

Service Manual

LW/MW/FM Stereo Radio with
Double Cassette Tape Deck and Record Player

Stereo Music System

SG-D15L
SG-D15AL

Color

(K)... Black Type



(SG-D15L)



(SG-D15AL)

Color	Areas
(K)	[EK] ... United Kingdom (SG-D15L/SG-D15AL)
(K)	[EF] ... France (SG-D15L)
(K)	[EB] ... Belgium (SG-D15L)

SPECIFICATIONS

■ AMPLIFIER SECTION

MPO	2 x 10W (THD 10%, 4 ohms)
Input sensitivity and impedance	
CD	250 mV/22 kilohms
MIC	1.5 mV/1.5 kilohms
Graphic equalizer	100 Hz, 330 Hz, 1 kHz, 3.3 kHz, 10 kHz ± 10 dB
Loudness control (volume at -30dB)	100 Hz, +6 dB
Load impedance	4 ~ 16 ohms

■ FM TUNER SECTION

Frequency range	87.5 ~ 108 MHz
Sensitivity	25.2 dBf (5 μ V, IHF '58)
(S/N 26 dB)	3.8 μ V (40 kHz mod., 75 ohms)
Total harmonic distortion	
1 kHz	0.3% (MONO), 0.5% (STEREO)
S/N	
MONO	60 dB (65 dB, IHF)
Image rejection at 98 MHz	35 dB
Stereo separation	
1 kHz	35 dB
Antenna terminals	75 Ω (unbalanced)

■ AM TUNER SECTION

Frequency range	
MW	527 ~ 1605 kHz
LW	150 ~ 350 kHz
Sensitivity (for 50mW)	
MW	200 μ V/m (1000 kHz)
LW	500 μ V/m (250 kHz)

■ CASSETTE DECK SECTION

Deck system	Auto stop double cassette system
Track system	4-track, 2-channel

Heads

playback
record/playback
erase

Solid permalloy head
Solid permalloy head
Double-gap ferrite head

Motors

Recording system
Erase system
Tape speed
Frequency response

DC servo motor
AC bias
AC erase
4.8 cm/sec. (1-7/8 ips)

NORMAL

50 Hz ~ 12 kHz (DIN)
50 dB (A-WTD)
0.15% (WRMS)

S/N

Wow and flutter

■ PHONO SECTION

Player system
Phono motor
Turntable size
Turntable speeds
Cartridge type
Stylus
Stylus pressure

Belt Drive Automatic Turntable
DC servo motor
28 cm
33-1/3 rpm, 45 rpm
ceramic (Part No. EPC-13STH)
sapphire (Part No. EPS-41ST)
5.5 g

■ GENERAL

Power consumption
Power supply
For United Kingdom
For others
Dimensions (W x H x D)

32W
AC 50 Hz/60 Hz, 240V
AC 50 Hz/60 Hz, 220V
380 x 320 x 352 mm
(14-31/32" x 12-17/32" x 13-27/32")
5.0 kg (11.0 lb.)

Weight

Note:

Specifications are subject to change without notice.
Weight and dimensions are approximate.

Panasonic

Matsushita Electric Trading Co., Ltd.
P O Box 288, Central Osaka, Japan

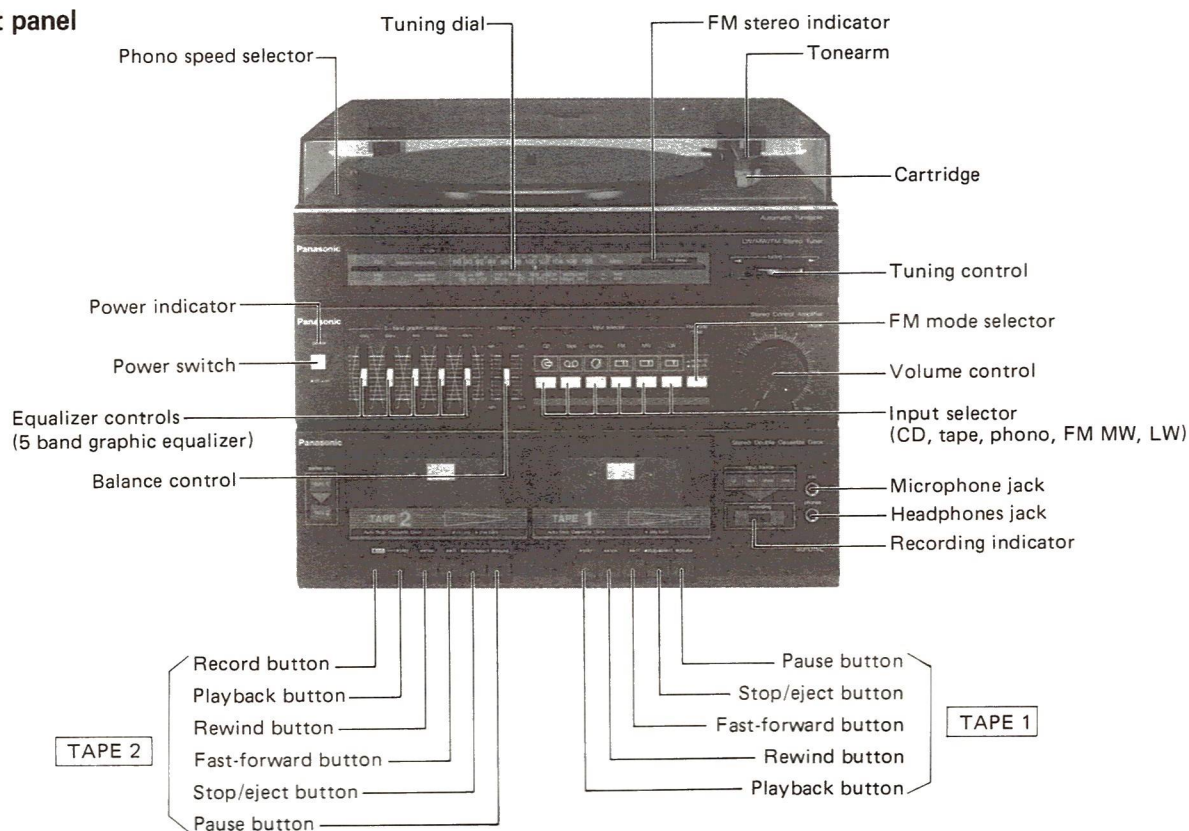
SG-D15L/D15AL

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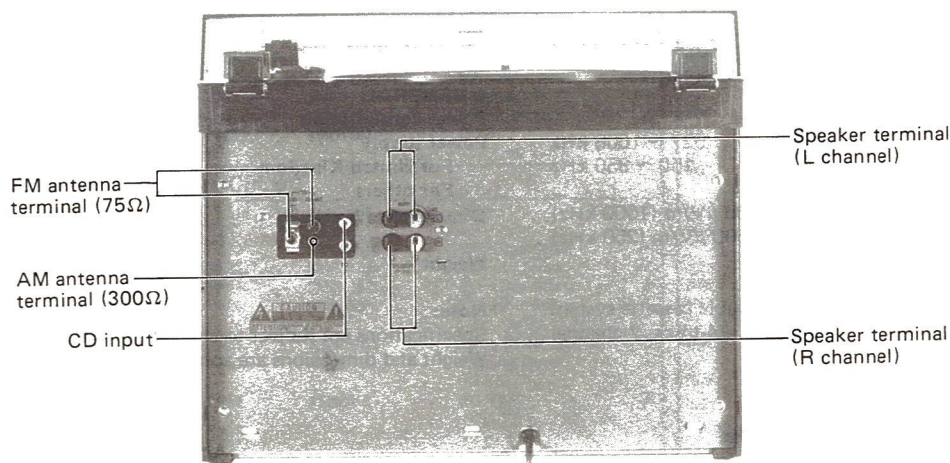
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LOCATION OF CONTROLS

● Front panel



● Rear panel

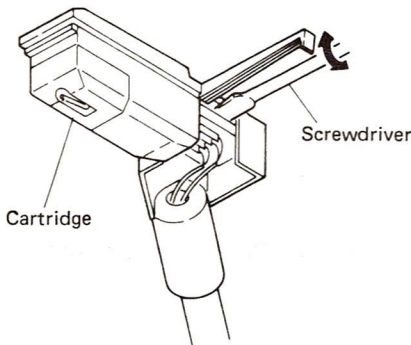
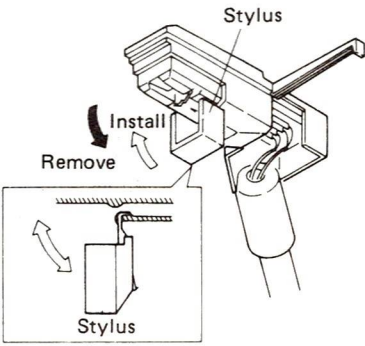
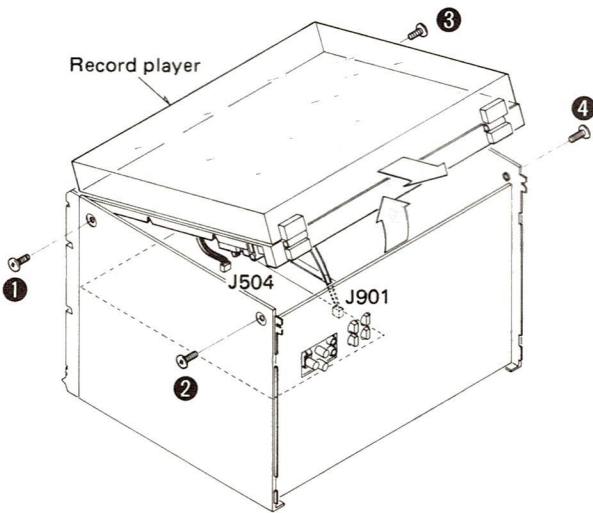
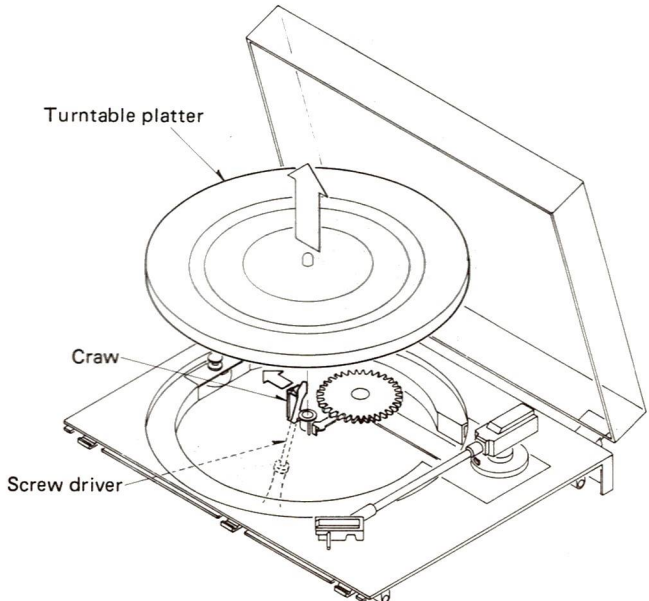


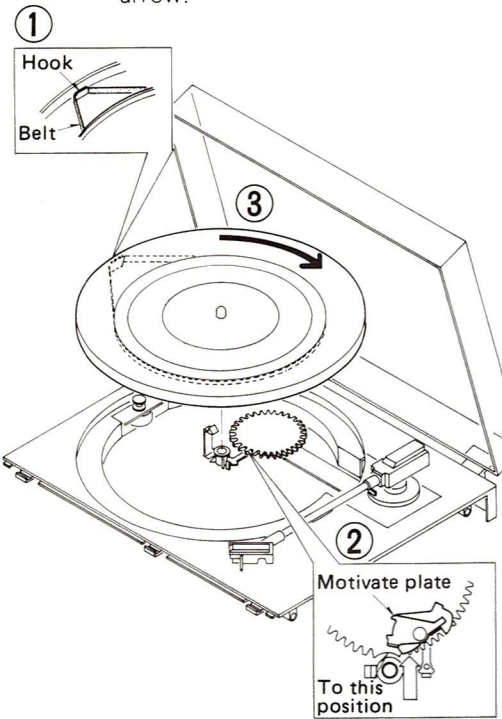
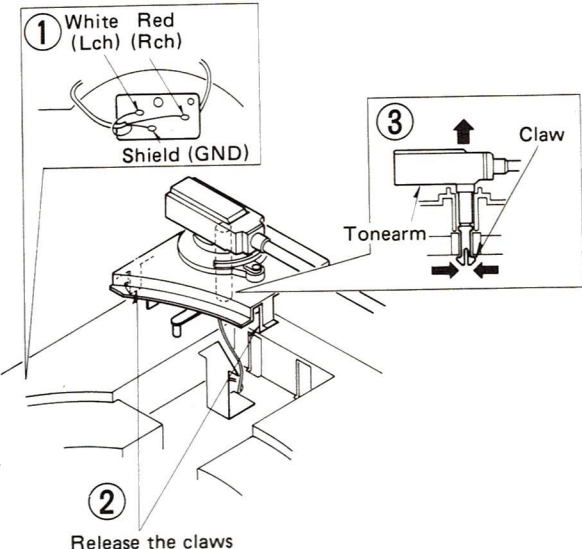
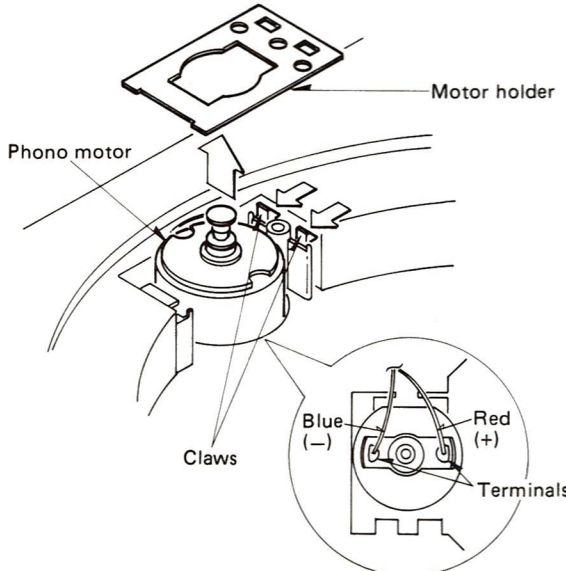
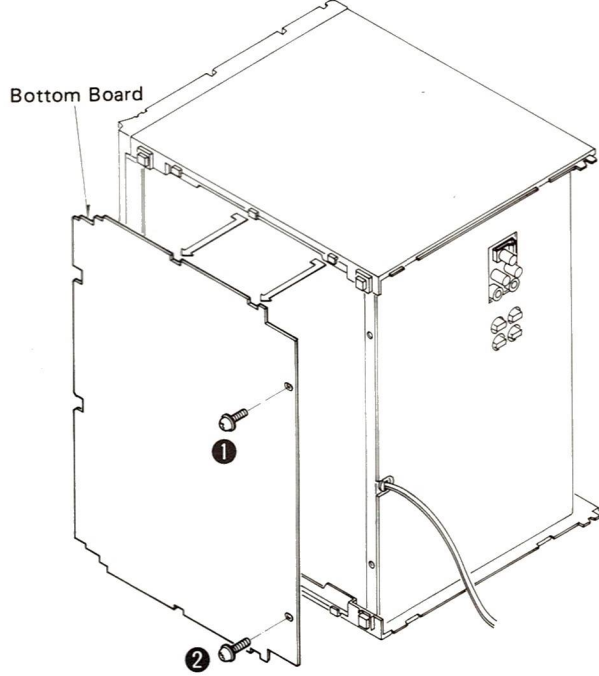
BEFORE REPAIR AND ADJUSTMENT

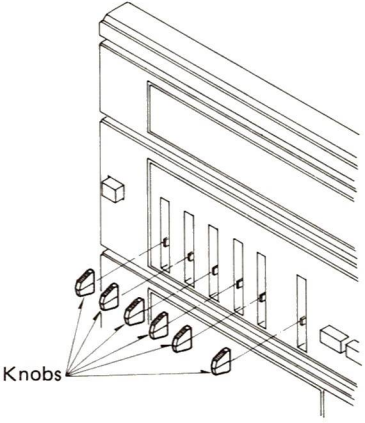
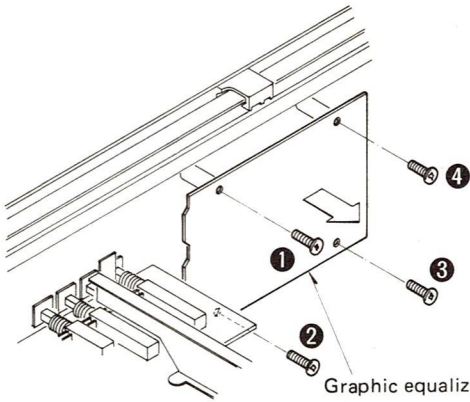
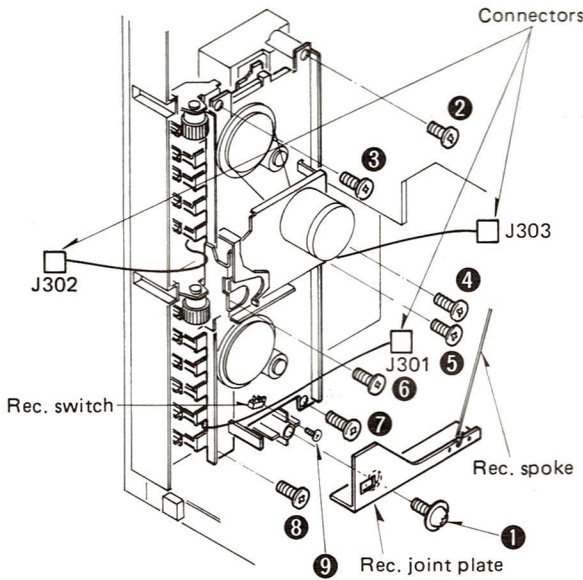
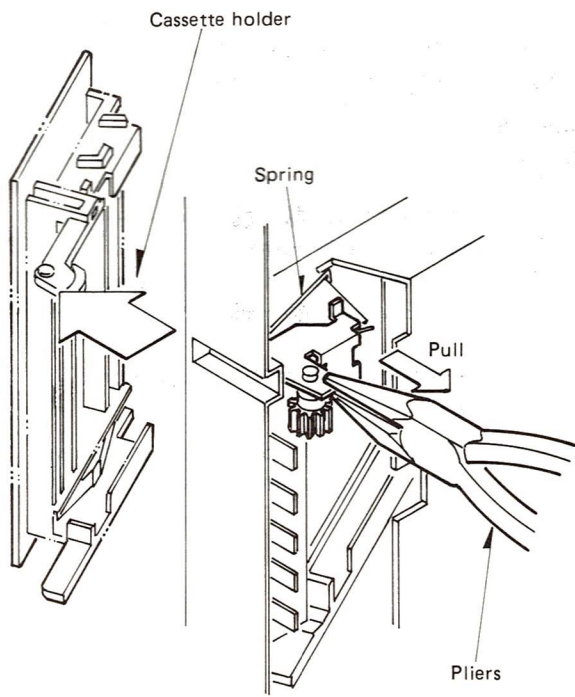
- (1) Turn off the power supply. Using a 10Ω , 5W resistor, shortcircuit both ends of power supply capacitors (C702) in order to discharge the voltage.
- (2) Before turning the power supply on, after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current at 50/60 Hz in NO SIGNAL mode should be shown below with respect to supply voltage 220V/240V.

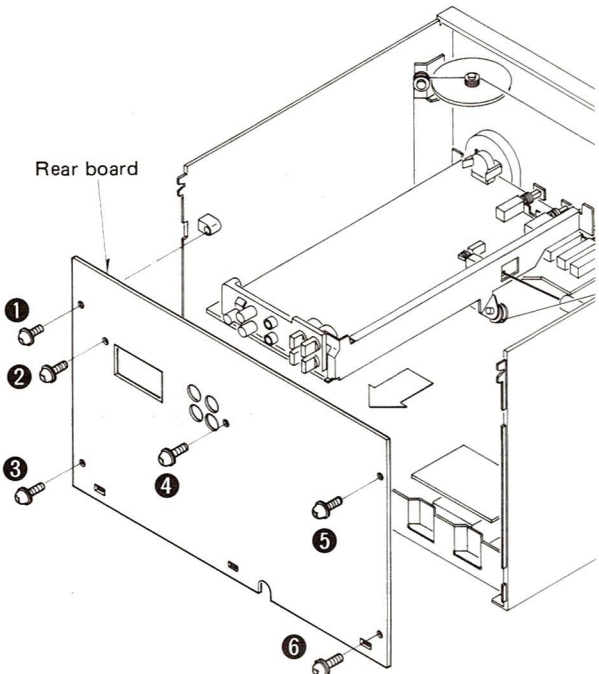
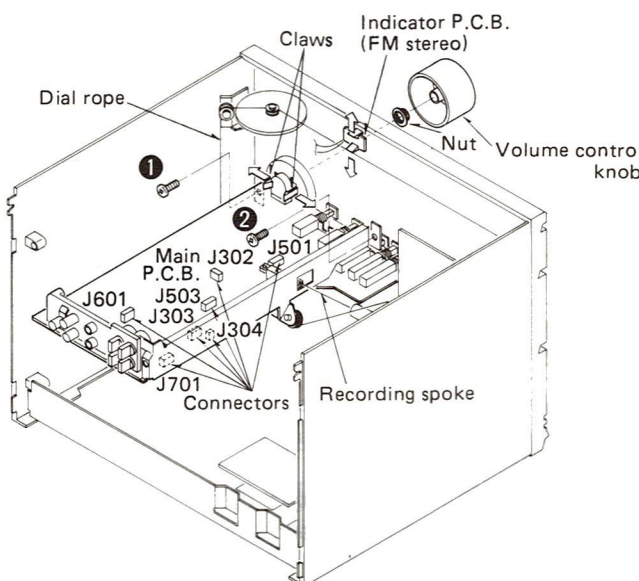
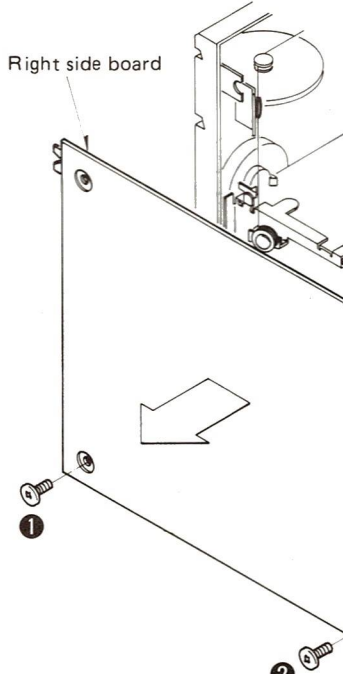
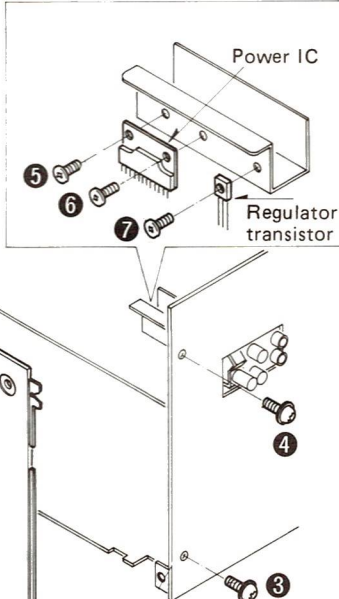
Power supply voltage		AC220V	AC240V
Consumed current	50Hz	20~70mA	15~60mA
	60Hz	20~70mA	15~60mA

DISASSEMBLY INSTRUCTIONS

Ref. No. 1 Procedure 1	How to remove the cartridge Turn the screwdriver in the direction of the arrow. 	Ref. No. 2 Procedure 2	How to remove the stylus Remove the stylus in the direction of the arrow. 
Ref. No. 3 Procedure 3	How to remove the record player - Remove the 4 screws (①~④). - Pull out the 2 connectors (J504 and J901). 	Ref. No. 4 Procedure 3→4	How to remove the turntable platter - Release the claw by screwdriver from under side. - Lift the turntable platter. 

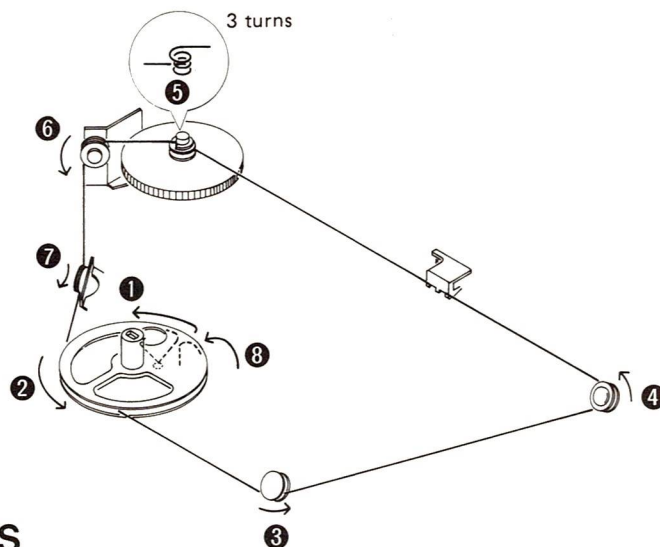
Ref. No. 5	How to install the turntable platter	Ref. No. 7	How to remove the tonearm
Procedure 3→4→5	1. Fix the belt to the hook. 2. Set the motivate plate in the direction of the arrow. 3. Install the turntable platter and turn the turntable platter in the direction of the arrow. 	Procedure 3→7	1. Unsolder the 3 leads. 2. Release the 2 claws and remove the tonearm base in the direction of the arrow. 3. Release the claw and lift the tonearm. 
Ref. No. 6	How to remove the phono motor	Ref. No. 8	How to remove the bottom board
Procedure 3→4→6	1. Unsolder the terminals of the phono motor. 2. Release the 2 claws and remove the motor holder. 3. Lift the phono motor. 	Procedure 8	Remove the 2 screws (1, 2). 

Ref. No. 9	How to remove the graphic equalizer P.C.B.	
Procedure 3→9	1. Pull out the 6 knobs.	2. Remove the 4 screws (①~④). 3. Remove the graphic equalizer P.C.B.
		
Ref. No. 10	How to remove the cassette tape deck	Ref. No. 11
Procedure 3→8→10		How to remove the cassette holder
	1. Remove the recording spoke. 2. Remove the screw ① and remove the recording joint plate. 3. Remove the 7 screws (②~⑧). 4. Remove the screw ⑨ and remove the recording switch. 5. Remove the 3 connectors (J301~J303). 	1. Remove the spring. 2. Pull the damper ass'y by a pliers. 3. Remove the cassette holder in the direction of the arrow. 

Ref. No. 12	How to remove the rear board	Ref. No. 13	How to remove main P.C.B.
Procedure 3→12	1. Remove the 6 screws (①~⑥). 2. Remove the rear board in the direction of the arrow. 	1. Pull out the volume control knob and remove the nut. 2. Remove the dial rope. 3. Release the 2 claws and remove the indicator P.C.B. 4. Remove the recording spoke. 5. Remove the 2 screws (①, ②) 6. Pull out the 7 connectors. 	
Ref. No. 14	How to remove the power IC and regulator transistor		
Procedure 3→14	1. Remove the 4 screws (①~④). 2. Remove the right side board. 3. Unsolder the power IC or regulator transistor. 4. Remove the 3 screws (⑤~⑦). ● When mounting the power IC or regulator transistor. Apply silicone compound (SZZOL15) to the rear side of power IC or regulator transistor.  		

■ DIAL CORD INSTALLATION GUIDE

1. Prepare a fresh cord more than 140 cm length.
2. Bring the variable capacitor into a state where the drum is completely turned to the left (maximum capacity and lowest frequency for the variable capacitor.)
3. Direct the cord in the order from ① to ⑧.
4. Fix the knot of the cord with the adhesive.



■ MEASUREMENTS AND ADJUSTMENTS

● LW/MW/FM

Control-positions and equipment used

- AM and FM signal generator (AM and FM-SG)
- IF genescope
- Oscilloscope
- AC and DC electronic voltmeter (EVM)
- Digital Frequency counter
- Resistor (330k Ω)
- AF oscillator

Note: For T203 (AM-IFT) adjusted parts are supplied.
So, do not turn the cores of these parts.

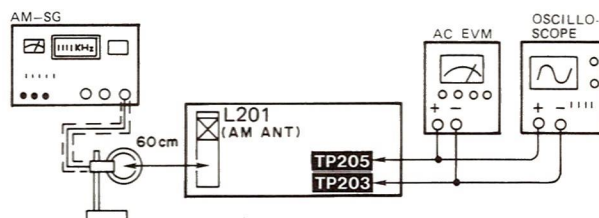
MW-RF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "MW" position.
3. Place the radio dial to minimum and signal generator setting to 510kHz.
4. Adjust L203 for maximum output.
5. Place the radio dial and signal generator setting to 600kHz.
6. Adjust L202 for maximum output.
7. Place the radio dial to maximum and signal generator setting to 1670kHz.
8. Adjust CT204 and CT203 for maximum output.
9. Repeat steps 3 ~ 8.

Note: Antenna input level must be as low as possible being free from AGC.

AM SIGNAL GENERATOR CONDITION

Modulation 30%
Modulation frequency 400 Hz



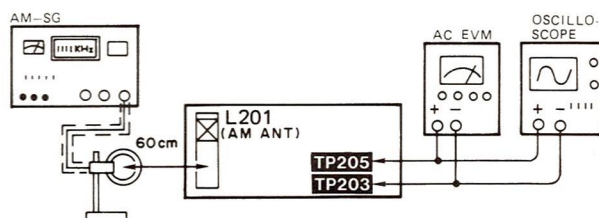
LW-RF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "LW" position.
3. Place the radio dial to minimum and signal generator setting to 142kHz.
4. Adjust L209 for maximum output.
5. Place the radio dial and signal generator setting to 145kHz.
6. Adjust L208 for maximum output.
7. Place the radio dial to maximum and signal generator setting to 363kHz.
8. Adjust CT205 and CT206 for maximum output.
9. Repeat steps 3 ~ 8.

Note: Antenna input level must be as low as possible being free from AGC.

AM SIGNAL GENERATOR CONDITION

Modulation 30%
Modulation frequency 400 Hz



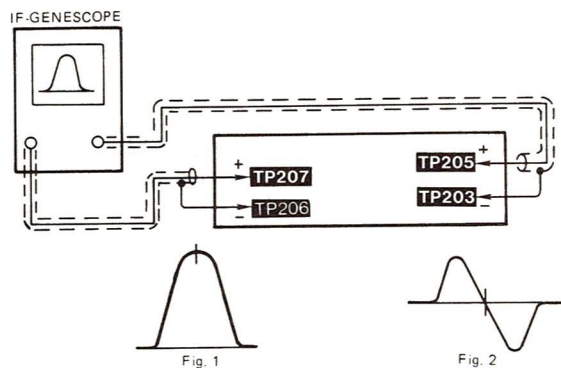
FM-IF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" position.
3. Place the radio dial setting to point of non-interference.
4. Adjust **T201** for maximum amplitude and symmetrical curve (Refer to Fig. 1).
5. Adjust **T202** for maximum amplitude and proper linearity. (Refer to Fig. 2).

Note: Before adjusting, turn the core of **T202** fully counterclockwise.

GENESCOPE CONDITION

Frequency 10.7 MHz

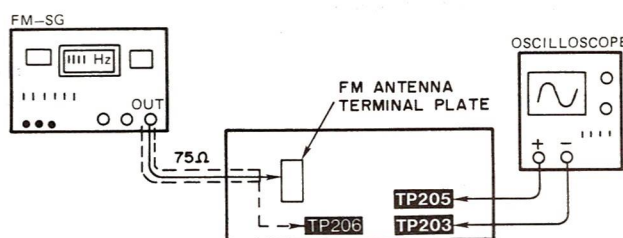


FM-RF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" position.
3. Place the radio dial to minimum and signal generator setting to **87.25MHz**. Add weak input so that noise is included in the output waveform.
4. Adjust **L205** and **L204** so that the output waveform is vertically symmetrical.
5. Place the radio dial to maximum and signal generator setting to **108.4MHz**.
6. Adjust **CT202** and **CT201** so that the output waveform is vertically symmetrical.
7. Repeat steps 3 ~ 6.

FM SIGNAL GENERATOR CONDITION

Modulation 100%
Modulation frequency 400 Hz
Output level 66 dB

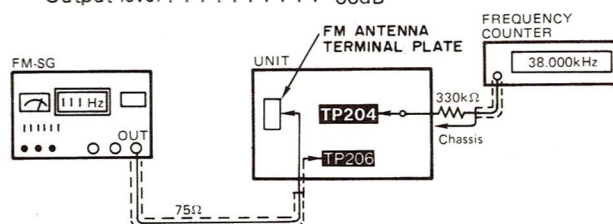


MPX VCO ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "auto" position.
3. Place the radio dial and signal generator setting to **98.0 MHz**.
4. Adjust **VR201** for **38kHz±0.1kHz** on frequency counter reading.

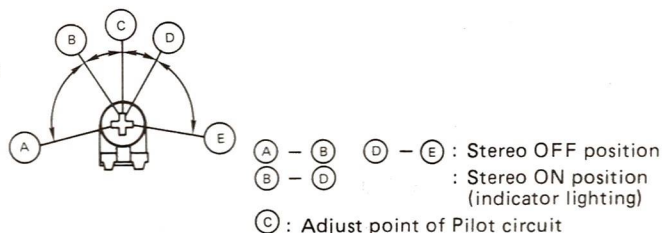
FM SIGNAL GENERATOR CONDITION

Modulation 0% (non-modulation)
Output level 66dB



★ USING ALTERNATE SYSTEM

1. Apply stereo signal from generator or receive the stereo broadcast.
2. Adjust **VR201** until stereo indicator lights up. Cement arm of **VR201** as shown in figure.



●CASSETTE

MEASUREMENT CONDITON:

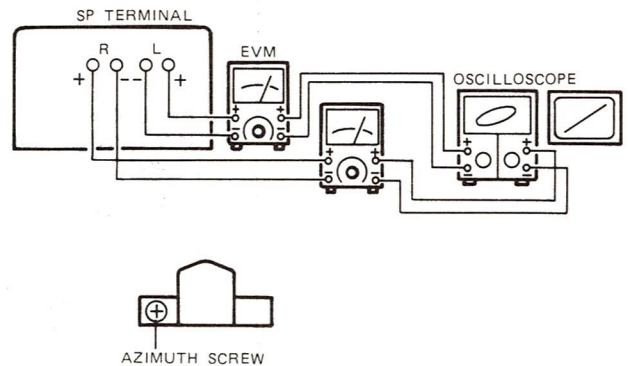
- Make sure heads are clean
- Make sure capstan and pressure roller are clean

TEST TAPE:

- Head azimuth adjustment (8kHz, -20dB): QZZCFM
- Tape speed adjustment (3kHz, -10dB): QZZCWAT

HEAD AZIMUTH ADJUSTMENT (Tape 1, 2)

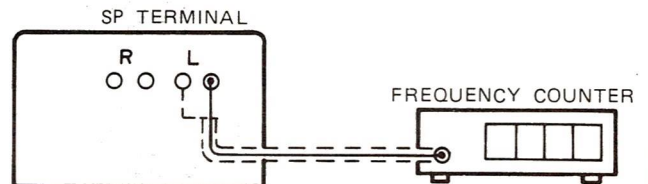
1. Test equipment connection is shown in figure.
2. Playback the azimuth adjusted part (8kHz, -20dB) of the test tape (QZZCFM) and regulate the angle adjusting screw so that the outputs of L-CH and R-CH are maximized. (When the adjusting positions are different with L-CH and R-CH, find a position where the outputs of L-CH and R-CH are balanced, and then mark the adjustment.)
3. At the same time, draw a lissajous waveform and eliminate phase deflection.
4. After the adjustment, apply screw-lock to the angle adjusting value.



TAPE SPEED ADJUSTMENT (Tape 1, 2)

1. Test equipment connection is shown in figure.
2. Place unit into "TAPE" position.
3. Playback the middle part of the test tape (QZZCWAT).
4. Adjust the VR in the motor so that the output is within the standard.

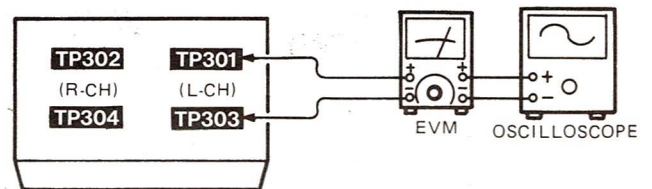
Standard value: $3000 \pm 20\text{Hz}$



BIAS CURRENT ADJUSTMENT (Tape 2)

1. Test equipment connection is shown in figure.
2. Place unit into "TAPE" position.
3. Press the record button.
4. Adjust VR401 for $4.1\text{mV} \pm 0.3\text{mV}$ indication on EVM.

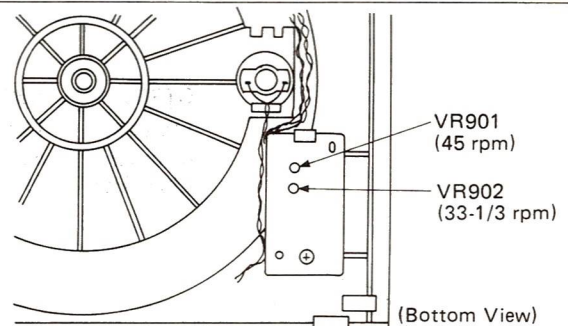
Standard value: 4.1mV



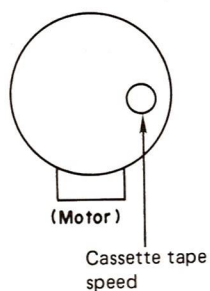
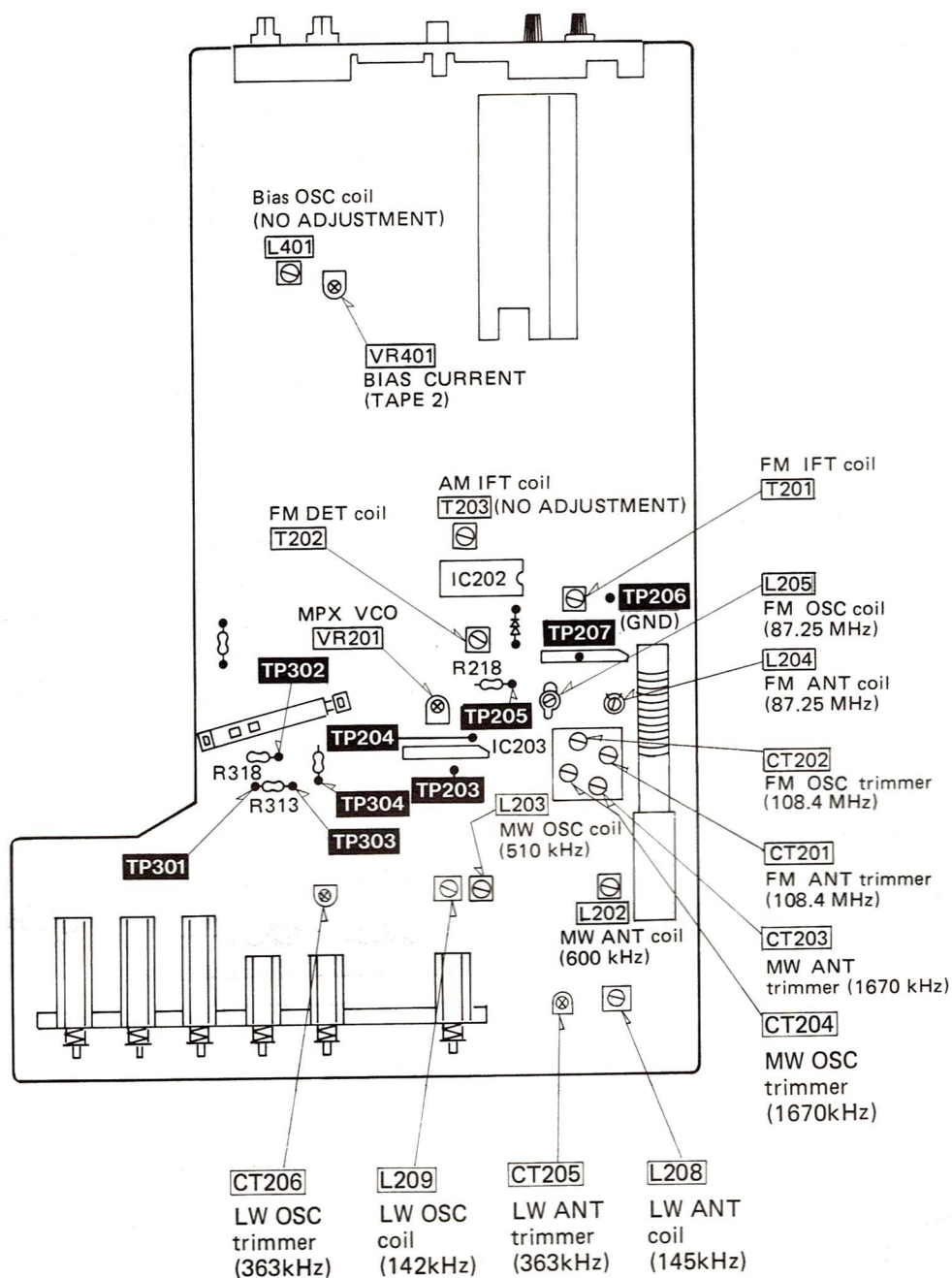
ROTATING SPEED ADJUSTMENT

1. Open the record player.
2. Set the speed selector to "33".
3. Adjust VR902 so that the turntable platter rotates at the rated speed. ($33\text{-}1/3\text{ rpm}$)
4. Set the speed selector to "45".
5. Adjust VR901 so that the turntable platter rotates at the rated speed. (45 rpm)

Note: Be sure to adjust $33\text{-}1/3\text{ rpm}$ first.



● Adjustment points



RESISTORS AND CAPACITORS

- Notes:**
- Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
 - Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

- The unit of resistance is Ω (ohm).
K = 1000 Ω , M = 1000k Ω
- The unit of capacitance is μ F (microfarad).
P = 10⁻⁶ μ F
- Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Resistor Type	Wattage	Tolerance	Capacitor Type	Voltage		Tolerance
ERD : Carbon	25 : 1/4W S1 : 1/2W	G : $\pm$ 2% J : $\pm$ 5% K : $\pm$ 10%		ECEA Type	Other	
			ECE Electrolytic	0J : 6.3V	1H : 50V	C : $\pm$ 0.25pF
			ECC Ceramic	1A : 10V	KC : 400V AC	J : $\pm$ 5%
			ECK Ceramic	1C : 16V		K : $\pm$ 10%
			ECQP Polypropylene	1E : 25V		Z : +80%, -20%
			ECGN Ceramic	1H : 50V		P : +100%, -0%
			ECFT Semiconduction			
			ECQ Polyester			

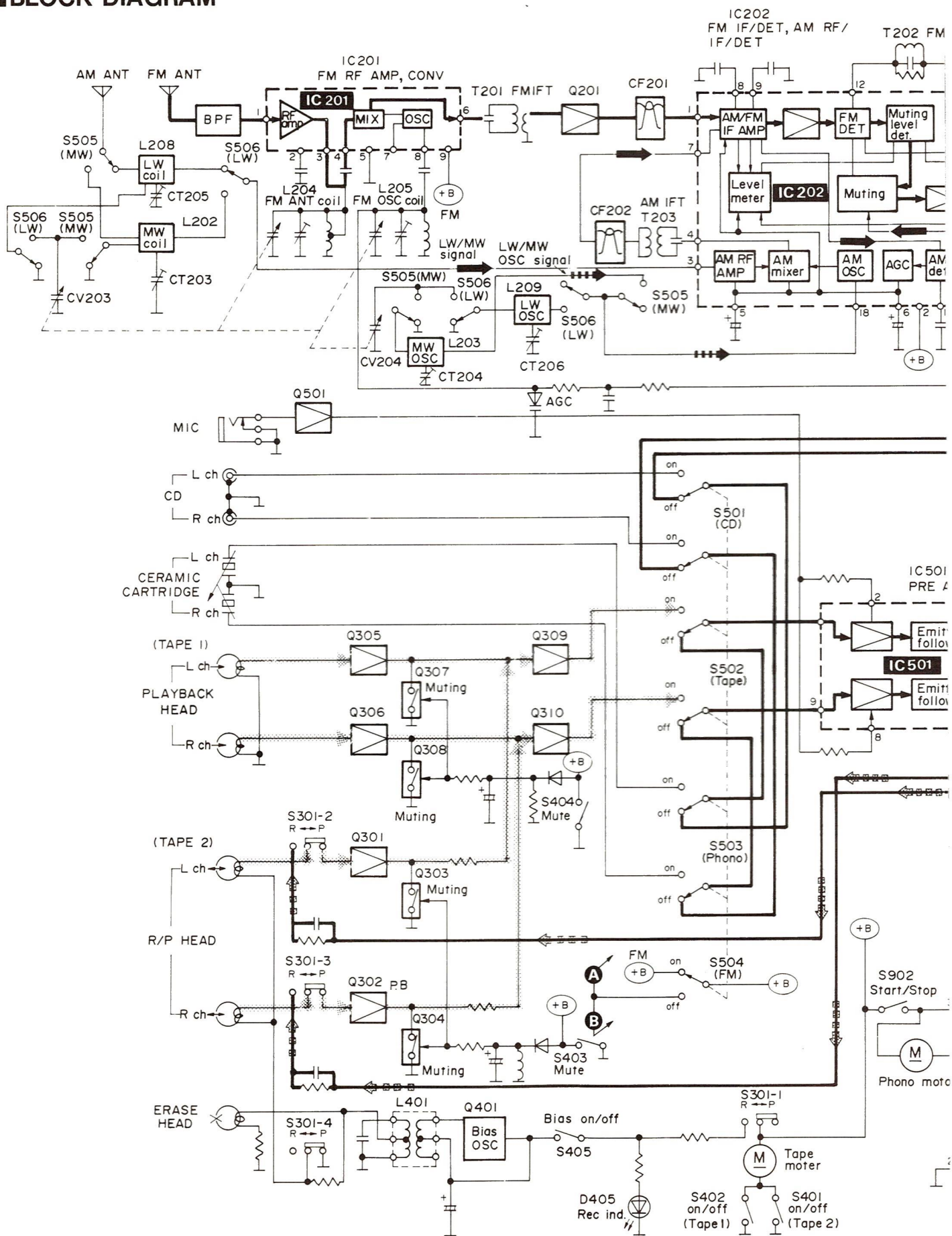
RESISTORS

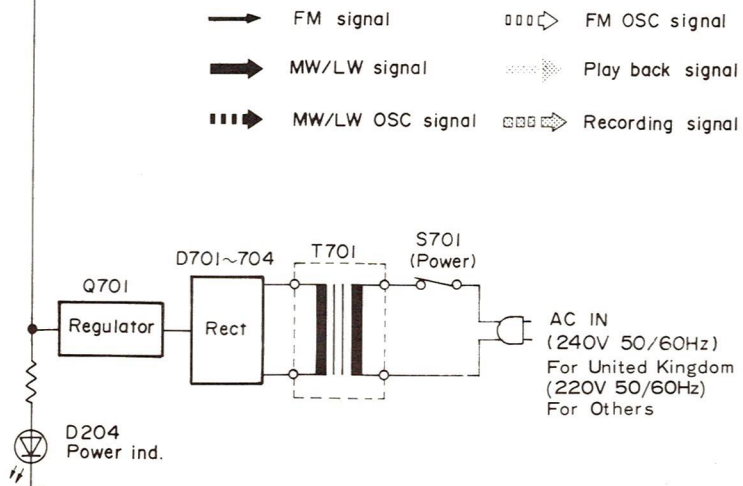
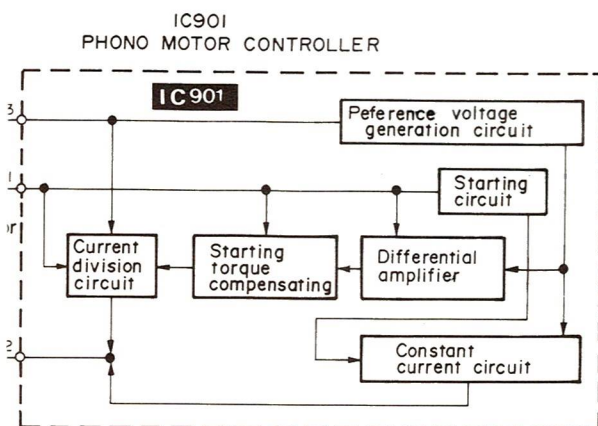
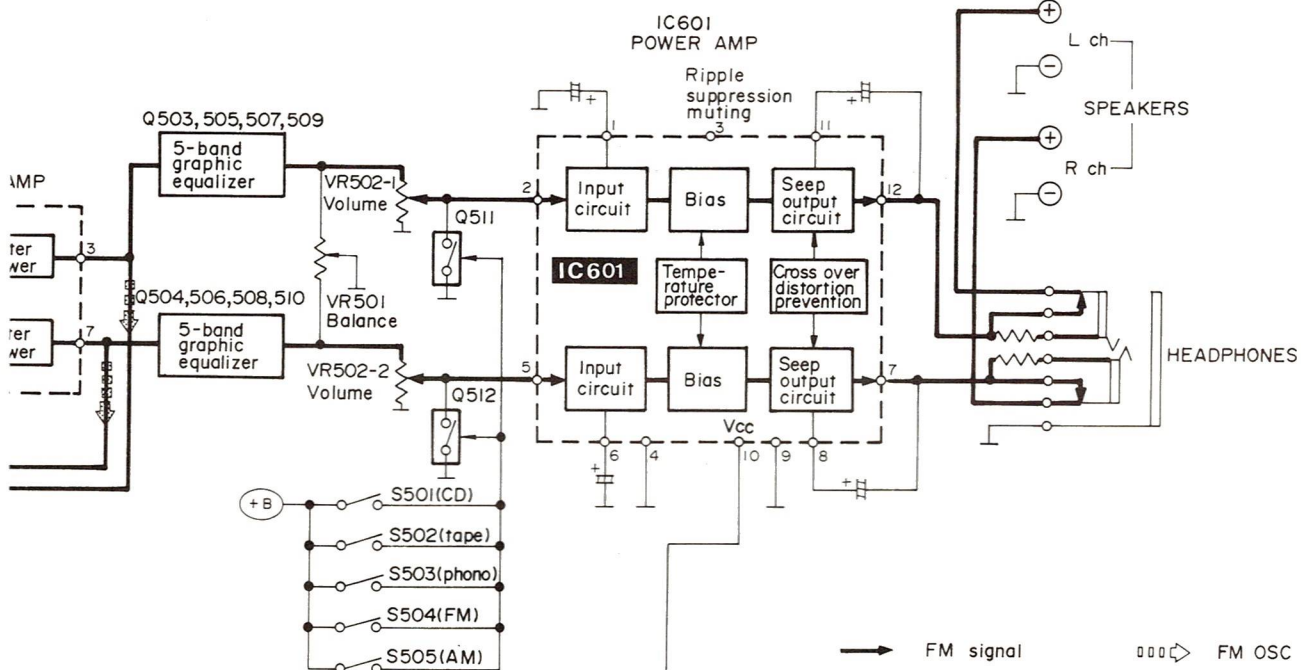
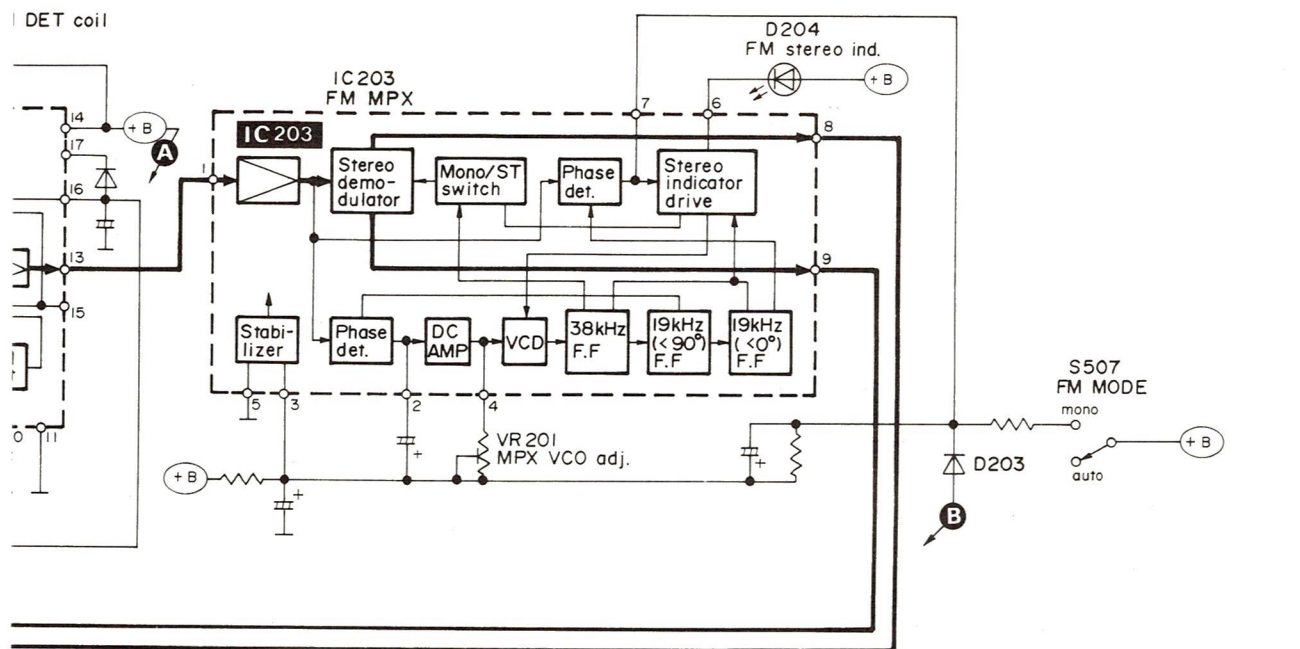
Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
R201	ERD25FJ330	33	R309, 310	ERD25FJ221	220	R412	ERD25FJ821	820	R553, 554	ERD25TJ124	120K
R202	ERD25FJ470	47	R311, 312	ERD25TJ223	22K	R413	ERD25FJ472	4.7K	R555, 556	ERD25FJ102	1K
R203	ERD25TJ334	330K	R313, 314	ERD25FJ100	10	R414	ERD25FJ151	150	R557, 558	ERD25FJ682	6.8K
R204	ERD25TJ474	470K	R315, 316	ERD25FJ561	560	R415	ERD25FJ472	4.7K	R559, 560	ERD25TJ823	82K
R205	ERD25FJ222	2.2K	R317, 318	ERD25TJ183	18K	R501, 502	ERD25FJ102	1K	R561, 562	ERD25FJ471	470
R206	ERD25TJ224	220K	R323, 324	ERD25FJ101	100	R503, 504	ERD25TJ104	100K	R563, 564	ERD25FJ682	6.8K
R207	ERD25FJ101	100	R325, 326	ERD25TJ155	1.5M	R505, 506	ERD25FJ122	1.2K	R565, 566	ERD25TJ823	82K
R208	ERD25FJ102	1K	R327, 328	ERD25FJ221	220	R507, 508	ERD25TJ393	39K	R567, 568	ERD25FJ471	470
R209	ERD25FJ821	820	R329, 330	ERD25TJ153	15K	R519	ERD25FJ221	220	R569, 570	ERD25FJ682	6.8K
R210	ERD25FJ561	560	R331, 332	ERD25TJ223	22K	R520	ERD25FJ103	10K	R571	ERD25FJ221	220
R211	ERD25FJ102	1K	R333, 334	ERD25TJ224	220K	R521	ERD25FJ102	1K	R572, 573	ERD25FJ102	1K
R212	ERD25FJ470	47	R335, 336	ERD25TJ155	1.5M	R522	ERD25TJ474	470K	R574	ERD25FJ102	1K
R214	ERD25TJ105	1M	R337, 338	ERD25TJ273	27K	R523	ERD25FJ472	4.7K	R576	ERD25FJ102	1K
R215	ERD25FJ472	4.7K	R339, 340	ERD25FJ681	680	R524	ERD25FJ472	4.7	R577	ERD25FJ103	10K
R216	ERD25FJ152	1.5K	R341, 342	ERD25FJ561	560	R525, 526	ERD25TJ105	1M	R578, 579	ERD25FJ102	1K
R217	ERD25FJ331	330	R343, 344	ERD25TJ224	220K	R527, 528(EK)	ERD25TJ123	12K	R580	ERD25FJ472	4.7K
R218	ERD25FJ181	180	R345, 346	ERD25FJ472	4.7K	R527, 528	ERD25FJ822	8.2K	R581	ERD25FJ472	4.7K
R219	ERD25FJ221	220	R347, 348	ERD25FJ472	4.7K	[other]			R582	ERD25FJ472	4.7K
R220	ERD25FJ103	10K	R349	ERD25FJ472	4.7K	R529, 530	ERD25TJ223	22K	R601, 602	ERD25TJ563	56K
R221, 222	ERD25FJ332	3.3K	R350, 351	ERD25FJ103	10K	R531, 532	ERD25FJ391	390	R603, 604	ERD25TJ683	68K
R223, 224	ERD25TJ273	27K	R401	ERD25FJ100	10	R533, 534	ERD25FJ103	10K	R605, 606	ERD25FJ102	1K
R225, 226	ERD25FJ182	1.8K	R402	ERD25FJ1R0	1	R535, 536	ERD25FJ122	1.2K	R607, 608	ERD25FJ271	270
R227	ERD25TJ224	220K	R403	ERD25FJ100	10	R537, 538	ERD25TJ223	22K	R702	ERD25FJ681	680
R228	ERD25FJ122	1.2K	R404	ERD25FJ472	4.7	R539, 540	ERD25FJ471	470	R703	ERD25FJ101	100
R229	ERD25FJ821	820	R405	ERD25TJ104	100K	R541, 542	ERD25FJ272	2.7K	R704	ERD25FJ122	1.2K
R230	ERD25FJ103	10K	R406	ERD25FJ472	4.7K	R543, 544	ERD25FJ332	3.3K	R705	ERD25FJ472	4.7
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R305, 306	ERD25TJ155	1.5M	R409	ERD25FJ472	4.7K	R549, 550	ERD25TJ334	330K	R904	ERD25FJ472	4.7K
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CAPACITORS

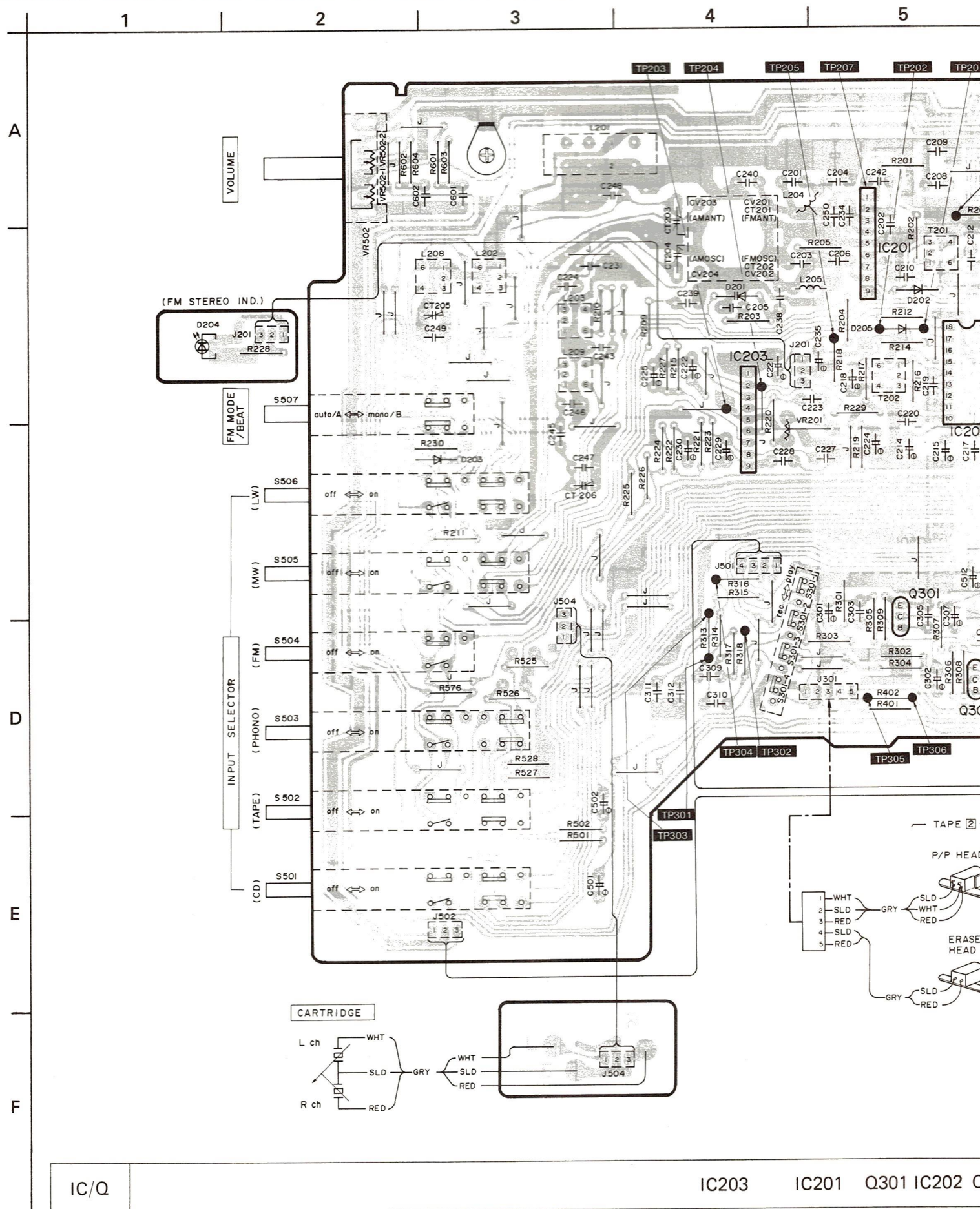
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C202	ECKD1H102KB	0.001	C237	ECKD1H102ZF	0.001	C340, 341	ECEA1CU100	10	C537, 538	ECEA1HSR15	0.15
C203	ECCD1H150KC	15P	C238	ECCD1H050CC	5P	C401	ECQP2A822JZ	0.0082	C539, 540	ECFT1E152KDY	0.0015
C204	ECKD1H102KB	0.001	C239	ECKD1H223ZF	0.022	C402	ECFTD473JX	0.047	C541, 542	ECFTD473JX	0.047
C205	ECKD1H103ZF	0.01	C240	ECCD1H050CC	5P	C403	ECFTD562JX	0.0056	C543	ECEA1CU221	220
C206	ECCD1H470KC	47P	C242	ECKD1H103ZF	0.01	C404	ECEA1EU47R	4.7	C545, 546	ECEA1CU470	47
C207	ECCD1H820K	82P	C243	ECKD1H223ZF	0.022	C405	ECEA1CU221	220	C601, 602	ECFTD223JX	0.022
C208	ECCD1H100KC	10P	C244	ECQP2A361JZ	360P	C406	ECQM1H333JZ	0.033	C603, 604	ECEA1HU010	1
C209	ECCD1H100KC	10P	C245	ECQP2A181JZ	180P	C407	ECFT1E104MDY	0.1	C605, 606	ECFT1E102KDY	0.001
C210	ECKD1H103ZF	0.01	C246	ECCD1H680K	68P	C501, 502	ECEA1CU100	10	C607, 608	ECEA1CU470	47
C211	ECEA1CU470	47	C247	ECCD1H180KC	18P	C503, 504	ECKD1H102ZF	0.001	C609, 610	ECEA1HUR22	0.22
C212	ECKD1H103ZF	0.01	C248	ECCD1H050CC	5P	C505, 506	ECCD1H560K	56P	C611, 612	ECEA1AU471	470
C213	ECEA1HU010	1	C249	ECCD1H220K	22P	C507, 508	ECEA1EU47R	4.7	C613	ECEA1AU101	100
C214	ECEA0JU101	100	C250	ECKD1H102KB	0.001	C509, 510	ECEA1CU100	10	C614	ECEA1EU101	100
C215	ECEA1EU47R	4.7	C301, 302	ECEA50MR47R	0.47	C511	ECEA1AU220	22	C615	ECEA1AU101	100
C216, 217	ECFTD223JX	0.022	C303, 304	ECCD1H330K	33P	C512	ECEA1CU101	100	C701	ECKDKC472PF2	0.0047
C218	ECEA1CU221	220	C305, 306	ECKD1H102ZF	0.001	C513	ECEA1HU010	1	C702	ECEA1EU222	2200
C219	ECFTD223JX	0.022	C307, 308	ECEA1HU010	1	C514	ECKD1H102ZF	0.001	C703	ECKD1H102ZF	0.001
C220	ECFD1E333KD	0.033	C309, 310	ECFT1E152KDY	0.0015	C515	ECEA1HU010	1	C704	ECEA1CU101	100
C221	ECEA1HU010	1	C311, 312	ECFT1E472KDY	0.0047	C516	ECEA1CU470	47	C705, 706	ECKD1H103ZF	0.01
C222	ECEA1HUR33	0.33	C321, 322	ECEA50MR47R	0.47	C517, 518	ECFD1E333KD	0.033	C707, 708	ECKD1H103ZF	0.01
C223	ECQP2A102JZ	0.001	C323, 324	ECCD1H330K	33P	C519, 520	ECEA1HUR33	0.33	C901	ECEA1HU3R3	3.3
C224	ECEA1CU101	100	C325, 326	ECFT1E102KDY	0.001	C521, 522	ECFT1E332KDY	0.0033	C902	ECEA1CU220	22
C225	ECEA1EU47R	4.7	C327, 328	ECEA1HU010	1	C523, 524	ECFT1V393KD	0.039	C903(EK)	ECEA1HU2R2	2.2
C227, 228	ECFT1E183KDY	0.018	C329, 330	ECEA1HU010	1	C525, 526	ECEA1HU010	1	C903[other]	ECEA1HU010	1
C229, 230	ECEA1HU010	1	C331, 332	ECKD1H102ZF	0.001	C527, 528	ECEA1HU010	1	C904	ECEA1CU470	47
C231	ECCD1H050CC	5P	C333, 334	ECEA1HU010	1	C529, 530	ECEA1CU100	10	C905(EK)	ECEA1HU2R2	2.2
C234	ECCD1H050CC	5P	C335, 336	ECEA1HUR22	0.22	C531, 532	ECFTD562JX	0.0056			
C235	ECEA1HU010	1	C337, 338	ECEA1AU471	470	C533, 534	ECEA1HUR33	0.33			

BLOCK DIAGRAM





CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

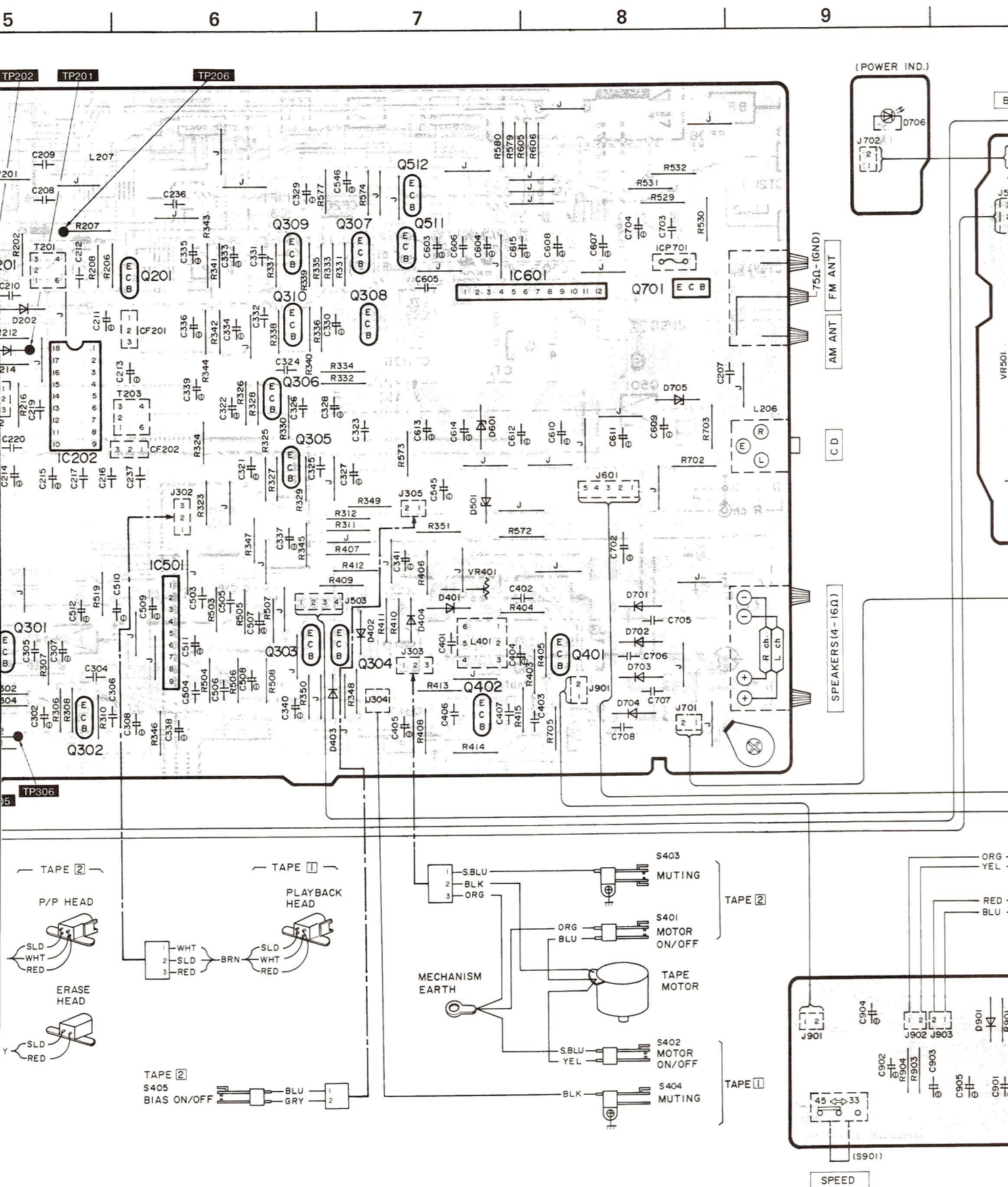


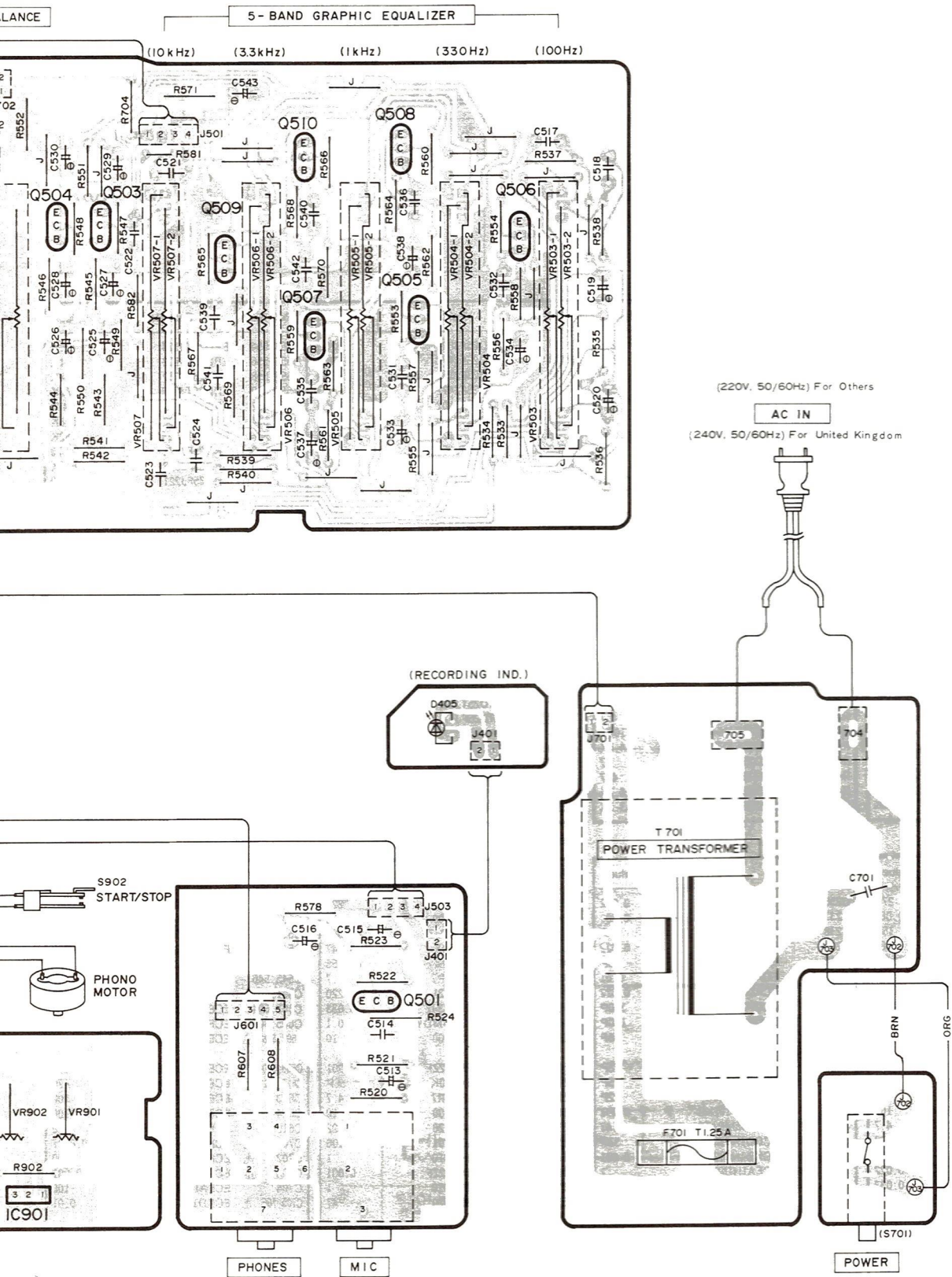
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IC203

IC201

Q301 IC202 C





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