

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 For this reason, ground connections should always be maintained as originally made in the set.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 \pm .25 mmfd, — .00075 temperature coefficient, ceramic capacitor. If defective it should be replaced with a 2 mmfd \pm .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, 1/2 watt	60B 8-105
R2	100 ohms, 1/2 watt	60B 8-101
R3	1000 ohms, 1/2 watt	60B 8-102
R4	22,000 ohms, 1/2 watt	60B 8-223
R5	470 ohms, 1/2 watt	60B 8-471
R6	470 ohms, 1/2 watt	60B 8-471
R7	1000 ohms, 1/2 watt	60B 8-102
R8	1 megohm, 1/2 watt	60B 8-105
R9	1 megohm, 1/2 watt	60B 8-105
R10	220,000 ohms, 1/2 watt	60B 8-224
R11	1000 ohms, 1/2 watt	60B 8-102
R12	1000 ohms, 1/2 watt	60B 8-102
R13	1 megohm, 1/2 watt	60B 8-105
R14	1000 ohms, 1/2 watt	60B 8-102
R15	47,000 ohms, 1/2 watt	60B 8-474
R16	470,000 ohms, 1/2 watt	60B 8-474
R17	390 ohms, 1/2 watt	60B 8-391
R18	15,000 ohms, 5%, 1/2 watt	60B 7-153
R19	15,000 ohms, 5%, 1/2 watt	60B 7-153
R20	27,000 ohms, 1/2 watt	60B 8-273
R21	47 ohms, 1 watt	60B 14-470
R22	33 ohms, 1 watt	60B 14-330
R23	18,000 ohms, 1/2 watt	60B 8-183
R24	1 megohm Volume Control (tapped at 500,000 ohms)	75B 2-14
R25	10 megohms, 1/2 watt	60B 8-106
R26	500,000 ohms, 1/2 watt	
R27	500,000 ohms, 1/2 watt	
R28	150 ohms, 1 watt	60B 14-151

CONDENSERS

Symbol	Description	Part No.
C1a	485.8 mmfd, (max) AM RF	Gang 68B 27
C1b	15 mmfd, (max) FM RF	
C1c	15 mmfd, (max) FM Osc.	
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	64B 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, \pm .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

Symbol Description Part No.

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	100 mmfd 10%	Dual Ceramic 63A 7-1
C24	100 mmfd 10%	
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	70 mfd, 150 volts	Elect. 67C 7-14
C31b	30 mfd, 150 volts	
C31c	20 mfd, 25 volts	
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	64B 1-25

(C37 used only in sets with model numbers ending in "UL".)

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)	79B 42-2
M2	Rectifier, Selenium	99A 1-2
M3	Socket, Interlock (includes line cord)	A2006
M4	Plug, Interlock	98A 15-6
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 9-1

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, Timmerman (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.

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

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 1/8" 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.

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

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.

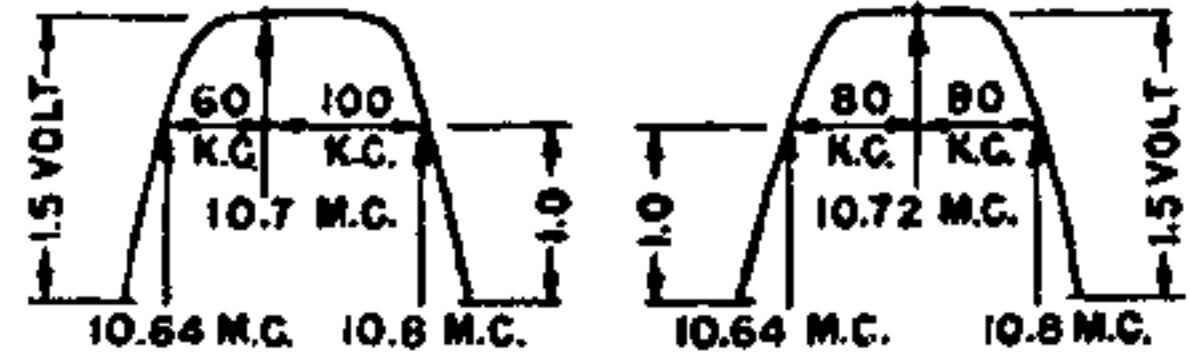


Fig. 1

Fig. 2

TYPICAL SELECTIVITY CURVES

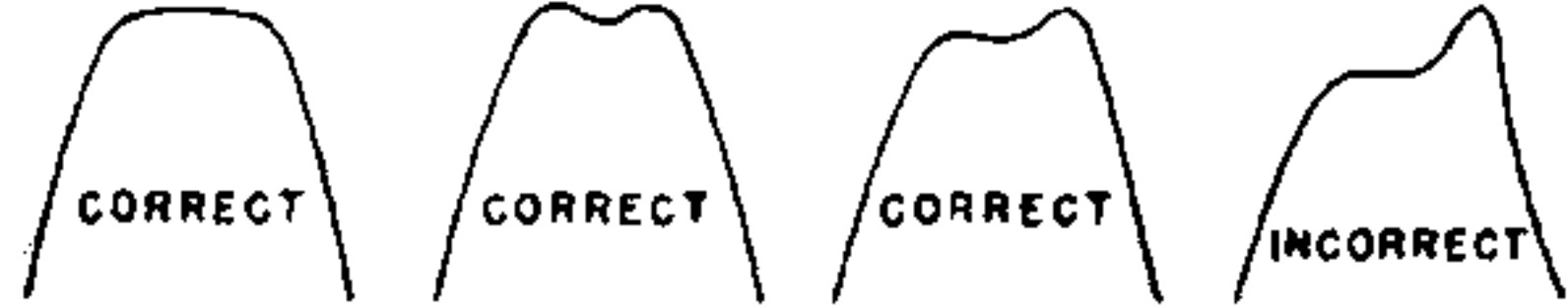


Fig. 3

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 described in "FM Alignment Equipment."

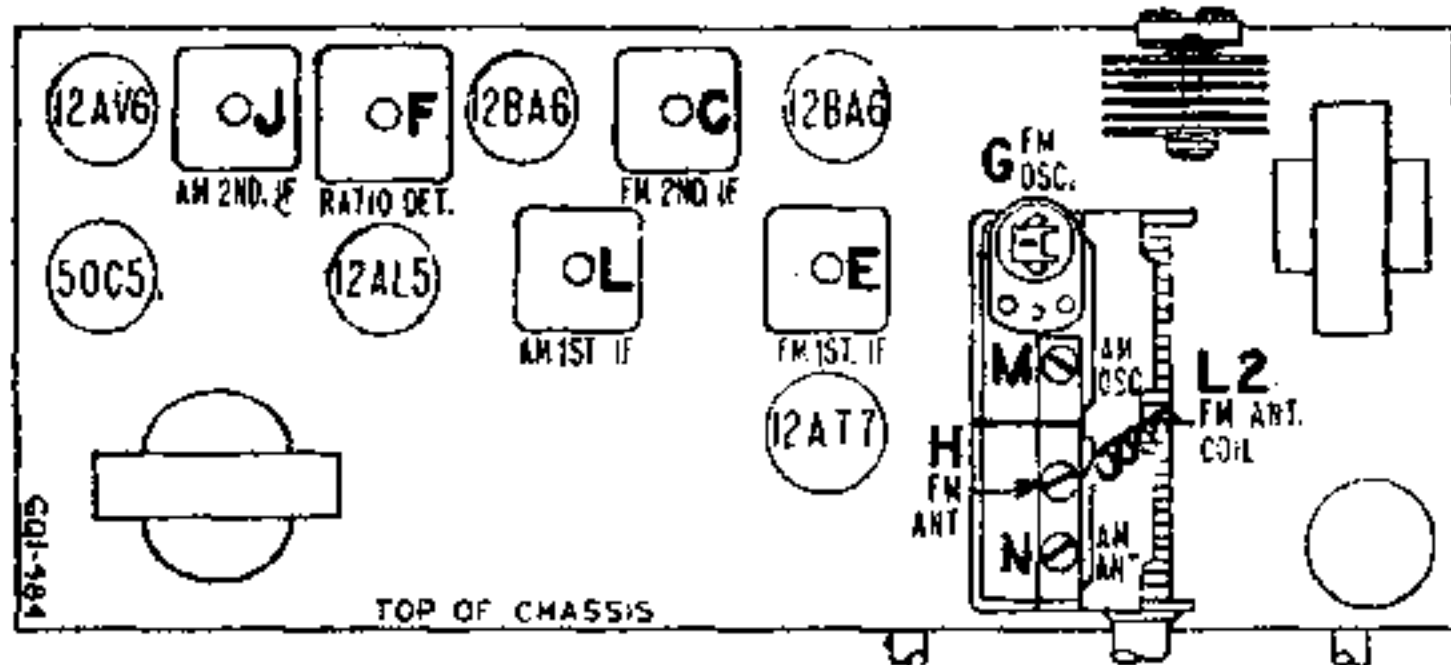


Fig. 7A. Trimmer Location, Top

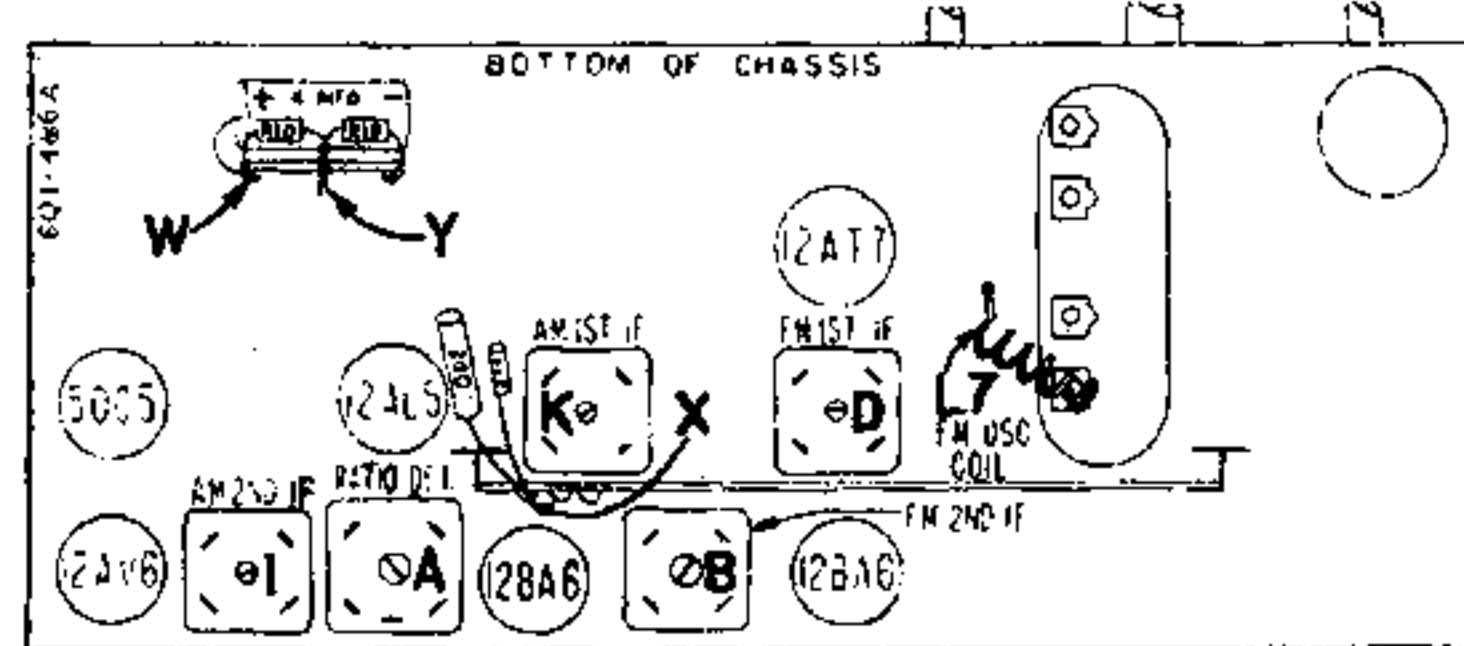


Fig. 7B. Trimmer Location, Bottom

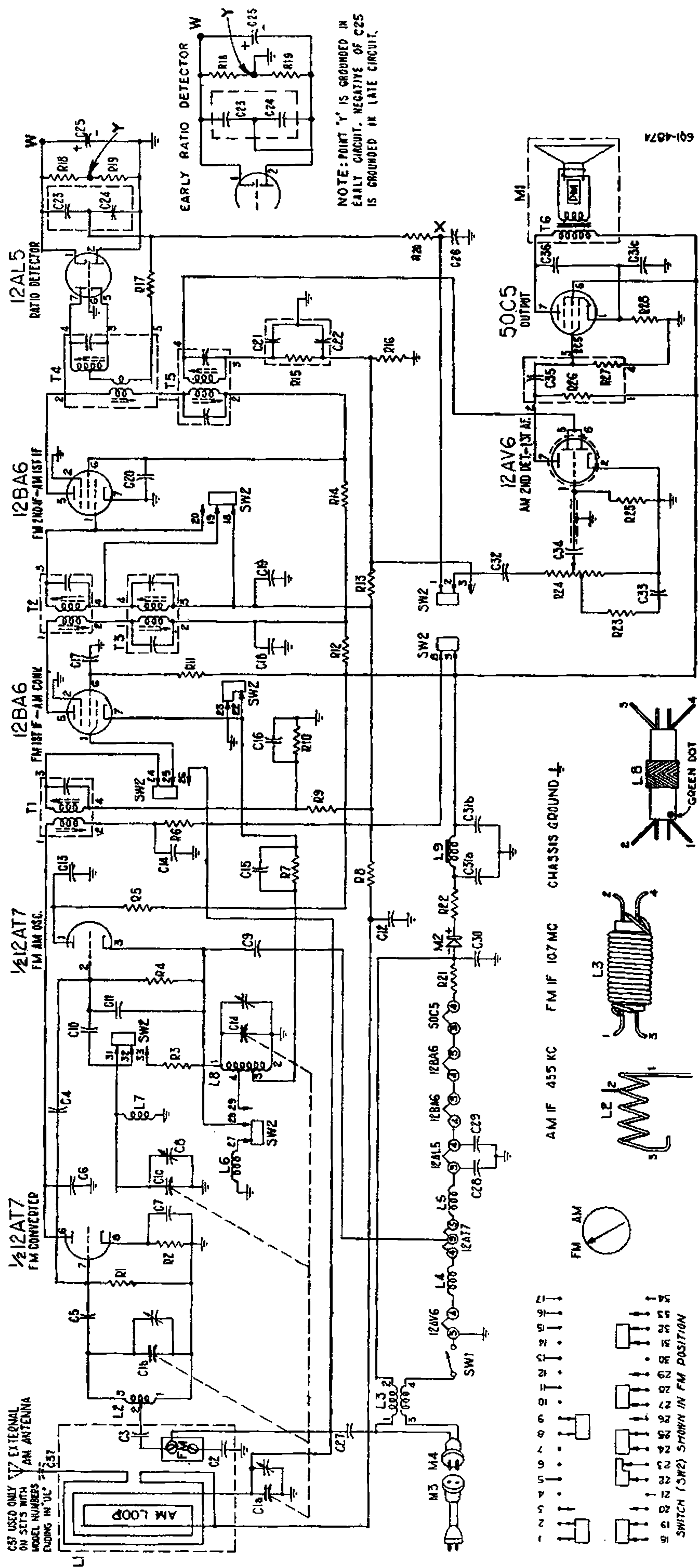
AM ALIGNMENT PROCEDURE

- 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.

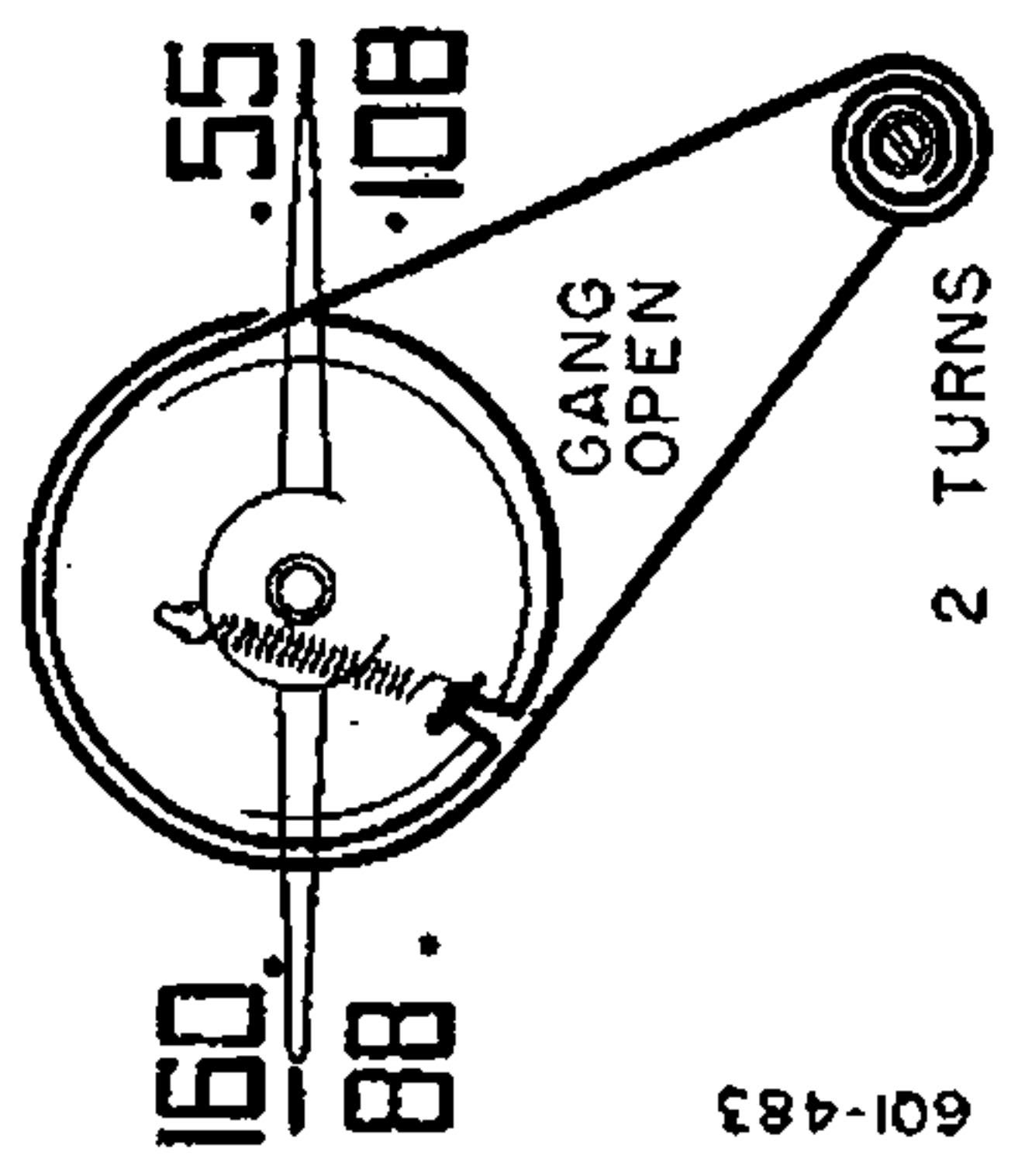
	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
Set Band Switch to Broadcast Position and be sure to follow instructions under heading "Important Preliminary Alignment Steps." Loop antenna 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.

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



NOTE: POINT 'Y' IS GROUNDED IN EARLY CIRCUIT. NEGATIVE OF C25 IS GROUNDED IN LATE CIRCUIT.



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.

- 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.

VOLTAGE DATA

