

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.C. 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:

4¾" high x 14¾" 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:

4¾ Inches High x 14¾ 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	① 150	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	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	② 1K	10M	2M	2.2K		
V13-12AU7	Listen	110	0	3.5	105	105	60	0	2.5	105	500	1.25M	1K	② 1K	② 1K	25K	1M	1.5K	② 1K
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 $\pm 10\%$.

ALL RESISTANCES MEASURED UNDER FOLLOWING CONDITIONS:

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

AM ALIGNMENT PROCEDURE

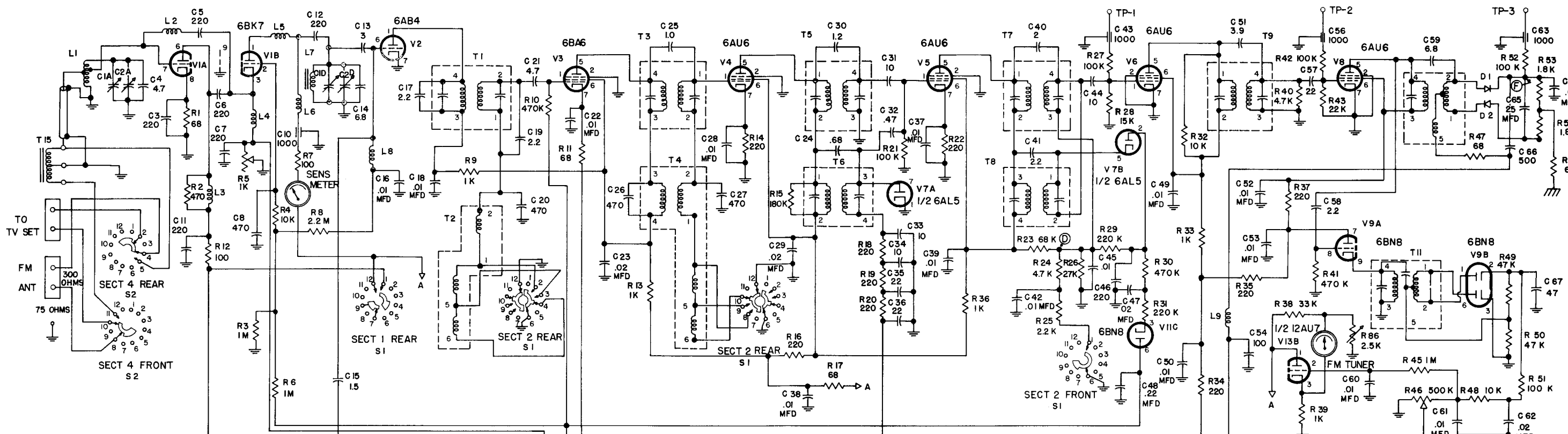
Step No.	Circuit Under Test	Position of Switches	SIGNAL SOURCE			REMARKS	Measured With	SIGNAL OUTPUT		REMARKS
			Signal Generator	Frequency	Connected To			Connected To	Adjust	
1	I.F. and A.G.C.	Selector: "SHARP" AM Sensitivity: "MINIMUM"	C.W. Oscillator	455KC	V15 Pin 7	Oscillator coupled thru .01 μ F capacitor	V.T.V.M. DC Probe	Point G T2: T4: T6:	Upper and lower tuning 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 1,000 Ω resistor. Defeat A.G.C. delay by grounding point D.
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 50 μ F capacitor	V.T.V.M. DC Probe	Point G L22: C2E: T12: T13: C2B: C2C:	For maximum at 600KC For maximum at 1500KC For maximum at 600KC For maximum at 1500KC	Set dial pointer at 600KC and 1500 KC respectively.
3	Whistle Filter	AM Sensitivity: "MINIMUM"	C.W. Oscillator	10KC	Point G		Audio Voltmeter	Audio Output L18: L19: R85:	For minimum	Short points H-J and adjust input level for 2V output. Remove short and adjust as indicated in preceding column.
4	Sensitivity Meter	AM Sensitivity: "MINIMUM"	—	—	—	—	Tuner Sensitivity Meter	R5:	For zero	
5	I.F.	Selector: "BRD." AM Sensitivity: "MAXIMUM"	Sweep Oscillator	455KC \pm 15KC	V15 Pin 7	Oscillator coupled thru .01 μ F capacitor	Oscilloscope Synchronized with Input Sweep	Point G T6:	For symmetry of flat top	Usually only lower tuning core needs retouching.
6	A.G.C.	Selector: "BRD." AM Sensitivity: "MEDIUM"	Sweep Oscillator	455KC \pm 15KC	V15 Pin 7	Oscillator coupled thru .01 μ F capacitor	Oscilloscope Synchronized with Input Sweep	Point G T8:	For symmetry of flat top	
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 50 μ F capacitor	Oscilloscope Synchronized with Input Sweep	Point G T12: T13: C2B: C2C:	For symmetry and amplitude at 600KC For symmetry and amplitude at 1500KC	Check also at 1000KC for symmetry and amplitude. Readjust if needed for optimum tracking across BC. band.
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 F capacitor Generator output: 10 μ V Modulation %: variable	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%.
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 50 μ F capacitor Generator output: variable	Audio Voltmeter	Audio Output	—	Readings of audio-output for generator outputs of: 10 μ V and 100,000 μ V is a measure of A.G.C. control, and the ratio of audio outputs corresponding to 100K μ V / 10 μ V Should Not Exceed: 3:1.
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 50 μ F capacitor Generator output: variable	Harmonic Distortion Analyzer	Audio Output	—	Distortion to be measured at input levels of 1,000 μ V and 1V. Set reference level at 10,000 μ V, remove modulation, and measure hum.
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 50 μ F capacitor Generator output: 10,000 μ V	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.

The following equipment is used for alignment: a. "Microvolter," Model 20-BC, Ferris Instrument Co. b. "Senior Volt Ohmyst," Model WV-98A, R.C.A. c. "FM-AM Signal Generator," Type 202-E, Boonton Radio Corp. d. "A.M. Signal Generator," Type 65B, Measurements Corp. e. "Univerter," Type 207-E, Boonton Radio Corp. f. "Distortion Analyzer," Model 330-B, Hewlett Packard. g. "Oscilloscope," Type 274-A, Dumont. These equipments or reasonable equal should be used for proper alignment.

Step No.	Circuit Under Test	Position of Switches	SIGNAL SOURCE			FM ALIGNMENT	PROCEDURE	SIGNAL OUTPUT		REMARKS
			Signal Generator	Frequency	Connected To	REMARKS	Measured With	Connected To	Adjust	
1	I.F. Limiters and Detectors	Selector: "TUNE"	CW Oscillator	10.7MC	V2 Plate Circuit	Loosely couple oscillator output thru .01 μ F capacitor to the glass envelope of V2. V2 tube shield must be above ground	V.T.V.M. DC Probe	T.P.1	T1: } T3: } T5: } T7: } Upper and lower tuning cores for maximum	Shunt transformer winding not under adjustment with 10K Ω 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	
2	Local Oscillator	Selector: "LISTEN" AFC: "OFF"	CW Oscillator	90-105MC	FM Antenna Terminals	Oscillator coupled thru "Balun"	funer Sensitivity Meter	—	L15: For maximum at 90MC C74: For maximum at 105 MC	Dial pointer set at 90-105MC respectively.
3	Overall	Selector: "LISTEN" AFC: "OFF"	FM Generator	90-105MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: variable	V.T.V.M. DC Probe Harmonic Distortion Analyzer	T.P.1 Audio Output	L7: For maximum at 90 MC C2D: For maximum at 105MC L1: For max. usable sensitivity at 90MC C2A: For max. usable sensitivity at 105MC	These 4 adjustments are interrelated. Max. usable sensitivity is lowest possible signal input without exceeding 3% distortion plus noise.
							V.T.V.M. DC Probe Oscilloscope Synchronized with Input Signal	T.P.1 T.P.1	Taps on L1 for optimum image rejection at 90-105MC Retouch I.F. Transf. for optimum band pass curve	
4	Overall (FM Meter)	Selector: "LISTEN" AFC: "ON"	FM Generator	100MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: variable	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.
5	Overall (Harmonic Distortion)	Selector: "LISTEN" AFC: "OFF"	FM Generator	100MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: 1K μ V	Harmonic Distortion Analyzer	Audio Output	—	Measure harmonic distortion and audio output.
6	Overall (DE Emphasis)	Selector: AFC: "ON" "OFF"	FM Generator	100MC 75KC Dev. External Frequency Source	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: 1K μ V	Audio Voltmeter	Audio Output	—	Determine drop in db of audio output for modulation frequencies of 10KCS (AFC-OFF) and, 20cps (AFC-ON). ON).
7	Overall (Squelch)	Selector: "TUNE"	FM Generator	100MC 400cps 75KC Dev.	FM Antenna Terminals	Generator coupled thru "Balun" Generator output: variable	Oscilloscope	Audio Output	R74: For suppression of noise to a level where approx. 25 μ V of generator output is needed to overcome squelch	Noise should not appear at sides of tuning-in points.
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	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 Ω resistor. Check Step 2 and readjust if need be.
9	Overall (AFC)	Selector: "LISTEN" AFC: "ON"	FM Generator	90-105MC 400cps 75KC Dev.	Antenna Terminals	Generator coupled thru "Balun" Generator output: 1K μ V	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.

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 Voltohmyst," Model WV-98A, R.C.A. b. "FM-AM Signal Generator," Type 202E, Boonton Radio Corp. c. "Distortion Analyzer," Model 330B, Hewlett Packard. d. "Oscilloscope," Type 274-A, Dumont. e. "90-105 MC C.W. Oscillator, with Low Hum Content." f. Balun; VHF, 50 Ω to 300 Ω , Measurements, Model V6A. These equipments or reasonable equal should be used for proper alignment.



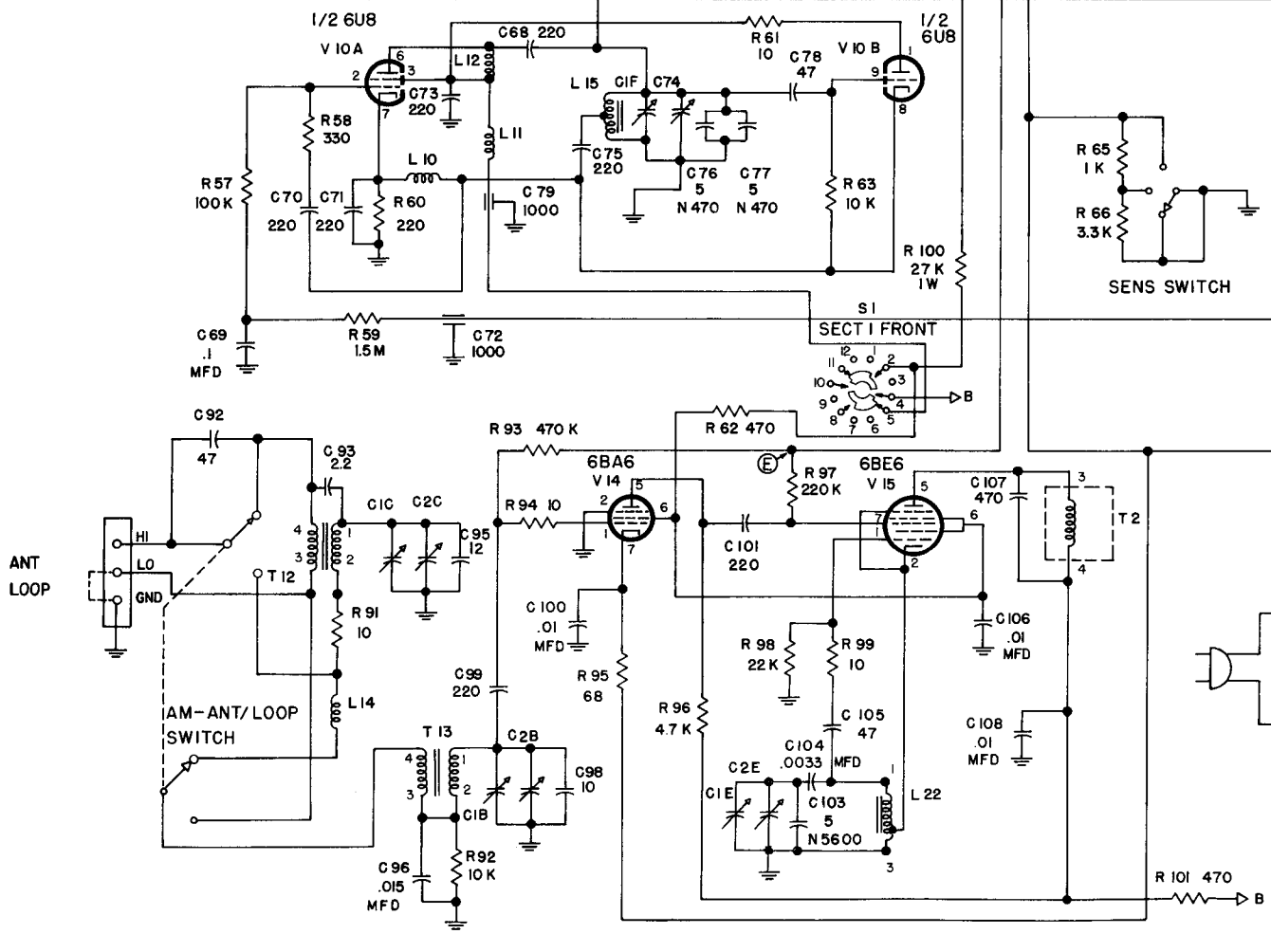
SEL SWITCH SHOWN IN POS 1: PHONO
 POS 2: AM SHARP
 POS 3: AM MEDIUM
 POS 4: AM BROAD
 POS 5: FM TUNE
 POS 6: FM LISTEN

AM-F=455 Kc
 FM-F=10.7 Mc

ALL RESISTORS ARE .5 W
 EXCEPT OTHERWISE SPECIFIED

ALL CAPACITORS IN MMFD
 EXCEPT OTHERWISE SPECIFIED

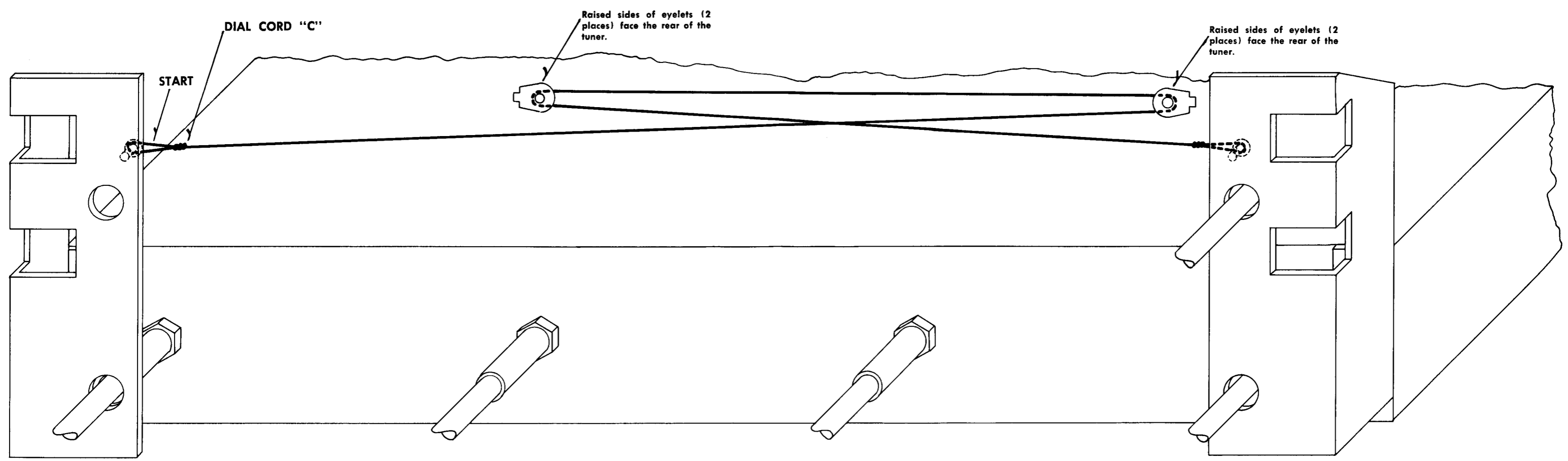
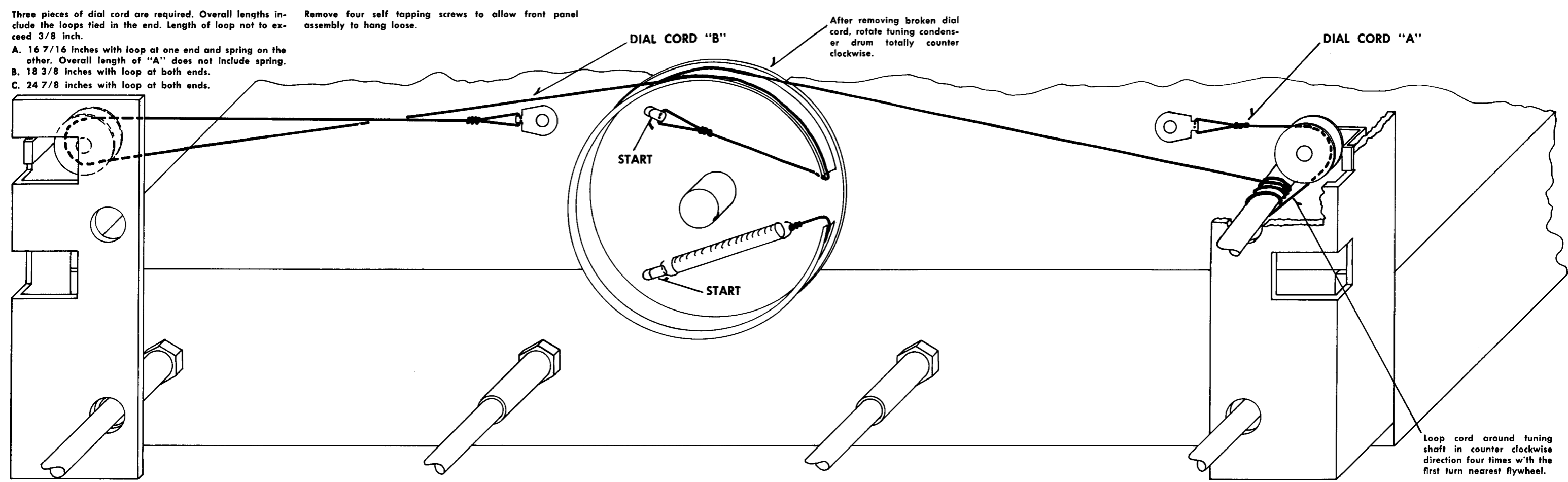
⊥ CHASSIS GROUND
 ⏏ AUDIO GROUND



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.