

# **ALIGNMENT MANUAL**

## **McINTOSH MODEL MR-55A**

### **AM-FM TUNER**

(Serial No. 3K001 and Above)

**McINTOSH LABORATORY, INC.**  
2 Chambers St. Binghamton, N. Y.  
U.S.A.

## SPECIFICATIONS:

### AM

#### Sensitivity:

2.0 microvolts of equivalent noise

#### Selectivity:

Narrow (4 K.G. bandwidth)  $\pm 10$  K.C. from center down 53 db.

Medium (13 K.C. bandwidth)  $\pm 10$  K.C. from center down 20 db.

Broad (20 K.C. bandwidth)  
(Measurements include R.F. and I.F. circuits. The characteristics are substantially unchanged over entire R.F. tuning range.)

#### Bandwidth:

I.F. at 600 K.C. and at 1600 K.C.; 20 K.C.

R.F. at 600 K.C. 21 K.C.; at 1600 K.C.; 23 K.C.

#### Audio Bandwidth:

Broad Position 3 db; 20 to 8.5 K.C.

Medium Position 3 db; 20 to 6.5 K.C.

Narrow Position 3 db; 20 to 1.6 K.C.

#### Distortion:

Less than 1.5% at 100% Modulation

#### Sensitivity Selector:

Three Positions

#### Hum:

More than 50 db below 100% Modulation

#### Whistle Filter:

More than 50 db rejection 10 K.C.

#### Dimensions:

4 $\frac{3}{4}$ " high x 14 $\frac{3}{4}$ " wide x 12" deep

### FM

#### Usable Sensitivity:

3 Microvolts at 100% modulation ( $\pm 75$  K.C. Dev.) for less than 3% total noise and distortion I.H.F.M. standards.

#### Distortion:

75 K.C. Deviation (100% Mod.)  
Less than 1 %

#### Capture Ratio:

1 to 0.8

#### I.F. Bandwidth

200 K.C.; Flat on Top

#### I.F. Transformers:

Mechanically captive

#### Limiters:

Two

#### Limiter and Detector Bandwidth:

2 Megacycles

#### Frequency Response:

Within 3 db; 20-20,000 cycles  
Within 1.5 db; 30-20,000 cycles

#### A.F.C.:

Separate detector; strong, distortion free, completely variable

#### Hum:

More than 65 db below 100% Modulation

#### Drift:

$\pm 30$  K.C. without A.F.C.; negligible with A.F.C

#### Antenna Input Impedance:

300 ohm balanced; 75 ohm unbalanced

## TUBE COMPLEMENT:

V1—6BK7 F.M. R.F. Amplifier

V2—6AB4 F.M. Mixer

V3—6BA6 1st I.F. Amplifier

V4—6AU6 2nd I.F. Amplifier

V5—6AU6 3rd I.F. Amplifier

V6—6AU6 1st Limiter

V7—6AL5 A.M. Det. and A.V.C.

V8—6AU6 2nd Limiter

V9—6BN8 A.F.C. Detector

V10—6U8 F.M. Oscillator and Reactor

V11—6BN8 Squelch Amplifier and Detector

V12—6AB4 1st Audio

V13—12AU7 Audio Output and F.M. Meter

V14—6BA6 A.M. R.F.

V15—6BE6 A.M. Oscillator and Converter

V16—6BW4 Rectifier

D1 } —IN542 Detector  
D2 }

1847 Pilot Lights (4)

## SIZE:

4 $\frac{3}{4}$  Inches High x 14 $\frac{3}{4}$  Inches Wide x 12 Inches Deep

## WEIGHT:

Tuner Only: 17 Pounds, 3 Ounces; In Shipping Carton: 28 Pounds

VOLTAGE AND RESISTANCE CHART

Tube Number	Selector Switch Position	VOLTAGE AT PIN NUMBER									RESISTANCE AT PIN NUMBER								
		1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
V1-6BK7	Listen	108	— .6	0	0	6.3AC	115	0	0	0	1.5K	1.1M	150	0	0	650	0	68	0
V2-6AB4	Listen	100	— 1.5	0	6.3AC	0	0	0			2.5K	3.5M	0	0	INF	3.5M	0		
V3-6BA6	Listen	— .9	0	6.3AC	0	100	100	.6			2.5M	0	0	0	1.5K	1.5K	68		
V4-6AU6	Listen	0	0	6.3AC	0	108	108	1.5			7	0	0	0	8.5K	8.5K	220		
V5-6AU6	Listen	0	0	0	6.3AC	100	100	1.2			100K	0	0	0	1.7K	1.7K	220		
V6-6AU6	Listen	— .75	0	6.3AC	0	105	105	0			15K	0	0	0	1.7K	1.7K	0		
V7-6AL5	Sharp	0	25	6.3AC	0	30	0	— .6			0	250K	0	0	20K	0	750K		
V8-6AU6	Listen	— 5	0	6.3AC	0	110	110	0			22K	0	0	0	1.25K	1.25K	0		
V9-6BN8	Listen	— .8	0	0	6.3AC	0	— 5	110	— .7	0	50K	90K	0	0	0	50K	1K	470K	0
V10-6U8	Listen	105	— .5	105	105	105	105	2.7	2.5	2	1K	2M	1K	(2) 1K	(2) 1K	1K	220	220	10K
V11-6BN8	Listen	0	3	5	0	6.3AC	— .8	55	0	.9	1K	(3) 22K	0	0	0	220K	100K	70	1.8K
V12-6AB4	Listen	85	2.5	105	105	0	0	2.5			290K	2.2K	(2)	1K	10M	2M	2.2K		
V13-12AU7	Listen	110	0	3.5	105	105	60	0	2.5	105	500	1.25M	1K	1K		25K	1M	1.5K	(2)
V14-6BA6	Sharp	— .3	0	0	6.3AC	50	100	1			2.5M	0	0	0	6.5K	28K	0		
V15-6BE6	Sharp	— .9	0	6.3AC	0	100	100	— .3			22K	0	0	0	1.5K	2.8K	2.5M		
V16-6BW4	Listen	160AC	0	160	0	6.3AC	0	160AC	0	160	50	INF	0	0	0	INF	50	INF	0
Point E	Listen	8																	
Point E	Sharp	33																	

NOTES: 1. Varies with setting of R5  
2. Varies with setting of R109  
3. Varies with setting of R74

ALL VOLTAGES MEASURED UNDER  
FOLLOWING CONDITIONS:

- 1. Sensitivity-switch in maximum position.
- 2. No signal at antenna terminals.
- 3. A.F.C.—OFF
- 4. Use of 11M ohm input impedance voltmeter.
- 5. All voltages measured with respect to ground.
- 6. A-C input 117V. —60 cycles.
- 7. All voltages + DC except where otherwise indicated.
- 8. All voltages ± 10%.

ALL RESISTANCES MEASURED UNDER  
FOLLOWING CONDITIONS:

- 1. Sensitivity-switch in maximum position.
- 2. V16-Pin 3 grounded.
- 3. All resistance readings ± 10%, and measured with respect to ground.

# AM ALIGNMENT

Step No.	Circuit Under Test	Position of Switches	SIGNAL SOURCE Signal Generator	Frequency	Connected To	REMARKS
1	I.F. and A.G.C.	Selector: "SHARP" AM Sensitivity: "MINIMUM"	C.W. Oscillator	455KC	V15 Pin 7	Oscillator coupled thru .01 μF capacitor
2	Front End and Local Oscillator	Selector: "SHARP" AM Sensitivity: "MEDIUM" Antenna: "ANT."	C.W. Oscillator	600KC and 1500KC	AM Antenna Terminals	Oscillator coupled thru 50μμF capacitor
3	Whistle Filter	AM Sensitivity: "MINIMUM"	C.W. Oscillator	10KC	Point G	
4	Sensitivity Meter	AM Sensitivity: "MINIMUM"				
5	I.F.	Selector: "BRD." AM Sensitivity: "MAXIMUM"	Sweep Oscillator	455KC ±15KC	V15 Pin 7	Oscillator coupled thru .01μF capacitor
6	A.G.C.	Selector: "BRD." AM Sensitivity: "MEDIUM"	Sweep Oscillator	455KC ±15KC	V15 Pin 7	Oscillator coupled thru .01μF capacitor
7	Overall	Selector: "BRD." AM Sensitivity: "MEDIUM" Antenna: "ANT."	Sweep Oscillator	All B.C. Frequencies with 15KC - deviation	AM Antenna Terminals	Sweep Oscillator coupled thru 50μμF capacitor
8	Overall (Sensitivity)	Selector: "SHARP" AM Sensitivity: "MAXIMUM" Antenna: "ANT."	Modulated Generator	600— 1500KC 400cps AM Modulated	AM Antenna Terminals	Generator coupled thru 50 μ μ F capacitor Generator output: 10μV Modulation %: variable
9	Overall (A.G.C. Control)	Selector: "SHARP" AM Sensitivity: "MAXIMUM" Antenna: "ANT."	Modulated Generator	1000KC 400cps at 100% AM Modulated	AM Antenna Terminals	Generator coupled thru 50μμF capacitor Generator output: variable
10	Overall (Harmonic Distortion, Hum)	Selector: "SHARP" AM Sensitivity: "MAXIMUM" Antenna: "ANT."	Modulated Generator	1000KC 400cps at 100% AM Modulated	AM Antenna Terminals	Generator coupled thru 50μμF capacitor Generator output: variable
11	Overall (Fidelity)	Selector: "SHARP"/"BRD." AM Sensitivity: "MAXIMUM" Antenna: "ANT."	Generator Modulated by variable external source	600KC 1000KC 1500KC  30% AM Modulated	AM Antenna Terminals	Generator coupled thru 50μμF capacitor Generator output: 10,000μV

The following equipment is used for alignment: a. "Microvolter," Model 20-BC, Ferral Generator," Type 202-E, Boonton Radio Corp. d. "A.M. Signal Generator," Type f. "Distortion Analyzer," Model 330-B, Hewlett Packard, g. "Oscilloscope," Type 2' alignment.

# T PROCEDURE

Measured With	SIGNAL OUTPUT Connected To	Adjust	REMARKS
V.T.V.M. DC Probe	Point G	T2: } T4: } Upper and lower tuning T6: } cores for maximum	Make adjustments with input level below A.G.C. operating point.
	V7B Pin 2	T8: } Upper and lower tuning cores for maximum	Shunt winding NOT under adjustment with A 1,000Ω resistor. Defeat A.G.C. delay by grounding point D.
V.T.V.M. DC Probe	Point G	L22: } C2E: } For maximum at 600KC T12: } T13: } For maximum at 600KC C2B: } C2C: } For maximum at 1500KC	Set dial pointer at 600KC and 1500 KC respectively.
Audio Voltmeter	Audio Output	L18: } L19: } For minimum R85: }	Short points H-J and adjust input level for 2V output. Remove short and adjust as indicated in preceding column.
Tuner Sensitivity Meter		R5: } For zero	
Oscilloscope Synchronized with Input Sweep	Point G	T6: } For symmetry of flat top	Usually only lower tuning core needs retouching.
Oscilloscope Synchronized with Input Sweep	Point G	T8: } For symmetry of flat top	
Oscilloscope Synchronized with Input Sweep	Point G	T12: } T13: } For symmetry and ampli- tude at 600KC C2B: } C2C: } For symmetry and ampli- tude at 1500KC	Check also at 1000KC for symmetry and amplitude. Readjust if needed for optimum tracking across BC. band,
Audio Voltmeter	Audio Output		Determine the percentage of modulation required to bring about 10db increase in audio-output. Signal-to-noise-ratio is adequate if modulation required is less than 60%.
Audio Voltmeter	Audio Output		Readings of audio-output for generator outputs of: 10μV and 100,000μV is a measure of A.G.C. control, and the ratio of audio outputs corresponding to 100μV /10μV Should Not Exceed: 3:1.
Harmonic Distortion Analyzer	Audio Output		Distortion to be measured at input levels of 1,000μV and 1V. Set reference level at 10,000μV, remove modulation, and measure hum.
Audio Voltmeter	Audio Output		Tune in "SHARP" while generator is modulated with 400cps. Set reference level in "BROAD" position, and increase modulating frequency until audio output is down 3 db.

is Instrument Co. b. "Senior Volt Ohmyst," Model WV-98A, R.C.A. c. "FM-AM Sig-  
 je 65B, Measurements Corp. e. "Univerter," Type 207-E, Boonton Radio Corp.  
 '4-A, Dumont. These equipments or reasonable equal should be used for proper

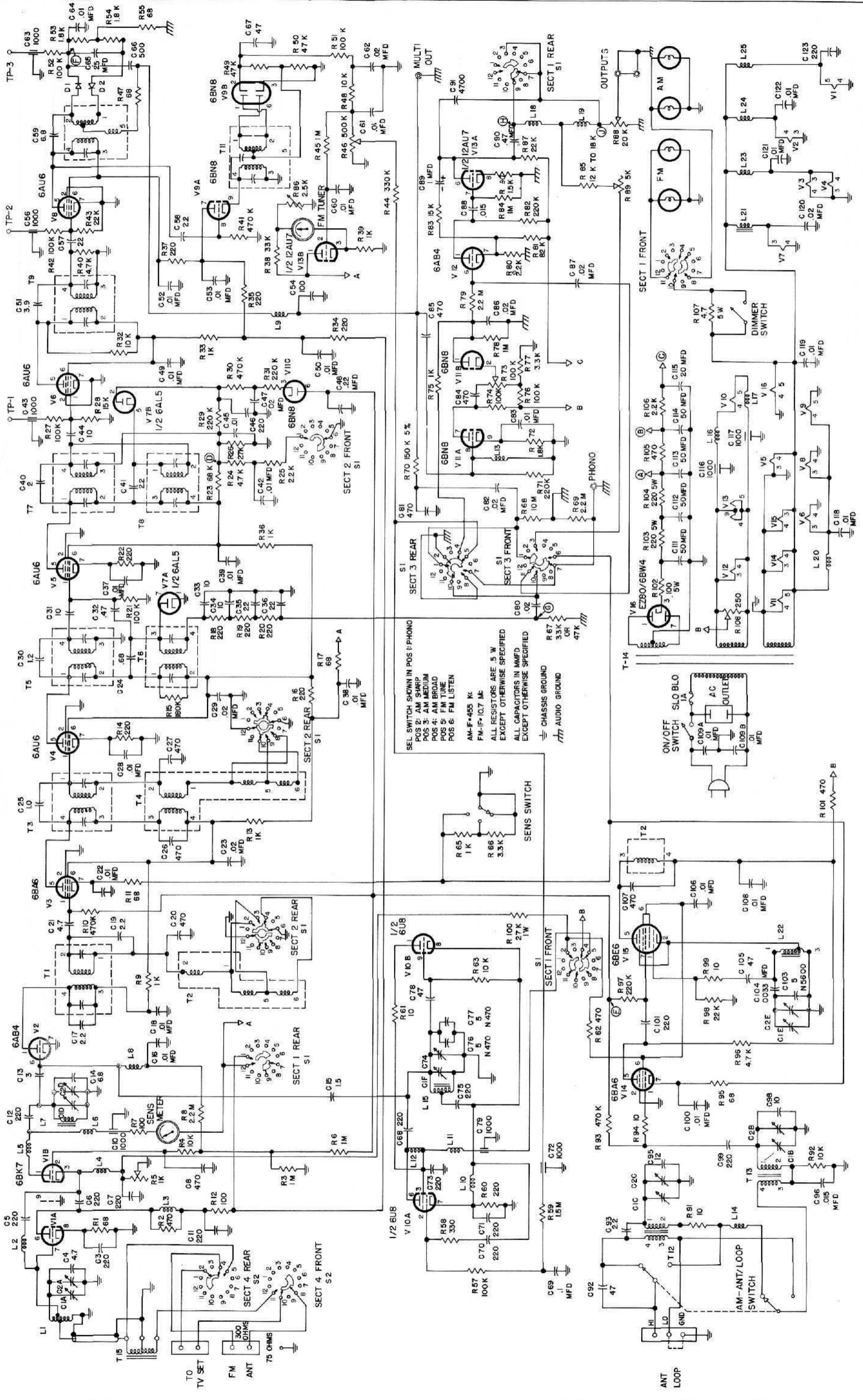
# FM ALIGNMENT

Step No.	Circuit Under Test	Position of Switches	SIGNAL SOURCE		Connected To	REMARKS
			Signal Generator	Frequency		
	I.F. Limiters and Detectors	Selector: "TUNE"	CW Oscillator	10.7MC	V2 Plate Circuit	Loosely couple oscillator output thru .01μF capacitor to the glass envelope of V2. V2 tube shield must be above ground
2	Local Oscillator	Selector: "LISTEN" AFC: "OFF"	CW Oscillator	90-105MC	FM Antenna Terminals	Oscillator coupled thru "Batun"
3	Overall	Selector: "LISTEN" AFC: "OFF"	FM Generator	90-105MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: variable
4	Overall (FM Meter)	Selector: "LISTEN" AFC: "ON"	FM Generator	100MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: variable
5	Overall (Harmonic Distortion)	Selector: "LISTEN" AFC: "OFF"	FM Generator	100MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: 1 KμV
6	Overall (DE Emphasis)	Selector: "ON" "OFF"	FM Generator	100MC 75KC Dev. External Frequency Source	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: 1 KμV
7	Overall (Squelch)	Selector: "TUNE"	FM Generator	100MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: variable
8	Overall (Hum)	Selector: "LISTEN"/"PHONO"  AFC: "ON"	FM Generator and CW Oscillator	100MC 400cps 75KC Dev. 90-105MC	Antenna Terminals	Generator and CW oscillator coupled thru "Balun" individually
9	Overall (AFC)	Selector: "LISTEN" AFC: "ON"	FM Generator	90-105MC 400cps 75KC Dev.	Antenna Terminals	Generator coupled thru "Balun" Generator output: 1 KμV

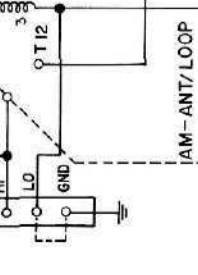
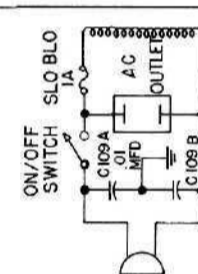
**NOTES:** In performing steps 2-3-4-5-8 it is suggested that cover for oscillator compartment and bottom shield be put in place.  
The following equipment is used for alignment: a. "Senior Volttohmyst," Model WV-98A, R.C.A. b. "FM-AM Signal Generator," Type 202E, Boonton Radio Corp. e. "Distortion Analyzer," Model 330B, Hewlett Packard, d. "Oscilloscope," Type 274-A, Dumont. e. "90-105 MC CW. Oscillator, with Low Hum Content." f. Balun; VHF, ~~50Ω~~ to 300Ω, Measurements, Model V6A. These equipments or reasonable equal should be used for proper alignment.

# PROCEDURE

Measured With	SIGNAL Connected To	OUTPUT Adjust	REMARKS
V.T.V.M. DC Probe	T.P.1	T1: } T3: } Upper and lower tuning T5: } cores for maximum T7: }	Shunt transformer winding not under adjustment with 10K $\Omega$ resistor. Apply negative bias (Approx. 10V) to AGC bus (Point E)
	T.P.2	T9: Upper and lower tuning cores for maximum	In later models TP2 and TP3 are not present—then: TP2=V8 Pin 1 TP3=Point F
	T.P.3	T10: Lower tuning core for maximum	
	Multi Out	T10: Upper tuning core for zero	
	T11 Pin 5	T11: Lower tuning core for maximum	
Tuner Sensitivity Meter		L15: For maximum at 90MC C74: For maximum at 105 MC	Dial pointer set at 90-105MC respectively.
V.T.V.M. DC Probe	T.P.1	L7: For maximum at 90 MC C2D: For maximum at 105MC	<b>These 4 adjustments are interrelated.</b> Max, usable sensitivity is lowest possible signal Input without exceeding 3% distortion plus noise.
Harmonic Distortion Analyzer	Audio Output	L1: For max. usable sensitiv- ity at 90MC C2A: For max. usable sensitiv- ity at 105MC	
V.T.V.M. DC Probe	T.P.1	Taps on L1 for optimum image rejection at 90-105MC	
Oscilloscope Synchronized with Input Signal	T.P.1	Retouch I.F. Transf. for optimum band pass curve	
Harmonic Distortion Analyzer Oscilloscope	Audio Output	T11: Upper tuning core for minimum distortion	Adjust R86 for FM meter center, while grounding high side of R46. Then make indicated adjustment on preceding column, at max. usable sensitivity. Check for electrical zero- center and symmetrical deflection of FM meter.
Harmonic Distortion Analyzer	Audio Output		Measure harmonic distortion and audio output.
Audio Voltmeter	Audio Output		Determine drop in. db of audio output for modulation frequencies of 10KCS (AFC-OFF) and, 20cps (AFC-ON). ON).
Oscilloscope	Audio Output	R74: For suppression of noise to a level where approx. 25 $\mu$ V of generator out- put is needed to over- come squelch	Noise should not appear at sides of tuning-in points.
Harmonic Distortion Analyzer	Audio Output		With FM generator set a reference level at 100MC. Then with C.W. oscillator at 90MC measure hum level. Switch to "Phono" and measure hum level with phono- input shorted with 1M $\Omega$ resistor. Check Step 2 and readjust if need be.
Oscilloscope	Audio Output		With tuner, approach generator frequency from both sides. At approximately 500KC off generator frequency AFC action should pull tuner to center channel. Check sensitivity meter for adequate deflection.

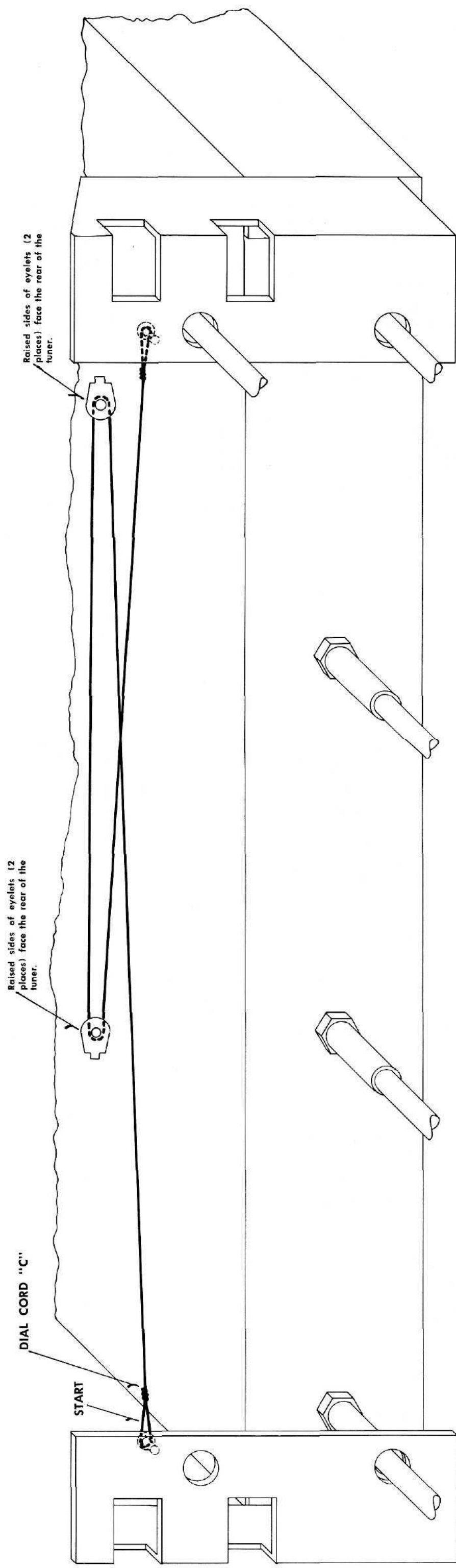
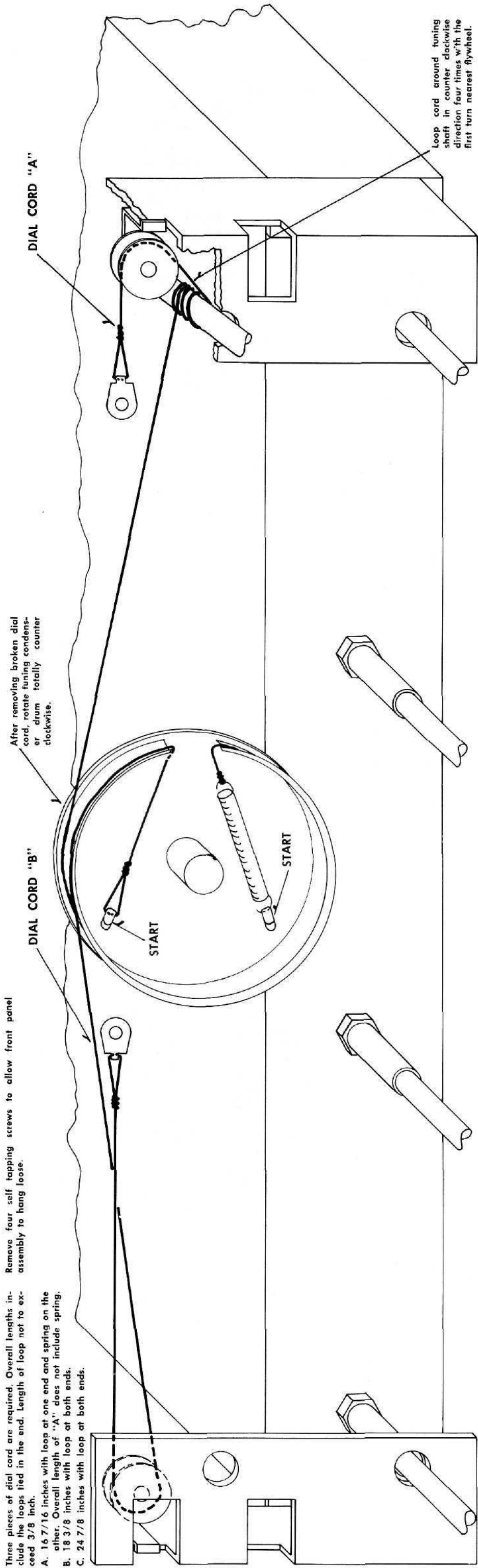


SEL SWITCH SHOWN IN POS 1: PHONO  
POS 2: AM SHARP  
POS 3: AM MEDIUM  
POS 4: AM BROAD  
POS 5: FM TUNE  
POS 6: FM LISTEN  
AM-F-455 K  
FM-IF-10.7 Mc  
ALL RESISTORS ARE .5 W  
EXCEPT OTHERWISE SPECIFIED  
ALL CAPACITORS IN MMFD  
EXCEPT OTHERWISE SPECIFIED  
CHASSIS GROUND  
AUDIO GROUND



Three pieces of dial cord are required. Overall lengths include the loops tied in the end. Length of loop not to exceed 3/8 inch. Remove four self tapping screws to allow front panel assembly to hang loose.

- A. 16 7/16 inches with loop at one end and spring on the other. Overall length of "A" does not include spring.
- B. 18 3/8 inches with loop at both ends.
- C. 24 7/8 inches with loop at both ends.



Dial pointer is attached to cord with the tuning knob in the extreme counter clockwise position. Align with the dial pointer directly over the zero mark on the logging scale.  
Lubricate eyelets and dial cord with "Lubriplate" or equivalent.