001-17	Condenser, .05 mfd., 600 v., Paper
73	39001-87	Condenser, .25 mfd., 600 v., Paper
74	137727-8	Condenser, 1000 mmf., 500 v., Ceramic
75	137727-8	Condenser, 1000 mmf., 500 v., Ceramic
76	137727-38	Condenser, 5000 mmf., 500 v., Ceramic
77	137727-38	Condenser, 5000 mmf., 500 v., Ceramic
78	137727-8	Condenser, 1000 mmf., 500 v., Ceramic
79	137727-8	Condenser, 1000 mmf., 500 v., Ceramic
80	142958	Condenser, 4 mfd., 50 v., Elect.
81	143062	Condenser, 30 mfd., 450 v., Elect.
82A	143089	Condenser, 40 mfd., 450 v., (Four Section Elect. Filter)
82B		Condenser, 20 mfd., 450 v., (Four Section Elect. Filter)
82C		Condenser, 10 mfd., 450 v., (Four Section Elect. Filter)
82D		Condenser, 20 mfd., 25 v., (Four Section Elect. Filter)
83	39373-92	Resistor, 1.0 Megohm, ½ w.
84	39373-71	Resistor, 68,000 ohms, ½ w.
85	39373-170	Resistor, 22,000 ohms, 1 w.
87	39373-92	Resistor, 1.0 Megohm, ½ w.
88	39373-75	Resistor, 120,000 ohms, ½ w.
89	39373-92	Resistor, 1.0 Megohm, ½ w.
90	39373-40	Resistor, 2,200 ohms, ½ w.
91	39373-65	Resistor, 39,000 ohms, ½ w.
92	39373-40	Resistor, 2,200 ohms, ½ w.
93	39373-87	Resistor, 470,000 ohms, ½ w.
94	39373-67	Resistor, 47,000 ohms, ½ w.
95	39373-21	Resistor, 270 ohms, ½ w.
96	39373-174	Resistor, 33,000 ohms, 1 w.
97	39373-65	Resistor, 39,000 ohms, ½ w.
98	39373-65	Resistor, 39,000 ohms, ½ w.
99	39373-62	Resistor, 27,000 ohms, ½ w.
100	39373-94	Resistor, 1.5 Megohm, ½ w.
101	39373-74	Resistor, 100,000 ohms, ½ w.
102	39373-33	Resistor, 1000 ohms, ½ w.
104	39373-60	Resistor, 22,000 ohms, ½ w.
105	39373-67	Resistor, 47,000 ohms, ½ w.
106	39373-71	Resistor, 68,000 ohms, ½ w.
107	39373-64	Resistor, 33,000 ohms, ½ w.
108	39373-80	Resistor, 220,000 ohms, ½ w.
109	39373-19	Resistor, 220 ohms, ½ w.
110	39373-71	Resistor, 68,000 ohms, ½ w.
111	39373-74	Resistor, 100,000 ohms, ½ w.
112	39373-161	Resistor, 6,800 ohms, 1 w.
113	39373-19	Resistor, 220 ohms, ½ w.
114	39373-107	Resistor, 10 Megohm, ½ w.
115	39373-80	Resistor, 220,000 ohms, ½ w.
116	39373-107	Resistor, 10 Megohm, ½ w.
117	39373-84	Resistor, 330,000 ohms, ½ w.
118	39373-84	Resistor, 330,000 ohms, ½ w.
119	39373-74	Resistor, 100,000 ohms, ½ w.
120	39373-239	Resistor, 220 ohms, 2 w.
121	39373-253	Resistor, 1000 ohms, 2 w.
122A	137021	Res'r (wirewound) 700 ohm, 4 w. (Two Sec.
122B		Res'r (wirewound) 400 ohm, 4 w. (Two Sec.
123	39373-92	Resistor, 1.0 Megohm, ½ w.
124	39373-3	Resistor, 15 ohms, ½ w.
125A	39368-12	Control, Treble Tone (500,000 ohms)
125B	39369-1	Switch, Power
126	39368-19	Cont'l, Vol. (2.5 Meg., Tap 750K ohms)
	39370-2	Shaft, Volume Control (knurled)
127	39368-22	Control, Bass Tone (3 Megohm)
	39370-2	Shaft, Bass Tone Control (knurled)
128	137091	Transformer, Output
129	135106	Transformer, Power
130	142918	Plug, Power
131	143742	Plug and Cable Assy., Power
132	139727-4	Cord, Phono Motor
133A	143097	Switch, Band Change (Three Section)
133B		Switch, Band Change (Three Section)
133C		Switch, Band Change (Three Section)
134	143833	Record Changer with No. 143393 Crystal Cart
135A	143126	Socket, Phono (Two Hole)
135B		Socket, Audio Input (Two Hole)
136	132300-2	Cable and Plug Assy., Power

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REPLACEMENT PARTS LIST—MODEL 9-207M

Figures in first column correspond to figures in Schematic Diagram.

Item No.	Part Number	Description
137	143775	Cable Assy., Antenna
139	143685	Cable and Pin Assy., Speaker
140	143768	Shielded Lead Assy., Audio Input
141	137058	Speaker
142	143404	Terminal Strip, Loop Antenna
143	143893	Antenna Loop
144	143765	Push Button Assy. (complete)
145	47133	Socket, P.B. Assy.
146	48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.
147	48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.
148	48858	Bulb (Dial), Type 47, 6.3 v., .15 amp.
149	39001-80	Condenser, .02 mfd., 600 v., Paper
150	143896	Shielded Lead Assy., Phono
151	137727-43	Condenser, 15 mmf., 500 v., Ceramic
152	137398-5	Condenser, 3.3 mmf. Fixed insulated
153	137398-6	Condenser, 4.7 mmf. Fixed insulated
154	137727-79	Condenser, 5 mmf., 500 v., Ceramic
155	137398-4	Condenser, 2.2 mmf. Fixed insulated
156	137727-78	Condenser, 3 mmf., 500 v., Ceramic
159	39373-19	Resistor, 220 ohms, ½ w.
	143761	Coil, P.B. Osc. No. 1 (540-900 kc)
	143760	Coil, P.B. Osc. No. 2 (590-1000 kc)
	143759	Coil, P.B. Osc. No. 3 (680-1150 kc.)
	143758	Coil, P.B. Osc. No. 4 (750-1300 kc.)
	143757	Coil, P.B. Osc. No. 5 (880-1500 kc.)
	143756	Coil, P.B. Osc. No. 6 (1000-1620 kc.)
	136327-14	Condenser, Trimmer, P.B. No. 1
	136327-24	Condenser, Trimmer, P.B. No. 2
	136327-24	Condenser, Trimmer, P.B. No. 3
	136327-12	Condenser, Trimmer, P.B. No. 4
	136327-25	Condenser, Trimmer, P.B. No. 5
	136327-25	Condenser, Trimmer, P.B. No. 6
	143729	Background Assy., Dial
	142756	Blade Assy., F.M. Osc. Tuning
	143446	Button (P.B. Assy.)
	139477-1	Button-Loop (with shoulder)
	139477-2	Button-Loop (without shoulder)
	143897	Cabinet
	136201	Clip, Dial Glass
	134220	Cotter, External
	136853	Cushion (Rubber), Dial Mtg.
	143526	Dial
	143286	Escutcheon, Dial
	134055	Grommet, Band Switch
	39012-86	Iron Core, S.W. Osc.
	39012-85	Iron Core, S.W. R.F.
	39012-84	Iron Core, 1st I.F.
	39012-84	Iron Core, 2nd I.F.
	138576-6	Knob (Volume, Tone or Tuning)
	143778	Knob (Band Change)
	136111	Mounting, Rubber (chassis)
	45580	Mounting, Rubber (speaker)
	143769	Pointer, Dial
	136979	Pulley, Dial Drive Idler
	143453	Pulley & Hub, Variable Condenser
	51071	Ring, Retaining (Dial Drive Shaft)
	39220-38CP	Screw, Chassis Mtg.
	143455	Shaft, Dial Drive
	46065	Shock Mount, Sub-Chassis Mtg.
	139040	Shock Mount, Sub-Chassis Mtg.
	39232-10	Socket, Tube, Octal
	136470	Socket, Tube, Loctal
	143146	Socket, Tube, Min.
	136565-25	Socket, Dial Light
	137148	Spacer
	51752	Spring, Dial Drive Cord
	143552	Strip, Dial Pointer
	135038-12	Terminal Strip, Two Lug
	135038-13	Terminal Strip, Three Lug
	135038-47	Terminal Strip, Four Lug
	135038-23	Terminal Strip, Five Lug
	134916	Washer, Spring (Dial Drive Shaft)

CABINET PARTS

143943	Baffle, Speaker
143654	Bracket, L.H. Radio Bin
143653	Bracket, R.H. Radio Bin
143846	Bumper, Rubber, Radio Bin
143485	Bumper, Rubber, Doors
142973	Button, Indicator
143941	Door, Speaker
143940	Doors, (matched pair), Record Comp.
143935	Frame Assy. only, Rec' Changer Draw.
143509	Grille Cloth
143942	Hinges, Record Compartment Door
137266-SB	Hinge, Speaker Door
143939	Knobs, Record Compartment Door
143944	Leg & Base Assy.
143936	Panel (matched pair) Drawer & Radio Bin
143856	Panel Assy., Radio Dial
143938	Pull, Rec'd Changer Draw. & Radio Bin
143478	Slides (one set) Rec'd Changer Drawer
143913	Spring, Radio Bin
139319	Strike & Catch Assy.

MEGACYCLES TO CHANNEL NUMBERS

Cross index between frequency calibrations in megacycles on the dial and channel numbers follow:

Frequency in Megacycles	Channel No.	Frequency in Megacycles	Channel No.
87.9	200	98.9	255
88.9	205	99.9	260
89.9	210	100.9	265
90.9	215	101.9	270
91.9	220	102.9	275
92.9	225	103.9	280
93.9	230	104.9	285
94.9	235	105.9	290
95.9	240	106.9	295
96.9	245	107.9	300
97.9	250		

To find the frequency in megacycles for CHANNEL NUMBERS between those given above, add .2 megacycle for every whole number added to the CHANNEL NUMBER; for example channel 204 would be 88.7 megacycles and 251 would be 98.1 megacycles.

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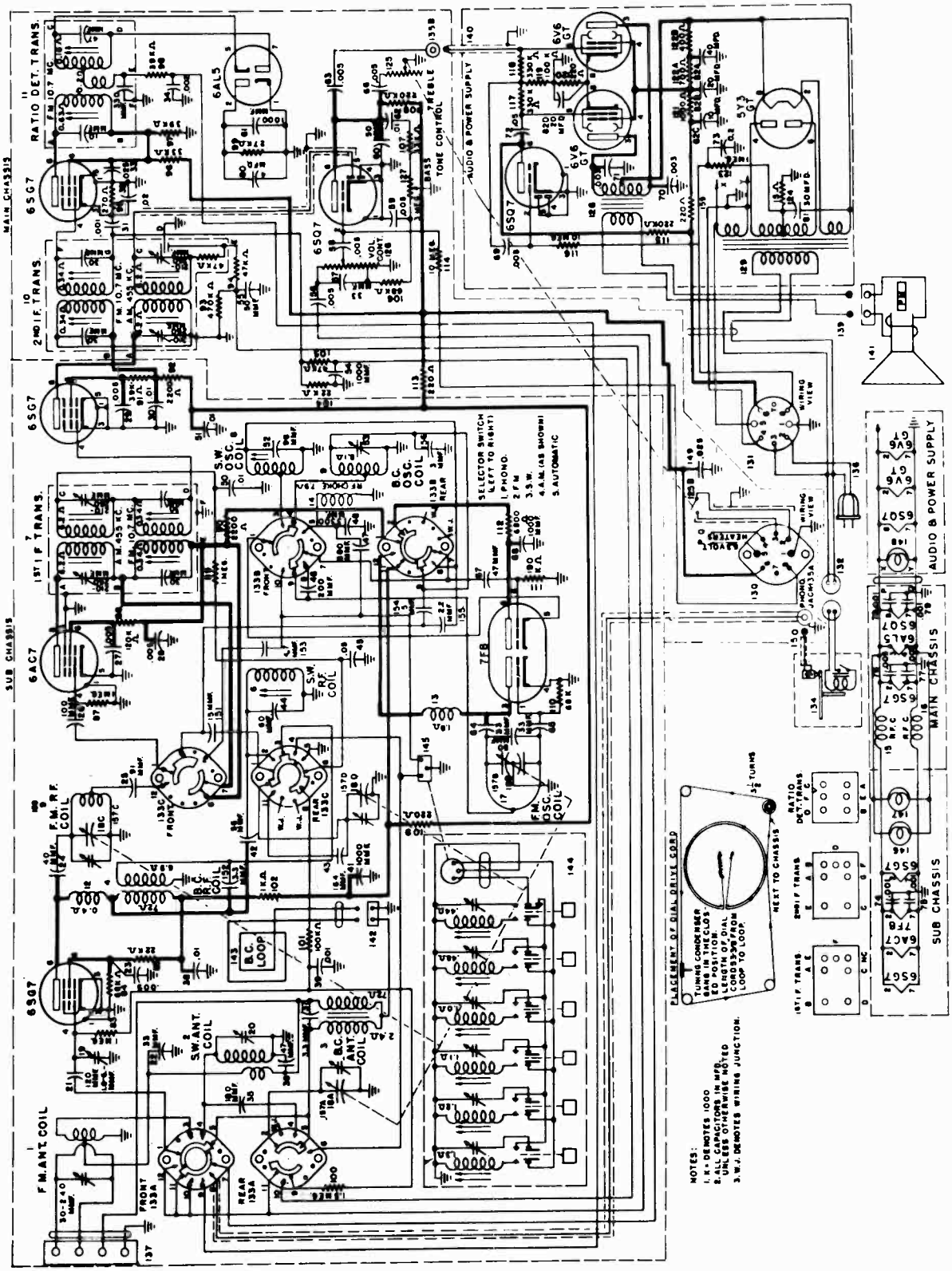
MODEL 9-207M



RECORD CHANGER: See Webster Model 156, Pages RCD.CH. 19-1 through RCD.CH. 19-11

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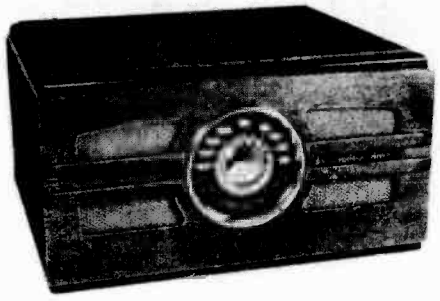
MODEL 10-145M



DESCRIPTION

TYPE: Five-tube superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: 60 cycle a.c. only.

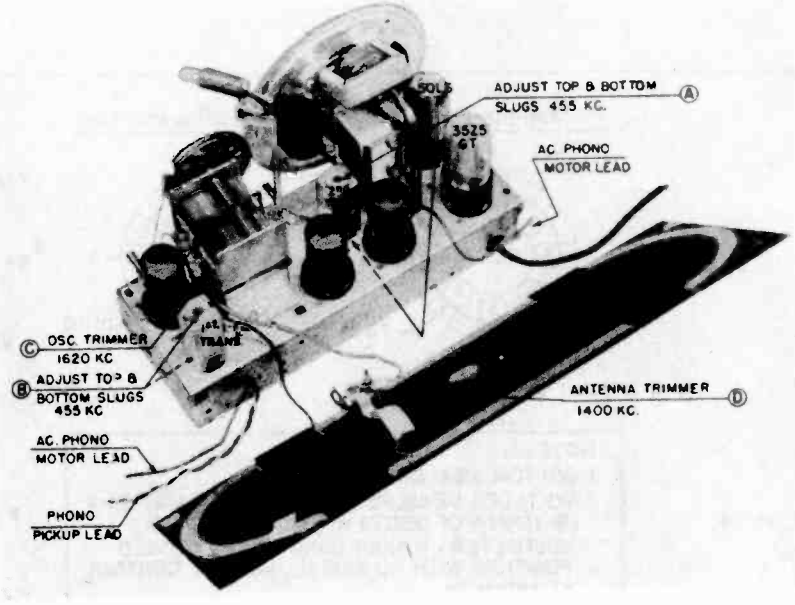
VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:
Radio position—35 watts.
Phono position—55 watts.

TUBE COMPLEMENT:

Type	Function
12SA7	Converter
12SK7	I.F. Amplifier
12SQ7	Detector, AVC, 1st Audio Amplifier
50L6GT	A.F. Power Output
35Z5GT	Rectifier

DIAL BULB: Type 47, 6.3 volts, .15 amp.



CHASSIS, TOP VIEW—MODEL 10-145M

Reversing the position of the power plug may reduce power hum.

Under no circumstances should a ground be connected to this receiver.

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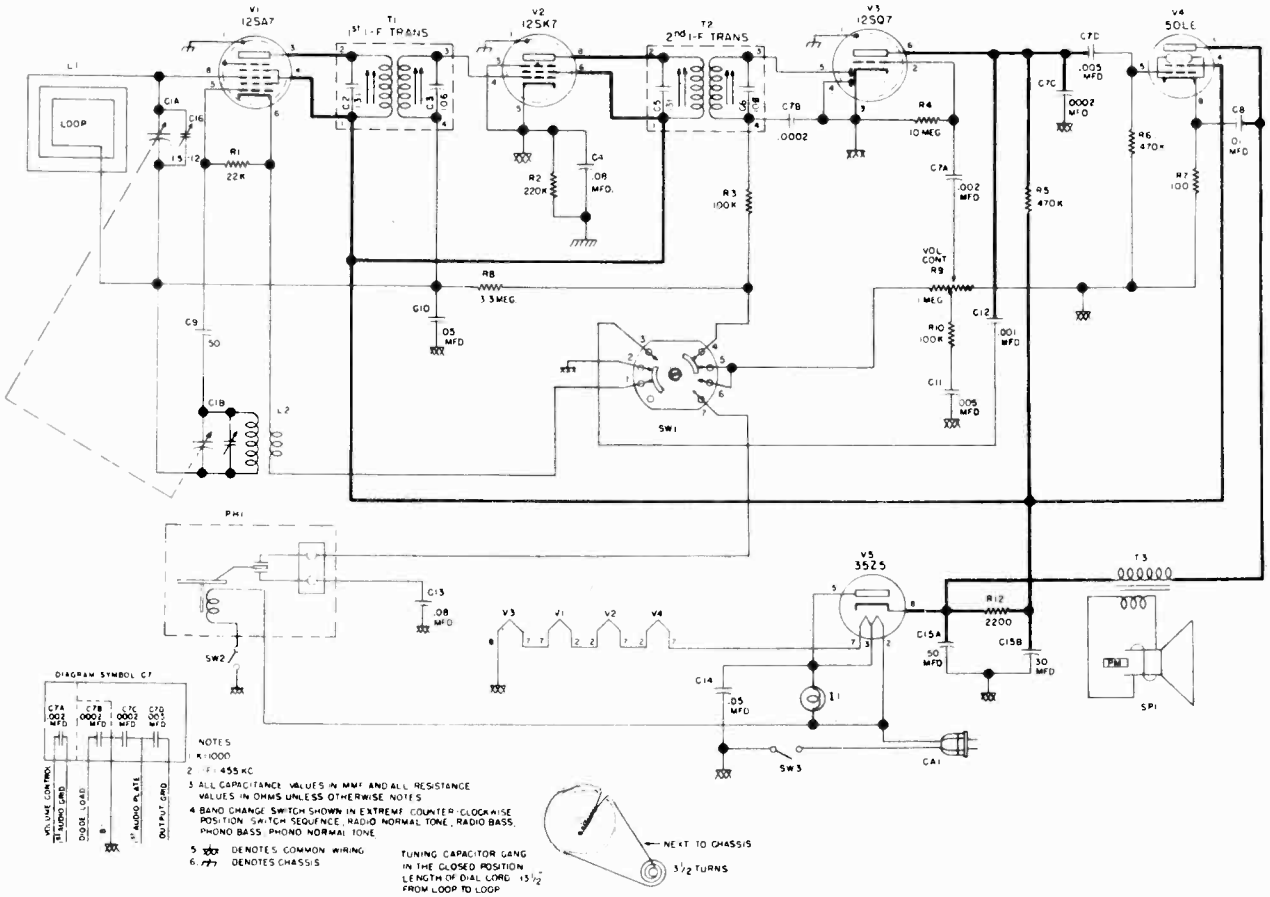
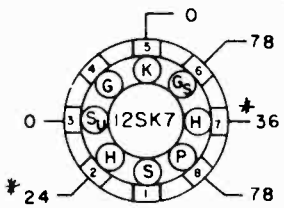
MODEL 10-145M

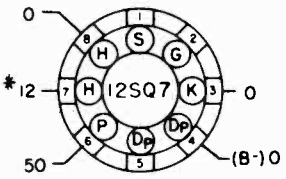


SCHEMATIC DIAGRAM—MODEL 10-145M

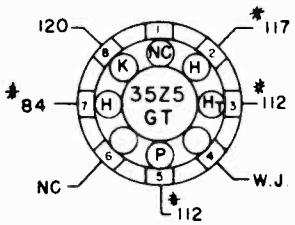
I-F AMPLIFIER



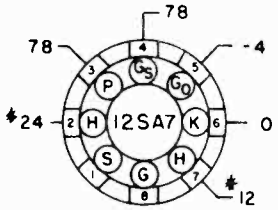
DET.-AVG. & 1ST AUDIO AMP.



RECTIFIER

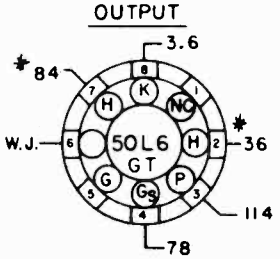


CONVERTER



NOTES:
1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGES MEASURED FROM SOCKET LUG TO (B-)(PIN 4 OF 12SQ7) WITH AN ELECTRONIC VOLTMETER; TUNING GANG IN THE CLOSED POSITION WITH NO SIGNAL, VOLUME CONTROL AT MINIMUM.
3. N.C. = NO CONNECTION
4. W.J. = WIRING JUNCTION.
5. ✱ = AC. VOLTAGE
6. SUPPLY VOLTAGE 117 V. 60 ~
7. SOCKET VOLTAGE TOLERANCE ± 10 %

OUTPUT



SOCKET VOLTAGE CHART

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MODEL 10-145M

ALIGNMENT PROCEDURE

1. Turn the tuning capacitor to the completely closed position against the stop and set the dial pointer to the reference line at the end of the dial scale.
2. Turn tone control switch to normal tone position.
3. Connect the output meter across the speaker voice coil.
4. The r.f. signal input from the signal generator should be connected as indicated in the Alignment Chart. Connect the signal generator ground through a 0.1 mfd. capacitor to B— (pin 4 on 12SQ7 tube socket).
5. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, Chassis, Top View—Model 10-145M

Alignment Sequence	Signal Generator Output			Position of		Adjust for Maximum Output
	Frequency in kc.	In Series with	To	Radio-Phono Switch	Tuning Dial	
1	455	200 mmf.	Ant.	Counter-clockwise	Open	A & B (See Note 1)
2	1620	200 mmf	Ant.	Counter-clockwise	Open	C (See Note 1)
3	1400	*Radiated to Loop			Tune in Signal	D (See Note 2)

*Place signal generator output lead near the loop antenna.

Notes: 1. Disconnect loop antenna. Connect a 33,000 ohm resistor from pin 8 on 12SA7 tube socket to B-(pin 4 on 12SQ7 tube socket).
2. Remove 33,000 ohm resistor, connect loop antenna and place receiver chassis in cabinet.

REPLACEMENT PARTS LIST—MODEL 10-145M

Figures in first Column correspond to figures in schemetic diagram.

Symbol No.	Part Number	Description
C-1A	AC-137073-39	Capacitor, Variable \ Two Section
C-1B		Capacitor, Variable /
C-2	Part of T1	Capacitor, 131 mmf.
C-3	Part of T1	Capacitor, 106 mmf.
C-4	39001-19	Capacitor, .1 mfd., 600 v., paper
C-5	Part of T2	Capacitor, 131 mmf.
C-6	Part of T2	Capacitor, 106 mmf.
C-7A	C-144675-1	Capacitor, .002 mfd., 500 v. \
C-7B		Capacitor, .0002 mfd., 500 v. \ Four
C-7C		Capacitor, .0002 mfd., 500 v. \ Section
C-7D		Capacitor, .005 mfd., 500 v. /
C-8	39001-13	Capacitor, .01 mfd., 600 v., paper
C-9	C-137727-21	Capacitor, 50 mmf., 500 v., ceramic
C-10	39001-17	Capacitor, .05 mfd., 600 v., paper
C-11	39001-11	Capacitor, .005 mfd., 600 v., paper
C-12	39001-7	Capacitor, .001 mfd., 600 v., paper
C-13	39001-19	Capacitor, .1 mfd., 600 v., paper
C-14	39001-17	Capacitor, .05 mfd., 600 v., paper
C-15A	B-136770	Capacitor, 50 mfd., 150 v. \ Two
C-15B		Capacitor, 30 mfd., 150 v. / Section
C-16	C-137219-2	Capacitor, Trimmer (used on L1)
R-1	39373-60	Resistor, 22,000 ohm, ½ w.
R-2	39373-80	Resistor, 220,000 ohm, ½ w.
R-3	39373-74	Resistor, 100,000 ohm, ½ w.
R-4	39373-107	Resistor, 10 megohm, ½ w.
R-5	39373-87	Resistor, 470,000 ohm, ½ w.
R-6	39373-87	Resistor, 470,000 ohm, ½ w.
R-7	39373-14	Resistor, 100 ohm, ½ w.
R-8	39373-100	Resistor, 3.3 megohm, ½ w.
R-9	39368-18	Control, Volume (1 megohm, Tap 300,000 ohm)
	39370-2	Shaft, Volume Control (Knurled)
R-10	39373-74	Resistor, 100,000 ohm, ½ w.
R-12	39374-205	Resistor, 2200 ohm, 2 w., 10%
CA-1	C-132300-1	Cable & Plug Assembly, Power
I-1	138437-1	Bulb (dial) Type 47, 6.3 v., .15 amp.
L-1	AC-145863	Loop Assembly, Antenna
L-2	AW-145860	Coil, Oscillator
PH-1	D-145821	Record Changer
SP-1	C-145878	Speaker & Transformer Assy.
SW-1	B-145904	Switch, Tone-Phono
SW-2	Part of SW1	Switch, Power (Phono Motor)
SW-3	39369-1	Switch, Power (On-Off)
T-1	AC-139919-3	Transformer, 1st I.F.
T-2	AC-139919-3	Transformer, 2nd I.F.
T-3	Part of SP1	Transformer, Output
	139418	Bumper (Rubber), Lid
	R-145867	Cabinet
	W-131154-1	Cotter, External Type
	B-145942	Dial Glass
	B-145909	Escutcheon
	146124	Foot, Rubber
	146125	Grille Cloth
	W-134055	Grommet, Var. Capacitor Mtg.
	146126	Hinge, Lid
	W-145890	Knob
	146122	Lid, Cabinet
	B-145921	Pointer, Dial
	B-135075-13	Shaft, Dial Drive
	D-136565-32	Socket, Dial Light
	39204	Socket, Tube
	W-51752	Spring, Dial Drive Cord
	146123	Support, Lid
	W-134916	Washer (Spring, Dial Drive Shaft)

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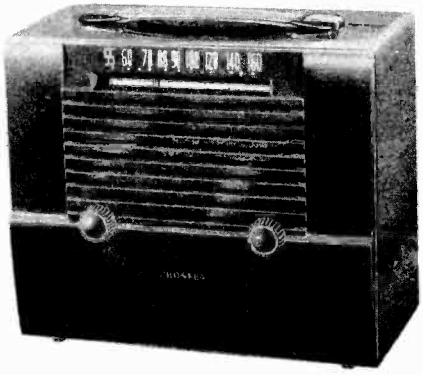
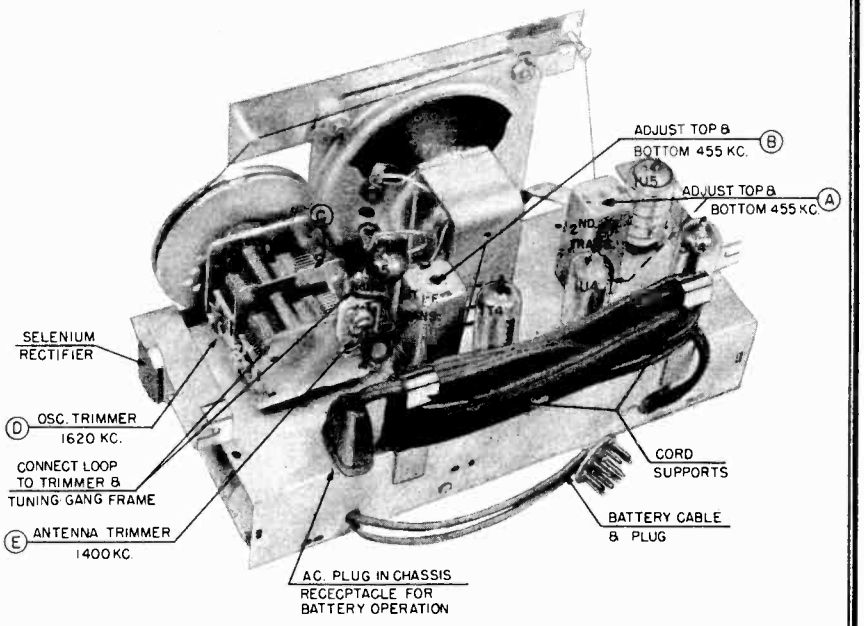
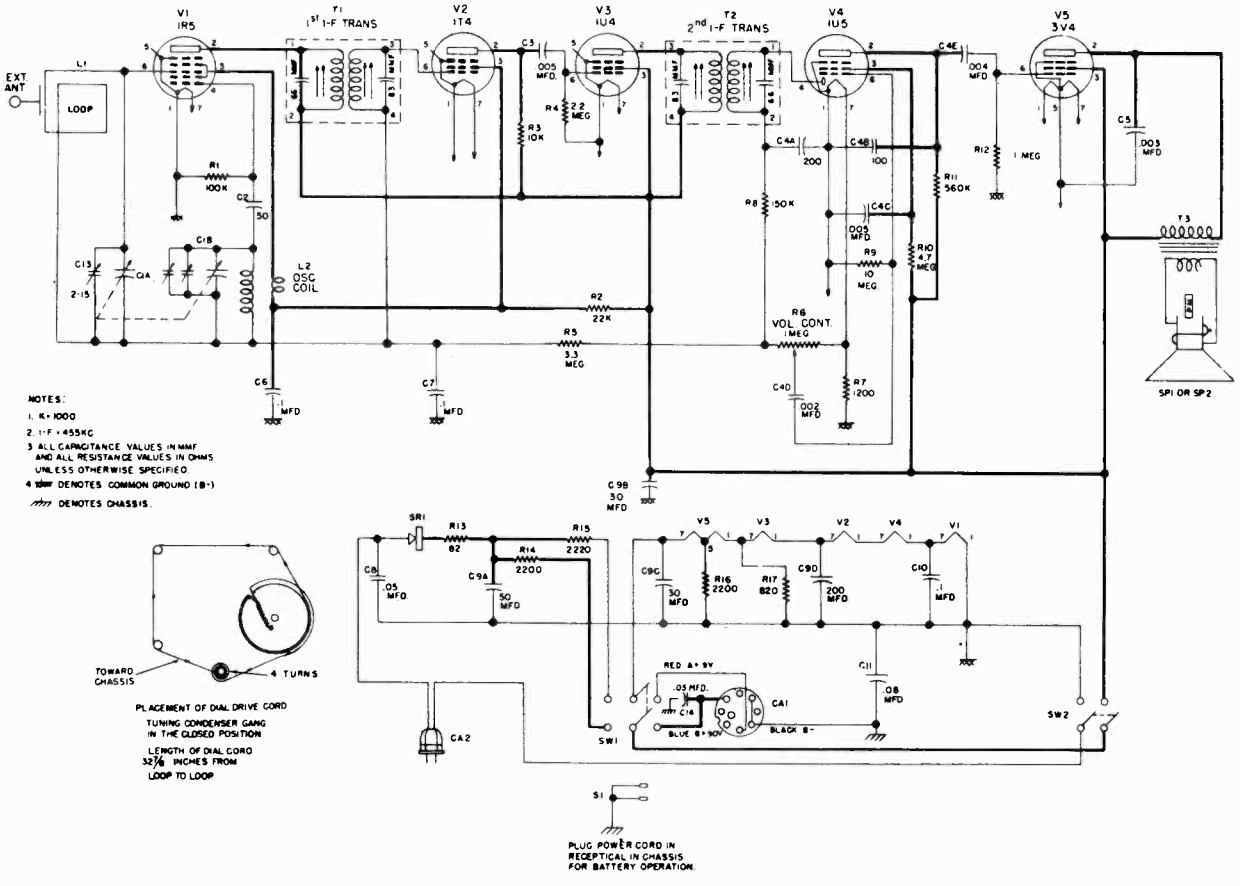
MODEL 10-307M





CHASSIS, TOP VIEW — MODEL 10-307M



SCHEMATIC DIAGRAM — MODEL 10-307M

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ALIGNMENT PROCEDURE

ALIGNMENT SHOULD ALWAYS BE MADE ON BATTERY OPERATION.

1. Unsolder the two loop antenna leads from the rear of the tuning capacitor and remove the chassis from the cabinet.
2. Remove the chassis bottom cover and connect a 33,000 ohm resistor from the grid of the 1R5 converter tube to B— (pin 6 to pin 1 of V1 tube socket).
3. Connect the battery cable plug to the receptacle on the battery. Wrap the power cord around the metal cord supports and insert the prongs of the plug into the receptacle on the chassis.
4. Connect the output meter across the speaker voice coil.
5. Connect the high side of the signal generator through a 200 mmf. capacitor to the converter grid terminal (pin 6 of V1 tube socket). Connect the signal generator ground through a .05 mfd. capacitor to B— (pin 1 of V1 tube socket).
6. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, Chassis View — Model 10-307M

Alignment Sequence	Signal Generator Output			Position of Dial pointer or Var. Cond.	Adjust for Maximum Output	Remarks
	Frequency in KC	In Series with	To			
1	455	200 mmf.	V1 Grid	Open	A & B	See steps 2 & 5 of Alignment procedure
2	1620	200 mmf.	V1 Grid	Open	D	See notes 1 & 2 of Alignment notes
3	1400	Radiated to Loop		1400 kc	E	See notes 3 & 4 of Alignment notes

ALIGNMENT NOTES

1. After adjusting A and B, replace the chassis bottom.
2. Preset C to ¼ turn from its closed position before adjusting D.
3. Before adjusting E remove the 33,000 ohm resistor from pins 6 and 1 of the V1 tube socket. Replace the chassis in the cabinet and connect the antenna loop (see chassis top view). Make certain that the battery cable and the power cord are connected for battery operation (see step 3, Alignment Procedure), and the battery pack in place in the cabinet.
4. To obtain a radiated signal for this alignment, place the signal generator output lead near the loop antenna.

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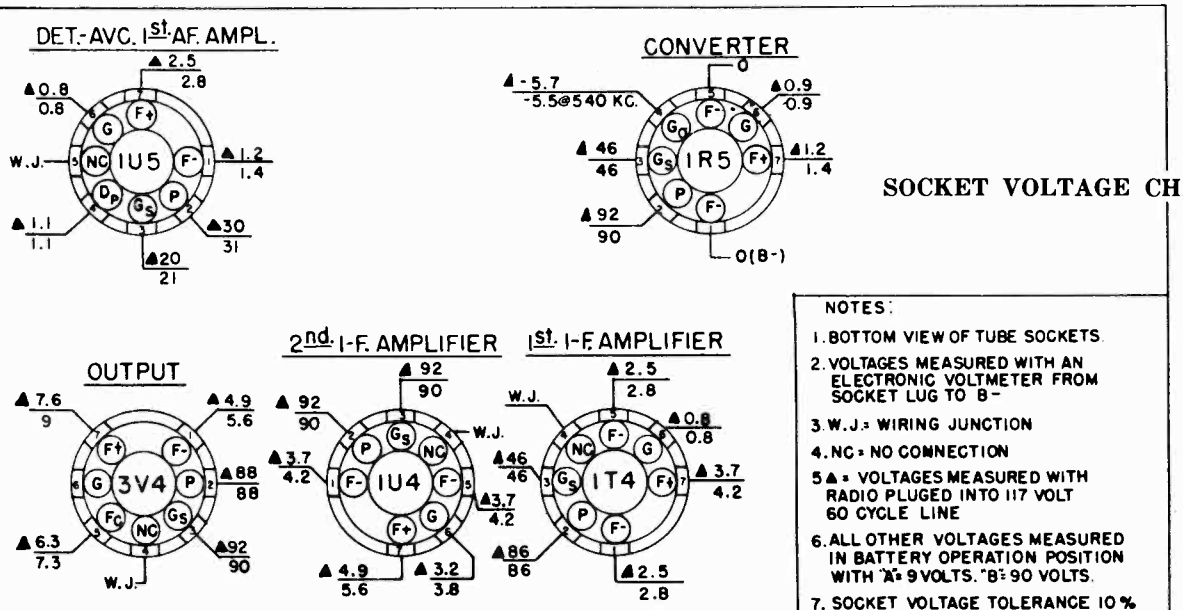
MODEL 10-307M



SOCKET VOLTAGE CHART

NOTES:

1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B-
3. W.J. = WIRING JUNCTION
4. NC = NO CONNECTION
5. ▲ = VOLTAGES MEASURED WITH RADIO PLUGED INTO 117 VOLT 60 CYCLE LINE
6. ALL OTHER VOLTAGES MEASURED IN BATTERY OPERATION POSITION WITH "A" = 9 VOLTS. "B" = 90 VOLTS.
7. SOCKET VOLTAGE TOLERANCE 10%

REPLACEMENT PARTS LIST

Symbol No.	Part No.	Description
C-1A	AG-137073-38	Capacitor, Variable (Two Section
C-1B		Capacitor, Variable)
C-2	C-137727-21	Capacitor, 50 mmf., 500 v., ceramic
C-3	39001-11	Capacitor, .005 mfd., 600 v., paper
C-4A	B-144675-10	Capacitor, 200 mmf., 500 v.
C-4B		Capacitor, 100 mmf., 500 v. (Five
C-4C		Capacitor, .005 mfd., 500 v. Section
C-4D		Capacitor, .002 mfd., 500 v.
C-4E		Capacitor, .004 mfd., 500 v.
C-5	39001-76	Capacitor, .003 mfd., 600 v., paper
C-6	39001-19	Capacitor, .1 mfd., 600 v., paper
C-7	39001-19	Capacitor, .1 mfd., 600 v., paper
C-8	39001-17	Capacitor .05 mfd., 600 v., paper
C-9A	B-145261	Capacitor, 50 mfd., 150 v. (Four
C-9B		Capacitor, 30 mfd., 100 v. Section
C-9C		Capacitor, 30 mfd., 25 v. Electrolytic
C-9D		Capacitor, 200 mfd., 10 v.
C-10	39001-19	Capacitor, .1 mfd., 600 v., paper
C-11	39001-17	Capacitor, .05 mfd., 600 v., paper
C-13	C-136327-45	Capacitor, 2-15 mmf., Trimmer
C-14	39001-65	Condenser, .05 mfd., 200 v.
R-1	39373-74	Resistor, 100,000 ohm, ½ w.
R-2	39373-60	Resistor, 22,000 ohm, ½ w.
R-3	39373-54	Resistor, 10,000 ohm, ½ w.
R-4	39373-97	Resistor, 2.2 megohm, ½ w.
R-5	39373-100	Resistor, 3.3 megohm, ½ w.
R-6	39368-14	Control, Volume (1 megohm)
R-7	39374-26	Resistor, 1200 ohm, ½ w., 10%
R-8	39373-77	Resistor, 150,000 ohm, ½ w.
R-9	39373-107	Resistor, 10 megohm, ½ w.
R-10	39373-102	Resistor, 4.7 megohm, ½ w.
R-11	39374-58	Resistor, 560,000 ohm, ½ w., 10%
R-12	39373-92	Resistor, 1 megohm, ½ w.
R-13	39374-188	Resistor, 82 ohm, 2 w., 10%
R-14	39373-40	Resistor, 2200 ohm, ½ w.
R-15	B-144857-4	Resistor, 2220 ohm, 7 w.
R-16	39373-40	Resistor, 2200 ohm, ½ w.
R-17	39374-24	Resistor, 820 ohm, ½ w., 10%
CA-1	AB-139513-3	Cable Assembly, Battery
CA-2	C-132300-8	Cable & Plug Assy., A. C. Power
L-1	AC-145385	Loop Assembly, Antenna
L-2	AW-145006	Coil Assembly, Oscillator
S-1	Part of SW-1	Socket, Power Cable Plug
SR-1	W-145429	Rectifier, Selenium
SW-1	W-145233	Switch (D. P. D. T.)
SW-2	39369-2	Switch, Power
SP-1	139631	Speaker
T-1	AC-139919-2	Transformer, 1st I. F.
T-2	AC-139919-2	Transformer, 2nd I. F.
T-3	138131-3	Transformer, Output
	AB-145289	Background, Dial
	CR-94	Battery
	AW-145444	Bracket Assy., Antenna Terminal
	AC-145369	Cabinet & Antenna Assembly
	W-145420	Clip, Fuse
	W-131154-1	Cotter, External
	W-145161	Handle
	B-145121-2	Knob
	W-134126	Plug, Battery Cable
	B-145259	Pointer, Dial
	B-135075-2	Shaft, Dial Drive
	W-142732	Shield, Tube
	W-46065	Shock Mount, Var. Cond. Mtg.
	W-145379	Shock Mount
	39462-2	Socket, Tube
	W-51752	Spring, Dial Drive Cord
	W-138136	Strip, Dial Pointer
	C-135038-78	Strip, Terminal (2¼" Long; 6 Lugs)
	C-135038-18	Strip, Terminal (¾" Long; 2 Lugs)
	W-139060	Stud, Trimout (Chassis Bottom)
	W-134916	Washer, Spring (Dial Drive Shaft)

Figures in the first column correspond to figures in Schematic Diagram.

DESCRIPTION

POWER SUPPLY: a.c.—d.c. or Battery.

VOLTAGE RATING: a.c.—d.c., 110 to 120 volts. Battery "A" 9 volts, "B" 90 volts.

POWER OUTPUT: 200 M.W. maximum.

POWER CONSUMPTION: 15 watts at 125 volts, 60 cycle.

TUBE COMPLEMENT:

Type	Function
1R5	Converter
1T4	1st I.F. Amplifier
1U4	2nd I.F. Amplifier
1U5	Detector, AVC, 1st A.F. Amplifier
3V4	A.F. Power Output

Selenium Rectifier

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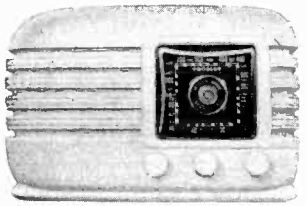
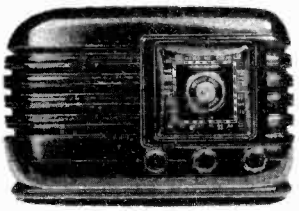
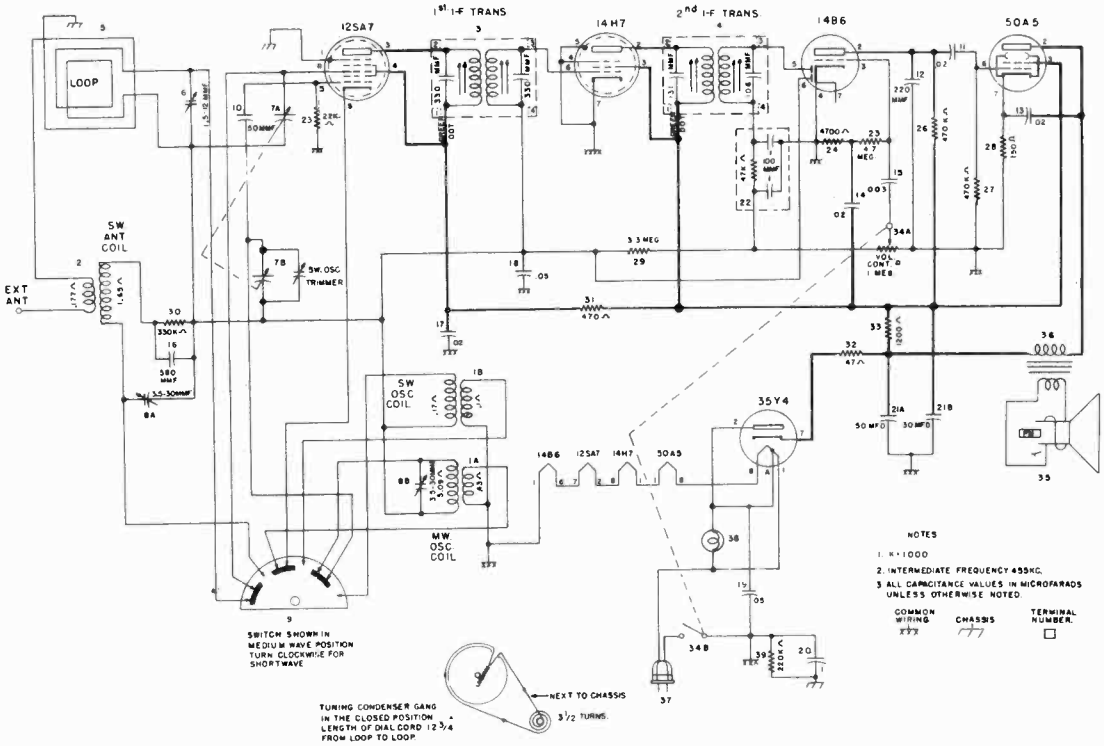
MODELS 58XTA, 58XTW, Rev.



58XTW

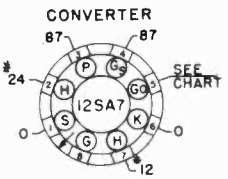
58XTA

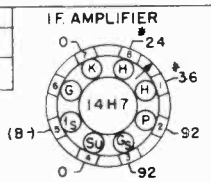


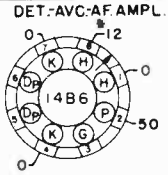


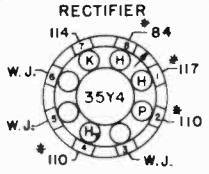
SOCKET VOLTAGE CHART

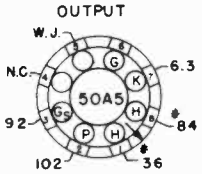
OSC. GRID VOLTAGE CHART		
MEDIUM WAVE	GANG CLOSED	-5.8
SHORTWAVE	GANG CLOSED	-4.2











NOTES
1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGE MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO (B-) (PIN 5 OF 14H7)
3. LINE VOLTAGE 117 V. 60 CYCLE.
4. N.C. = NO CONNECTION.
5. W.J. = WIRING JUNCTION.
6. * = A.C. VOLTAGE
7. SOCKET VOLTAGE TOLERANCE ± 10%

Notas: El diagrama muestra el chasis visto por debajo. medir los voltajes de cada punto a B—(espiga 5 en el 14H7) todos los valores de voltajes medidos con voltimetro al vacio.

WJ=borne de conexiones

NC=Sin conectar

*=Voltaje C. A.

Tolerancia—10%

Voltaje de linea: 117 voltios, 60 ciclos.

Voltaje de rejilla osciladora: onda media, 540 KC:—4.9
onda corta, 5.7 mc:—3.8

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MODELS 58XTA, 58XTW, Rev.

DESCRIPTION

TYPE: Five-tube, two-band, superheterodyne.

FREQUENCY RANGE: American Broadcast Band, 540 to 1600 kc. (Selector Switch, Counter-clockwise or Left.)

Overseas Short-wave Band: 5.8 to 15 mc. (Selector Switch, Clockwise or Right.)

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.—d.c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 35 watts nominal.

POWER OUTPUT: 1.5 watts minimum.

TUBE COMPLEMENT

Type	Function
12SA7	Mixer
14H7	I. F. Amplifier
14B6	Detector, AVC, 1st A. F. Amplifier
50A5	A. F. Power Output
35Y4	Rectifier

DIAL BULB: Type 47, 6.3 volts, .15 amp.

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce power hum.

Under no circumtsances should a ground be connected to this receiver.

ALIGNMENT PROCEDURE

1. Turn the tuning condenser to the completely closed position against the stop and set the dial pointer to the reference line separating the medium and short wave scales.
2. Connect the output meter across the speaker voice coil.
3. The r.f. signal input from the signal generator should be connected to the external antenna lead. Connect the signal generator ground through a 0.1 mfd. condenser to B—(pin 3 on 14H7 tube socket).
4. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 2, Chassis, Rear View—Models 56XTA, 56XTW

Alignment Sequence	Signal Generator Output			Position of		Adjust for Maximum Output
	Frequency in kc.	In Series with	To	Band Switch	Tuning Dial	
1	455	200 mmf.	Ant.	Left	1,620	A & B
2	15,300	400 ohms	Ant.	Right	15,300	C
3	15,000	400 ohms	Ant.	Right	15,000	D
4	1,400	200 mmf.	Ant.	Left	1,400	E & F

NOTE: When aligning the short-wave oscillator trimmer (C), be sure that the circuit is aligned at the correct frequency and not at the image frequency which is 910 kilocycles lower as indicated by the receiver dial. To check: Tune in the generator frequency, then increase the generator output and tune in the image frequency. The image frequency should be weaker than the fundamental and audible 910 kilocycles lower on the receiver dial. If the image cannot be tuned in, the oscillator trimmer is adjusted to the wrong peak; i. e., the oscillator trimmer may be adjusted to the image or one of the harmonics instead of the fundamental frequency. The correct peak is the second one heard as the trimmer adjustment screw is opened from the completely closed position.

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MODELS 58XTA, 58XTW, Rev.

CARACTERISTICAS

TIPO: Superheterodino, cinco tubos, dos bandas.

FRECUENCIAS: Banda de onda media 540 a 1600 KC (Interruptor de bandas hacia la izquierda)

Banda de onda corta: 5.8 a 15 mc. (Interruptor de bandas hacia la derecha)

FRECUENCIA INTERMEDIA: 455 KC.

FUENTE DE ALIMENTACION: Corriente alterna y directa.

VOLTAJE: 105-125 voltios.

CONSUMO: 35 watts.

POTENCIA DE SALIDA: 1.5 watts mínima.

DESCRIPCION DE TUBOS

Tipo	Funcion
12SA7	Mezclador
14H7	Amplificador de F. I.
14B6	Detector, C. A. V. y 1 er audio
50A5	Salida
35Y4	Rectificador

FOQUITO PILOTO: Tipo 47, 6.3 voltios .15 amp.

TABLA DE AJUSTES

Orden de Ajustes	SALIDA DEL OSCILADOR			Interruptor de Bandas	Sintonia Cuadrante	Ajuste a Maximum
	Frecuencia en KC	En serie con	A			
1	455	200 mmfd	Ant.	Izquierda	1,620	A y B
2	15,300	400 ohms	Ant	Derecha	15,300	C
3	15,000	400 ohms	Ant	Derecha	15,000	D
4	1,400	200 mmfd	Ant	Izquierda	1,400	E y F

Nota: Cuando ajuste el trimer (C) de onda corta asegúrese que el circuito sea ajustado a la frecuencia correcta y nó en la imagen que es 910 kilociclos más baja en el receptor. Para chequear: Sintonice la frecuencia del oscilador, aumente la salida del oscilador y sintonice la imagen en el receptor, la imagen debe ser más débil que la fundamental y estar 910 KC más abajo. Si no se puede sintonizar la imagen, el trimer del oscilador está mal ajustado, es decir el oscilador quizás esté ajustado a la imagen o algun harmónico de la frecuencia del oscilador. El pico correcto es el segundo que se escuche cuando se abre el tornillo de ajuste después de cerrarlo por completo.

Cuando se use este receptor en corriente directa será necesario ajustar la posición del enchufe del cordon a la polaridad correcta.

Cambiando la posicion del enchufe puede reducir zumbido de la corriente alterna.

Bajo ningun concepto no conecte tierra externa a este receptor.

AJUSTE

1. Cierre por completo el condensador variable y ponga la aguja de sintonía en la línea de referencia que separa las escalas de ondas cortas y media.
2. Concecte el metro de salida a través de la bobina móvil de la bocina.
3. Conecte la señal de RF del oscilador al alambre de antena exterior. Conecte la tierra del oscilador a través de un condensador de 0.1 mfd a B—(espiga 3 del 14H7).
4. Avance el control de volumen del receptor todo lo que dé y ajuste la salida del oscilador lo suficiente para producir una lectura en la mitad de la escala del metro de salida pero deberá mantenerla lo mas baja posible para evitar que el C. A. V. del receptor funcione.

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MODELS 58XTA,
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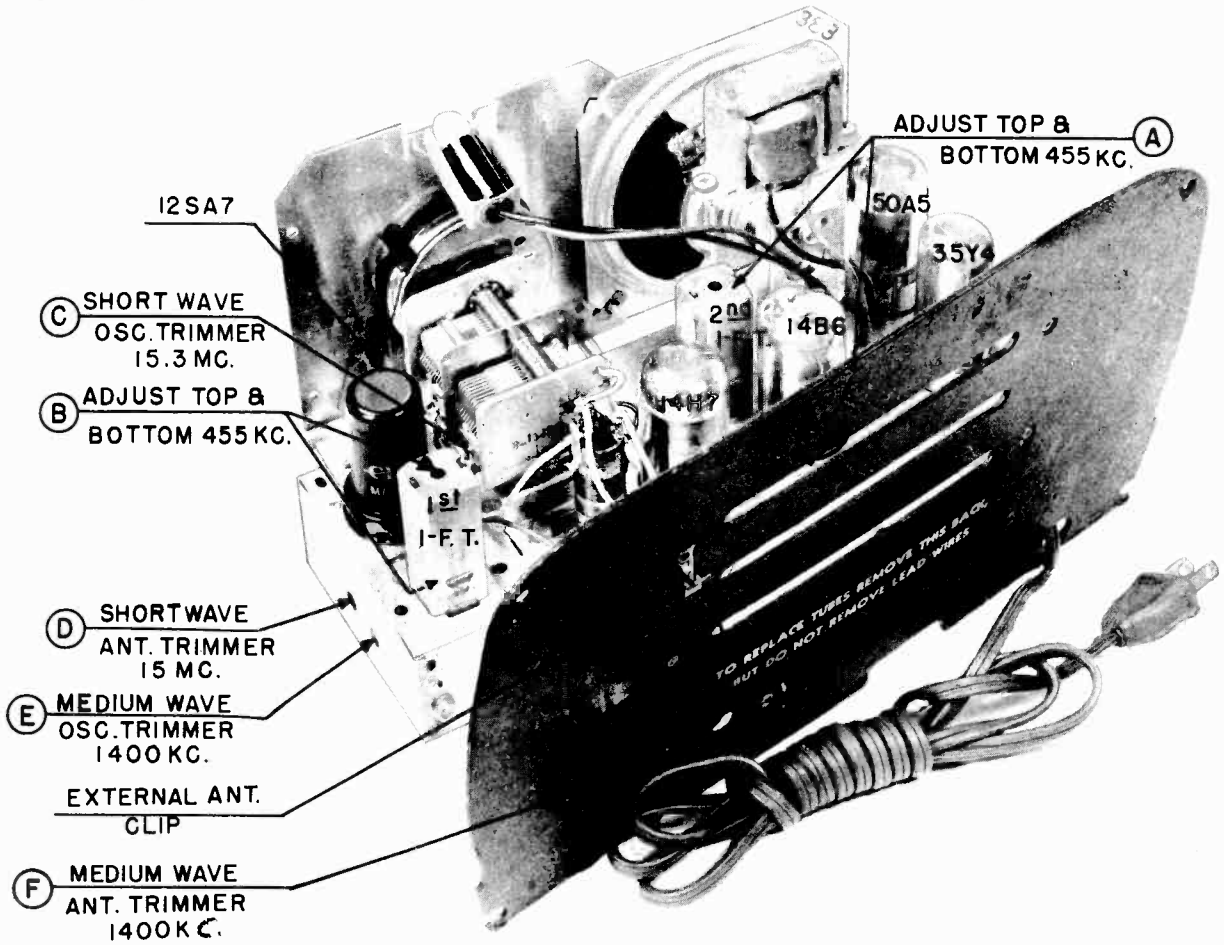

REPLACEMENT PARTS LIST—MODELS 58XTA, 58XTW

Figures in first column correspond to figures in Schematic Diagram

Item No.	Part No.	Description
1A	AW-146155	Coil, Osc. M.W. } Two
1B		Coil, Osc. S.W. } Section
2	AW-146139	Coil, Ant. S.W.
3	C-139919-4	1st I.F. Trans.
4	C-139919-3	2nd I.F. Trans.
5	AC-135817	Loop & Back Assy.
6	C-137219-2	Condenser, Trimmer, 1.5-12 mmf. (Part of 5)
7A	AW-144666	Condenser, Tuning } Two Section
7B		Condenser, Tuning } Variable
8A	AB-144617	Condenser, Trimmer, 3.5-30 mmf. } Two
8B		Condenser, Trimmer, 3.5-30 mmf. } sect.
9	W-135808	Switch, Band Change
10	B-137498-11	Condenser, 50 mmf. 500 v. mica
11	39477-43	Condenser, .022 mfd., 600 v., paper
12	B-137498-22	Condenser, 220 mmf., 500 v., mica
13	39477-43	Condenser, .022 mfd., 600 v., paper
14	39477-43	Condenser, .022 mfd., 600 v., paper
15	39477-38	Condenser, .0033 mfd., 600 v., paper
16	B-137498-14	Condenser, 580 mmf., 300 v., mica
17	39477-43	Condenser, .022 mfd., 600 v., paper
18	39477-45	Condenser, .047 mfd., 600 v., paper
19	39477-45	Condenser, .047 mfd., 600 v., paper
20	39477-47	Condenser, .1 mfd., 600 v., paper
21A	B-137649	Condenser, 30 mfd. 150 v. } Two sect.
21B		Condenser, 50 mfd. 150 v. } Elect.
22	B-142951-2	Condenser, Resistor
23	39373-60	Resistor, 22,000 ohms ½ w.
24	39373-47	Resistor, 4,700 ohms ½ w.
25	39373-102	Resistor, 4.7 megohms ½ w.
26	39373-87	Resistor, 470,000 ohms ½ w.
27	39373-87	Resistor, 470,000 ohms ½ w.
28	39373-16	Resistor, 150 ohms ½ w.
29	39373-100	Resistor, 3.3 megohm ½ w.
30	39373-84	Resistor, 330,000 ohms ½ w.
31	39373-26	Resistor, 470 ohm, ½ w.
32	39373-119	Resistor, 47 ohm 1 w.
33	39373-34	Resistor, 1,200 ohm ½ w.
34A	39368-14	Control, Volume, 1.0 megohm
34B	39369-1	Switch, Power (Part of 34A)
35	C-146133	Speaker
36	Part of Item 35	Transformer, Output
37	C-132300-1	Cable & Plug, Power
38	W-48858	Bulb (Dial), Type 47, 6.3 v., 15 amp.
39	39373-80	Resistor, 220,000 ohm, ½ w.
	39232-1	Socket, tube
	C-136721	Background, Dial
	D-132136-1	Cabinet (58XTA)
	AW-134738	Cabinet (58XTW)
	W-134667	Clip, Dial Pointer
	C-136962	Dial Face
	W-134882	Knob (58XTA)
	W-134883	Knob (58XTW)
	B-134610	Lens, Dial
	B-134570	Pointer, Dial
	W-51071	Ring, Retaining (Dial Drive Shaft)
	39220-32 CP	Screw, Chassis Mounting # 8-32 x ¾"
	W-134917	Shaft, Dial Drive
	D-136565-4	Socket Assy., Dial Light
	W-51752	Spring, Dial Drive Cord
	W-132124 SB	Stud, Trimount

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