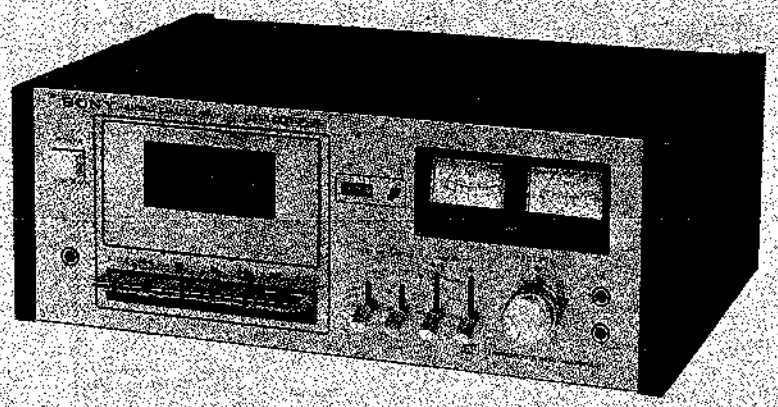
TC-186SD

AEP Model



STEREO CASSETTE-CORDER

SPECIFICATIONS

Power Requirements: 110, 127, 220, or 240 V ac, 50/60 Hz

Power Consumption: 8 W

Tape Speed: 4.8 cm/s (1 7/8 ips)

Fast Forward and Rewind Time: Approx. 90 sec. (by C-60)

Recording System: 4-track 2-channel stereo

Record Bias Frequency: 105 kHz

Signal-to-Noise Ratio:
DOLBY* NR OFF
With Ferri-Chrome Cassette
54 dB at peak level (NAB)
48 dB (DIN)
With chromium dioxide cassette
54 dB at peak level (NAB)
With regular cassette
52 dB at peak level (NAB)
DOLBY* NR ON
Improved by 5 dB at 1 kHz, 10 dB above 5 kHz

Total Harmonic Distortion: 1.7 %

Frequency Response:
DOLBY* NR OFF
With Ferri-Chrome Cassette and chromium dioxide cassette
30 – 16,000 Hz (NAB)
50 – 15,000 Hz ±3 dB (NAB)
40 – 15,000 Hz (DIN)
With regular cassette
30 – 14,000 Hz (NAB)
40 – 12,000 Hz (DIN)

Wow and Flutter: 0.09 % WRMS (NAB)
±0.2 % (DIN)

Inputs:
MIC (phone jack) 2
sensitivity 0.2 mV (–72 dB)
for low-impedance microphones
LINE IN (phono jack) 2
sensitivity 0.06 V (–22 dB)
input impedance more than 100 kΩ

Outputs:
LINE OUT (phono jack) 2
output level 0.435 V (–5 dB)
at load impedance 100 kΩ
suitable load impedance more than 10 kΩ
HEADPHONES (binaural jack) 1
suitable load impedance 8 Ω

REC/PB (AEP, E Model):
Input impedance less than 10 kΩ
Output impedance less than 10 kΩ

Dimensions: Approx. 390 (w) x 150 (h) x 295 (d) mm
15 3/8 (w) x 5 3/4 (h) x 11 5/8 (d) inches
including projecting parts and controls

Weight: Approx. 6.3 kg (13 lb 15 oz)

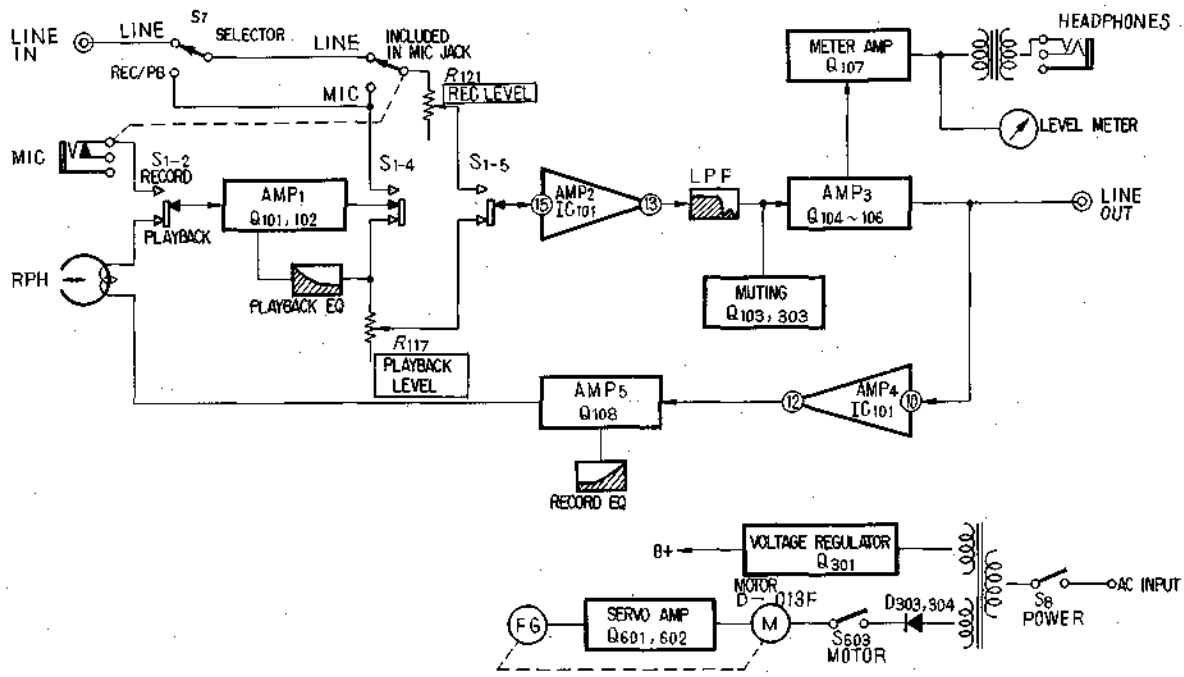
* **'Dolby'** and the double-D symbol are the trade marks of Dolby Laboratory Inc. Noise reduction system manufactured under license from Dolby Laboratory Inc.

SONY®

SERVICE MANUAL

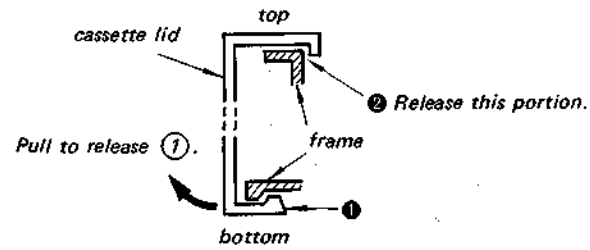
SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



SECTION 2
DISASSEMBLY

2-1. CASSETTE LID REMOVAL



2-2. CASE REMOVAL

Remove four screws from both sides of the case.

2-3. AUDIO AMP BOARD REMOVAL

The audio amp board easily removes with removing three screws (PSW 3 x 6). When reattaching the board, make sure that the record/playback switch lever (B) securely push the record/playback slide switch.

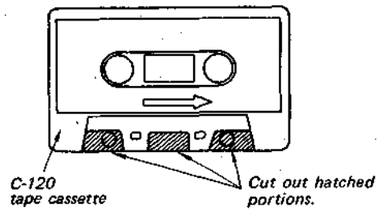
SECTION 3
ADJUSTMENTS

3-1. MECHANICAL ADJUSTMENTS

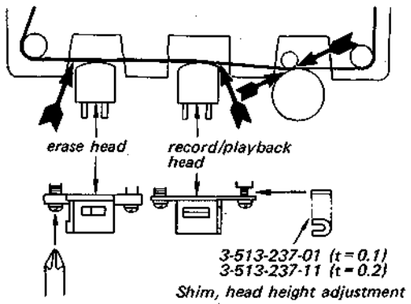
Tape Path Adjustment

– Playback Mode –

1. Make an adjustment cassette as shown below.

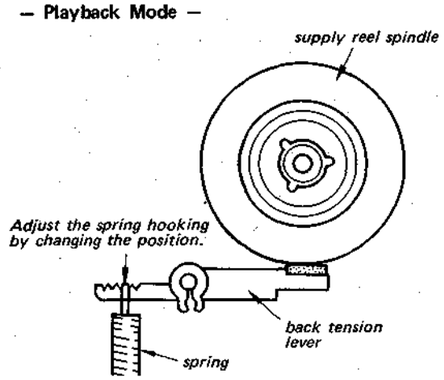


2. In playback mode and viewing from the front, adjust the head heights to eliminate tape curl and tape twist at arrowed portions.



Playback Back Tension Torque Adjustment

– Playback Mode –

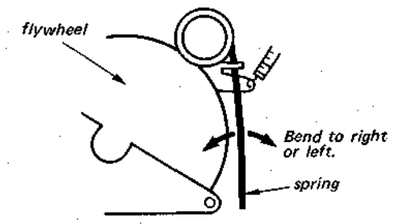


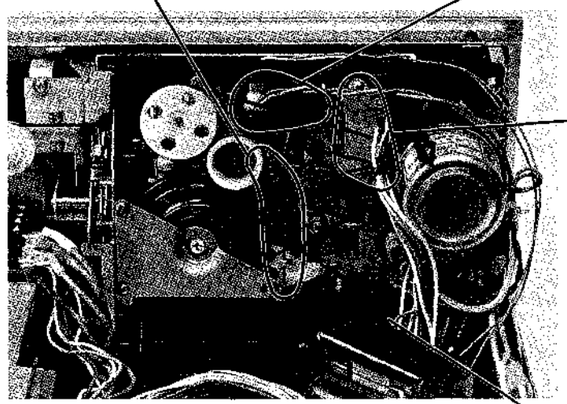
Specification: 2.5 ~ 4 g·cm (0.04 ~ 0.05 oz·inch)

Fast Forward and Rewind Torque Adjustment

– Fast Forward and Rewind Modes –

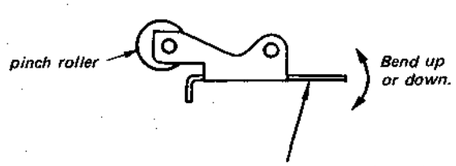
Bend the spring to obtain torque of 55 ~ 95 g·cm (0.8 ~ 1.3 oz·inch).





PAUSE Timing Adjustment

– PAUSE Mode –



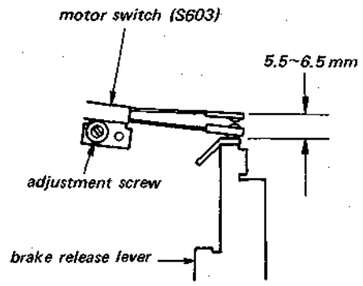
Bend here and adjust the position of pinch roller so that the rotations of pinch roller and real spindles cease at the same time.

Motor Switch (S603) Position Adjustment

– Stop Mode –

Loosen adjustment screw and adjust the position of the switch to obtain the specified clearance between the switch leaves.

After the adjustment, tighten and lock the screw with a suitable locking compound.

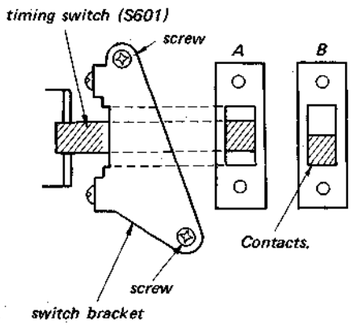


Timing Switch (S601) Position Adjustment

– Stop Mode –

Loosen the screws and adjust position of the switch bracket so that it places as shown B.

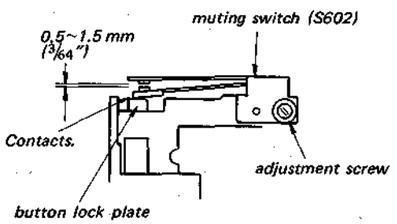
After the adjustment, tighten the screws.



Muting Switch (S602) Position Adjustment

– Stop Mode –

Loosen the adjustment screw and adjust position of the switch so that the clearance between contacts of switch leaves becomes 0.5 ~ 1.5 mm ($^3/_{64}$").



Reference Datum

Forward Torque:	30 ~ 65 g·cm (0.42 ~ 0.9 oz·inch)
Pinch Roller Pressure:	270 ~ 370 g (9.5 ~ 13 oz)
Shut-off Time:	Within six seconds

3-2. ELECTRICAL ADJUSTMENTS

PRECAUTION

1. Clean the following parts with an alcohol moistened swab:
   * record/playback head
   * erase head
   * capstans
   * pinch roller
   * rubber belts
   * idlers
2. Demagnetize record/playback head with a head demagnetizer.
3. Do not use magnetized screwdriver for adjustments.
4. Adjustments should be performed in the order arranged in this service manual.
5. Adjustments should be performed for both L-CH and R-CH with rated power supply voltage unless otherwise specified.
6. Record and playback level adjustments should be carefully performed.

Test Equipment/Tools Required:

audio oscillator (af osc)
VTVM
digital frequency counter
speed checker SONY LMF-30
attenuator (600 Ω)
non-magnetic screwdriver
resistors ... 600 Ω (¼ W), 10 kΩ (¼ W), 100 kΩ (¼ W)
blank tapes (completely erased with bulk eraser)
SONY CS-10 (HF), CS-20 (CrO_2), CS-30 (Fe-Cr)
BIAS and EQ switch settings in accordance with tape used are as follows.

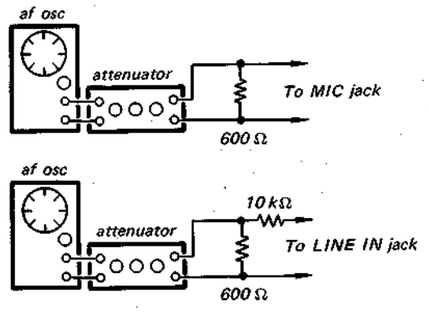
Tape	BIAS switch	EQ switch
CS-10	NORMAL	NORMAL
CS-20	HIGH	CrO_2
CS-30	NORMAL	Fe-Cr

SONY test tapes
P-4-A81 (6.3 kHz, -10 dB)
P-4-L81 (333 Hz, 0 dB)
WS-48 (3 kHz, 0 dB)

Switches and controls should be set as follows unless otherwise specified.
DOLBY NR switch: OFF
LIMITER switch: OFF
LEC LEVEL controls: 5 (center detent)
EQ switch: NORMAL
BIAS switch: NORMAL

Test Equipment Connections:

Input side:



Standard Record:

Deliver the specified input signal level to the input jack and set the REC LEVEL control to obtain the specified output signal level.

Standard Input Level

	MIC	LINE IN
source impedance	300 Ω	10kΩ
input level	0.77mV (-60dB)	0.25V (-10dB)

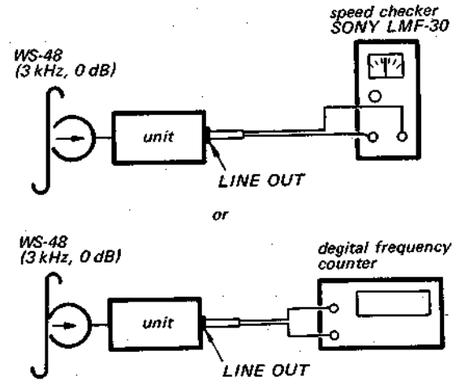
Standard Output Level

	LINE OUT	HEADPHONES
load impedance	100 kΩ	8 Ω
output level	0.435 V (-5 dB)	31 mV (-28 dB)

1. Tape Speed Adjustment

Procedure:

Mode: Playback



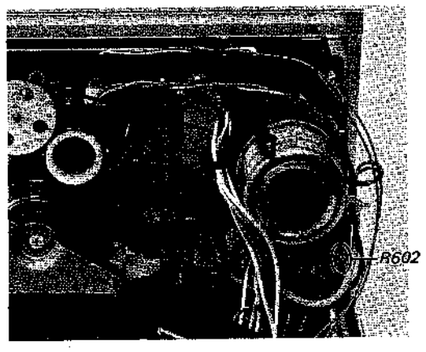
Adjust R602 to obtain the specified values below.

Specification:

speed checker	digital frequency counter
-1 ~ +1 %	2,970 ~ 3,030 Hz

Frequency difference between beginning and end of tape should be within 1 % (10 Hz).

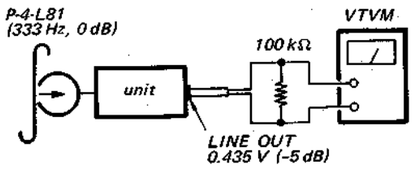
Adjustment Location:



2. Playback Level Adjustment

Procedure:

1. Mode: Playback



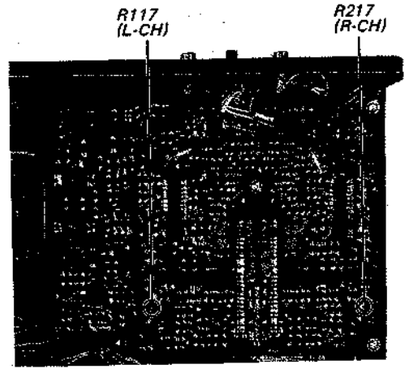
Adjust R117 (L-CH) and R217 (R-CH) to obtain 0.435 V (-5 dB) VTVM reading.

2. Assure that the LINE OUT level does not change when the mode is changed from playback to stop several times.

Specification:

LINE OUT level: 0.42 ~ 0.46 V (-5.5 ~ -4.5 dB)
Level difference between channels: less than 0.5 dB
TAPE SELECT switch: Fe-Cr
Level difference from NORMAL should be -0.2 dB ± 0.5 dB

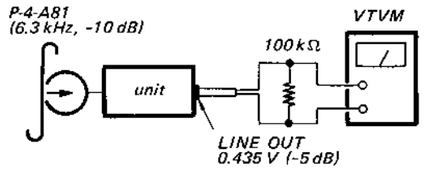
Adjustment Locaton:



3. Playback Equalizer Adjustment

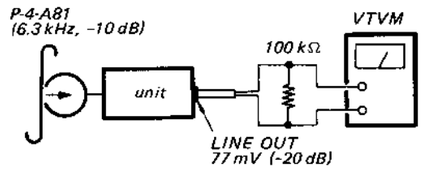
Procedure:

1. Mode: Playback



2. Mode: Playback

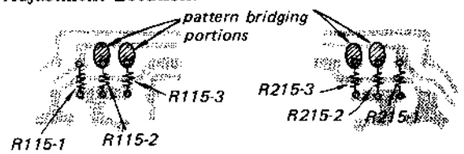
   TAPE SELECT switch: CrO_2, Fe-Cr

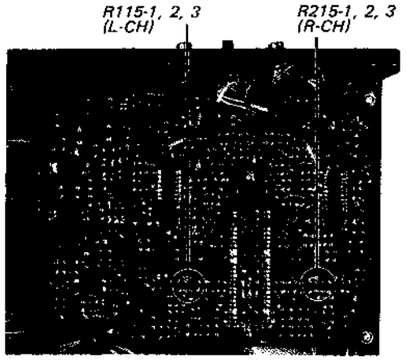


Adjust R115-1, 2, 3 (L-CH) and R215-1, 2, 3 (R-CH) by bridging patterns to obtain the LINE OUT voltage 15 dB lower than that obtained in step 1 above.

Specification: 62 ~ 95 mV
(-22 ~ -18 dB)

Adjustment Location:

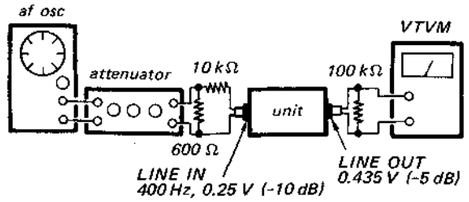




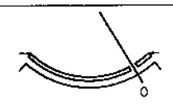
4. VU Meter Calibration

Procedure:

1. Mode: Standard record (See page 5.)



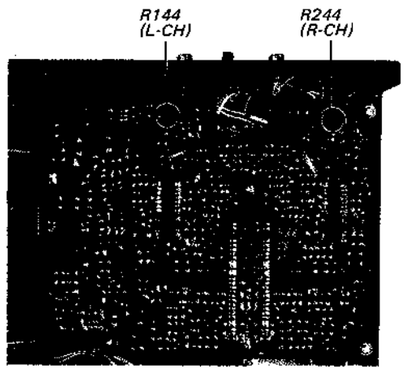
2.

Adjust	VU meter reading: 0 VU
R144 (L-CH) R244 (R-CH)	

Specification:

When the REC LEVEL control is adjusted to make 0 VU indication, VTVM reading should be 0.42 ~ 0.46 V (-5.5 ~ -4.5 dB)

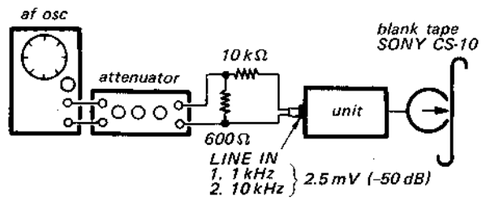
Adjustment Location:



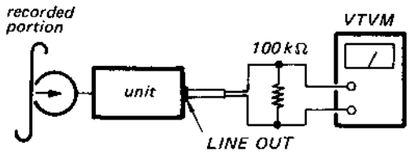
5. Record Bias Adjustment

Procedure:

1. Mode: Record



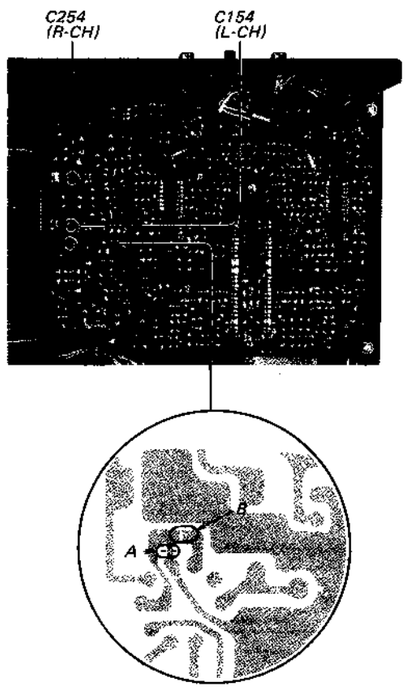
2. Mode: Playback



1) Adjust C154 (L-CH) and C254 (R-CH) to make both signal outputs equal.

2) If necessary, cut the pattern A and connect patterns B and repeat adjustment 1).

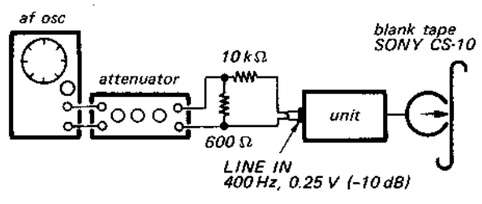
Adjustment Location:



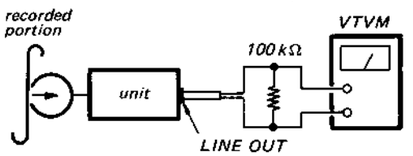
6. Record Level Adjustment

Procedure:

1. Mode: Standard record (See page 5.)



2. Mode: Playback



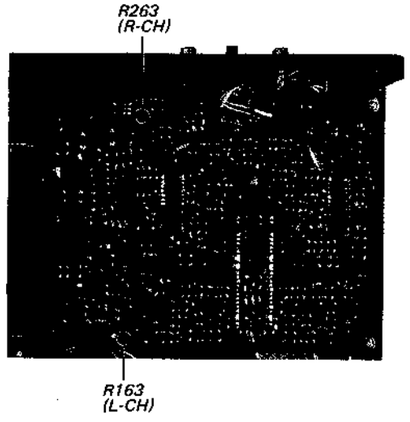
Adjust R163 (L-CH) and R263 (R-CH) to obtain -5 dB (0.435 V) VTVM reading.

3. Change the blank tape to CS-20 and CS-30, and perform the same record and playback procedure. Measure LINE OUT level.

Specification:

SONY tape	LINE OUT level
CS-10	-5 dB (0.435 V, reference)
CS-20	-7 ~ -4 dB (0.35 ~ 0.49 V)
CS-30	-6 ~ -4 dB (0.39 ~ 0.49 V)

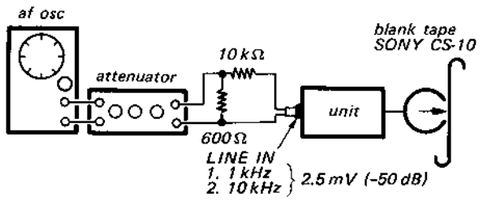
Adjustment Location:



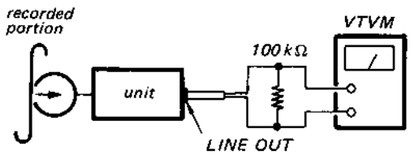
5. Record Bias Adjustment

Procedure:

1. Mode: Record



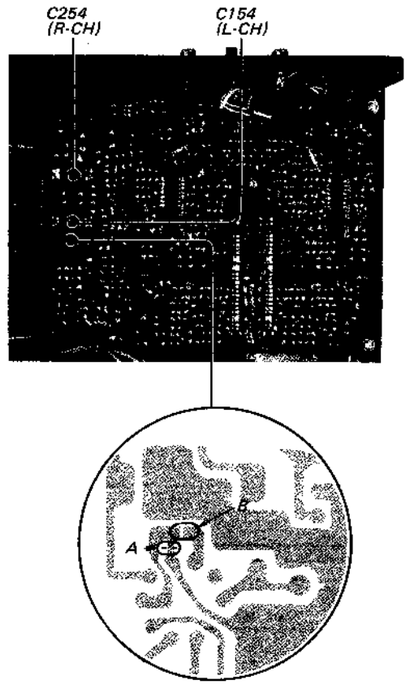
2. Mode: Playback



1) Adjust C154 (L-CH) and C254 (R-CH) to make both signal outputs equal.

2) If necessary, cut the pattern A and connect patterns B and repeat adjustment 1).

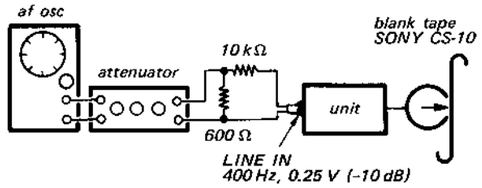
Adjustment Location:



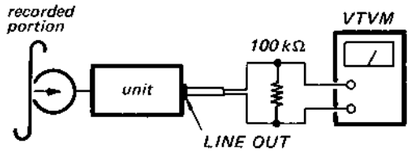
6. Record Level Adjustment

Procedure:

1. Mode: Standard record (See page 5.)



2. Mode: Playback



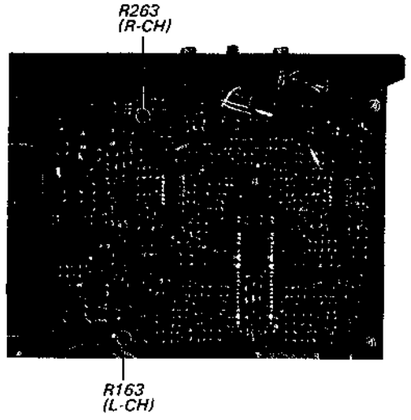
Adjust R163 (L-CH) and R263 (R-CH) to obtain -5 dB (0.435 V) VTVM reading.

3. Change the blank tape to CS-20 and CS-30, and perform the same record and playback procedure. Measure LINE OUT level.

Specification:

SONY tape	LINE OUT level
CS-10	-5 dB (0.435 V, reference)
CS-20	-7~-4 dB (0.35~0.49 V)
CS-30	-6~-4 dB (0.39~0.49 V)

Adjustment Location:



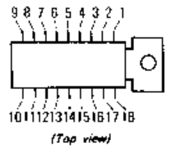
MEMO

SECTION 4
DIAGRAMS

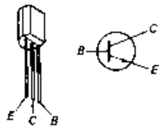
4-1. MOUNTING DIAGRAM

– Conductor Side –

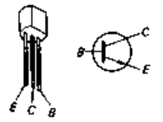
IC101, 201: CX-064



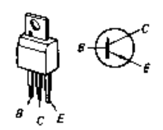
Q101, 102, 104 } 2SC1361
Q201, 202, 204 }
Q103, 105~108 }
Q203, 205~208 } 2SC1363
Q303, 602 }



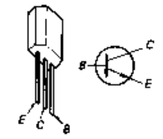
Q302: 2SC1384



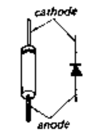
Q301: 2SC1760
Q603: 2SC1761



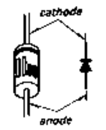
Q601: 2SC633A

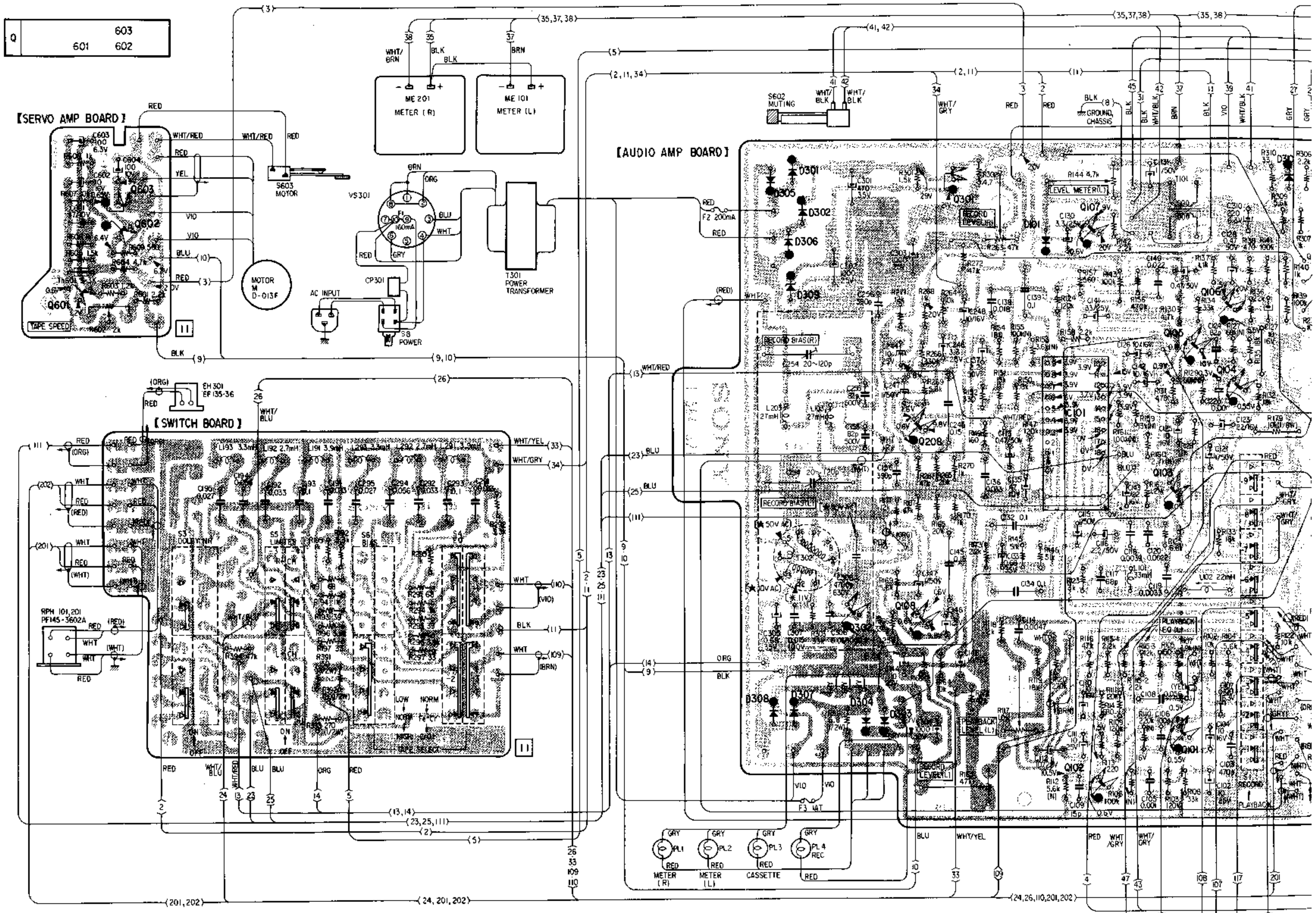


D101, 201: 1T22A
D310: 1S1555
D301~308: 10E-2



D309: EQA01-21R

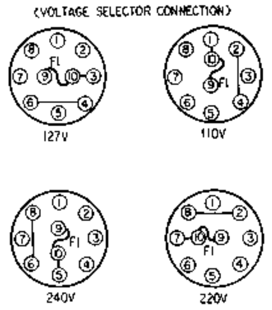




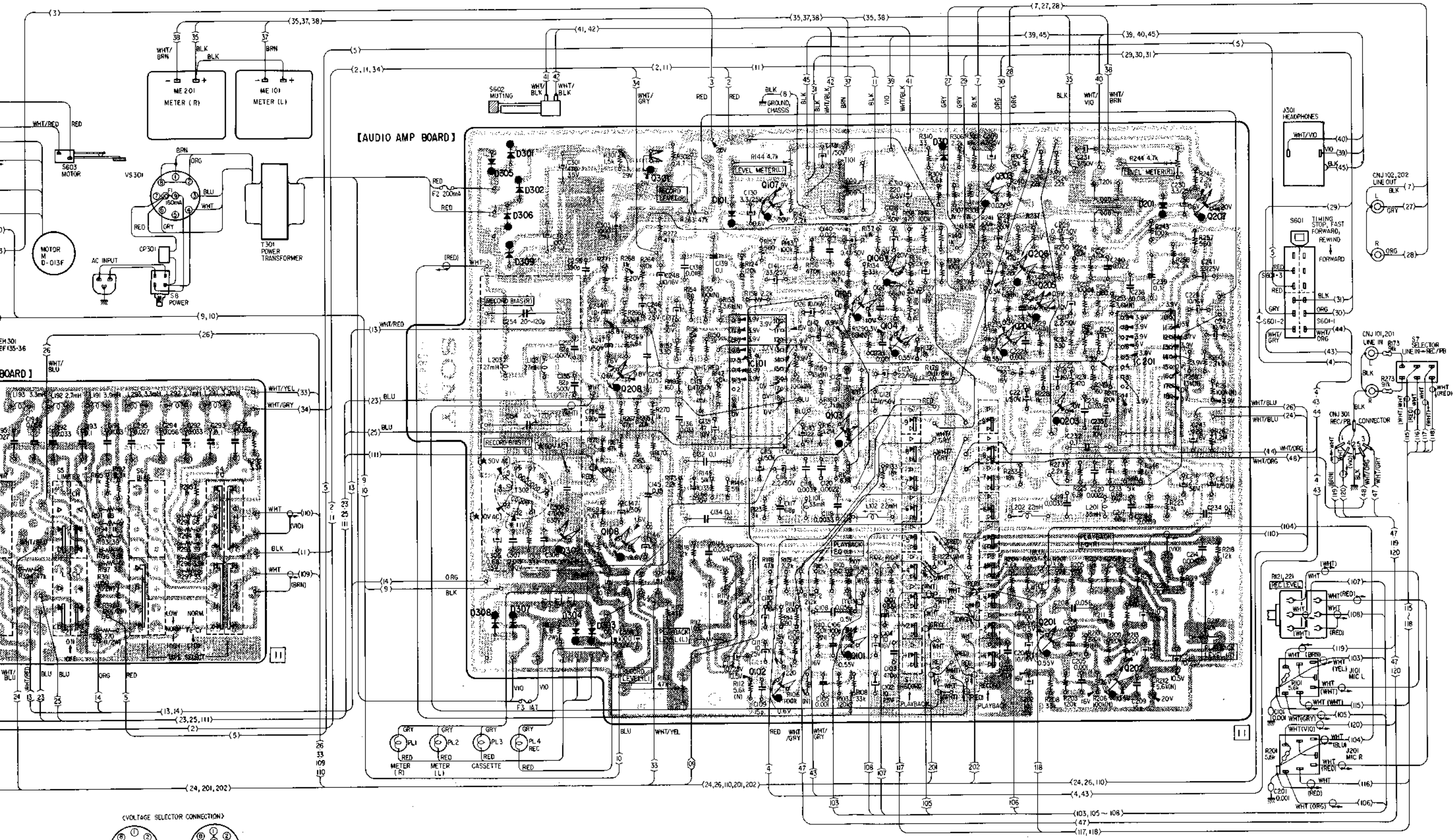
Q	
	603
	601 602

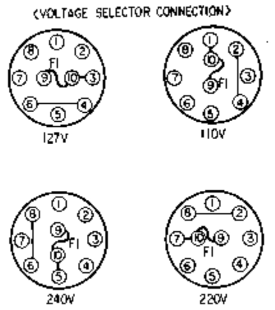
Note:

▨ : B+



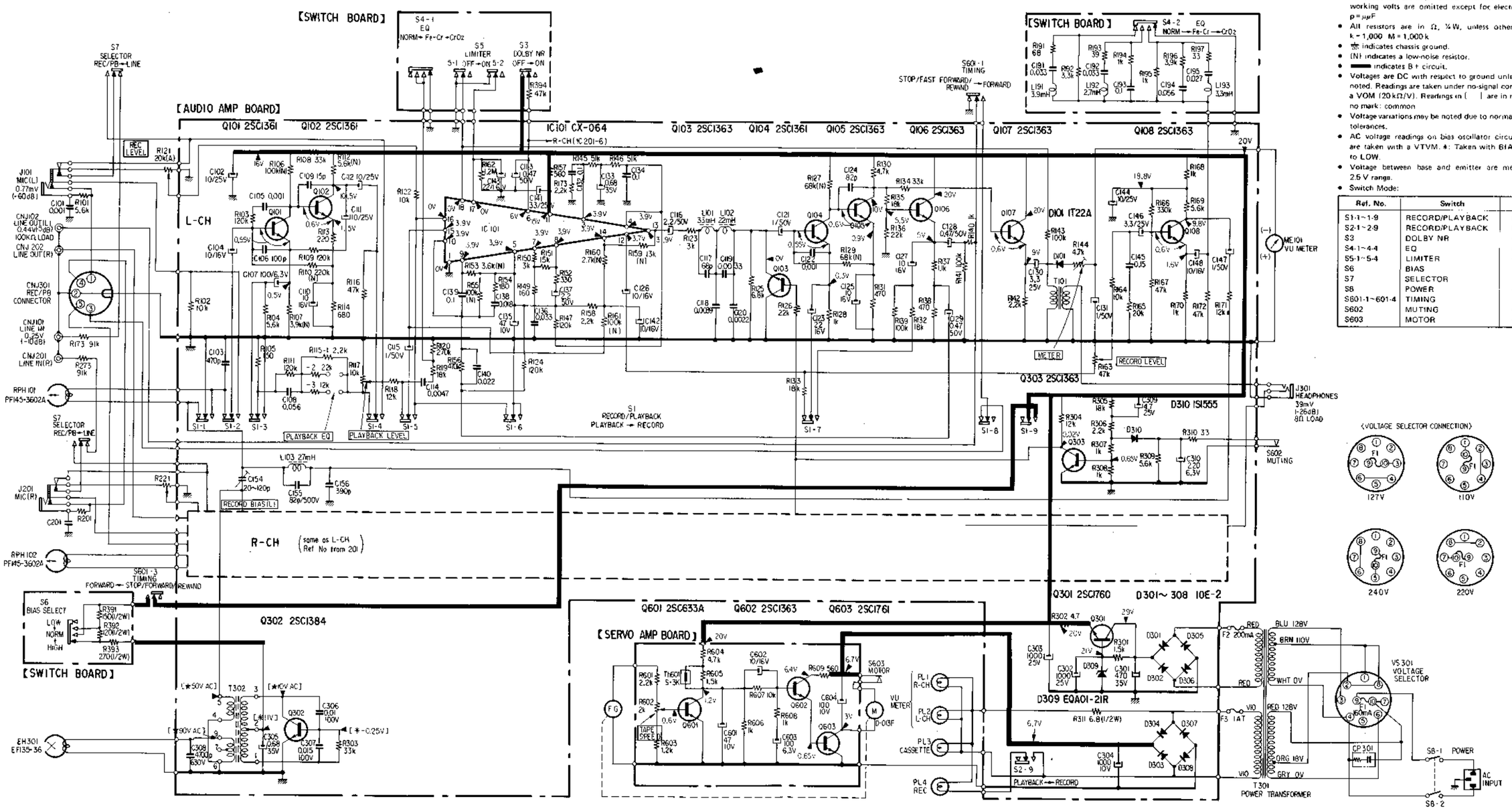
Q IC	302 208 108 301 IC101 107 102 103 101 105 106 104
D	305 308 306 301 309 302 307 304 303 101 310





Q IC	302 208 108 301 IC101 107 102 103 101 105 106 104 303 204 206 205 203 201 202 IC201 207
D	305 308 306 301 309 302 307 304 303 101 310 201

4-2. SCHEMATIC DIAGRAM



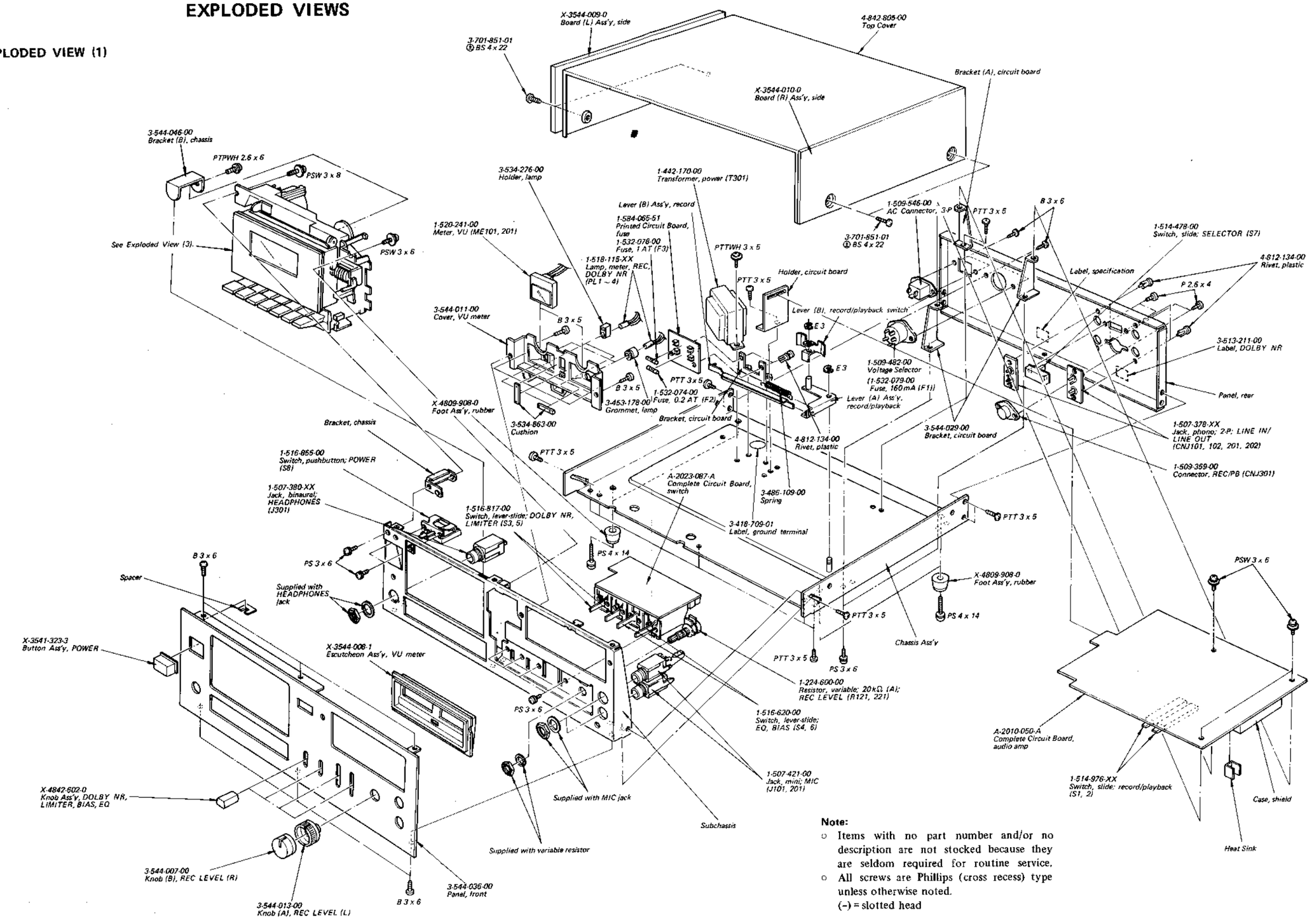
Note:

- All capacitors are in μF unless otherwise noted. 50 or less working volts are omitted except for electrolytic type. p=μμF
- All resistors are in Ω, ¼W, unless otherwise noted. k=1,000 M=1,000k
- ⏚ indicates chassis ground.
- (N) indicates a low-noise resistor.
- ▬ indicates B+ circuit.
- Voltages are DC with respect to ground unless otherwise noted. Readings are taken under no-signal conditions with a VOM (20kΩ/V). Readings in ( ) are in record mode, no mark: common
- Voltage variations may be noted due to normal production tolerances.
- AC voltage readings on bias oscillator circuit marked * are taken with a VTVM. ★: Taken with BIAS switch set to LOW.
- Voltage between base and emitter are measured with 2.5 V range.
- Switch Mode:

Ref. No.	Switch	Position
S1-1~1-9	RECORD/PLAYBACK	PLAYBACK
S2-1~2-9	RECORD/PLAYBACK	PLAYBACK
S3	DOLBY NR	OFF
S4-1~4-4	EQ	NORM
S5-1~5-4	LIMITER	OFF
S6	BIAS	LOW
S7	SELECTOR	LINE
S8	POWER	OFF
S601-1~601-4	TIMING	FORWARD
S602	MUTING	OFF
S603	MOTOR	OFF

SECTION 5
EXPLODED VIEWS

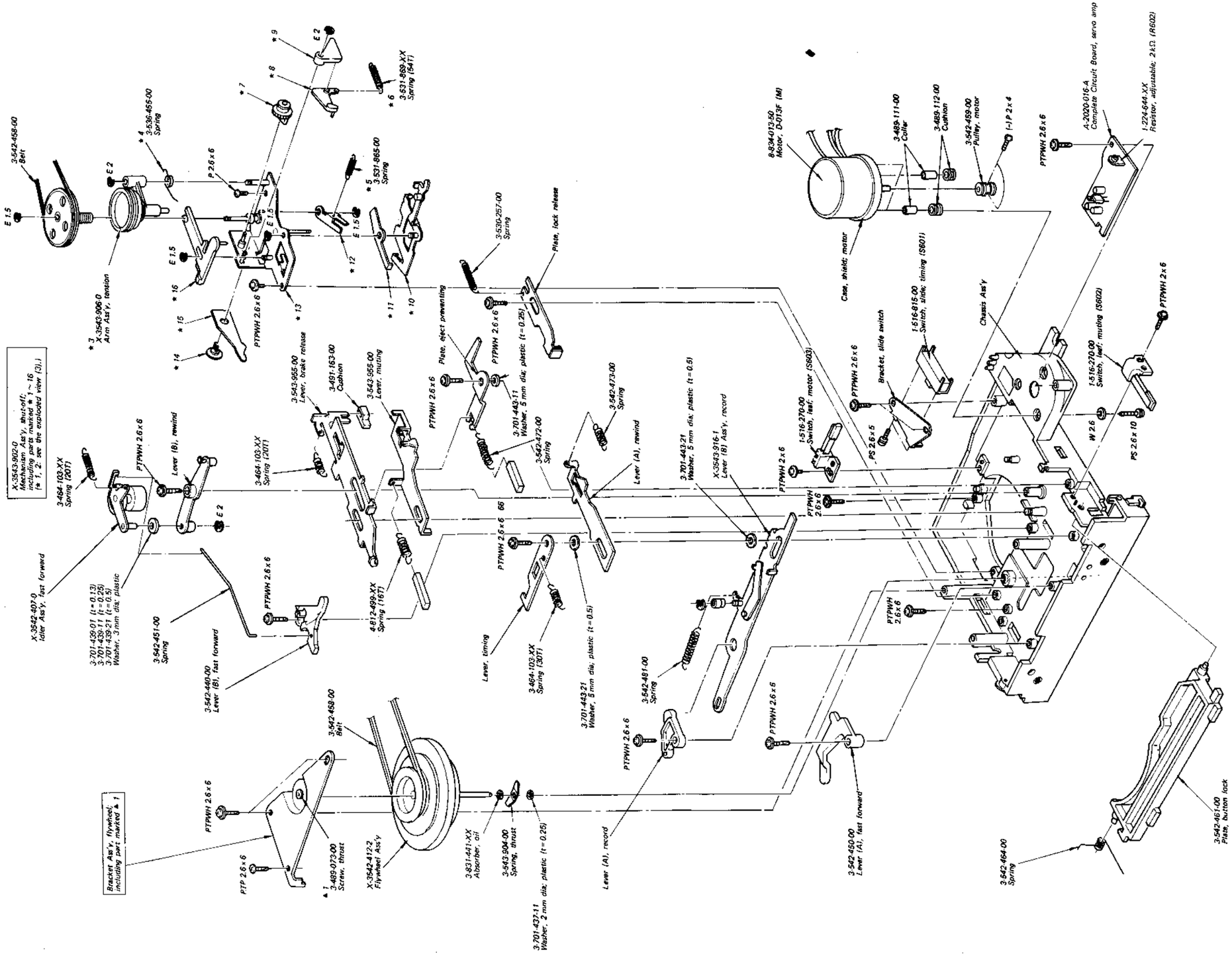
5-1. EXPLODED VIEW (1)



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head

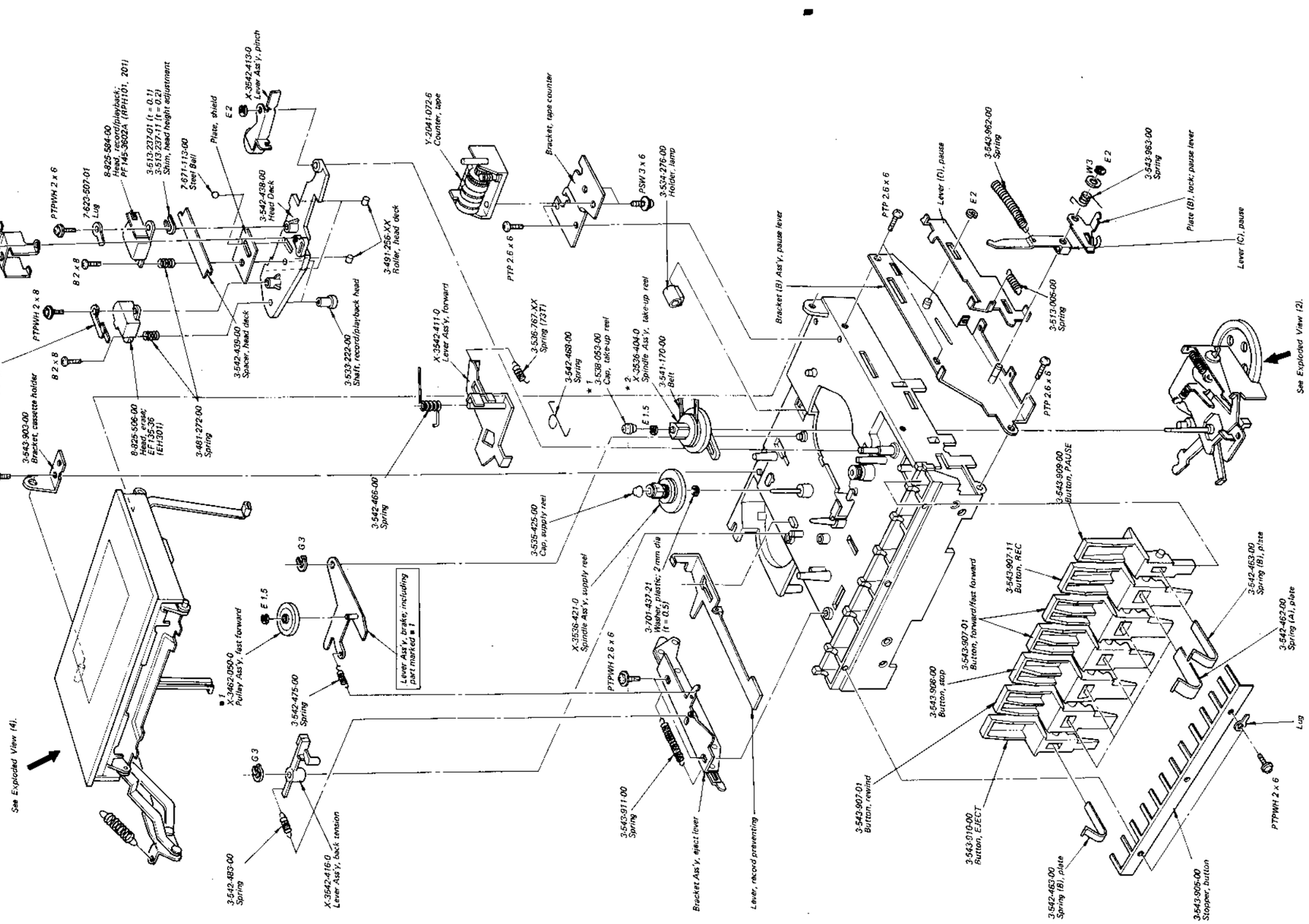
5-2. EXPLODED VIEW (2)



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Philips (cross recess) type unless otherwise noted.
  (-) = slotted head
- (□□T) shows the number of coils in spring.

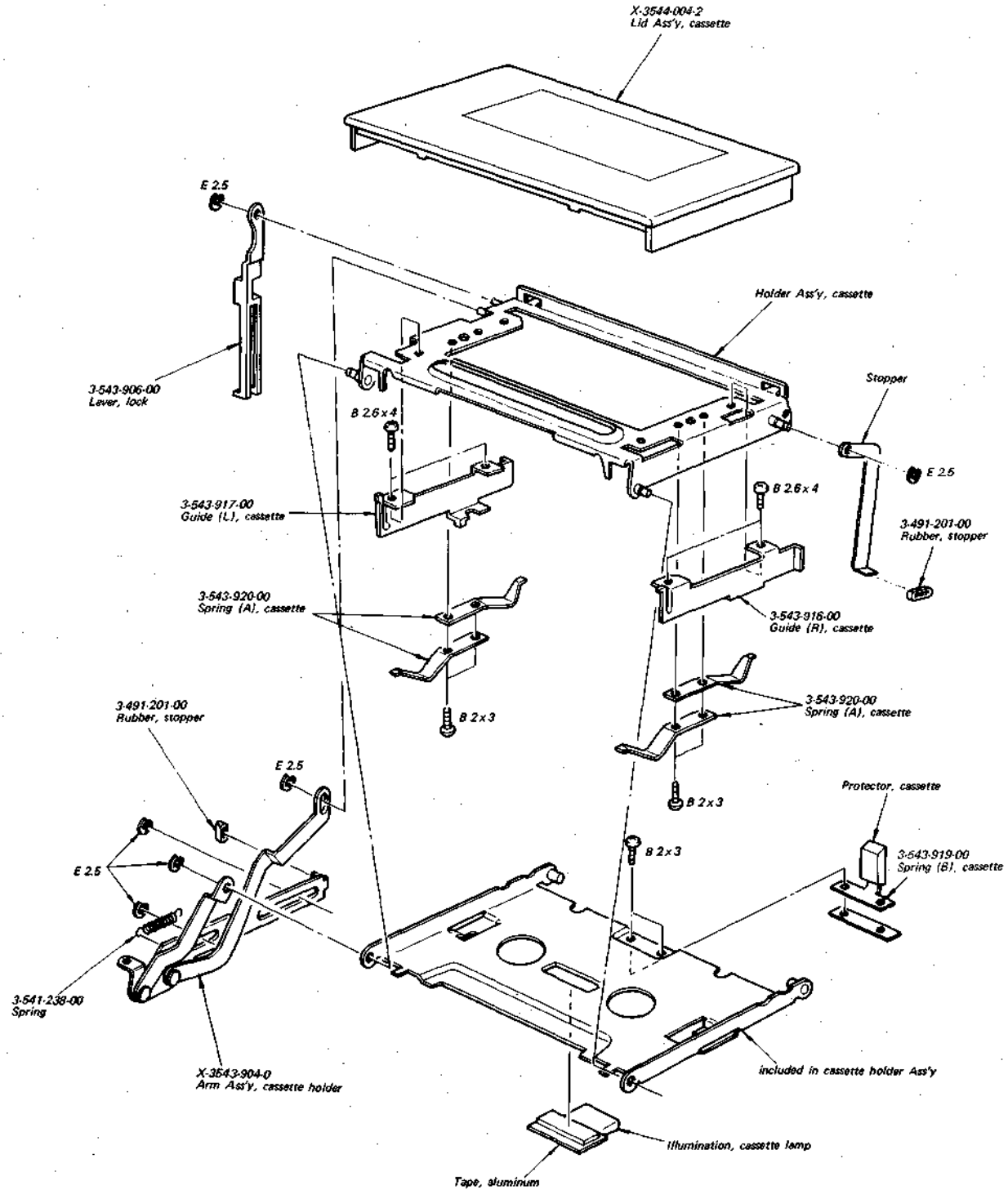
5-3. EXPLODED VIEW (3)



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head
- (□□T) shows the number of coils in spring.

5-4. EXPLODED VIEW (4)



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- (□□T) shows the number of coils in spring.

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	COMPLETE CIRCUIT BOARDS	
	A-2010-050-A	Audio Amp
	A-2020-016-A	Servo Amp
	A-2023-087-A	Switch
	PRINTED CIRCUIT BOARD	
	1-584-065-51	fuse
	SEMICONDUCTORS	
	Transistor	
Q101,201 Q102,202		2SC1361
Q103,203		2SC1363
Q104,204		2SC1361
Q105~108 Q205~208		2SC1363
Q301		2SC1760
Q302		2SC1384
Q303		2SC1363
Q601,602		2SC1363
Q603		2SC1761
	Diodes	
D101,201		1T22A
D301~308		10E-2
D309		EQA01-21R
D310		1S1555
Th601	1-800-200-00	Thermistor
	IC	
IC101,201		CX-064

Ref. No.	Part No.		Description
	COILS		
L101,201	1-407-212-XX	33 mH	microinductor
L102,202	1-407-240-00	22 mH	variable inductor
L103,203	1-407-211-XX	27 mH	microinductor
L191,291	1-407-201-XX	3.9 mH	microinductor
L192,292	1-407-199-XX	2.7 mH	microinductor
L193,293	1-407-200-XX	3.3 mH	microinductor
	CAPACITORS		
	All capacitors are in μF and ceramic type unless otherwise indicated. 50 or less working volts are omitted except for electrolytic type. (elect = electrolytic, p = μμF)		
C101,201	1-101-455-11	0.001	
C102,202	1-121-398-11	10	25 V elect
C103,203	1-102-114-11	470 p	
C104,204	1-121-916-11	10	16 V elect
C105,205	1-102-074-11	0.001	16 V
C106,206	1-102-106-11	100 p	
C107,207	1-121-413-11	100	6.3 V elect
C108,208	1-105-522-12	0.056	mylar
C109,209	1-102-951-11	15 p	
C110,210	1-121-916-11	10	16 V elect
C111,211 C112,212	1-121-398-11	10	25 V elect
C113	1-121-726-11	0.47	50 V elect
C114,214	1-105-509-12	0.0047	mylar
C115,215	1-121-391-11	1	50 V elect
C116,216	1-121-450-11	2.2	50 V elect
C117,217	1-101-889-11	68 p	
C118,218	1-105-508-12	0.0039	mylar
C119,219	1-129-794-11	0.0033	film
C120,220	1-105-505-12	0.0022	mylar
C121,221	1-121-391-11	1	50 V elect
C122,222	1-102-074-11	0.001	
C123,223	1-121-479-11	22	16 V elect
C124,224	1-102-974-11	82 p	
C125~127 C225~227	1-121-471-11	10	16 V elect

Ref. No.	Part No.			Description
C128,228 C129,229	1-121-726-11	0.47	50 V	elect
C130,230	1-121-392-11	3.3	25 V	elect
C131,231	1-121-391-11	1	50 V	elect
C132,232	1-105-525-12	0.1		mylar
C133,233	1-131-214-21	0.68	35 V	tantalum
C134,234	1-105-525-12	0.1		mylar
C135,235	1-121-409-11	47	10 V	elect
C136,236	1-105-519-12	0.033		mylar
C137,237	1-121-986-11	2.2	50 V	elect
C138,238	1-105-516-12	0.018		mylar
C139,239	1-105-525-12	0.1		mylar
C140,240	1-105-517-12	0.022		mylar
C141,241	1-121-404-11	33	25 V	elect
C142,242	1-121-471-11	10	16 V	elect
C143,243	1-121-479-11	22	16 V	elect
C144,244	1-121-398-11	10	25 V	elect
C145,245	1-105-847-12	0.15		mylar
C146,246	1-121-392-11	3.3	25 V	elect
C147,247	1-121-391-11	1	50 V	elect
C148,248	1-121-471-11	10	16 V	elect
C154,254	1-141-069-XX	20~120 p		trimmer
C155,255	1-107-037-11	82 p	500 V	silvered mica
C156,256	1-102-113-11	390 p		
C191,291 C192,292	1-105-519-12	0.033		mylar
C193,293	1-105-525-12	0.1		mylar
C194,294	1-105-522-12	0.056		mylar
C195,295	1-105-518-1w	0.027		mylar
C301	1-121-733-11	470	25 V	elect
C302,303	1-121-388-11	1000	35 V	elect
C304	1-121-736-11	1000	10 V	elect
C305	1-131-214-11	0.68	35 V	tantalum
C306	1-105-713-12	0.01	100 V	mylar
C307	1-105-715-12	0.015	100 V	mylar
C308	1-129-710-11	4700	630 V	film
C309	1-121-395-11	4.7	25 V	elect
C310	1-121-419-11	220	6.3 V	elect
C601	1-121-409-11	47	10 V	elect
C602	1-121-471-11	10	16 V	elect
C603	1-121-413-11	100	6.3 V	elect
C604	1-121-414-11	100	10 V	elect

RESISTORS

All resistors are in ohms. Regular type ¼ W carbon and composition resistors are omitted. Check the schematic diagram for the resistance Values. (k = 1000, M = 1000 k)

R117,217	1-224-645-XX	10 k, adjustable		
R121,221	1-224-600-00	20 k (A), variable; REC LEVEL		
R144,244	1-224-643-XX	4.7 k, adjustable		
R163,263	1-224-647-XX	47 k, adjustable		
R391	1-244-853-11	150	½ W	carbon
R392	1-244-851-11	120	½ W	carbon
R393	1-244-270-11	270	½ W	carbon
R602	1-224-644-XX	2 k, adjustable		

SWITCHES

S1,2	1-514-976-XX	Slide, record/playback
S3	1-516-817-00	Lever-slide, DOLBY NR
S4	1-516-620-00	Lever-slide, EQ
S5	1-516-817-00	Lever-slide, LIMITER
S6	1-516-620-00	Lever-slide, BIAS
S7	1-514-478-00	Slide, SELECTOR
S8	1-516-855-00	Pushbutton, POWER
S601	1-516-815-00	Slide, timing
S602,603	1-516-270-00	Leaf, muting/motor

TRANSFORMERS

T101,201	1-427-299-00	Output
T301	1-442-170-00	Power
T302	1-433-132-14	Bias Osc

JACKS

CNJ101~201 CNJ102,202	1-507-378-XX	Phono, 2-p; LINE IN/LINE OUT
CNJ201	1-509-359-00	Connector, REC/PB
J301		Binaural, HEADPHONES

Ref. No.	*Part No.*	*Description*
		MISCELLANEOUS
CP301	1-101-534-31	Encapsulated Component
EH301	8-825-506-00	Head, erase; EF135-36
F1	1-532-079-00	Fuse, 160 mA
F2	1-532-074-00	Fuse, 200 mAT
F3	1-532-078-00	Fuse, 1 AT
M	8-834-013-50	Motor, D-013F
ME101,201	1-520-241-00	Meter, VU
PL1~4	1-518-115-XX	Lamp, 6 V 35 mA
RPH101, RPH201	8-825-584-00	Head, record/playback; PF145-3602A
VS301	1-509-482-00	Voltage Selector
	1-509-546-00	AC connector, 3 p

Part No.	*Description*
	ACCESSORIES
X-3701-018-2	Tips Ass'y, cleaning
1-534-049-51	Cord, connection; RK-74H
3-780-826-11	Manual, instruction
3-793-010-21	Booklet, tape talk
3-793-506-11	Label, voltage
3-793-828-11	Card, caution; cassette
8-890-060-00	Tape, cassette; Fe-Cr; C-60

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9-954-372-01

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