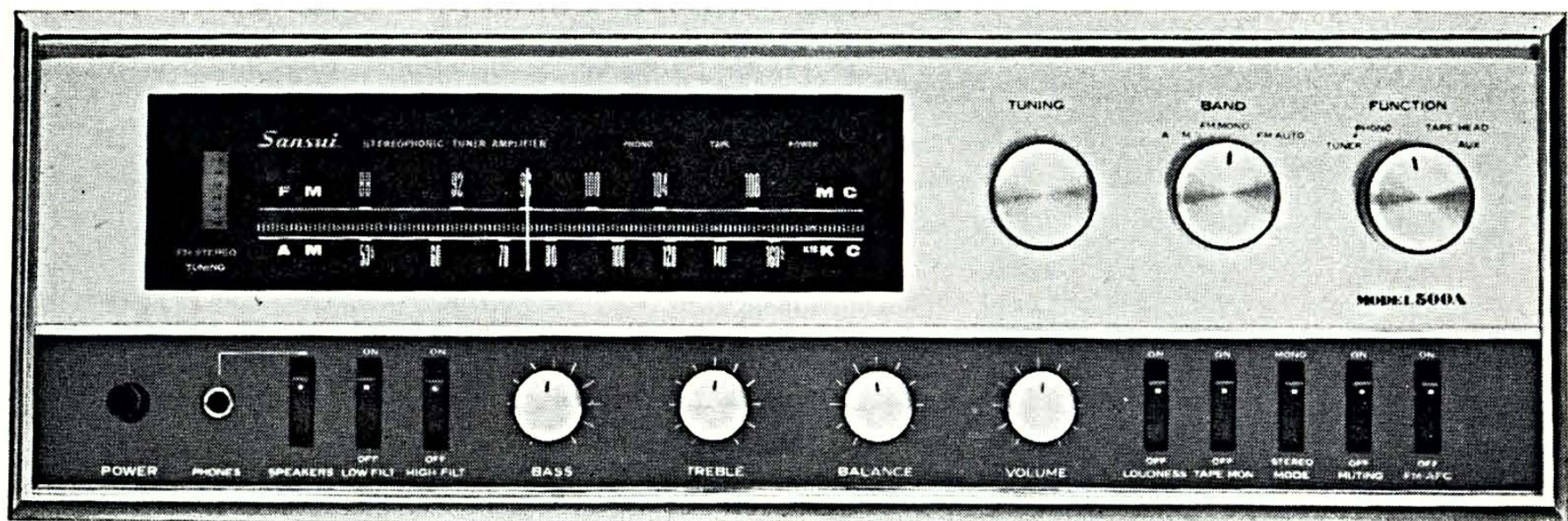


SERVICE MANUAL

AM/FM MULTIPLEX STEREO TUNER AMPLIFIER

SANSUI MODEL 500A



Sansui

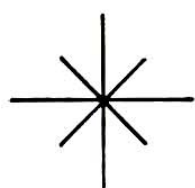
SANSUI ELECTRIC COMPANY LIMITED

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SANSUI

AM/FM MULTIPLEX
STEREO TUNER
AMPLIFIER



MODEL
500A

HOW TO USE THIS SERVICE MANUAL

- Step 1 What type or nature of the trouble you are confronted with? Look it up in the trouble-shooting charts in this service manual.
- Step 2 Isolate the trouble to a particular unit or part by referring to the charts.
- Step 3 Pinpoint the position of the part by means of the circuit diagram and the co-ordinates listed in the parts list.
- Step 4 In the same way, by referring to the chassis diagram and the co-ordinates listed in the parts list, you can easily find out in what part of chassis the part is located.

TROUBLESHOOTING AUDIO SYSTEM

If the amplifier is operating satisfactorily, the trouble may be attributed to the following :

1. Incorrect connections or loose terminal contact. Check the speakers, record player, tape recorder or tape deck, antenna and line cord.
2. Incorrect or improper operation. Before operating the audio equipments, be sure to

look up the manufacturer's instructions.

3. Improper location of audio equipments. The proper positioning of the audio equipments, such as speakers and record player, is vital to stereo.
4. Defective audio equipment or equipments.
5. The next step to do is listed below :

Program	Symptom	Probable Cause	What to Do
AM, FM or MPX reception	A. Constant or intermittent noise heard at times or in a certain area	* Discharge or oscillation caused by electrical appliances, such as fluorescent lamp, TV set, D.C. motor, rectifier and oscillator * Natural phenomena, such as atmospherics, statics, strays and thunderbolt * Insufficient antenna input due to thick reinforced concrete wall of a building or long distance from the station * Wave interference from other electrical appliances	* Attach a noise limiter to the electrical appliance that causes the noise, or attach it to the power source of the amplifier. * Install an outdoor antenna and ground the amplifier to raise the signal-to-noise ratio. * Reverse the power cord plug-receptacle connections. * If the noise occurs at a certain frequency, attach a wave trap to the ANT. input. * Keep the set in proper distance from other electrical appliances.
	B. The needle of the tuning meter does not move well.	The movement of the needle is one thing, the sensitivity of the amplifier is another.	Tune the set for maximum signal strength.
	C. The zero point of the meter diverges much.	Regional difference in field intensity	The unit is not at fault.
AM reception	A. Noise heard at a particular time of a day, in a certain area or over part of dial	This results from the nature of AM broadcast.	* Install the antenna for maximum antenna efficiency. See "ANTENNA" in the operating instructions. * In some cases, the noise can be eliminated by grounding the amplifier or reversing the power cord plug-receptacle connections.
	B. High-frequency noise	1. Adjacent-channel interference or beat interference 2. TV set too close to the audio system	* Although such noise cannot be eliminated by the amplifier, it is advisable to turn the TREBLE control properly from midpoint to left and switch on the HIGH FILTER. * Keep the TV set in proper distance from the audio system.
FM reception	A. Noisy	1. Poor noise limiter effect or too low S/N ratio due to insufficient antenna input Note: FM reception is affected considerably by the conditions of transmission by stations: power and antenna efficiency. As a result, you may receive one station quite well while having difficulty in receiving another station.	* Install the antenna (attached) for maximum signal strength. * If this does not prove effective, use an outdoor antenna designed exclusively for FM. When you use a TV antenna for both TV and FM with the help of a divider, make sure the TV reception is not affected. * Excessive long antenna may rather cause a noise.

Program	Symptom	Probable Cause	What to Do
(Continued)	B. Noise heard like "scratch noise"	1. Ignition noise caused by the starting of an automobile engine	* Install the antenna and its lead-in wire in proper distance from the road or raise the antenna input as described above.
	C. Distortion or no sound during the reception	1. Drift of tuning resulted from the nature of FM	* Turn on the FM AFC switch.
	D. Tuning noise between stations	This noise results from the nature of the FM reception. As the station signal becomes weak, the noise limiter effect is also decreased. The amplification of the limiter, in turn, is enlarged and thus a big noise is generated.	If the amplifier is equipped with a muting switch, turn it on. Inasmuch as it also reduces the sensitivity, it should be used sparingly.
FM-MPX reception	A. Noise heard during FM-MPX reception while not heard during FM mono reception	1. The service area of the FM-MPX broadcast is only half as much as that of the FM mono broadcast.	* Install the antenna for maximum antenna input. * Switch on the noise filter and/or turn the TREBLE control properly from midpoint to left.
	B. Clearness of channel separation is decreased during the reception.	1. Excess heat	* Circulation of air is important to the amplifier. Make sure that air can flow underneath.
	C. The stereo indicator goes on and off.	1. Interference	* The indicator is not at fault.
	D. The stereo indicator goes on and off even though a stereo station is not received.	1. Interference	* The indicator is not at fault.
Record playing or tape playback	A. Hum or howling	* Record player placed directly on the speaker box * Use of wire other than shielded wire * Loose terminal contact. * Shielded wire too close to the line cord, fluorescent lamp or other electrical appliances * Nearby amateur radio station or TV transmission antenna	* The connecting cord should be as short as possible. * Put a cushion between the player and the speaker box or place them separately from each other. * Switch on the LOW FILTER and turn the BASS control properly from midpoint to left. * Consult the nearest Radio Regulatory Bureau.
	B. Distortion	* Worn or old record * Worn pick-up needle * Needle covered with dust * Improper needle pressure	* Turn the TREBLE control properly from midpoint to left. * Switch on the HIGH FILTER.
Over all stereo programs	The BALANCE control is not at the midpoint when equal sound comes from left and right channels.	It is important to adjust the control for equal sound from both channels. It should not be always set to the midpoint.	Set the control to the position where the equal sound comes from both channels.

AMPLIFIER TROUBLESHOOTING CHART

OVER ALL PROGRAM SOURCES

Symptom	Probable Cause		Check Point
No sound over all program sources	A. Defective speaker	1. Broken speaker cord, 1. Broken or short-circuited voice coil	Check continuity of speaker and cord. Repair broken cord or replace speaker.
	B. No power	1. No power comes to the power source. 2. Defective on-off switch 3. Defective line cord 4. Loose plug contact 5. Blown fuse If the fuse should be burnt out as soon as it is replaced, the trouble may be attributed to: a. Shorted power transformer; b. Shorted capacitor; c. B circuit open. 6. Broken primary winding of power transformer	PS-1 PU-2 FU-1 T ₀₀₁ C ₀₀₃ , C ₀₀₄ , C ₀₀₅ , C ₀₂₁ Check continuity of B circuit. T ₀₀₁
	C. Defective power circuit	1. Divergence of voltage specified in "CIRCUIT DIAGRAM"	Measure voltage in power circuit and replace defective element. Check R ₀₀₁ , R ₀₀₂ and R ₀₀₃ for disconnection.
	D. Defective low-frequency circuit	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Blown heater of tube 3. Capacitor, open or short-circuited	Measure voltage in low-frequency circuit and replace defective element. V ₁₂ , V ₁₄ , V ₁₆ , V ₁₇ or V ₁₃ , V ₁₅ , V ₁₈ , V ₁₉ C ₇₀₃ , C ₇₀₄ , C ₇₀₇ , C ₈₀₄ , C ₈₀₅ or C ₇₁₂ , C ₇₁₃ , C ₇₁₆ , C ₈₀₉ , C ₈₁₀
Weak sound over all program sources	A. Defective speaker circuit	1. Shorted voice coil	Check voice coil for short circuit.
	B. Defective power circuit	1. Divergence of voltage specified in "CIRCUIT DIAGRAM"	Measure voltage in power circuit and replace defective element.
	C. Defective low-frequency circuit	1. Divergence of voltage 2. Shorted output transformer 3. Insufficient capacity or short circuit of capacitor 4. Weak tube	Measure voltage in low-frequency circuit and replace defective element. T ₈₀₁ , T ₈₀₂ C ₇₀₃ , C ₇₀₄ , C ₇₀₇ , C ₈₀₄ , C ₈₀₅ or C ₇₁₂ , C ₇₁₃ , C ₇₁₆ , C ₈₀₉ , C ₈₁₀ , C ₇₀₆ , C ₇₀₉ or C ₇₁₅ , C ₇₁₈ V ₁₂ , V ₁₄ , V ₁₆ , V ₁₇ or V ₁₃ , V ₁₅ , V ₁₈ , V ₁₉
Distortion over all program sources	A. Defective speaker	1. Defective voice coil 2. Defective cone or damper	Check and replace.
	B. Defective power circuit	1. Divergence of voltage specified in "CIRCUIT DIAGRAM"	Measure voltage in power circuit and replace defective element.

Symptom	Probable Cause		Check Point
(Continued)	C. Defective low-frequency circuit	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Aging or weak tube 3. Shorted output transformer	Measure voltage in low-frequency circuit and replace defective element. V ₁₄ or V ₁₅ T ₈₀₁ or T ₈₀₂
Hum over all program sources	A. Defective power circuit	1. Defective hum balancer 2. Insufficient capacity of capacitor	VR ₀₀₃ , VR ₀₀₄ C ₀₀₃ , C ₀₀₄ , C ₀₀₅ , C ₀₂₀ , C ₀₁₈ , C ₀₁₉
	B. Defective low-frequency circuit	1. Inner contact or poor insulation of tube 2. Insufficient capacity of capacitor 3. Fixed resistor blown	V ₁₂ , V ₁₄ , V ₁₆ , V ₁₇ or V ₁₃ , V ₁₅ , V ₁₈ , V ₁₉ C ₀₀₆ , C ₀₀₇ , C ₀₀₈ , C ₀₀₉ R ₈₁₂ , R ₈₂₄
Noisy over all program sources	A. Defective speaker	1. Defective voice coil 2. Inner contact of speaker components 3. Defective cone or damper	
	B. Defective power circuit	1. Divergence of voltage specified in "CIRCUIT DIAGRAM"	Measure voltage in power circuit and replace defective element.
	C. Defective low-frequency circuit	1. Fixed resistor defective 2. Capacitor, shorted or poor insulation 3. Shorted primary winding of output transformer 4. Inner contact of tube 5. Defective master volume	R ₇₀₄ , R ₇₀₆ , R ₈₀₃ , R ₈₀₄ , R ₈₀₆ , R ₈₀₇ or R ₇₁₁ , R ₇₁₃ , R ₈₁₅ , R ₈₁₆ , R ₈₁₈ , R ₈₁₉ C ₈₀₂ , C ₈₀₃ or C ₈₀₇ , C ₈₀₈ ; C ₀₂₀ T ₈₀₁ or T ₈₀₂ V ₁₂ , V ₁₄ , V ₁₆ or V ₁₃ , V ₁₅ , V ₁₈ , V ₁₉ VR ₇₀₁ or VR ₇₀₂
SPEAKER switch does not work at all.	A. Defective headphone		Check headphone.
	B. Defective headphone circuit		R ₈₂₅ , R ₈₂₆ or R ₈₃₀ , R ₈₃₁ ; JAC-1ab
HIGH FILTER switch does not work at all.	A. Defective filter circuit		C ₇₀₅ or C ₇₁₄ ; SS ₇₀₉ , SS ₇₁₀
LOW FILTER switch does not work at all.	A. Defective filter circuit		C ₇₀₅ or C ₇₁₇ ; SS ₇₀₉ , SS ₇₁₀
LOUDNESS switch does not work at all.	A. Defective filter circuit		C ₇₀₁ , C ₇₀₂ , R ₇₀₁ or C ₇₁₀ , C ₇₁₁ , R ₇₀₈ ; VR ₇₀₁ , VR ₇₀₂ , SS ₇₀₁ , SS ₇₀₂
TONE CONTROL does not work at all.	A. Defective tone control circuit		C ₇₀₅ , C ₇₀₆ , C ₇₀₈ , C ₇₀₉ , R ₇₀₇ or C ₇₁₄ , C ₇₁₅ , C ₇₁₄ , C ₇₁₅ , C ₇₁₇ , C ₇₁₈ , R ₇₁₄ ; VR ₇₀₃ , VR ₇₀₅ , VR ₇₀₆

AMPLIFIER TROUBLESHOOTING CHART

FM RECEPTION

Symptom	Probable Cause		Check Point
No sound	A. Defective overall section		See "No sound over all program sources".
	B. Defective FM section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Blown heater of tube 3. Aging capacitor 4. Aging I.F.T. 5. Defective oscillating circuit	Measure voltage in FM section and replace defective element. $V_1 \sim V_8$ Check C_{214} for insufficient capacity and C_{212}, C_{213}, C_{210}, C_{211} for short. T_{101}, $T_{201} \sim T_{204}$ C_{113}, C_{114}, R_{108}, L_3, V_{3b}
Weak sound	A. Weak station signal		See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD".
	B. Defective overall section		See "Weak sound over all program sources".
	C. Defective FM section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Poor Q of coil 3. Insufficient capacity of capacitor 4. Improper contact of rotary switch 5. Poor emission of tube 6. Voltage drop in local oscillator 7. Divergence in adjustment of: a. Tracking. b. I.F.T. c. Variable resistor.	Measure voltage in FM section and replace defective element. T_{101}, $T_{202} \sim T_{204}$ and $L_1 \sim L_3$ C_{109}, CR_{201}, CR_{202}, C_{214}, C_{215}, C_{107} S_{2a}, S_{2b} $V_1 \sim V_8$ C_{113}, C_{114}, L_3, V_{3b} Optimum adjustment often needs to use measuring instruments. $TC_1 \sim TC_3$, $L_1 \sim L_3$ T_{101}, $T_{201} \sim T_{204}$/IF curve & S curve. VR_{201}
Distortion	A. Defective overall section		See "Distortion over all program sources".
	B. Defective FM section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Defective diode. 3. Insufficient capacity of capacitor. 4. Divergence in adjustment of: a. Tracking. b. I.F.T.	Measure voltage in FM section and replace defective element. D_{202}, D_{203} C_{110}, C_{201}, C_{204}, C_{206}, C_{207} Optimum adjustment often needs to use measuring instruments. $TC_1 \sim TC_3$, $L_1 \sim L_3$ T_{101}, $T_{201} \sim T_{204}$/IF curve & S curve.
Hum	A. Defective overall section		See "Hum over all program sources".

Symptom	Probable Cause		Check Point
(Continued)	B. Defective FM section	1. Inner contact or poor insulation of tube 2. Insufficient capacity of capacitor	$V_1 \sim V_8$ $C_{110}, C_{201}, C_{204}, C_{206}, C_{209}, C_{011}, C_{013}, C_{104}, C_{119}$
Noisy	A. Amplifier is O.K.		See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD".
	B. Defective overall section		See "Noisy over all program sources".
	C. Defective FM section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Aging tube 3. Resistor, rubbing or blown 4. Insufficient capacity or short circuit of capacitor	Measure voltage in FM section and replace defective element. $V_1 \sim V_8$ $R_{103}, F_{105}, R_{202}, R_{203}, R_{205}, R_{206}, R_{216}$ $C_{211}, C_{218}, CR_{203}, C_{206}, C_{104}, C_{119}, C_{110}, C_{201}, C_{109}, CR_{201}, CR_{202}, C_{209}, C_{208}$
Tuning meter does not work normally.	A. Defective FM tuner		
	B. Defective tuning indicator circuit.		(M), $R_{204}, CR_{203}, S_{2e}, S_{2f}$
FM-AFC switch does not work at all.	A. Defective AFC circuit.		$D_{101}, C_{111}, C_{120}, C_{217}, R_{210}, SS_{101}$
MUTING switch does not work at all.	A. Defective muting circuit.		$R_{212}, R_{209}, R_{208}, R_{211}, VR_{201}, C_{216}, C_{215}, V_8$

FM-MPX RECEPTION

Symptom	Probable Cause		Check Point
No sound	A. Defective FM section		See "FM RECEPTION: No sound"
	B. Defective overall section		See "No sound over all program sources".
	C. Defective MPX section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Blown heater of tube 3. Defective resistor 4. Insufficient capacity or short circuit of capacitor 5. MPX coil aging	Measure voltage in MPX section and replace defective element. $V_9 \sim V_{11}$ $R_{421}, R_{423}, R_{424}, R_{425}, R_{422}$ $C_{401}, C_{403}, C_{416}, C_{417}, C_{418}, C_{419}, C_{420}, C_{422}, C_{423}, C_{424}, C_{425}, C_{426}$ L_{402}
Weak sound	A. Defective FM section		See "FM RECEPTION: Weak sound".
	B. Defective overall section		See "Weak sound over all program sources".

FM-MPX RECEPTION (Continued)

Symptom	Probable Cause		Check Point
(Continued)	C. Defective MPX section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Insufficient capacity of capacitor 3. Aging diode 4. Divergence in adjustment of MPX coil.	Measure voltage in MPX section and replace defective element. C ₄₀₁ , C ₄₁₆ , C ₄₁₇ , C ₄₂₀ , C ₄₂₂ , C ₄₂₃ , C ₄₂₄ , C ₄₀₄ , C ₄₀₆ , C ₄₁₀ , C ₄₁₀ , C ₄₁₂ , C ₄₁₅ , C ₄₁₄ D ₄₀₁ ~D ₄₀₈ Optimum adjustment often needs to use measuring instruments. L ₄₀₁ ~L ₄₀₄
Distortion	A. Defective FM section		See "FM RECEPTION: Distortion".
	B. Defective overall section		See "Distortion over all program sources".
	C. Defective MPX section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Aging diode 3. Insufficient capacity of capacitor 4. Fixed resistor defective 5. Divergence in adjustment of MPX coil	Measure voltage in MPX section and replace defective element. D ₄₀₁ ~D ₄₀₄ C ₄₂₀ , C ₄₂₄ R ₄₀₁ , R ₄₀₂ , R ₄₀₃ , R ₄₀₉ , R ₄₁₁ , R ₄₂₆ , R ₄₃₁ L ₄₀₁ ~L ₄₀₄ Optimum adjustment often needs to use measuring instruments.
Hum	A. Defective FM section		See "FM RECEPTION: Hum"
	B. Defective overall section		See "Hum over all program sources".
	C. Defective MPX section	1. Inner contact or poor insulation of tube 2. Insufficient capacity of capacitor	V ₉ ~V ₁₁ C ₀₁₄ , C ₀₁₅ , C ₀₁₁
Noisy	A. Defective FM section		See "FM RECEPTION: Noisy".
	B. Defective overall section		See "Noisy over all program sources"
	C. Defective MPX section	1. Defective MPX coil 2. Defective fixed resistor 3. Aging capacitor 4. Aging tube 5. Loose contact of rotary switch	L ₄₀₂ ~L ₄₀₄ R ₄₀₅ , R ₄₀₆ , R ₄₂₇ , R ₄₂₈ , R ₄₂₉ , R ₄₃₀ C ₄₀₁ , C ₄₀₉ , C ₄₁₆ , C ₄₁₇ , C ₄₂₀ , C ₄₂₂ , C ₄₂₃ , C ₄₂₄ V ₉ ~V ₁₁ S _{2a} , S _{2b}
No MPX stereo sound	A. Subcarrier amplifying circuit defective	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Insufficient capacity or short circuit of capacitor 3. 38-kc oscillating circuit defective 4. Aging tube (poor emission) 5. Aging coil (too low Q)	Measure voltage at pins of V ₉ and V ₁₀ in subcarrier amplifying circuit and replace defective element. C ₄₀₅ , C ₄₀₂ , C ₄₀₄ , C ₄₀₅ , C ₄₁₀ , C ₄₁₂ , C ₄₁₁ , C ₄₁₆ , C ₄₁₇ R ₄₀₉ , R ₄₁₀ , R ₄₁₁ , C ₄₁₃ , L ₄₀₄ , C ₄₁₅ V ₉ , V ₁₀ L ₄₀₂ , L ₄₀₃
Poor separation	A. Defective MPX section	1. Same as above. 2. Divergence of properties of circuit elements (MPX coil and diode) due to temperature change	Same as above. Readjust VR ₄₀₁ . Taking account of the temperature change, our company has adjusted the circuit elements for the optimum conditions.

Symptom	Probable Cause	Check Point
Stereo indicator does not glow white when FM MPX station is received.	A. Defective MPX circuit	Same as above.
	B. Defective stereo indicator circuit a. Pilot lamp off b. Aging or defective transistor or diode c. Variable or fixed resistor defective d. Insufficient capacity or short circuit of capacitor	PL ₇ TR ₁ ~TR ₃ , D ₅₀₁ , D ₅₀₂ VR ₅₀₁ , R ₅₀₁ , R ₅₀₂ , R ₅₀₃ , R ₅₀₄ , R ₄₀₈ C ₅₀₁ , C ₅₀₂ , C ₅₀₃ , C ₅₀₄ , C ₅₀₅
Stereo indicator changes repeatedly from white to green or from green to white even though a station is not received.	A. Amplifier is O.K.	See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD"
	B. Defective stereo indicator circuit	Check VR ₅₀₁ for divergence in adjustment. Check R ₂₀₇ and D ₂₀₂ .
Tuning meter does not work normally.	A. Defective MPX section	Check the preceding items.
	B. Defective tuning indicator circuit	See "FM RECEPTION: Tuning meter does not work normally".

AM RECEPTION

Symptom	Probable Cause	Check Point
No sound	A. Defective overall section	See "No sound over all program sources".
	B. Defective AM section 1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Aging or defective tube 3. Aging or defective I.F.T. 4. Detector diode defective 5. Aging or defective capacitor.	Measure voltage in FM section and replace defective element. V ₄ , V ₆ T ₃₀₁ , T ₃₀₂ D ₃₀₁ Check C ₃₀₇ and D ₃₀₈ for short circuit and C ₃₀₉ for insufficient capacity.
Weak sound	A. Weak station signal	See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD".
	B. Defective overall section 1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Voltage drop in local oscillator 3. Detector diode, aging or weak 4. Too low Q of coil 5. Insufficient capacity of capacitor 6. Aging or weak tube (poor emission)	Measure voltage in AM section and replace defective element. V ₉ , C ₃₀₂ , C ₃₀₄ , R ₃₀₂ , R ₃₀₃ , L ₅ D ₃₀₁ L ₄ , T ₃₀₁ , T ₃₀₂ C ₃₀₄ , CR ₂₀₂ , C ₃₀₉ V ₄ , V ₆

Symptom	Probable Cause		Check Point
(Continued)		7. Divergence in adjustment of: a. Tracking. b. I.F.T.	Optimum adjustment often needs to use measuring instruments. TC ₄ , TC ₅ T ₃₀₁ , T ₃₀₂
Distortion	A. Defective overall section		See "Distortion over all program sources".
	B. Defective AM section	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Detector diode, aging or weak 3. Insufficient capacity of capacitor 4. Divergence in adjustment	Measure voltage in AM section and replace defective element. D ₃₀₁ C ₃₀₅ , C ₃₀₆ See "Weak sound".
Hum	A. Defective overall section		See "Hum over all program sources"
	B. Defective AM section	1. Inner contact or poor insulation of tube. 2. Insufficient capacity of capacitor.	V ₄ , V ₆ C ₃₀₅ , C ₀₁₁
Noisy	A. Amplifier is O.K.		See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD".
	B. Defective overall section		See "Noisy over all program sources".
	C. Defective AM section	1. Aging or defective tube. 2. Loose contact of rotary switch.	V ₄ S _{2a} , S _{2b}
Tuning meter does not work normally.	A. Defective AM tuner		Check as described above.
	B. Defective tuning indicator circuit		See "FM RECEPTION: Tuning meter does not work normally".

USE OF RECORD PLAYER (MAGNETIC), TAPE DECK

Symptom	Probable Cause		Check Point
No sound	A. Program source defective		Check and repair or replace.
	B. Defective overall section		See "No sound over all program sources".
	C. Divergence of voltage	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Defective capacitor or resistor.	Measure voltage in head amplifier section and replace defective element. C ₆₀₇ , C ₆₁₇ , R ₆₁₀ , R ₆₂₄ , C ₆₀₅ , C ₆₁₅

Symptom	Probable Cause		Check Point
(Continued)		3. Loose contact of rotary switch. 4. Loose contact of input terminal or pin jack.	S _{1a} , S _{1e} , S _{1g} or S _{1b} , S _{1f} , S _{1h}
Weak sound	A. Program source defective		Check and repair or replace.
	B. Defective overall section		See "Weak sound over all program sources".
	C. Defective head amplifier	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Insufficient capacity of capacitor 3. Divergence of capacity of capacitor 4. Loose contact of rotary switch 5. Loose contact of input terminal or pin jack	Measure voltage in head amplifier section and replace defective element C ₆₀₁ , C ₆₀₅ , C ₆₀₇ or C ₆₁₁ , C ₆₁₅ , C ₆₁₇ C ₆₀₂ , C ₆₀₆ , C ₆₁₂ , C ₆₁₆ S _{1a} , S _{1e} , S _{1g} or S _{1b} , S _{1f} , S _{1h}
Distortion	A. Program source defective		Check and repair or replace.
	B. Defective overall section		See "Distortion over all program sources".
	C. Defective head amplifier	1. Divergence of voltage specified in "CIRCUIT DIAGRAM" 2. Capacitor, shorted or blown	Measure voltage in head amplifier section and replace defective element C ₆₀₁ , C ₆₁₁ , C ₆₀₂ , C ₆₀₅
Hum	A. Program source defective		Check and repair or replace.
	B. Amplifier is O.K.	1. Improper connections	See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD".
	C. Defective overall section		See "Hum over all program sources".
	D. Defective head amplifier	1. Insufficient capacity of capacitor	C ₀₁₂
Noisy	A. Program source defective		Check and repair or replace.
	B. Amplifier is O.K.		See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD".
	C. Defective overall section		See "Noisy over all program sources".
	D. Defective head amplifier	1. Fixed resistor defective 2. Defective capacitor	R ₆₀₁ ~R ₆₁₄ or R ₆₁₅ ~R ₆₂₈ C ₆₀₁ ~C ₆₁₀ or C ₆₁₁ ~C ₆₂₀

OTHER PROGRAM SOURCES

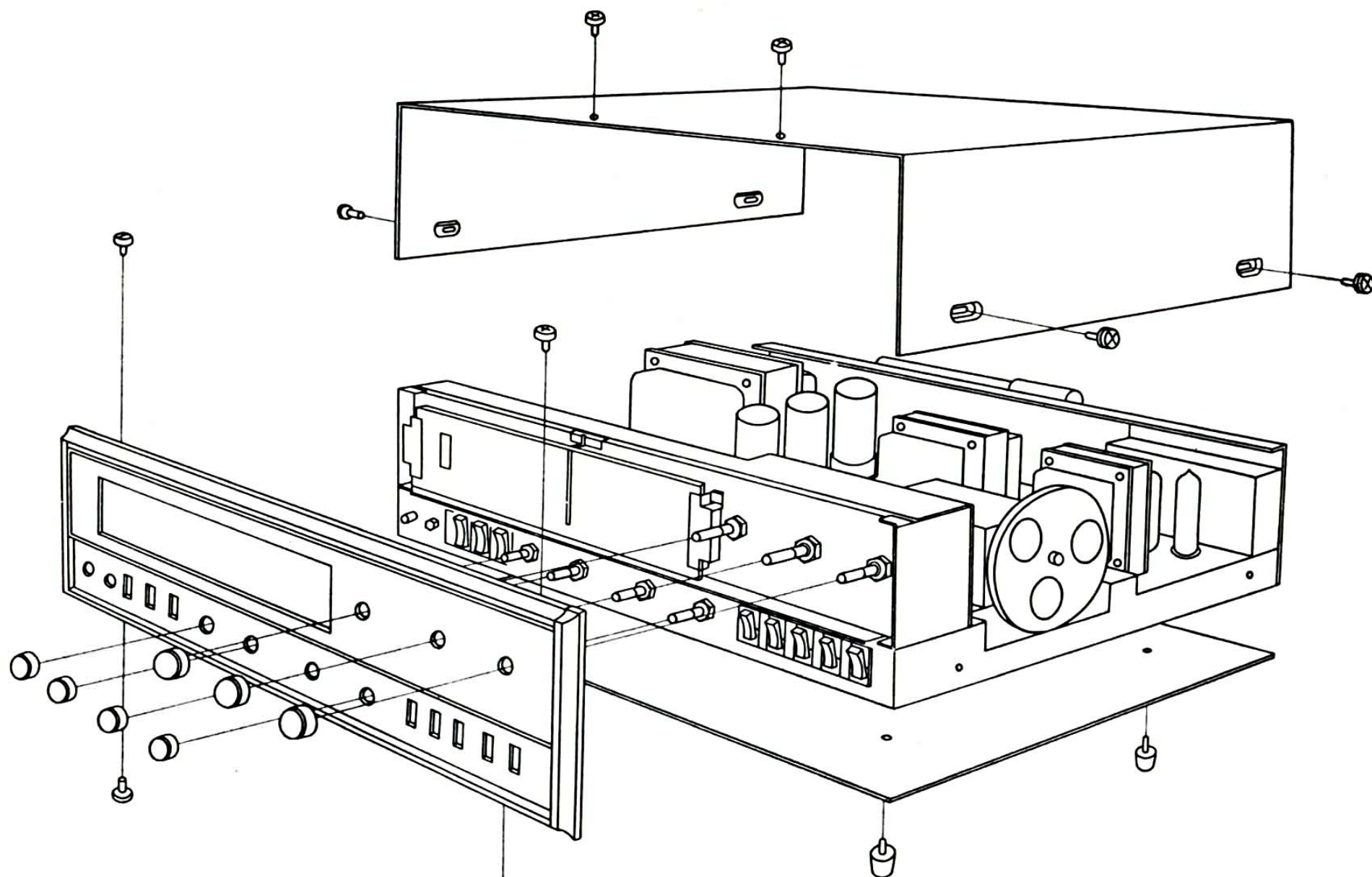
Symptom	Probable Cause	Check point
Record player with crystal cartridge does not operate properly.	1. Program source defective 2. Improper or incorrect connections 3. Defective overall section	Check and repair or replace. See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD". See "OVER ALL PROGRAM SOURCES"
Sound input from TV, additional tuner or others is not reproduced properly.	1. Program source defective 2. Improper or incorrect connections 3. Defective overall section	Check and repair or replace. See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD". See "OVER ALL PROGRAM SOURCES"
Pin-jack tape recorder does not operate properly.	1. Program source defective 2. Improper or incorrect connections 3. Defective overall section	Check and repair or replace. See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD". See "OVER ALL PROGRAM SOURCES"
One-connection tape recorder (DIN standard) does not operate properly.	1. Program source defective 2. Improper or incorrect connections 3. Defective overall section 4. Defective input circuit	Check and repair or replace. See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD". See "OVER ALL PROGRAM SOURCES". JAC-2, R ₀₁₃ ~R ₀₁₆

RECORDING ON TAPE

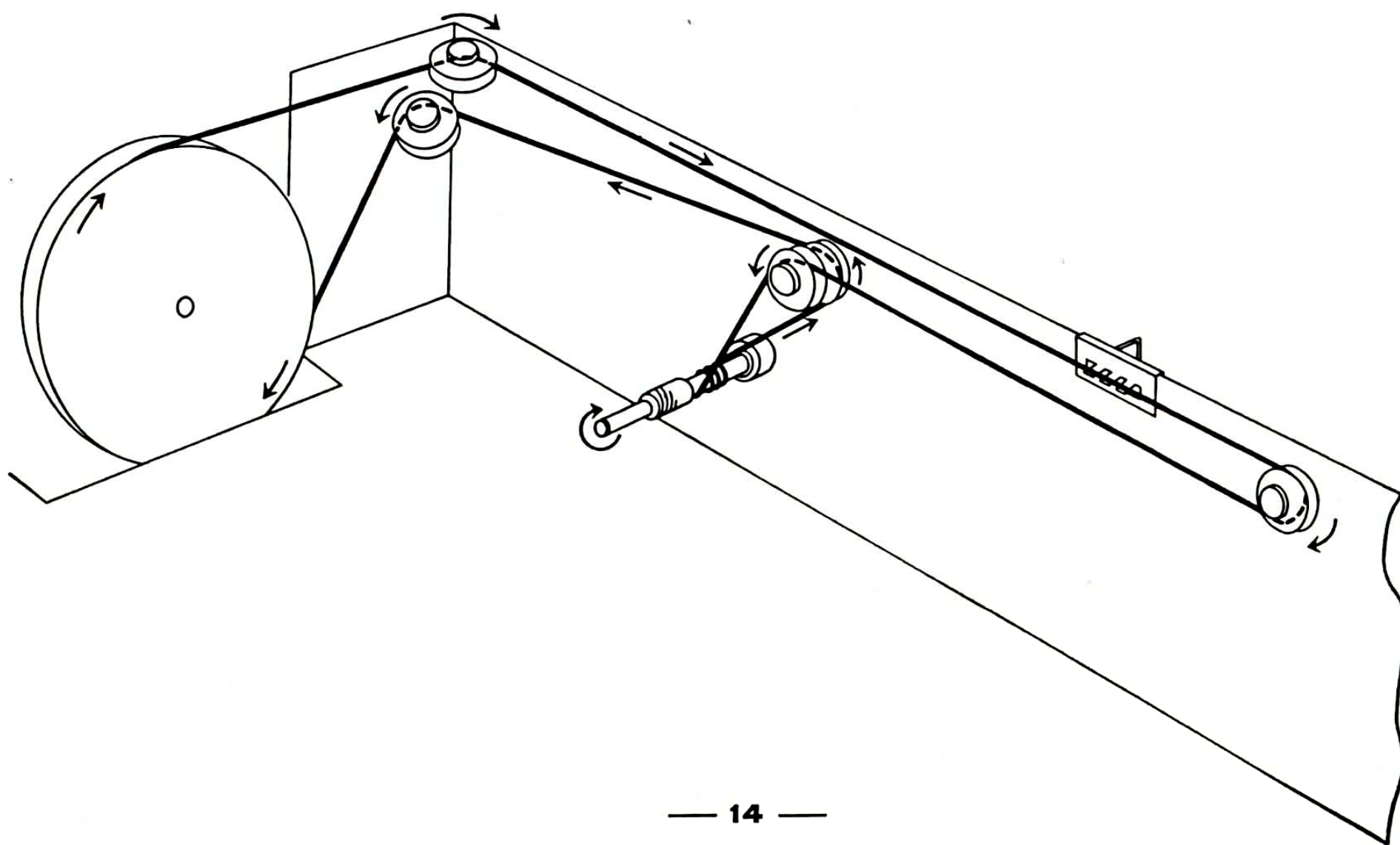
Symptom	Probable Cause	Check point
Broadcast is not recorded well.	1. Defective tape or tape recorder 2. Improper or incorrect connections 3. FM, FM-MPX or AM section defective	Check and repair or replace. See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD". See "AM", "FM" or "FM-MPX RECEPTION".
Record is not recorded well.	1. Defective tape or tape recorder 2. Improper or incorrect connections 3. Record, or record player defective 4. Defective head amplifier	Check and repair or replace. See "TROUBLESHOOTING AUDIO SYSTEM WHEN THE AMPLIFIER IS GOOD". Check and repair or replace. See "Defective head amplifier".

REMOVING THE FRONT PANEL, BONNET & BOTTOM PANEL/DIAL MECHANISM

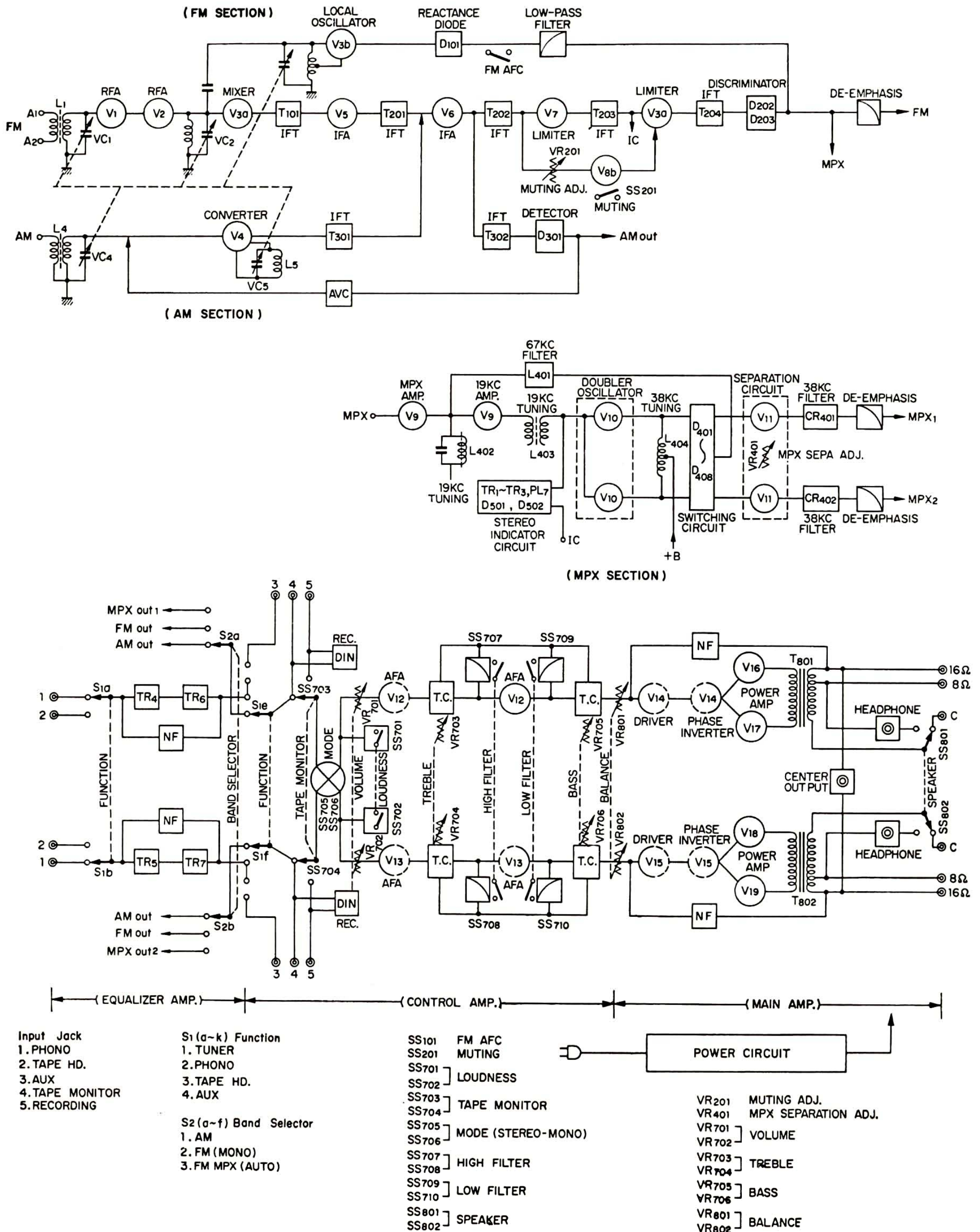
REMOVING THE FRONT PANEL, BONNET & BOTTOM PLATE



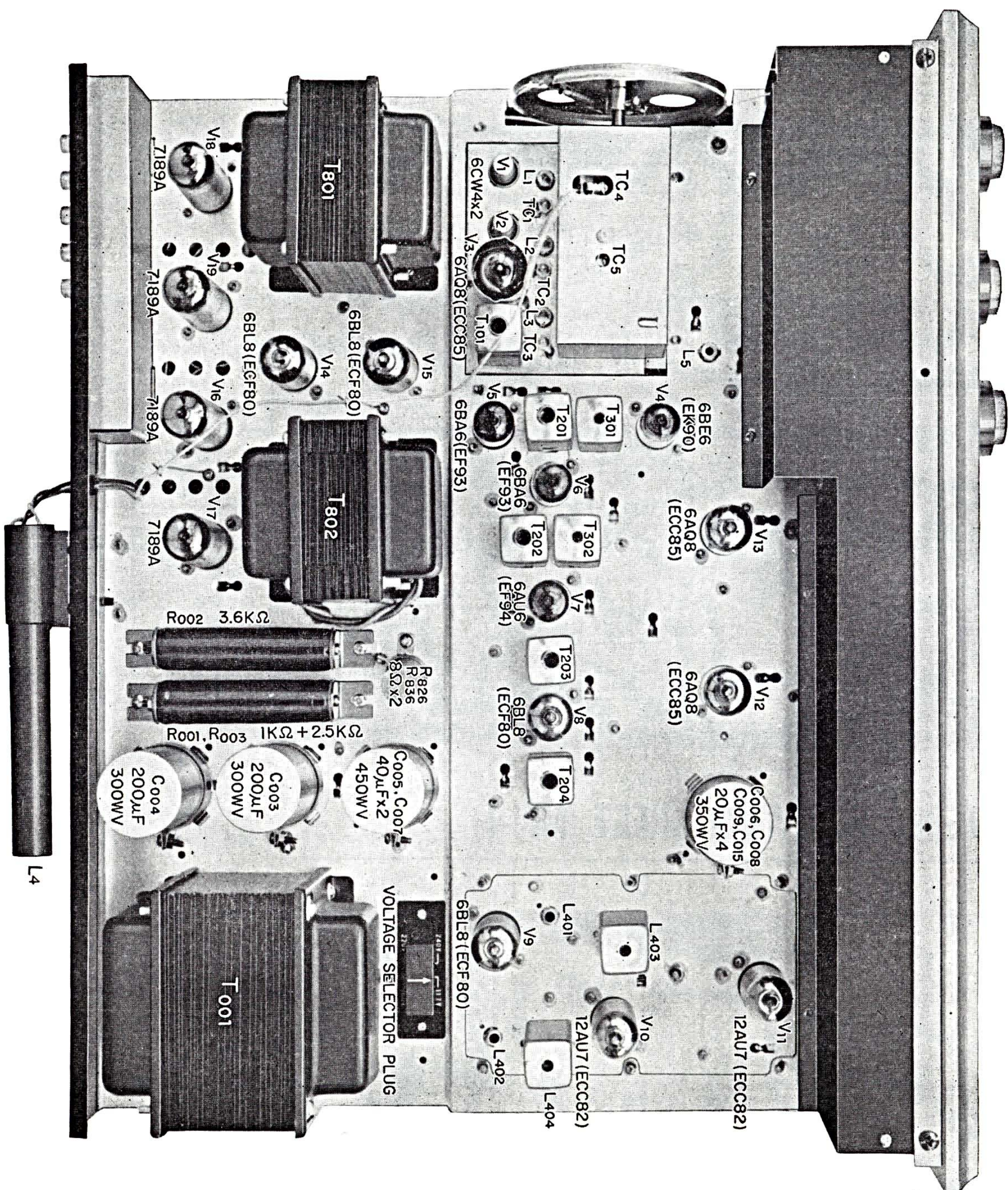
DIAL MECHANISM



BLOCK DIAGRAM

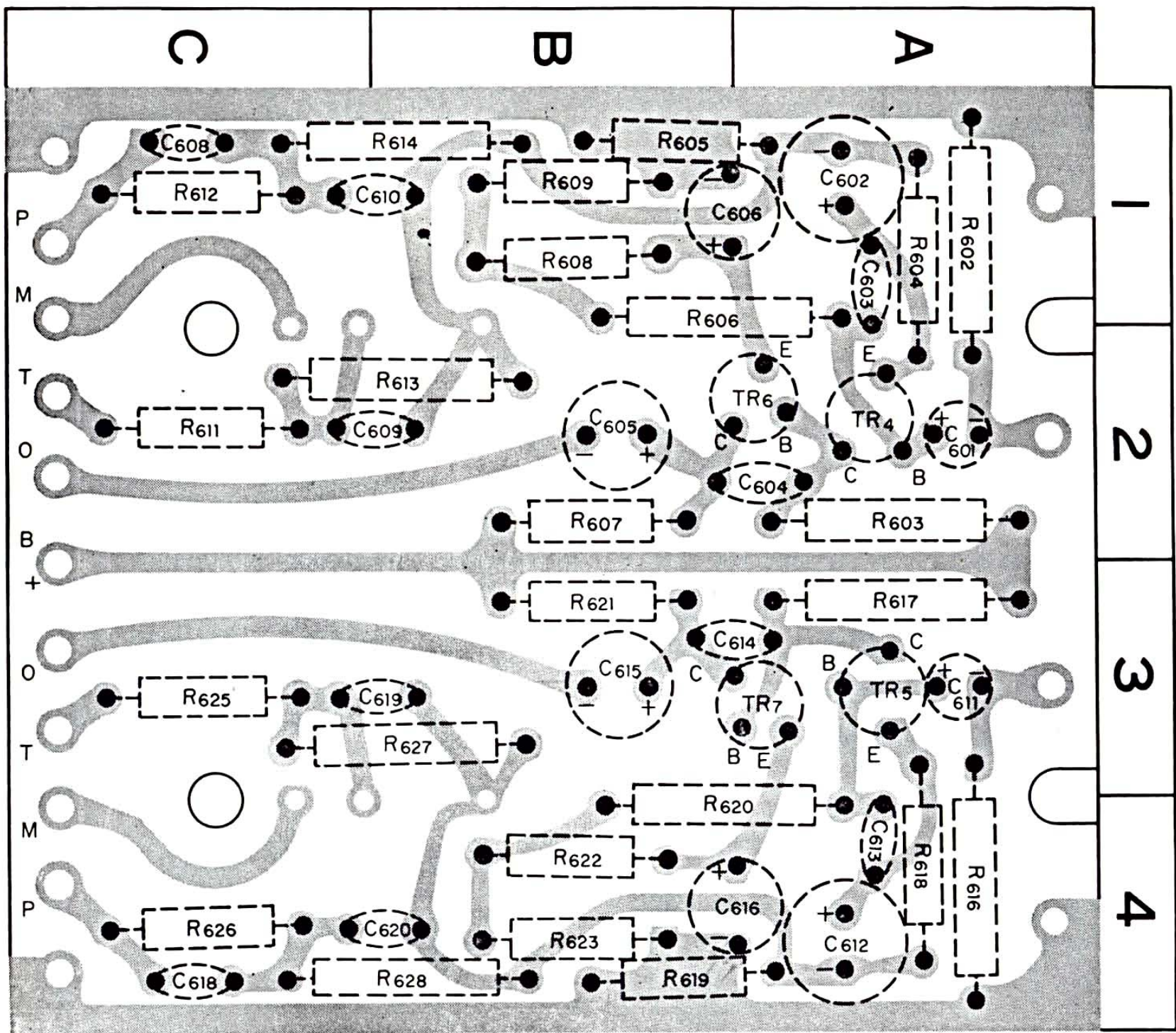


PARTS LAYOUT



PRINTED CIRCUIT SHEETS

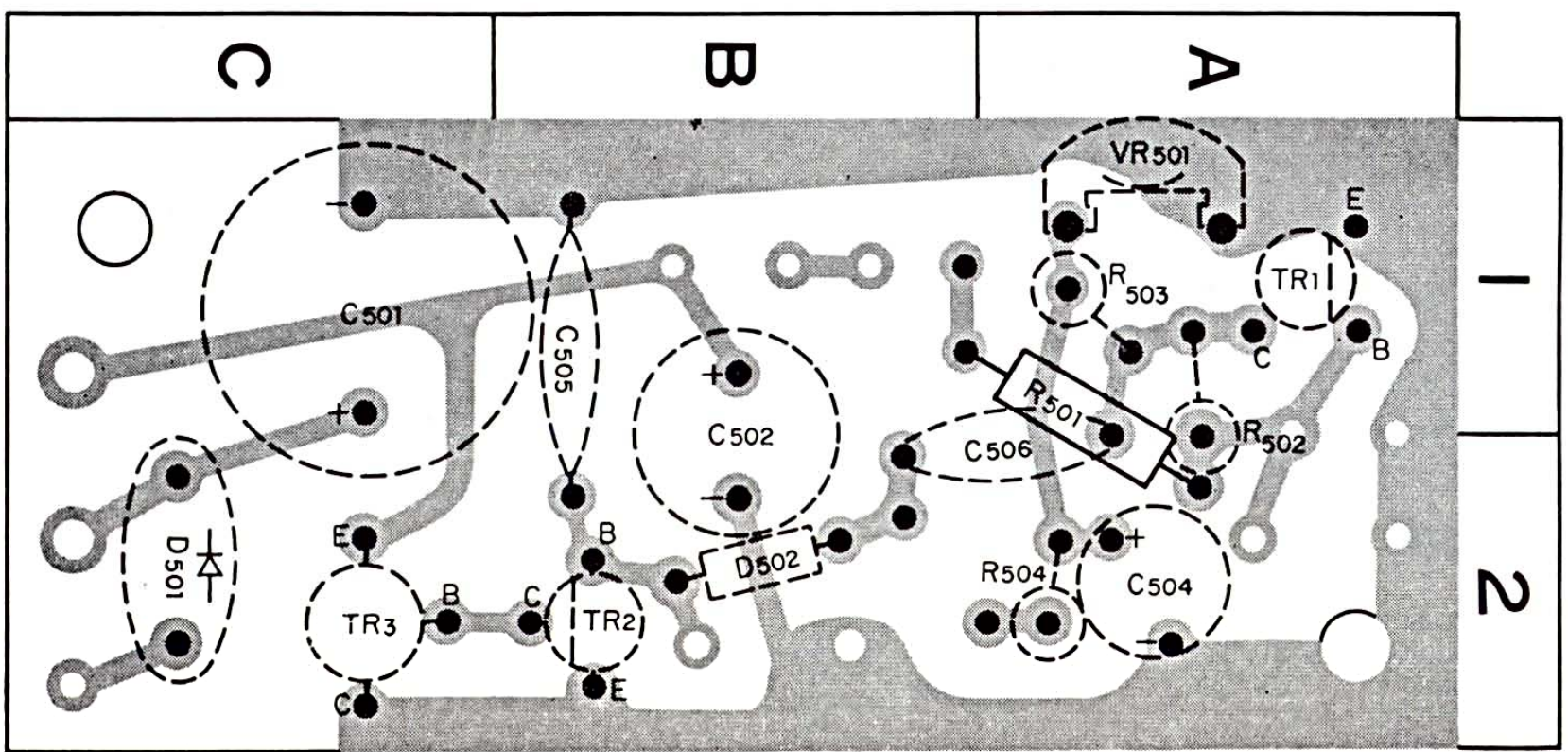
EQUALIZER AMP. SHEET (TRHA-6A)



Co-ordinates of Parts Used

R602....1 A	R628....4 B
R603....2 A	C601....2 A
R604....1 A	C602....1 A
R605....1 B	C603....1 A
R606....1 B	C604....2 A
R607....2 B	C605....2 B
R608....1 B	C606....1 B
R609....1 B	C608....1 C
R611....2 C	C609....2 B
R612....1 C	C610....1 B
R613....2 B	C611....3 A
R614....1 B	C612....4 A
R616....4 A	C613....4 A
R617....3 A	C614....3 B
R618....4 A	C615....3 B
R619....4 B	C616....4 B
R620....4 B	C618....4 C
R621....3 B	C619....3 B
R622....4 B	C620....4 B
R623....4 B	TR42 A
R625....3 C	TR53 A
R626....4 C	TR62 A
R627....3 B	TR73 A

STEREO INDICATOR SHEET (MPI-1)



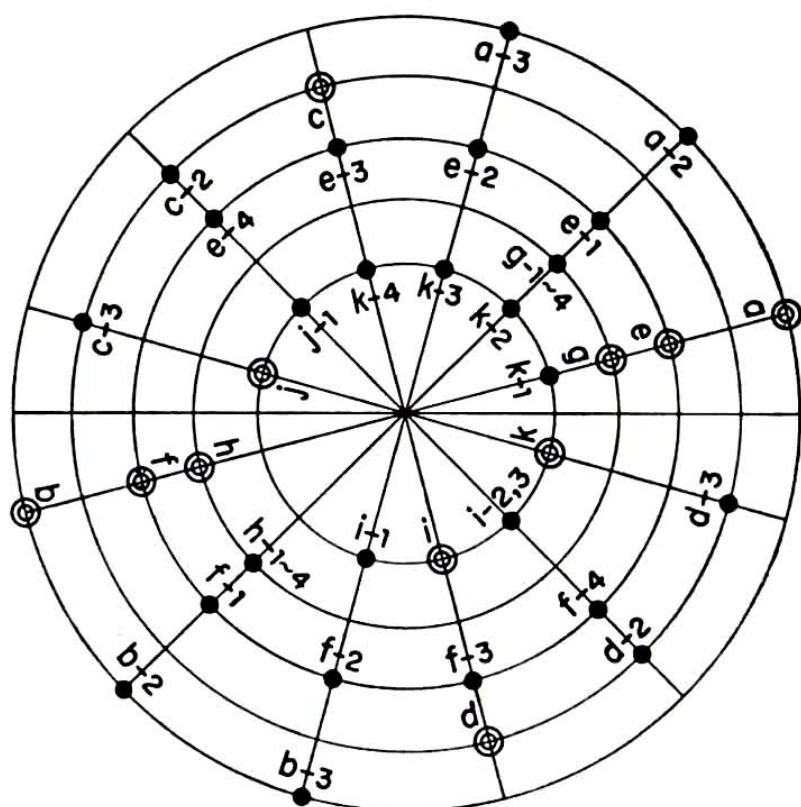
Co-ordinates of Parts Used

R501....1 A	C506....2 A
R502....1 A	VR501 ..2 C
R503....1 A	D501....2 C
R504....2 A	D502....2 B
C501....1 C	TR11 A
C502....1 B	TR22 B
C504....2 A	TR32 C
C505....1 B	

SELECTOR CHART

Remove the bonnet and look at the switches from the back side of the amplifier. This chart tells you the location of their contact and supporting points. The smaller the circle, the nearer the points locate to the back of the amplifier.

- : contact point
- ⊙: supporting point



FUNCTION

S₁ (a~k)

1. TUNER

2. PHONO

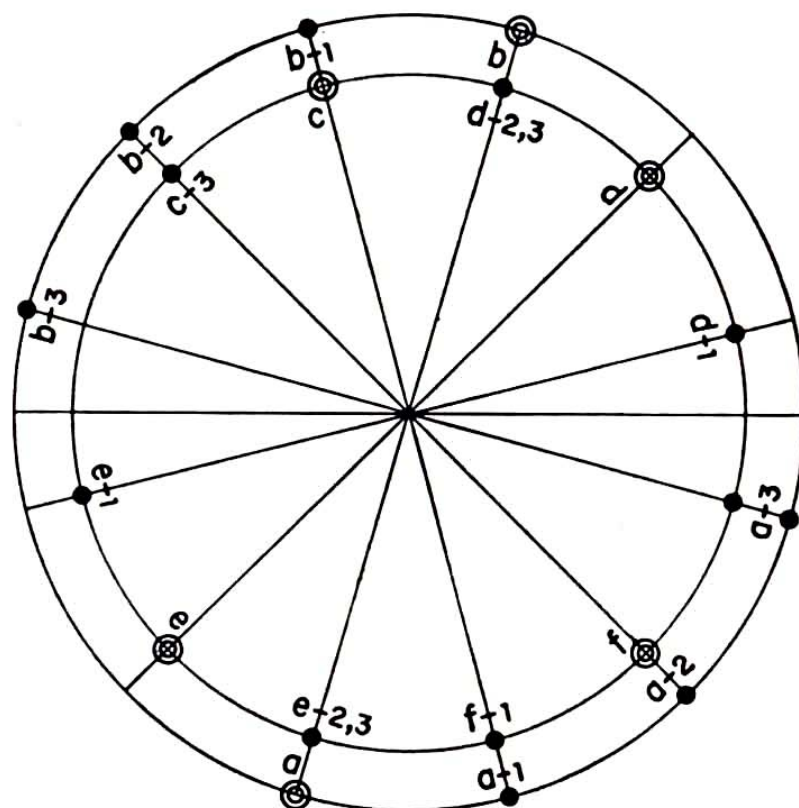
3. TAPE HD.

4. AUX

Co-ordinates in Circuit Diagram

S _{1a}	1D	S _{1g}	4D
S _{1b}	1E	S _{1h}	4E
S _{1c}	3E	S _{1i}	9F
S _{1d}	3F	S _{1j}	8E
S _{1e}	3D	S _{1k}	9F
S _{1f}	3E		

(Ex.) Contact Point
Supporting Point



BAND SELECTOR

S₂ (a~f)

1. AM

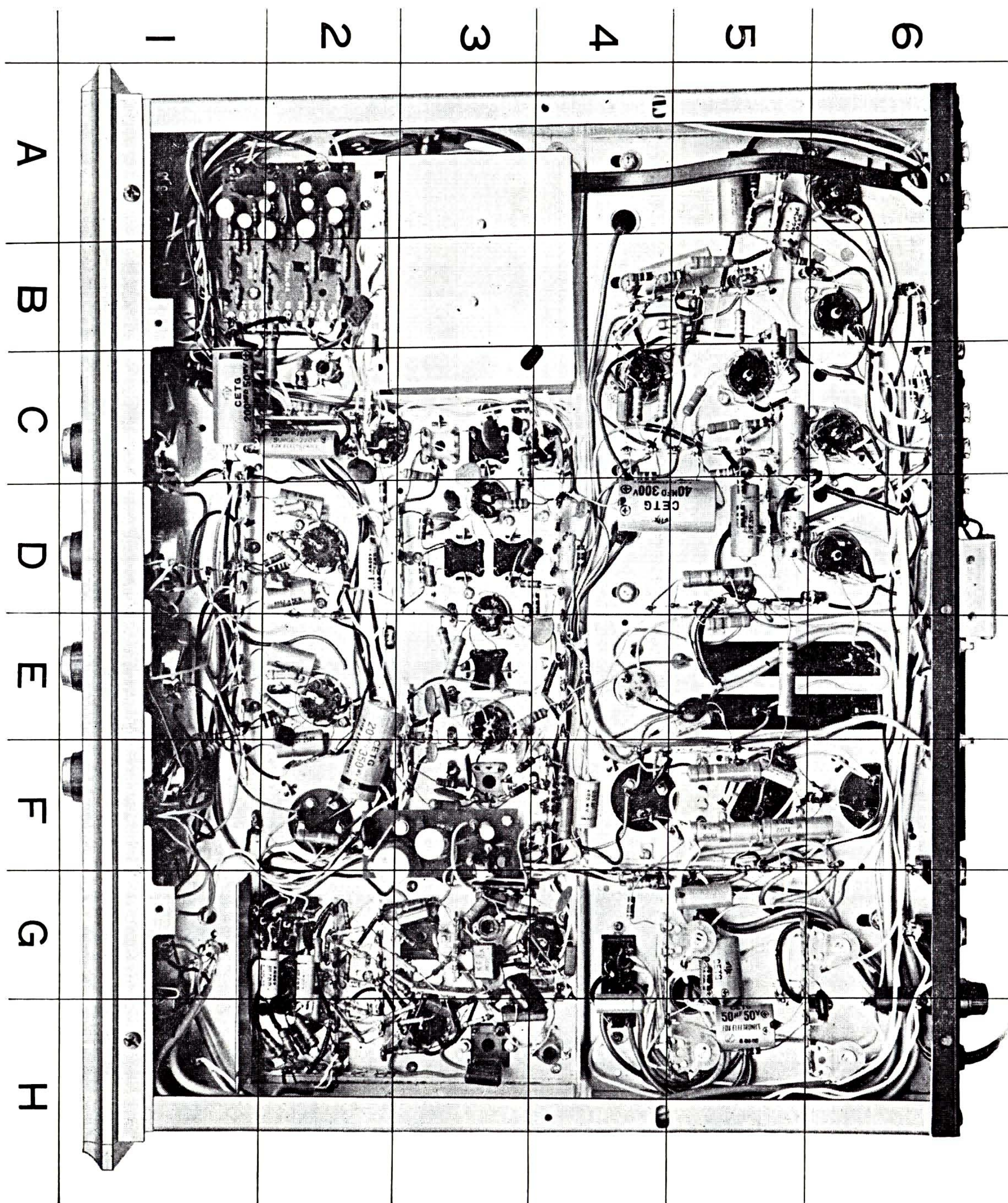
2. FM (MONO)

3. FM MPX (AUTO)

Co-ordinates in Circuit Diagram

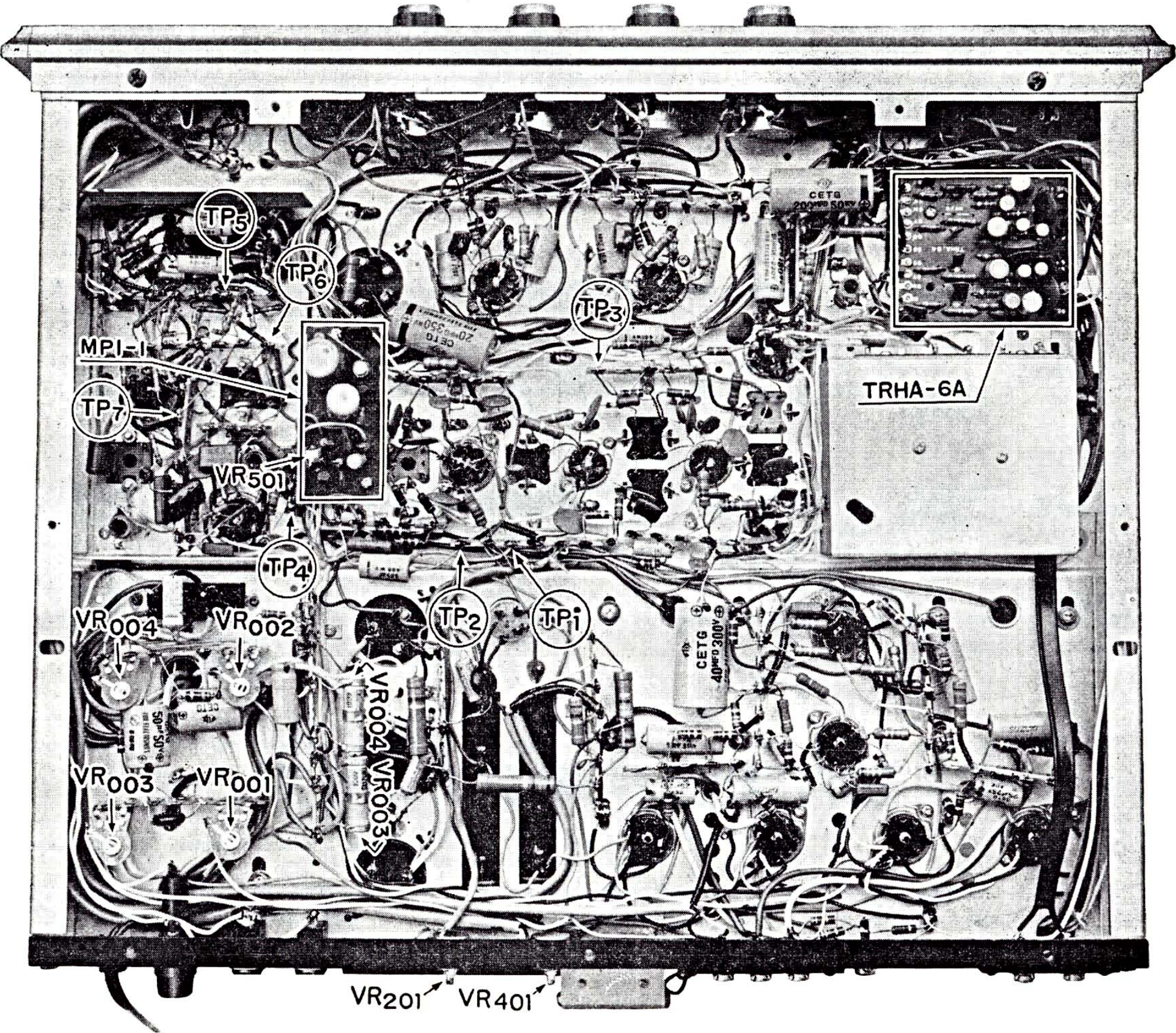
S _{2a}	9B
S _{2b}	9B
S _{2c}	9E
S _{2d}	9F
S _{2e}	4B
S _{2f}	5B

CHASSIS DIAGRAM

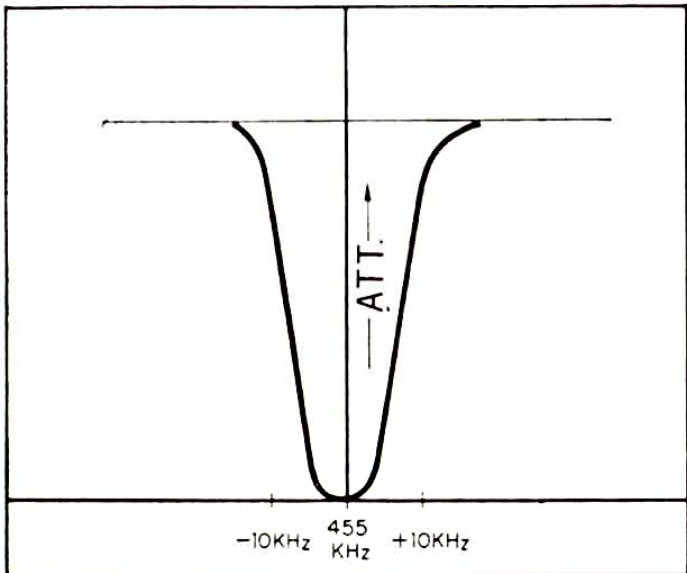


ALIGNMENT

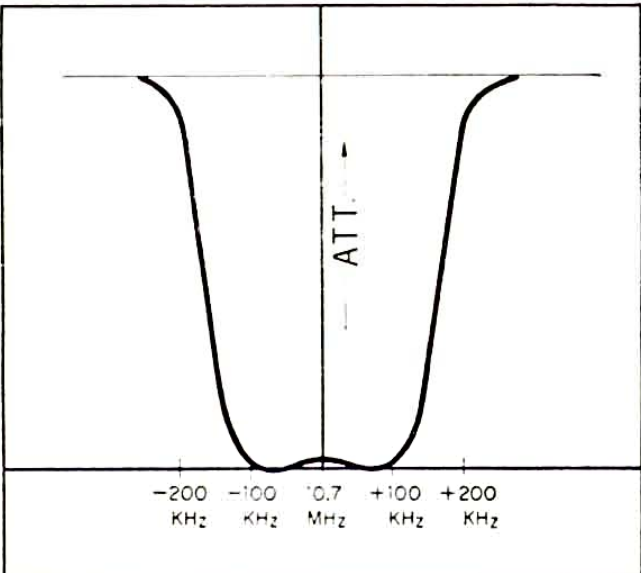
CO-ORDINATES OF TEST POINTS



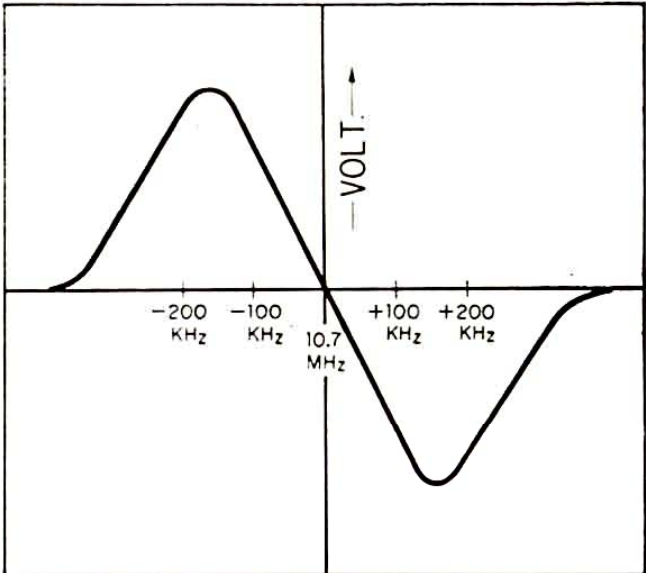
AM IF Wave form



FM IF Wave form



FM Discriminator Wave form



ALIGNMENT

FM ALIGNMENT PROCEDURE

1. AFC-OFF

2. Turn tuning gang fully.

Center carrier wave.

Set pointer at reference mark.

STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	DIAL SETTING	ADJUST	ADJUST FOR
1.	IF Transformer	10.7 MHz ± 400 KHz	V ₇ Pin 1 6AU6	oscilloscope at T.P ①		4th IFT (T ₂₀₃) Primary & secondary	Best IFT Wave form
		10.7 MHz ± 400 KHz	V ₆ Pin 1 6BA6	oscilloscope at T.P ①		3rd IFT (T ₂₀₂) Primary & secondary	Best IFT Wave form
		10.7 MHz ± 400 KHz	V ₅ Pin 1 6BA6	oscilloscope at T.P ①		2nd IFT (T ₂₀₁) Primary & secondary	Best IFT Wave form
		10.7 MHz ± 400 KHz	Couple Sweep Signal by a round tube V ₃ 6AQ8	oscilloscope at T.P ①		1st IFT (T ₁₀₁) Primary & secondary	✕Best IFT Wave form
2.	Discrimi- nator	10.7 MHz ± 400 KHz	Couple Sweep Signal by a round tube V ₃ 6AQ8	oscilloscope at T.P ②		5th IFT (T ₂₀₄) Discriminator Transformer	✕S Curve
3.	OSC.	88 MHz 400 Hz 100% Modulation	Antenna Terminals	oscilloscope & V.T, V.M. at oscillo load	88 MHz	OSC. coil L ₃	Maximum
4.	OSC.	108 MHz 400 Hz 100% Modulation	Antenna Terminals	oscilloscope & V.T, V.M. at oscillo load	108 MHz	OSC. Trimmer TC ₃	Maximum
5.		Reiterate 3. 4					
6.	RF Amp.	88 MHz 400 Hz 100% Modulation	Antenna Terminals	oscilloscope & V.T, V.M. at oscillo load	88 MHz	RF Amp. coil L ₂	Maximum
7.	Antenna circuit	88 MHz 400 Hz 100% Modulation	Antenna Terminals	oscilloscope & V.T, V.M. at oscillo load	88 MHz	Antenna coil L ₁	Maximum
8.	RF Amp	108 MHz 400 Hz 100% Modulation	Antenna Terminals	oscilloscope & V.T, V.M. at oscillo load	108 MHz	RF. Amp Trimmer TC ₂	Maximum
9.	Antenna circuit	108 MHz 400 Hz 100% Modulation	Antenna Terminals	oscilloscope & V.T, V.M. at oscillo load	108 MHz	Antenna circuit Trimmer TC ₁	Maximum
10.		Reiterate 6, 7, 8, 9					

AM ALIGNMENT PROCEDURE

STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	DIAL SETTING	ADJUST	ADJUST FOR
1.	IF Trans-former	455 KHz ± 30 KHz sweep-generator	V ₄ pin 7 6BE6	Sweep input at T.P ③		1st I.F.T...(T ₃₀₁) Primary & secondary 2nd I.F.T...(T ₃₀₂) Primary & secondary	Best I.F.T Wave form
2.	OSC.	AM-OSCILLATOR 535 KHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T, V.M, at output load	535 KHz	OSC. coil L ₃	Maximum
3.	OSC.	1605 KHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T, V.M, at output load	1605 KHz	OSC. Trimmer TC ₅	Maximum
4.		Reiterate 2, 3.					
5.	Antenna circuit	600 KHz 400 Hz 30% Modulation	Antenna Terminals	oscilloscope & V.T, V.M, at output load	600 KHz	Ferrite Loop Antenna at coil L ₄	Maximum
6.	Antenna	1400 KHz 400 Hz 30% Modulation		oscilloscope & V.T, V.M, at output load	1400 KHz	Antenna circuit at Trimmer TC-4	Maximum
7.		Reiterate 8, 9.					

FM MPX ALIGNMENT PROCEDURE

1. Do not attempt to align the Multiplex Circuit unless
the following equipment is available :

- a. Multiplex Stereo Generator b. FM Signal Generator c. Oscilloscope
d. Sweep Generator e. AC V.T, V.M. f. Audio oscillator

STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	ADJUST	ADJUST FOR
1.	67 KHz Trap	67 KHz Audio Signal	Connect to T.P ④	V.T, V.M at T.P ⑤	L ₄₀₁	Minimum
2.	19 KHz coil	FM Signal Gen. Modulated 30% by Stereo Gen. sub-Channel	Antenna Terminals Tune to signal	V.T, V.M. & Oscilloscope at T.P ⑥	L ₄₀₂	Maximum
3.	19 KHz coil	Same	Same	Same	L ₄₀₃	Maximum
4.	38 KHz Doubler	Same	Same	V.T, V.M. & Oscilloscope at T.P ⑦	L ₄₀₄	Maximum
5.	Separation VR	FM Signal Gen. Modulated 30% by Stereo Signal Gen. Channel-L	Same	V.T, V.M. & Oscilloscope at output load Channel-R	Seperation VR ₄₀₁	Channel-R Minimum

PARTS LIST

A: Part No.
B: Part name
C: Co-ordinates in Schematic Diagram
D: Co-ordinates in Chassis Diagram

MPI-1: Stereo Indicator Sheet; TRHA: Equalizer Amp. Sheets; Part located on the top surface are parentheized.

A	B	C	D
R001	1K Ω 15Watt Wire Wound Resistor	8F	6E
R002	3.6K Ω 30Watt Wire Wound Resistor	9F	5E
R003	2.5K Ω 15Watt Wire Wound Resistor	9E	5E
R004	68K Ω 1Watt 10% Carbon Fixed Resistor	8E	5B
R005	33K Ω 1Watt 10% Carbon Fixed Resistor	7E	2F
R006	27K Ω 1Watt 10% Carbon Fixed Resistor	10F	2C
R007	680 Ω 1/2Watt 10% Carbon Fixed Resistor	10F	2C
R008	8.8K Ω (3.3K Ω + 3.3K Ω + 2.2K Ω) 3Watt 10% Carbon Fixed Resistor	7C	5E
R009	4.7K Ω 1/2Watt 10% Solid Resistor	8F	5G
R011	100K Ω 1/2Watt 10% Carbon Fixed Resistor	6F	4G
R012	10K Ω 1/2Watt 10% Carbon Fixed Resistor	6F	4G
R013	100K Ω 1/4Watt 10% Carbon Fixed Resistor	1E	(6B)
R014	100K Ω 1/4Watt 10% Carbon Fixed Resistor	1E	(6B)
R015	470K Ω 1/2Watt 10% Solid Resistor	2E	(6B)
R016	470K Ω 1/2Watt 10% Solid Resistor	2E	(6B)
R017	8.2K Ω 1/2Watt 10% Solid Resistor	8F	5G
R018	8.2K Ω 1/2Watt 10% Solid Resistor	8F	6G
R019	8.2K Ω 1/2Watt 10% Solid Resistor	8F	5H
R020	8.2K Ω 1/2Watt 10% Solid Resistor	8F	6H
R021	470K Ω 1/2Watt 10% Carbon Fixed Resistor	5F	6G
R101	100K Ω 1/4Watt 10% Solid Resistor	2A	3A
R102	6K Ω 1/4Watt 10% Solid Resistor	3A	4A
R103	2K Ω 1/4Watt 10% Solid Resistor	4B	3B
R104	1.8K Ω 1/4Watt 10% Solid Resistor	4A	4B
R105	1K Ω 1/4Watt 10% Solid Resistor	4A	4B
R106	33K Ω 1/4Watt 10% Solid Resistor	6B	3B
R107	33K Ω 1/4Watt 10% Solid Resistor	6B	3B
R108	10K Ω 1/4Watt 10% Solid Resistor	5B	3B
R201	1.8K Ω 1/4Watt 10% Solid Resistor	5A	4C
R202	1K Ω 1/2Watt 10% Carbon Fixed Resistor	6A	3C
R203	1K Ω 1/2Watt 10% Carbon Fixed Resistor	6A	3D
R204	39K Ω 1/4Watt 10% Solid Resistor	7A	4D
R205	15K Ω 1/2Watt 10% Carbon Fixed Resistor	7A	3E
R206	15K Ω 1Watt 10% Carbon Fixed Resistor	7A	3E
R207	47K Ω 1/4Watt 10% Solid Resistor	8A	3E
R208	270K Ω 1/4Watt 10% Solid Resistor	8B	4E
R209	2.2M Ω 1/4Watt 10% Solid Resistor	8B	4E
R210	2.2M Ω 1/4Watt 10% Solid Resistor	7B	3F
R211	2.2M Ω 1/4Watt 10% Solid Resistor	8B	4D
R212	390 Ω 1/4Watt 10% Solid Resistor	8B	3E
R213	100K Ω 1/4Watt 10% Solid Resistor	8A	3E
R214	4.7K Ω 1/2Watt 10% Carbon Fixed Resistor	8A	2F
R215	12K Ω 1/2Watt 10% Carbon Fixed Resistor	8A	3F
R216	1K Ω 1/2Watt 10% Carbon Fixed Resistor	9A	3E
R217	1K Ω 1/4Watt 10% Solid Resistor	9A	3F
R218	1K Ω 1/4Watt 10% Solid Resistor	9A	3F
R219	10K Ω 1/4Watt 10% Solid Resistor	10A	4F
R220	10K Ω 1/4Watt 10% Solid Resistor	10A	4F
R221	68K Ω 1/4Watt 10% Solid Resistor	9A	4F
R301	1M Ω 1/4Watt 10% Solid Resistor	2B	2D
R302	22K Ω 1/4Watt 10% Solid Resistor	2B	2C

A	B	C	D
R303	47 Ω 1/4Watt 10% Solid Resistor	3B	2C
R304	4.7K Ω 1/4Watt 10% Solid Resistor	3B	3C
R305	2.2M Ω 1/4Watt 10% Solid Resistor	4B	3D
R306	100K Ω 1/4Watt 10% Solid Resistor	7B	3D
R307	47K Ω 1/4Watt 10% Solid Resistor	7B	2D
R401	10M Ω 1/2Watt 10% Carbon Fixed Resistor	3C	3G
R402	220 Ω 1/4Watt 10% Carbon Fixed Resistor	3C	3G
R403	2.7K Ω 1/4Watt 10% Carbon Fixed Resistor	3C	3G
R404	220 Ω 1/4Watt 10% Carbon Fixed Resistor	4C	4G
R405	15K Ω 1/2Watt 10% Carbon Fixed Resistor	4C	3G
R406	22K Ω 1/2Watt 10% Carbon Fixed Resistor	4C	3G
R407	47K Ω 1/4Watt 10% Carbon Fixed Resistor	4C	3G
R408	120K Ω 1/4Watt 10% Carbon Fixed Resistor	5C	3G
R409	1M Ω 1/4Watt 10% Carbon Fixed Resistor	5C	3H
R410	1K Ω 1/2Watt 10% Carbon Fixed Resistor	5C	2H
R411	100K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2H
R412	10K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	3H
R413	33K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	3G
R414	330K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2G
R415	330K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2G
R416	33K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	3G
R417	33K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2H
R418	330K Ω 1/4Watt 10% Carbon Fixed Resistor	7C	2H
R419	330K Ω 1/4Watt 10% Carbon Fixed Resistor	7C	2H
R420	33K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2G
R421	100K Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2G
R422	1M Ω 1/4Watt 10% Carbon Fixed Resistor	6C	2G
R423	100K Ω 1/4Watt 10% Carbon Fixed Resistor	7C	2G
R424	100K Ω 1/4Watt 10% Carbon Fixed Resistor	7C	2H
R425	100K Ω 1/4Watt 10% Carbon Fixed Resistor	7C	2G
R426	10M Ω 1/2Watt 10% Carbon Fixed Resistor	8C	2H
R427	22K Ω 1/2Watt 10% Carbon Fixed Resistor	8C	2H
R428	15K Ω 1/2Watt 10% Carbon Fixed Resistor	8C	2H
R429	22K Ω 1/2Watt 10% Carbon Fixed Resistor	8C	2H
R430	15K Ω 1/2Watt 10% Carbon Fixed Resistor	8C	2H
R431	10M Ω 1/2Watt 10% Carbon Fixed Resistor	8C	2H
R432	100K Ω 1/4Watt 10% Carbon Fixed Resistor	9C	2G
R433	100K Ω 1/4Watt 10% Carbon Fixed Resistor	9C	1G
R501	100K Ω 1/4Watt 10% Solid Resistor	2C	MPI-1
R502	150K Ω 1/4Watt 10% Solid Resistor	2C	MPI-1
R503	33K Ω 1/4Watt 10% Solid Resistor	2C	MPI-1
R504	47K Ω 1/4Watt 10% Solid Resistor	3C	MPI-1
R601	68K Ω 1/4Watt 10% Noise Less Resistor	1D	(6A)
R602	330K Ω 1/4Watt 10% Noise Less Resistor	2D	TRHA
R603	100K Ω 1/4Watt 10% Noise Less Resistor	2D	TRHA
R604	1K Ω 1/4Watt 10% Carbon Fixed Resistor	2D	TRHA
R605	470 Ω 1/4Watt 10% Carbon Fixed Resistor	2D	TRHA
R606	390K Ω 1/4Watt 10% Noise Less Resistor	2D	TRHA
R607	6.8K Ω 1/4Watt 10% Carbon Fixed Resistor	3D	TRHA
R608	220 Ω 1/4Watt 10% Carbon Fixed Resistor	3D	TRHA
R609	680 Ω 1/4Watt 10% Carbon Fixed Resistor	3D	TRHA

A	B	C	D
R610	10K Ω 1/4Watt 10% Carbon Fixed Resistor	3D	(1A)
R611	15K Ω 1/4Watt 10% Carbon Fixed Resistor	2E	TRHA
R612	25K Ω 1/4Watt 10% Carbon Fixed Resistor	2E	TRHA
R613	680K Ω 1/4Watt 10% Carbon Fixed Resistor	2E	TRHA
R614	330K Ω 1/4Watt 10% Carbon Fixed Resistor	2E	TRHA
R615	68K Ω 1/4Watt 10% Noise Less Resistor	1E	(6A)
R616	330K Ω 1/4Watt 10% Noise Less Resistor	2E	TRHA
R617	100K Ω 1/4Watt 10% Noise Less Resistor	2E	TRHA
R618	1K Ω 1/4Watt 10% Carbon Fixed Resistor	2E	TRHA
R619	470 Ω 1/4Watt 10% Carbon Fixed Resistor	2E	TRHA
R620	390K Ω 1/4Watt 10% Noise Less Resistor	2E	TRHA
R621	6.8K Ω 1/4Watt 10% Carbon Fixed Resistor	3E	TRHA
R622	220 Ω 1/4Watt 10% Carbon Fixed Resistor	3E	TRHA
R623	680 Ω 1/4Watt 10% Carbon Fixed Resistor	3E	TRHA
R624	10K Ω 1/4Watt 10% Carbon Fixed Resistor	3E	(1A)
R625	15K Ω 1/4Watt 10% Carbon Fixed Resistor	2F	TRHA
R626	25K Ω 1/4Watt 10% Carbon Fixed Resistor	2F	TRHA
R627	680K Ω 1/4Watt 10% Carbon Fixed Resistor	2F	TRHA
R628	330K Ω 1/4Watt 10% Carbon Fixed Resistor	2F	TRHA
R701	39K Ω 1/4Watt 10% Solid Resistor	4D	1C
R702	470K Ω 1/4Watt 10% Solid Resistor	4D	2E
R703	2.2K Ω 1/4Watt 10% Solid Resistor	4D	1E
R704	47K Ω 1/2Watt 10% Carbon Fixed Resistor	5D	2E
R705	2.2K Ω 1/4Watt 10% Solid Resistor	6D	2E
R706	47K Ω 1/2Watt 10% Carbon Fixed Resistor	6D	2E
R707	180K Ω 1/4Watt 10% Solid Resistor	6D	1F
R708	39K Ω 1/4Watt 10% Solid Resistor	4E	1B
R709	470K Ω 1/4Watt 10% Solid Resistor	4E	2D
R710	2.2K Ω 1/4Watt 10% Solid Resistor	4E	1D
R711	47K Ω 1/2Watt 10% Carbon Fixed Resistor	5E	2D
R712	2.2K Ω 1/4Watt 10% Solid Resistor	6E	2D
R713	47K Ω 1/2Watt 10% Carbon Fixed Resistor	6E	2D
R714	180K Ω 1/4Watt 10% Solid Resistor	6E	1F
R801	1K Ω 1/4Watt 10% Solid Resistor	7D	5C
R802	560 Ω 1/4Watt 10% Solid Resistor	7D	5C
R803	560K Ω 1/2Watt 10% Carbon Fixed Resistor	7D	5B
R804	150K Ω 1/2Watt 10% Carbon Fixed Resistor	8D	5B
R805	82K Ω 1/4Watt 10% Solid Resistor	8D	5B
R806	33K Ω 1/2Watt 10% Carbon Fixed Resistor	8D	5C
R807	33K Ω 1/2Watt 10% Carbon Fixed Resistor	8D	5C
R808	220K Ω 1/4Watt 10% Solid Resistor	8D	5D
R809	220K Ω 1/4Watt 10% Solid Resistor	8D	5D
R810	4.7K Ω 1/4Watt 10% Solid Resistor	9D	5D
R811	4.7K Ω 1/4Watt 10% Solid Resistor	9D	5C
R812	12K Ω 1/4Watt 10% Solid Resistor	9D	5C
R813	1K Ω 1/4Watt 10% Solid Resistor	7E	4B
R814	560 Ω 1/4Watt 10% Solid Resistor	7E	5B
R815	560K Ω 1/2Watt 10% Carbon Fixed Resistor	7E	4C
R816	150K Ω 1/2Watt 10% Carbon Fixed Resistor	8E	4C
R817	82K Ω 1/4Watt 10% Solid Resistor	8E	4C
R818	33K Ω 1/2Watt 10% Carbon Fixed Resistor	8E	4B

A	B	C	D
R819	33K Ω 1/2Watt 10% Carbon Fixed Resistor	8E	5C
R820	220K Ω 1/4Watt 10% Solid Resistor	8E	5A
R821	220K Ω 1/4Watt 10% Solid Resistor	8E	5A
R822	4.7K Ω 1/4Watt 10% Solid Resistor	9E	5A
R823	4.7K Ω 1/4Watt 10% Solid Resistor	9E	5B
R824	12K Ω 1/4Watt 10% Solid Resistor	8E	4B
R825	470 Ω 1Watt 10% Carbon Fixed Resistor	10D	5E
R827	2.2K Ω 1/4Watt 10% Solid Resistor	10E	6B
R828	4.7K Ω 1/4Watt 10% Solid Resistor	10E	6C
R829	4.7K Ω 1/4Watt 10% Solid Resistor	10E	6C
R826	8 Ω $\times$ 2 10Watt Wire Wound Resistor	10D	4E
R830		10E	4E
R831	470 Ω 1Watt 10% Carbon Fixed Resistor	10E	5D
C001	0.005 μ F 600WV 10% Oil tubular	8F	5F
C002	0.005 μ F 600WV 10% Oil tubular	8F	5E
C003	200 μ F 300WV electrolytic Lug terminal	8F	5F
C004	200 μ F 300WV electrolytic Lug terminal	8F	6F
C005	40 μ F 450WV electrolytic Lug terminal	9F	4F
C006	20 μ F 350WV electrolytic Lug terminal	8E	2F
C007	40 μ F 450WV electrolytic Lug terminal	8F	4F
C008	20 μ F 350WV electrolytic Lug terminal	7D	2F
C009	20 μ F 350WV electrolytic Lug terminal	6E	2F
C010	25 μ F 50WV electrolytic tubular	5F	5G
C011	40 μ F 300WV electrolytic tubular	9F	4D
C012	200 μ F 50WV electrolytic tubular	10F	1C
C013	20 μ F 180WV electrolytic tubular	10F	2C
C014	20 μ F 300WV electrolytic tubular	7C	2E
C015	20 μ F 350WV electrolytic Lug terminal	6C	2F
C016	50 μ F 50WV electrolytic tubular	8F	5H
C017	50 μ F 50WV electrolytic tubular	8F	5G
C018	25 μ F 25WV electrolytic tubular	8F	5B
C019	25 μ F 25WV electrolytic tubular	9F	5D
C020	0.0047 μ F 600WV 10% Oil tubular	5F	4H
C021	0.01 μ F 250WV $\pm 100\%$ Ceramic tubular	10F	4C
C022	0.01 μ F 250WV $\pm 100\%$ Ceramic tubular	10F	3D
C023	0.01 μ F 250WV $\pm 100\%$ Ceramic tubular	10F	3E
C024	0.01 μ F 250WV $\pm 100\%$ Ceramic tubular	10F	4F
C025	0.022 μ F 600WV $\pm 10\%$ Oil(UL)	5F	6G
C101	50pF 250WV 10% Ceramic tubular	2A	3A
C102	7pF 250WV ± 0.5 pF Ceramic tubular	2A	3A
C103	1000pF 250WV $\pm 100\%$ Ceramic tubular	2A	4A
C104	1000pF 250WV 10% Ceramic feedthru	3B	3B
C105	1000pF 250WV $\pm 100\%$ Ceramic tubular	3A	4A
C106	50pF 250WV 10% Ceramic tubular	3A	4B
C107	2pF 250WV ± 0.5 pF Ceramic tubular	3A	
C108	7pF 250WV ± 0.5 pF Ceramic tubular	4A	3B
C109	0.002 μ F 250WV $\pm 100\%$ Ceramic tubular	4A	4B
C110	0.002 μ F 250WV $\pm 100\%$ Ceramic tubular	4A	3C
C111	0.002 μ F 250WV $\pm 100\%$ Ceramic tubular	6B	3B
C112	6pF 250WV ± 0.5 pF Ceramic tubular	6B	3B

PARTS LIST

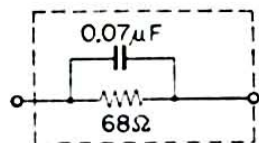
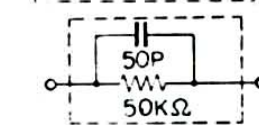
A: Part No.
B: Part Name
C: Co-ordinates in Schematic Diagram
D: Co-ordinates in Chassis Diagram

MPI-1: Stereo Indicator Sheet; TRHA: Equalizer Amp. Sheet; Parts located on the top surface are parenthesized.

A	B				C	D
C113	100 pF	250 WV	10%	Ceramic tubular	5B	3B
C114	20 pF	250 WV	10%	Ceramic tubular	5B	3B
C115	2000 pF	250 WV	$\pm 100\%$	Ceramic tubular	5B	4B
C116	200 pF	250 WV	10%	Ceramic tubular	7F	4A
C117	200 pF	250 WV	10%	Ceramic tubular	8F	4B
C118	200 pF	250 WV	10%	Ceramic tubular	8F	4B
C119	1000 pF	250 WV	10%	Ceramic feedthru	4B	3B
C120	0.05 μ F	250 WV	$\pm 100\%$	Ceramic tubular	6B	1A
C201	0.01 μ F	50 WV	$\pm 100\%$	Ceramic tubular	5A	3C
C202	2 pF	250 WV	$\pm 100\%$	Ceramic tubular	5A	3C
C203	0.002 μ F	250 WV	$\pm 100\%$	Ceramic tubular	6B	4D
C204	0.01 μ F	250 WV	$\pm 100\%$	Ceramic tubular	6A	3D
C205	10 μ F	12 WV		electrolytic tubular	7A	4D
C206	0.01 μ F	250 WV	$\pm 100\%$	Ceramic tubular	7A	3E
C207	10 pF	250 WV	± 1 pF	Ceramic tubular	8A	3E
C208	0.01 μ F	250 WV	$\pm 100\%$	Ceramic tubular	8A	3F
C209	0.01 μ F	250 WV	$\pm 100\%$	Ceramic tubular	9A	3F
C210	200 pF	250 WV	10%	Ceramic tubular	9A	4F
C211	0.01 μ F	400 WV	10%	Oil tubular	9A	4F
C212	200 pF	250 WV	10%	Ceramic tubular	9A	4F
C213	200 pF	250 WV	10%	Ceramic tubular	9A	4F
C214	0.05 μ F	400 WV	10%	Oil tubular	10B	4F
C215	0.01 μ F	250 WV	10%	Ceramic tubular	8B	3E
C216	0.01 μ F	250 WV	10%	Ceramic tubular	8B	3E
C217	0.002 μ F	250 WV	$\pm 100\%$	Ceramic tubular	7B	3F
C218	5 μ F	12 WV		electrolytic tubular	10A	4F
C301	10 pF	250 WV	10%	Ceramic tubular	2B	2C
C302	400 pF	500 WV	10%	Mica tubular	3B	2B
C303	15 pF	250 WV	10%	Ceramic tubular	3B	2C
C304	50 pF	250 WV	10%	Ceramic tubular	3B	2B
C305	0.01 μ F	250 WV	$\pm 100\%$	Ceramic tubular	3B	2C
C306	0.05 μ F	50 WV	10%	Ceramic tubular	4B	3C
C307	100 pF	250 WV	10%	Ceramic tubular	7A	3D
C308	50 pF	250 WV	10%	Ceramic tubular	7B	3D
C309	0.02 μ F	400 WV	10%	Oil tubular	7B	2D
C401	0.05 μ F	50 WV	$\pm 100\%$	Ceramic tubular	3C	4G
C402	680 pF	500 WV	10%	Mica tubular	3C	3G
C403	220 pF	500 WV	10%	Mica tubular	3C	3G
C404	82 pF	250 WV	5%	Mica tubular	3C	3G
C405	220 pF	500 WV	10%	Mica tubular	4C	4G
C406	1500 pF	500 WV	5%	Mica tubular	3C	3H
C407	0.05 μ F	50 WV	10%	Ceramic tubular	4C	4G
C408	220 pF	500 WV	10%	Mica tubular	4C	3G
C409	0.05 μ F	250 WV	10%	mylar tubular	4C	4G
C410	4700 pF	50 WV	5%	Mica tubular	4C	3G
C411	0.003 μ F	250 WV	$\pm 100\%$	Ceramic tubular	5C	3G
C412	4700 pF	50 WV	5%	Mica tubular	4C	3G
C413	220 pF	500 WV	10%	Mica tubular	5C	3H
C414	1 μ F	12 WV		electrolytic tubular	6C	3G

A	B				C	D
C415	4700 pF	50 WV	5%	Mica tubular	6C	3H
C416	0.001 μ F	250 WV	$\pm 100\%$	Ceramic tubular	6C	3H
C417	0.001 μ F	250 WV	$\pm 100\%$	Ceramic tubular	6C	3H
C418	80 pF	250 WV	10%	Ceramic tubular	7C	2H
C419	80 μ F	250 WV	10%	Ceramic tubular	7C	2G
C420	0.02 μ F	50 WV	10%	Ceramic tubular	7C	2G
C421	300 μ F	500 WV	10%	Mica tubular	8C	2H
C422	0.02 μ F	400 WV	10%	Oil tubular	8C	1G
C423	0.02 μ F	400 WV	10%	Oil tubular	8C	2G
C424	0.02 μ F	400 WV	10%	Ceramic tubular	8C	2G
C425	100 pF	500 WV	10%	Mica tubular	8C	2H
C426	100 pF	500 WV	10%	Mica tubular	9C	2G
C501	500 μ F	15 WV		electrolytic tubular	9C	2G
C502	200 μ F	12 WV		electrolytic tubular	1C	MPI-1
C503	0.002 μ F	250 WV	$\pm 100\%$	Ceramic tubular	1C	MPI-1
C504	3 μ F	50 WV		electrolytic tubular	2C	MPI-1
C505	0.05 μ F	50 WV	10%	Ceramic tubular	2C	MPI-1
C506	0.05 μ F	50 WV	10%	Ceramic tubular	2C	MPI-1
C601	1.5 μ F	3 WV		Tantal tubular	3C	MPI-1
C602	30 μ F	10 WV		electrolytic tubular	2D	TRHA
C603	150 pF	250 WV	10%	Ceramic tubular	2D	TRHA
C604	150 pF	250 WV	10%	Ceramic tubular	2D	TRHA
C605	10 μ F	25 WV		electrolytic tubular	3D	TRHA
C606	10 μ F	10 WV		electrolytic tubular	3D	TRHA
C607	0.1 μ F	50 WV	10%	mylar tubular	3D	(1A)
C608	0.003 μ F	50 WV	10%	mylar tubular	2E	TRHA
C609	0.004 μ F	50 WV	10%	mylar tubular	2E	TRHA
C610	0.01 μ F	50 WV	10%	mylar tubular	2E	TRHA
C611	1.5 μ F	3 WV		Tantal tubular	2E	TRHA
C612	30 μ F	10 WV		electrolytic tubular	2E	TRHA
C613	150 pF	250 WV	10%	Ceramic tubular	2E	TRHA
C614	150 pF	250 WV	10%	Ceramic tubular	2E	TRHA
C615	10 μ F	25 WV		electrolytic tubular	3E	TRHA
C616	10 μ F	10 WV		electrolytic tubular	3E	TRHA
C617	0.1 μ F	50 WV	10%	mylar tubular	3E	(1A)
C618	0.003 μ F	50 WV	10%	mylar tubular	2F	TRHA
C619	0.004 μ F	50 WV	10%	mylar tubular	2F	TRHA
C620	0.001 μ F	50 WV	10%	mylar tubular	2F	TRHA
C701	80 pF	500 WV	10%	Mica tubular	4D	1C
C702	0.01 μ F	50 WV	10%	mylar tubular	4D	1C
C703	0.05 μ F	50 WV	10%	mylar tubular	4D	2E
C704	0.3 μ F	250 WV	10%	M.P. Condenser	5D	2E
C705	400 pF	500 WV	10%	Mica tubular	5D	1G
C706	500 pF	500 WV	10%	Mica tubular	5D	1E
C707	0.05 μ F	400 WV	10%	Oil tubular	6D	2E
C708	0.005 μ F	50 WV	10%	mylar tubular	6D	1F
C709	0.005 μ F	50 WV	10%	mylar tubular	6D	1F
C710	80 pF	500 WV	10%	Mica tubular	4E	1C
C711	0.01 μ F	50 WV	10%	mylar tubular	4E	1B

A	B					C	D
C712	0.05 μ F	50WV	10%	mylar tubular	4E	2D	
C713	0.3 μ F	250WV	10%	M.P Condenser	5E	2D	
C714	400 pF	500WV	10%	Mica tubular	5E	1G	
C715	500 pF	500WV	10%	Mica tubular	5E	1E	
C716	0.05 μ F	400WV	10%	Oil tubular	6E	2D	
C717	0.005 μ F	50WV	10%	mylar tubular	6E	1F	
C718	0.005 μ F	50WV	10%	mylar tubular	6E	1F	
C801	30 μ F	6WV		electrolytic tubular	7D	5C	
C802	1 μ F	150WV		electrolytic tubular	7D	5C	
C803	30 PF	500WV	10%	Mica tubular	8D	5C	
C804	0.3 μ F	350WV	10%	M.P Condenser	8D	5D	
C805	0.3 μ F	350WV	10%	M.P Condenser	8D	5C	
C806	30 μ F	6WV		electrolytic tubular	7E	4B	
C807	1 μ F	150WV		electrolytic tubular	7E	4C	
C808	30 PF	500WV	10%	Mica tubular	8E	4C	
C809	0.3 μ F	350WV	10%	M.P Condenser	8E	5A	
C810	0.3 μ F	350WV	10%	M.P Condenser	8E	5B	
VR001	20K Ω (B)	Variable Resistor Driver type			8F	6G	
VR002	20K Ω (B)	Variable Resistor Driver type			8F	5G	
VR003	20K Ω (B)	Variable Resistor Driver type			6F	6H	
VR004	20K Ω (B)	Variable Resistor Driver type			6F	5H	
VR005	100 Ω	Hum Balancer			6F	5F	
VR006	100 Ω	Hum Balancer			6F	5F	
VR201	10K Ω (B)	Variable Resistor 16 ϕ type			8B	6F	
VR401	50K Ω (B)	Variable Resistor 16 ϕ type			8C	6E	
VR701	500K Ω (B)	Variable Resistor 24 ϕ type			4D	1C	
VR702		(Center-tap)			4E	1C	
VR703	250K Ω (B)	Variable Resistor 24 ϕ type			5D	1E	
VR704		(Center-tap)			5E	1E	
VR705	1M Ω (B)	Variable Resistor 24 ϕ type			6D	1F	
VR706		(Center-tap)			6E	1F	
VR801	500K Ω (BH)	Variable Resistor 24 ϕ tape			7D	1D	
VR802					7E	1D	
VC1	6~18PF	Variable Capacitor (FM. RF Tuning)			1A	3A	
VC2	6~18PF	Variable Capacitor (FM.RF Tuning)			3A	3B	
VC3	6~18PF	Variable Capacitor (FM. oscillator)			5B	3B	
VC4	8.8~328PF	Variable Capacitor (AM. RF Tuning)			1B	3A	
VC5	8.8~328PF	Variable Capacitor (AM. oscillator)			3B	3B	
TC1	15PF	Trimer condenser			2A	3A	
TC2	15PF	Trimer condenser			4A	3B	
TC3	10PF	Trimer condenser			5A	3B	
TC4	15PF	Trimer condenser			2B	3A	
TC5	15PF	Trimer condenser			3B	3B	
L1	FM. Antenna coil				1A	3A	
L2	FM. RF Tuning				3A	3B	

A	B					C	D	
L3	FM. Oscillator coil					5B	3B	
L4	AM. Loop stick Antenna coil					1B		
L5	AM. Oscillator coil					2B	2C	
L101	FM. RF coil 3.5 μ H					2A	3A	
L102	FM. RF coil 1 μ H					3A	4A	
L103	FM. RF coil 3.5 μ H					3A	3B	
L104	Heater Chark coil 0.8 μ H					8F	3A	
L401	MPX. coil	MFC-8B	70mH	$\pm 15\%$	3C	3G		
L402	MPX. coil	MFC-8A	45mH	$\pm 15\%$	4C	4H		
L403	MPX. coil	MFC-8C	14mH	$\pm 15\%$	4C	3G		
L404	MPX. coil	MFC-8D	35mH	$\pm 15\%$	5C	3H		
T001	Power transformer					7F	(5G)	
T101	1st FM. I.F.T 10.7Mc/s					4A	4B	
T201	2nd FM. I.F.T 10.7Mc/s					5A	3C	
T202	3rd FM. I.F.T 10.7Mc/s					6A	3D	
T203	4th FM. I.F.T 10.7Mc/s					8A	3E	
T204	FM. Discriminator transformer					9A	3F	
T301	1st AM. I.F.T 455Kc/s					4B	3C	
T301	2nd AM. I.F.T 455Kc/s					6A	3D	
T801	Output transformer (Primary 7K Ω) (Secondary 8 Ω , 16 Ω)					9D	(5D)	
T802	Output transformer (Primary 7K Ω) (Secondary 8 Ω , 16 Ω)					9E	(5A)	
CR201	0.01 μ F-68 Ω	CRS03				5A	3C	
CR202	0.01 μ F-68 Ω	CRS03				6A	3D	
CR203	50P-50K	CRS04				7A	4D	
CR401	38KC Filter FP-38					9C	2G	
CR402	38KC Filter FP-38					9C	2G	
JAC-1a	}	Head phone jack					10D	1H
JAC-1b							10E	1H
JAC-3	D.I.N. Jack (tape recorder connector)					1E	(5C)	
PU-1	Voltage selector plug (for 100V/117V/220V/240V)					6F	4G	
PL1, 2	Pilot Lamp (Fuse type) 6.3V 0.3A					8F		
PL3~6	Pilot Lamp 8V 0.15A					0.10F		
PL7	Pilot Lamp 8V 0.15A					1C	(1H)	
FU-1	Fuse 3A					5F	6G	
M	Tuning Meter 200 μ A					5B	(1G)	
S1(a~k)	Function Y-5-11-4						(1A)	
S2(a~f)	Band Selector Y-2-6-3						(1B)	

PARTS LIST

A: Part No.
B: Part name
C: Co-ordinates in Schematic Diagram
D: Co-ordinates in Chassis Diagram

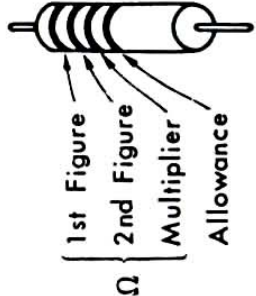
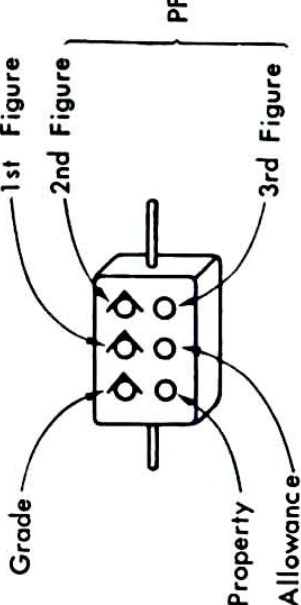
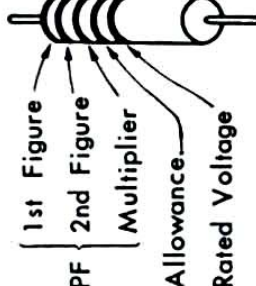
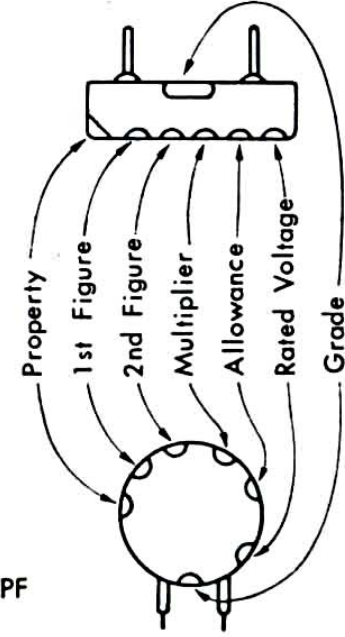
MPI-1: Stereo Indicator Sheet; TRHA: Equalizer Amp. Sheets; Part located on the top surface are parentheized.

A	B	C	D
SS101	FM. AFC Switch	7B	1A
SS201	Muting Switch	8B	1A
SS701	Loudness Switch	4D	1C
SS702		4E	1C
SS703	Tape Monitor	4D	1B
SS704		4E	1B
SS705	Mode (Stereo-Mono)	4E	1B
SS706		4E	1B
SS707	High Filter	5D	1F
SS708		5E	1F
SS709	Low Filter	6D	1G
SS710		6E	1G
SS801	Speaker Switch	10E	1G
SS802		10F	1G
PS-1	Power Switch	5F	1H
CO-1, 2	AC. Receptacles	5F	6G
V1	6CW4 FM. RF. Amp	2A	4A
V2	6CW4 FM. RF. Amp	3A	4B
V3	6AQ8(ECC85) FM. Oscillator & Mixer	4A,6B	4B
V4	6BE6(EK90) AM. Convertor	2B	2C
V5	6BA6(EF93) FM. 1st. IF. Amp.	5A	4C
V6	6BA6(EF93) AM. FM. 2nd. IF. Amp.	6A	3D
V7	6AU6(EF94) 1st Limitor	7A	3E
V8	6BL8(ECF80) 2nd Limitor & Muting	8A,B	3E
V9	6BL8(ECF80) MPX Amp & 19KC Amp.	3,4C	4G
V10	12AU7(ECC82) Doubler (38Kc Oscillator)	5C	3H
V11	12AU7(ECC82) Differential Amp.	8C	2H
V12	6AQ8(ECC85) Control Amp.	6,6D	2E
V13	6AQ8(ECC85) Control Amp.	5, 6E	2D
V14	6BL8(ECF80) Audio Amp. Phose inverter	7,8D	5C
V15	6BL8(ECF80) Audio Amp. Phose inverter	7, 8E	4C
V16	7189A Power Amp.	9D	6D
V17	7189A Power Amp.	9D	6C
V18	7189A Power Amp.	9E	6A
V19	7189A Power Amp.	9E	6B
TR1	2SC-372 D.C. Amp.	2C	MPI-1
TR2	2SC-324 Indicator Amp.	2C	MPI--
TR3	2SC-372 Indicator Amp.	2C	MPI-1
TR4	2SC-650 Equalizer Amp.	2D	TRHA
TR5	2SC-650 Equalizer Amp.	2E	TRHA
TR6	2SC-649 Equalizer Amp.	2D	TRHA
TR7	2SC-649 Equalizer Amp.	2E	TRHA
D001	SW-05c Si diode AC(RMS) $V_D=240V$ $I_D=500mA$ $-65^{\circ}C \sim 100^{\circ}C$	7F	5F
D002		7F	5F
D003	SW-05-02 Si diode $V_D=90V$ $I_D=500mA$ $-65^{\circ}C \sim 100^{\circ}C$	8F	5F
		7F	5G
D101	MA-351 Riatance diode (FM, AFC)	6B	3B

A	B	C	D
D201	OA-91 Ge diode $V_D=90V$ $I_D=50mA$ $-55^{\circ}C \sim 75^{\circ}C$	8A	3E
D202		9A	3F
D301		9A	3F
D501	SW-05-02 Si diode $V_D=90V$ $I_D=500mA$ $-65^{\circ}C \sim 100^{\circ}C$	7A	3D
		1C	MPI-1
D502	IN-60 Ge diode $V_D=40V$ $I_D=50mA$ $-65^{\circ}C \sim 90^{\circ}C$	2C	MPI-1
D401	IS-180 Si diode $V_D=50V$ $I_D=100mA$ $-55 \sim 150^{\circ}C$	6C	2G
D402		6C	2G
D403		6C	2G
D404		6C	2G
D405		6C	2H
D406		6C	2G
D407		7C	2H
D408		7C	2H

COLOR CODE

The color code indicates 10 different colors by using figures of 1 to 9. This code agrees with IEC and JIS.

Common to All Parts				Fixed Resistor	Mica Capacitor				Paper Capacitor		Ceramic Capacity			
Color	1st Figure	2nd Figure	Multiplier	Allowance (%)	Grade	Pro- perty	Allow- ance (%)	Rated Voltage (V)	Allow- ance (%)	Rated Voltage (V)	Grade	Pro- perty	Allow- ance (%)	Rated Voltage (V)
black	0	0	1	±2	X	A	±20(M)	300	±20(M)	100	X		±20	250
brown	1	1	10 ¹ (10)			B			±5(J)	200				
red	2	2	10 ² (K)		Y	C	±2(G)		±2(G)	250	Z			
orange	3	3	10 ³			D								
yellow	4	4	10 ⁴			E			±15(L)	400				
green	5	5	10 ⁵ (M)			F	±5(J)	500	+20(V) -15(V)					
blue	6	6	10 ⁶						+40(X) -15(X)	600			+100 -1	
purple	7	7	10 ⁷											
grey	8	8	10 ⁸		Z				+10(Y) -15(Y)		(Y)			
white	9	9	10 ⁹					1000	±10(K)	1000				
golden			10 ⁻¹ (0.1)	±5										
silver			10 ⁻² (0.01)	±10								YY YZ		
non-colored				±20										
Note														

Property	Temperature Coefficient	Divergence of Capacity	Q tanδ	Insulation Resistance
A	Not specified	Not specified	0.5 under	3000MΩ under
B	Not specified	Not specified	0.5 over	7500MΩ over but 0.1 over 3000MΩ over
C	-20~+200	±(0.5%+0.5pF)		
D	-100~+100	±(0.3%+0.1pF)		
E	-20~+100	±(0.1%+0.1pF)		
F	0~+70	±(0.05%±0.1pF)		

Grade	Usable Temperature Range	Test Classification
X	-55~+85	I or II
Y	-30~+85	I or II
Z	-30~+85	1

Letter	Allowance
G	±2
T	±5
K	±10
M	±20



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