TC-WR521/WR590

SERVICE MANUAL

US Model
Canadian Model
TC-WR521/WR590
AEP Model
UK Model
E Model
TC-WR590

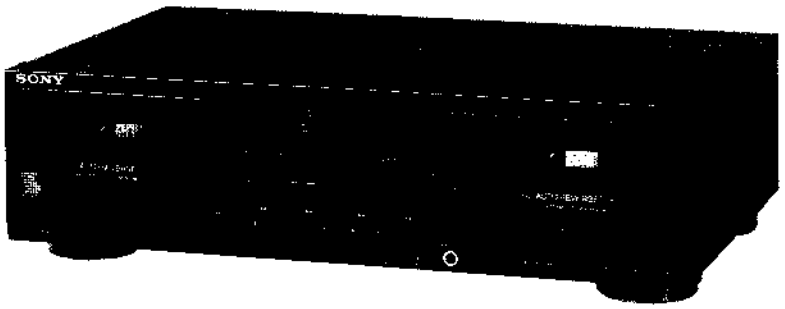


Photo : TC-WR590

SPECIFICATIONS

Recording system 4-track 2-channel stereo
Fast winding time Approx. 90 sec. (with Sony C-60 cassette)
Bias AC bias
Signal-to-noise ratio (at peak level)

Cassette (Dolby NR OFF)	Type IV (Sony Metal-Select/S)	Type II (Sony UX-S)	Type I (Sony HF-S)
	58 dB	57 dB	55 dB

Measured at peak level weighted without NR. The S/N is improved by about 15 dB at 500 Hz and by about 20 dB about 1 kHz with Dolby-C NR on, and by 5 dB at 1 kHz and by 10 dB about 5 kHz with Dolby-B NR on.

Harmonic distortion
0.4% (with Sony Type I, 160 nWb/m, 315 Hz, 3rd H.D.)
1.8% (with Sony Type IV, 250 nWb/m, 315 Hz, 3rd H.D.)

Frequency response (Dolby NR OFF)

Type IV cassette (Sony Metal-Select/S)	30–15,000 Hz (± 3dB, IEC) ····· WR521 30–18,000 Hz (± 3dB, IEC) ····· WR590 30–13,000 Hz [± 3dB, (–4dB) recording]
Type II cassette (Sony UX-S)	30–15,000 Hz (± 3dB, IEC) ····· WR521 30–17,000 Hz (± 3dB, IEC) ····· WR590
Type I cassette (Sony HF-S)	30–14,000 Hz (± 3dB, IEC) ····· WR521 30–15,000 Hz (± 3dB, IEC) ····· WR590

Wow and flutter ±0.14% W.Peak (IEC)
0.08% W.RMS (NAB)
±0.19% W.Peak (DIN)

Model Name Using Similar Mechanism			TC-WR520/WR570
Tape Transport Machanism Type	TC-WR521	DECK A	TCM-190RA12C
		DECK B	TCM-190RB22C
	TC-WR590	DECK A	TCM-190RA12C
		DECK B	TCM-190RB12C

Inputs

Line inputs (phono jacks)	Sensitivity	0.16 V
	Input impedance	47 kilohms

Outputs

Line outputs (phono jacks)	Rated output level	0.5 V at a load impedance of 47 kilohms
	Load impedance	Over 10 kilohms
Headphones (stereo phone jack) (WR590 only)	Output level	1 mW at a load impedance of 32 ohms

— Continued on page 2 —

STEREO CASSETTE DECK

SONY®

General

Power requirements	Model for U.S.A. and Canada: 120 V AC, 60 Hz Model for the United Kingdom: 240 V AC (or 220 V AC adjustable by Sony personnel), 50/60 Hz
Power consumption	23 W
Dimensions	TC-WR590 Approx. 430 × 123 × 285 mm (w/h/d) (17 × 4 7/8 × 11 1/4 inches) including projecting parts and controls TC-WR521 Approx. 430 × 118 × 285 mm (w/h/d) (17 × 4 3/4 × 11 1/4 inches) including projecting parts and controls
Weight	Approx. 4.5 kg (9 lbs 15 oz)

Supplied accessories

Audio connecting cords (2)

Design and specifications are subject to change without notice.

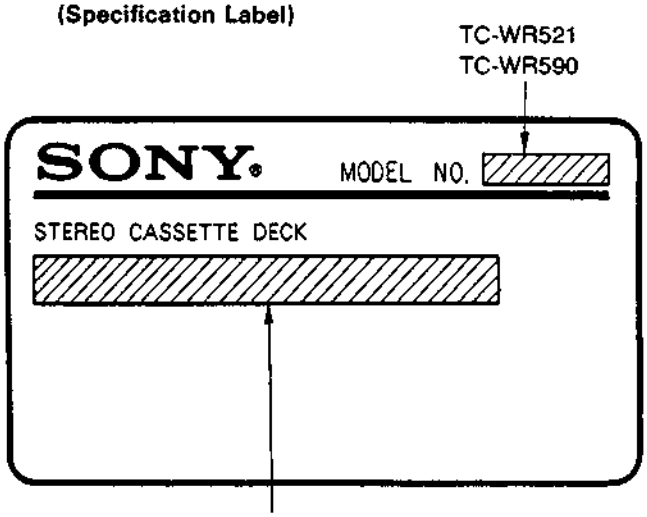
Note

This appliance conforms with EEC Directive 87/308/EEC regarding interference suppression.

TABLE OF CONTENTS

MODEL IDENTIFICATION

(Specification Label)



US, Canadian model: AC120V 60Hz 23W
UK model: AC240V ~50/60Hz
Germany, AEP model: AC220-230V ~50/60Hz
E model: AC120, 220, 240V ~50/60Hz 23W

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety check before releasing the set to the customer:
Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microampers). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2V AC range are suitable. (See Fig. A)

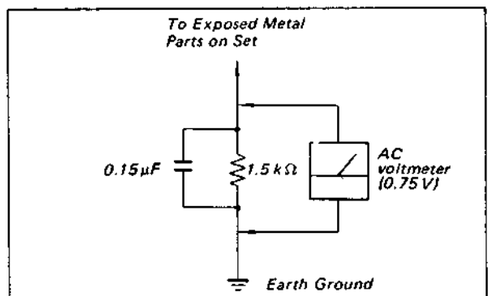


Fig. A. Using an AC voltmeter to check AC leakage.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

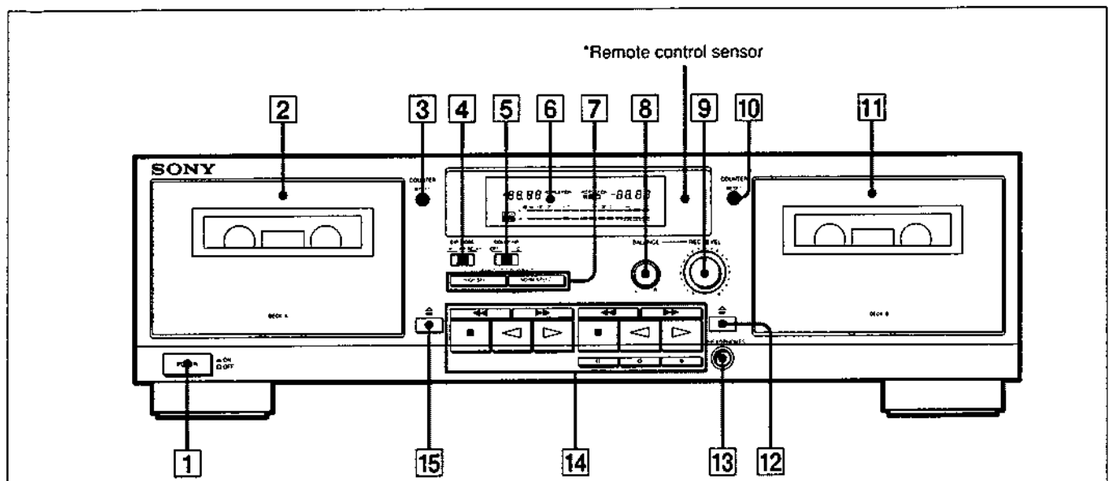
LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SECTION 1
GENERAL

This section is extracted from instruction manual.

1-1. IDENTIFYING THE PARTS

Front Panel



(The illustration shows the TC-WR590.)

For details, refer to the page number indicated in parenthesis.

1 **POWER switch**
2 **Deck A**
3 **COUNTER RESET button (deck A)**
4 **DIR (direction) MODE switch (pages 7, 8, 10 and 14)**
5 **DOLBY NR (Dolby noise reduction) switch (pages 7 and 10)**
6 **Display panel**
7 **SYNCHRO DUBBING buttons (page 14)**
HIGH SPEED button
NORM (normal) SPEED button
8 **BALANCE control (page 10)**
9 **REC (recording) LEVEL control (pages 10 and 11)**
10 **COUNTER RESET button (deck B)**
11 **Deck B**
12 **⏏ (eject) button (deck B)**
13 **HEADPHONES (headphones) jack (stereo phone jack) (WR590 only)**
14 **Tape operation buttons**
◀◀ (leftward fast winding) button
▶▶ (rightward fast winding) button
■ (stop) button
◀ (reverse play) button
▶ (forward play) button
II PAUSE button (deck B only)
O REC MUTE (record muting) button (deck B only) (page 13)
● REC (recording) button (deck B only)
15 **⏏ (eject) button (deck A)**

***Remote control sensor**
You can remotely control this cassette deck with:
— A remote commander that came with a Sony amplifier or receiver if it has the mark and cassette deck control capability.
— Any optional Sony remote commander with the mark and cassette deck control capability.

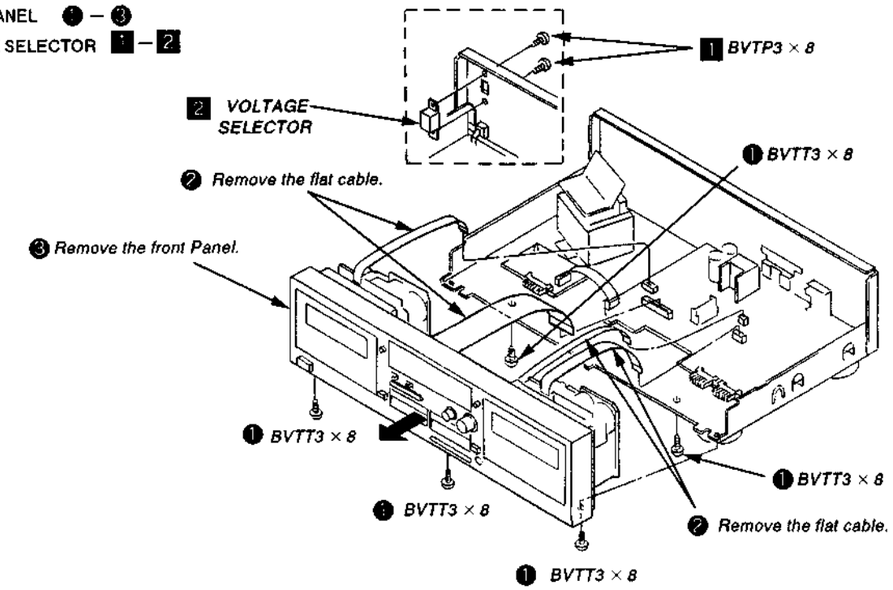
SECTION 2
DISASSEMBLY

Note : Follow the disassembly procedure in the numerical order given.

CASE
Unscrew the four case attachment screws M3 × 8 and remove the case.

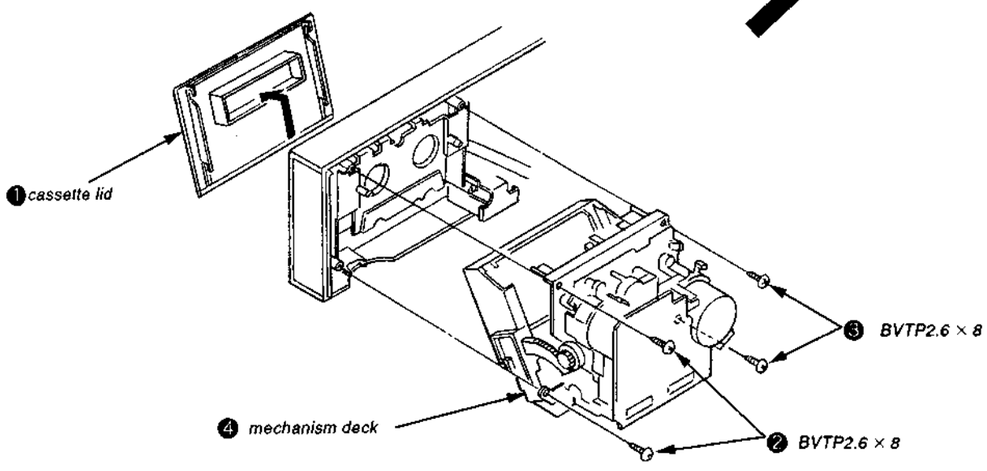
2-1. FRONT PANEL

FRONT PANEL ❹ – ❸
VOLTAGE SELECTOR ❶ – ❷

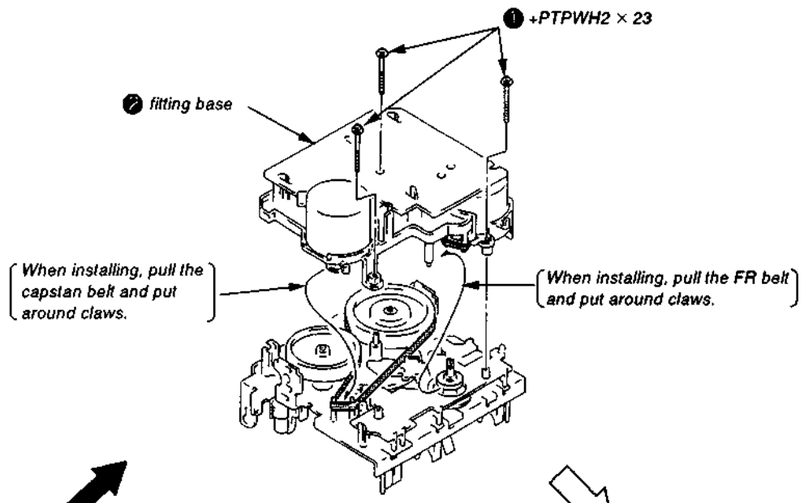


2-2 MECHANISM DECK

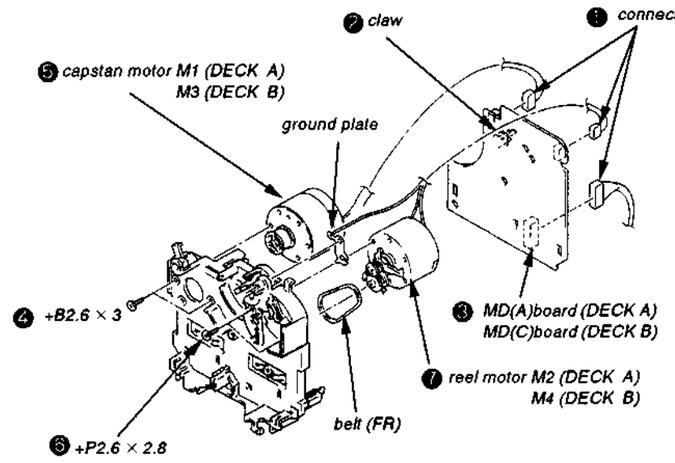
❶ Press the EJECT button.



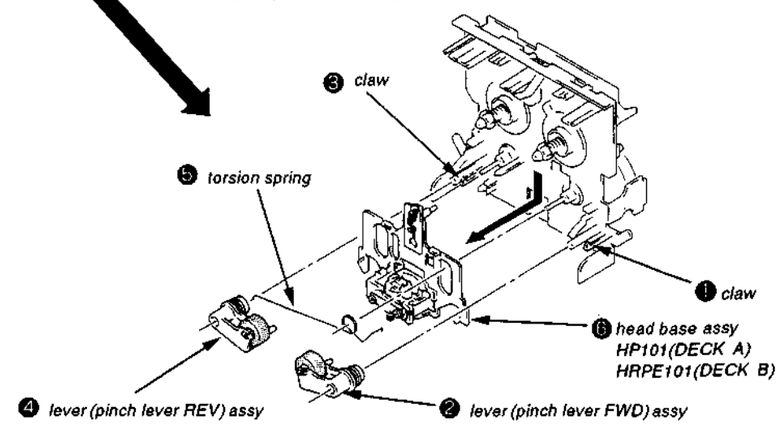
2 -3. CAPSTAN MOTOR, REEL MOTOR



Remove the cassette holder



2-4. HEAD, PINCH ROLLER



SECTION 3
EXPLANATION OF IC TERMINALS

IC801 M50941-712P

<table>
<tr><th>Pin. No.</th><th>Terminal name</th><th>I/O</th><th>Terminal explanation</th></tr>
<tr><td>1</td><td>VREF</td><td></td><td>Standard voltage 5V</td></tr>
<tr><td>2</td><td>METER. L</td><td>I</td><td>Meter L-CH input</td></tr>
<tr><td>3</td><td>METER. R</td><td>I</td><td>Meter R-CH input</td></tr>
<tr><td>4</td><td>KEY. 1</td><td>I</td><td>Key input</td></tr>
<tr><td>5</td><td>KEY. 2</td><td>I</td><td>Key input</td></tr>
<tr><td>6</td><td>B. METAL</td><td>I</td><td>Metal tape detection at B-deck, "L" : Metal</td></tr>
<tr><td>7</td><td>B. LSW</td><td>I</td><td>
<table>
<tr><th colspan="3">Switch status ON···Available OFF···Not Available</th><th rowspan="2">Input Voltage</th></tr>
<tr><th>REC A</th><th>REC B</th><th>HALF</th></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>5V</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>3.9V</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>2.8V</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>2V</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>1V</td></tr>
</table>
</td></tr>
<tr><td>8</td><td>A. SHUT</td><td>I</td><td>S-side reel rotation detection at A-deck</td></tr>
<tr><td>9</td><td>B. SHUT</td><td>I</td><td>S-side reel rotation detection at B-deck</td></tr>
<tr><td>10</td><td>VER. SELECT</td><td>I</td><td>Reverse/1 way "L" : Reverse</td></tr>
<tr><td>11</td><td>MOT. H/L</td><td>O</td><td>Tape speed selector "L" Normal, "H" : High</td></tr>
<tr><td>12</td><td>A. RM +</td><td>O</td><td>Reel moter (+) output at A-deck, "H" : FF</td></tr>
<tr><td>13</td><td>A. RM −</td><td>O</td><td>Reel moter (−) output at A-deck, "H" : REW</td></tr>
<tr><td>14</td><td>B. RM +</td><td>O</td><td>Reel moter (+) output at B-deck, "H" : FF</td></tr>
<tr><td>15</td><td>B. RM −</td><td>O</td><td>Reel moter (−) output at B-deck, "H" : REW</td></tr>
<tr><td>16</td><td>RELAY</td><td>O</td><td>Recording/play selector at B-deck, "L" : Recording</td></tr>
<tr><td>17</td><td>BIAS</td><td>O</td><td>Bias ON/OFF at B-deck, "H" : ON</td></tr>
<tr><td>18</td><td>A/B</td><td>O</td><td>A-deck/B-deck play selector, at B-deck, "H" : A-deck</td></tr>
<tr><td>19</td><td>REC/PB</td><td>O</td><td>Recording/play selector for Dolby IC, "H" : play</td></tr>
<tr><td>20</td><td>EQ. H/L</td><td>O</td><td>NORMAL/HIGH selector for recording equalizer, "L" : NORMAL</td></tr>
<tr><td>21</td><td>REC. MUTE</td><td>O</td><td>Recording MUTE ON/OFF "L" : ON</td></tr>
<tr><td>22</td><td>L. MUTE</td><td>O</td><td>LINE MUTE ON/OFF "L" : ON</td></tr>
<tr><td>23</td><td>P. OUT</td><td>O</td><td>Power holding output "L" : Power on holding</td></tr>
<tr><td>24</td><td>P. IN</td><td>I</td><td>Power switch input "L" : OFF</td></tr>
<tr><td>25</td><td>SIRCS</td><td>I</td><td>SIRCS signal input</td></tr>
<tr><td>26</td><td>CN − VSS</td><td></td><td>GND</td></tr>
<tr><td>27</td><td>RESET</td><td>I</td><td>RESET signal input</td></tr>
<tr><td>28</td><td>X − IN</td><td>I</td><td>Oscillation terminal</td></tr>
<tr><td>29</td><td>X − OUT</td><td>O</td><td>Oscillation terminal (4MHz)</td></tr>
<tr><td>30</td><td>XC − IN</td><td></td><td>Not used</td></tr>
<tr><td>31</td><td>XC − OUT</td><td></td><td>Not used</td></tr>
<tr><td>32</td><td>VSS</td><td></td><td>GND</td></tr>
<tr><td>33</td><td></td><td></td><td>Not used</td></tr>
<tr><td>34</td><td>TEST</td><td>I</td><td>Test mode selector "L" : Test mode</td></tr>
<tr><td>35</td><td>B. STOPSW</td><td>I</td><td>Mechanism stop swich input for B-deck "H" : STOP</td></tr>
</table>

Pin. No.	Terminal name	I/O	Terminal explanation
36	A. STOPSW	I	Mechanism stop switch input for A-deck "H" : STOP
37	A. HALF	I	Half pawl input for A-deck "L" : Available
38	VP	I	Pull-down volatage input for fluorescent (FL) tube
39	B. CM	O	Capstan motor ON/OFF for B-deck, "H" : ON
40	A. CM	O	Capstan motor ON/OFF for A-deck, "H" : ON
41 – 62	7G-P15	O	Fluorescent (FL) tube output
63	AVCC		Analog power input
64	VCC		Power

IC51 CXA1579P

Pin. No.	Terminal name	I/O	Terminal explanation
1	SPEED	I	Tape speed selector terminal "H" : HIGH
2	METAL	I	Metal tape selector terminal "H" : METAL
3	TAPE EQ	I	Tape equalizer selector terminal "H" : CrO_2
4	REC IN1	I	Recording equalizer amp input terminal
5	GND		
6	BOOST1	I	External capacitor for low-pass boost connecting terminal
7	VEE		
8	REC OUT1	O	Recording equalizer amp output terminal
9	REC OUT2	O	Recording equalizer amp output terminal
10	VCC		
11	BOOST2		External capacitor for low-pass boost connecting terminal
12	IREF	O	Standard current setting terminal of monolithic filter
13	REC IN2	I	Recording equalizer amp input terminal
14	REC CAL	I	Recording calibration terminal "H" : Recording level gain dowm

SECTION 4
ADJUSTMENTS

4-1. MECHANICAL ADJUSTMENTS

PRECAUTION

1. Clean the following parts with a denatured alcohol-moistened swab :
   record/playback/erase head pinch roller
   rubber belts capstan
   idlers
2. Demagnetize the record/playback head with a head demagnetizer.
   (Head demagnetizer do not approach for the erase head.)
3. Do not use a magnetized screwdriver for the adjustment.
4. After the adjustments, apply suitable locking compound to the parts adjusted.
5. The adjustments should be performed with the rated power supply voltage unless otherwise noted.

Torque Measurement

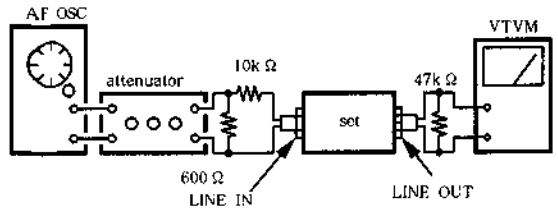
Torque	Torque meter	Meter reading
Forward	CQ-102C	30 to 65g • cm (0.42 to 0.9 oz • inch)
Forward back tension	CQ-102C	DECK A : 1 to 6g • cm (0.014 to 0.08 oz • inch) DECK B : 2 to 9g • cm (0.03 to 0.12 oz • inch)
Reverse	CQ-102RC	30 to 65g • cm (0.42 to 0.9 oz • inch)
Reverse back tension	CQ-102RC	1 to 6g • cm (0.014 to 0.08 oz • inch)
Forward, Reverse	CQ-201B	70 to 120g • cm (0.98 to 1.67 oz • inch)

4-2. ELECTRICAL ADJUSTMENTS

PRECAUTION

1. The adjustment should be performed in the publication. (Be sure to male playback adjustment at first.)
2. The adjustments and measurement should be performed for both L-CH and R-CH.
   • Switch position
   DOLBY NR switch : OFF
   DIR MODE switch : ⇄
   • Standard record position :
   Deliver the standard input signal level to input jack and set the REC LEVEL control to obtain the standard output signal level as follows.

– Record Mode –



Standard Input Level

Input terminal	LINE IN
source impedance	10k Ω
input signal level	0.25V (– 10dB)

Standard Output Level

Output terminal	LINE OUT
load impedance	47kΩ
output signal level	0.44V (– 5dB)

Test Tape

Tape	Contents	Use
P-4-A100	10kHz, – 10dB	Azimuth Adjustment
P-4-L300	315Hz, 0dB	PB Level Adjustment
WS-48B	3kHz, 0dB	Tape Speed Adjustment

0dB = 0.775V

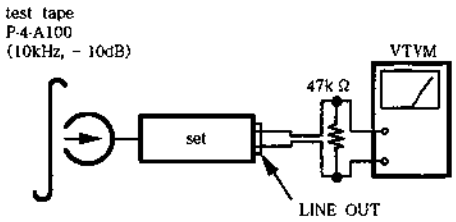
Test Mode

Connect ㉞ pin of IC801 to ground.
(place the IC801 pin 6 in "L" status) on the MAIN board with the power turned off, then turned the power on before adjustment.
Executes high speed dubbing when the HIGH SPEED (DUBBING) button is pressed during dubbing.
When pressing this button again, the normal speed dubbing is restored.
After adjustment, break the short condition.
The DECK A and B can be adjusted in the same manner.

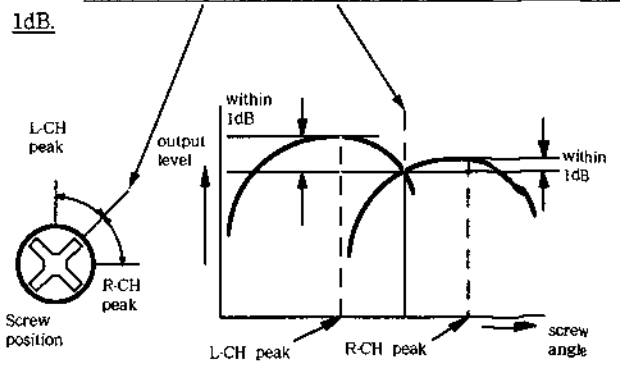
Record/Playback Head Azimuth Adjustment

Procedure:

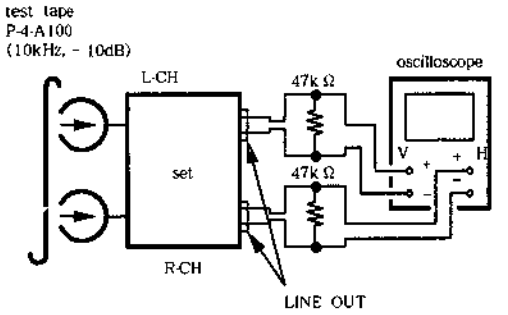
1. Forward playback Mode

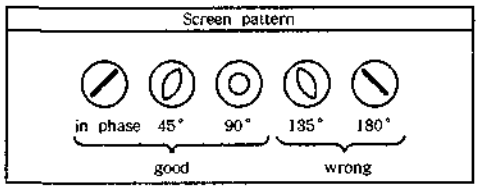


2. Turn the adjustment screw for the maximum output levels. If these levels do not match, turn the adjustment screw until both of output levels match together within 1dB.



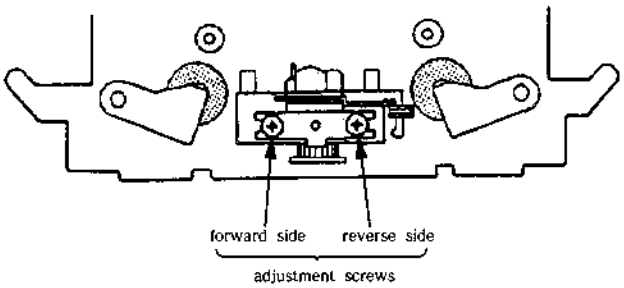
3. Playback Mode





4. Change the reveres playback mode and repeat the steps 1 to 3.
5. After the adjustment, lock the adjustment screws with suitable locking compound.

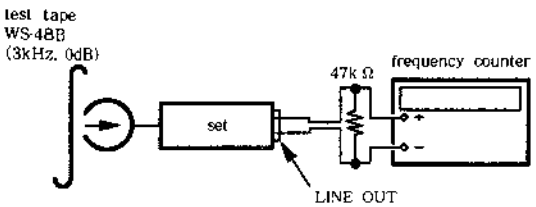
Adjustment Location : – record/playback head –



Tape Speed Adjustment

Procedure:

– Forward Playback Mode –



Perform high speed adjustment before normal speed adjustment.

(high speed adjustment)

1. Connect ㉘pin of IC801 to ground.
2. Set to FWD playback mode.
3. Keep on pressing the HIGH SPEED DUBBING switch.
4. Adjust RV72 so that the frequency counter reading becomes 6,000 ± 20Hz.
5. After adjustment, disconnect CN804 shorted in step 1.

(normal speed adjustment)

1. Set to FWD playback mode.
2. Adjust RV71 so that the frequency counter reading becomes 3,000 ± 10Hz.

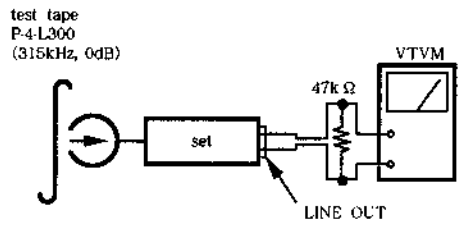
Frequency difference between the beginning and the end of the tape should be within 3%.
Frequency difference between deck A and deck B the beginning of the tape should be within 1.5%.

Adjustment Location : AUDIO board

Playback Level Adjustment

Procedure:

– Forward Playback Mode –



Adjust deck A, B : RV11(L-CH) and RV21(R-CH) so the VTVM reading becomes the adjustment limits below.

Adjustment Value :

LINE OUT level : – 7.7 ± 0.5dB (0.301 to 0.338V)

Level difference between channels : within 0.5dB

Confirm the LINE OUT level does not change in playback mode while changing the mode from playback to stop several times

Adjustment Location : AUDIO board

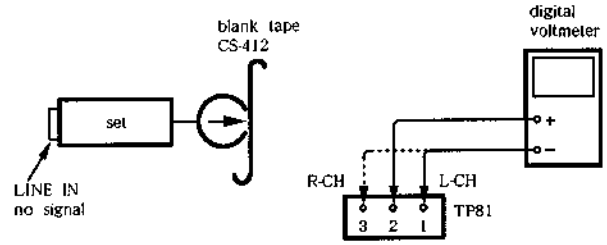
(TC-WR590 only)

Bias Consumption Current Adjustment

This adjustment should be performed when replacing the head assy or the bias oscillating transformer (T81,T91).

Procedure :

( ) : R-CH



1. Connect the digital voltmeter to test point TP81.
2. Set RV81 (RV91) to mechanical center.
3. Set to FWD record mode.
4. Adjust T81 (T91) so that the digital voltmeter reading becomes minimum.

Adjustment Location : AUDIO board

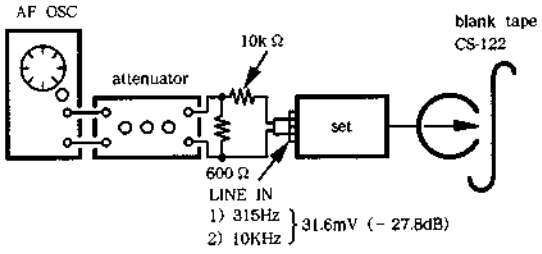
Record Level Adjustment

Setting :

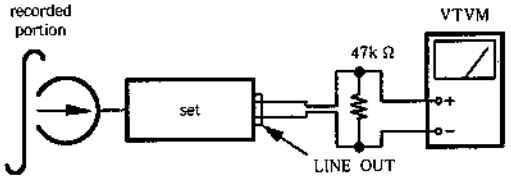
REC LEVEL control : standard record position (Refer to page 9.)

Procedure:

1. Record Mode



2. Playback Mode



Playback the signal recorded in step 1.
Confirm that the 10kHz playback output is 0 ± 0.5dB relative to the 315Hz output. If necessary, adjust RV81 (L-CH), RV91 (R-CH) and repeat the steps given above.
WR521 RV12 (L-CH), RV22 (R-CH)

Adjustment Location : AUDIO board

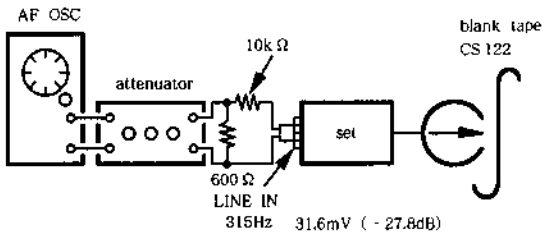
Record Level Adjustment

Setting :

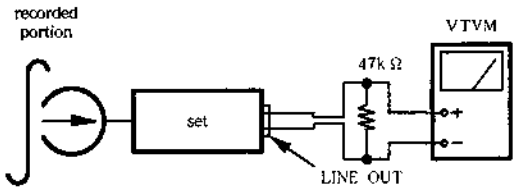
REC LEVEL control : standard record position (Refer to page 9.)

Procedure :

1. Record Mode



2. Playback Mode



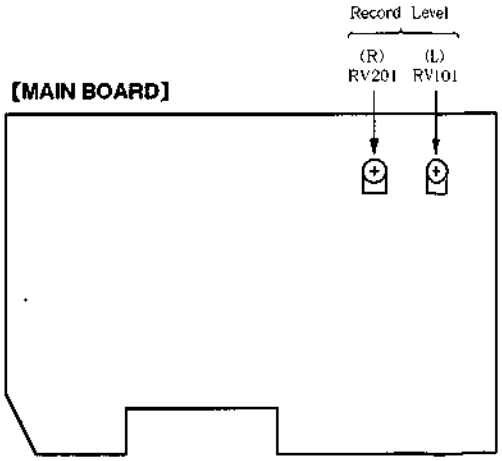
Confirm playback the tape recorded become adjustment level as follows.
If necessary, adjust RV101 (L-CH), RV201 (R-CH) and repeat the steps 1 and 2.

Adjustment Value :

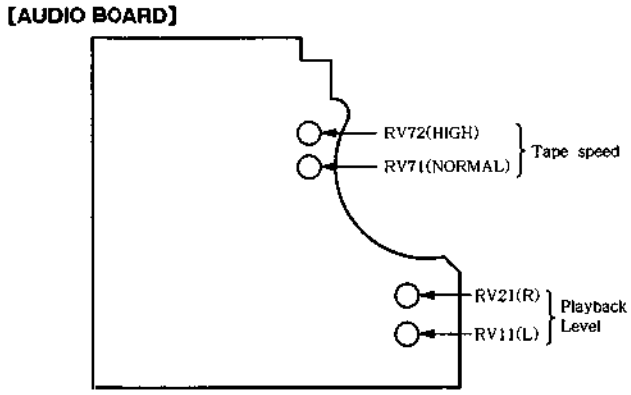
LINE OUT level : − 27.7 ± 0.5dB (30.2 to 33.8mV)

Adjustment Location : MAIN board

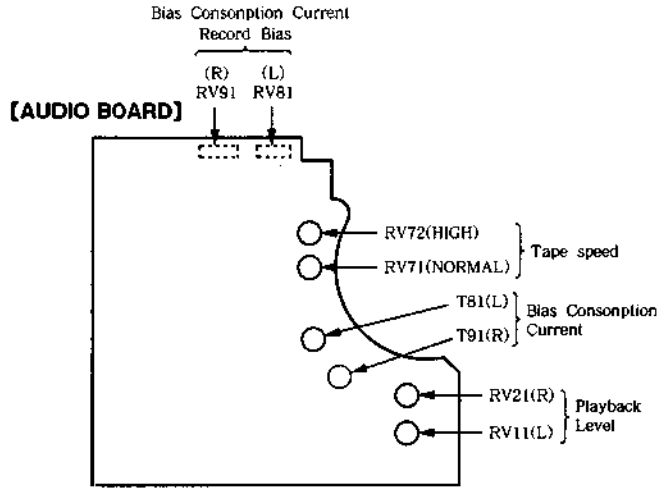
− Adjustment Parts Location Diagrams −



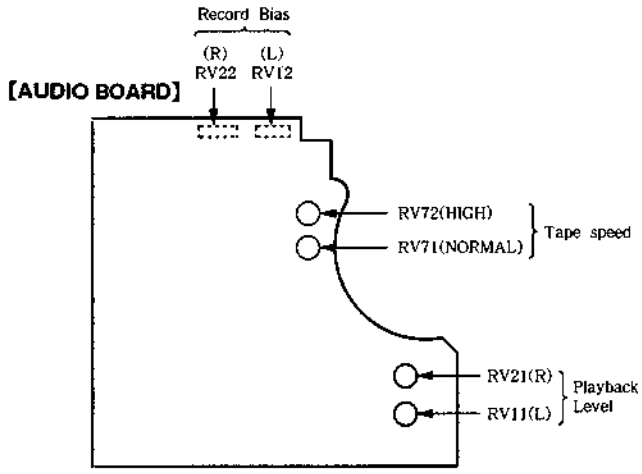
WR521/WR590
DECK A



WR590
DECK B

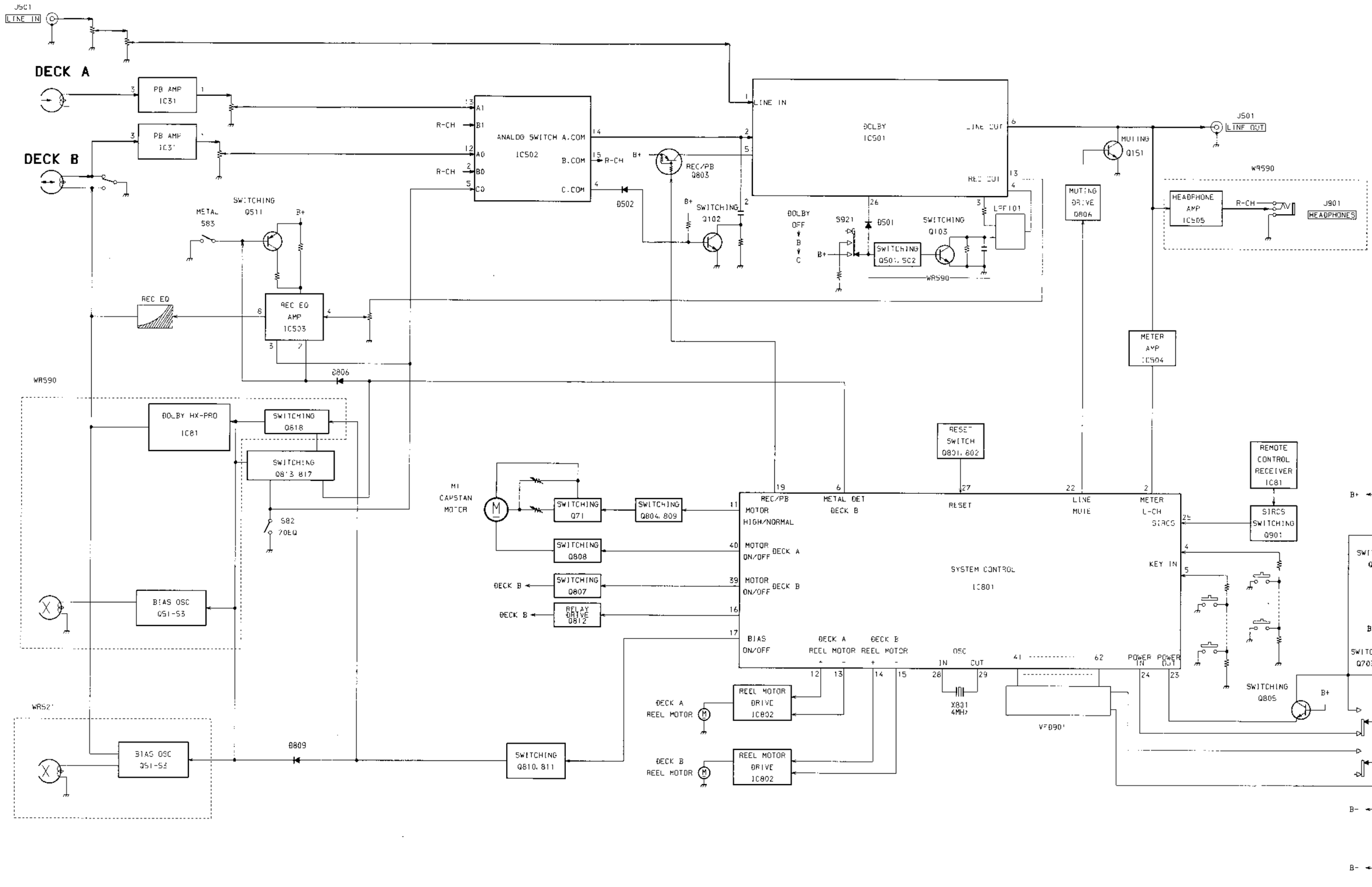


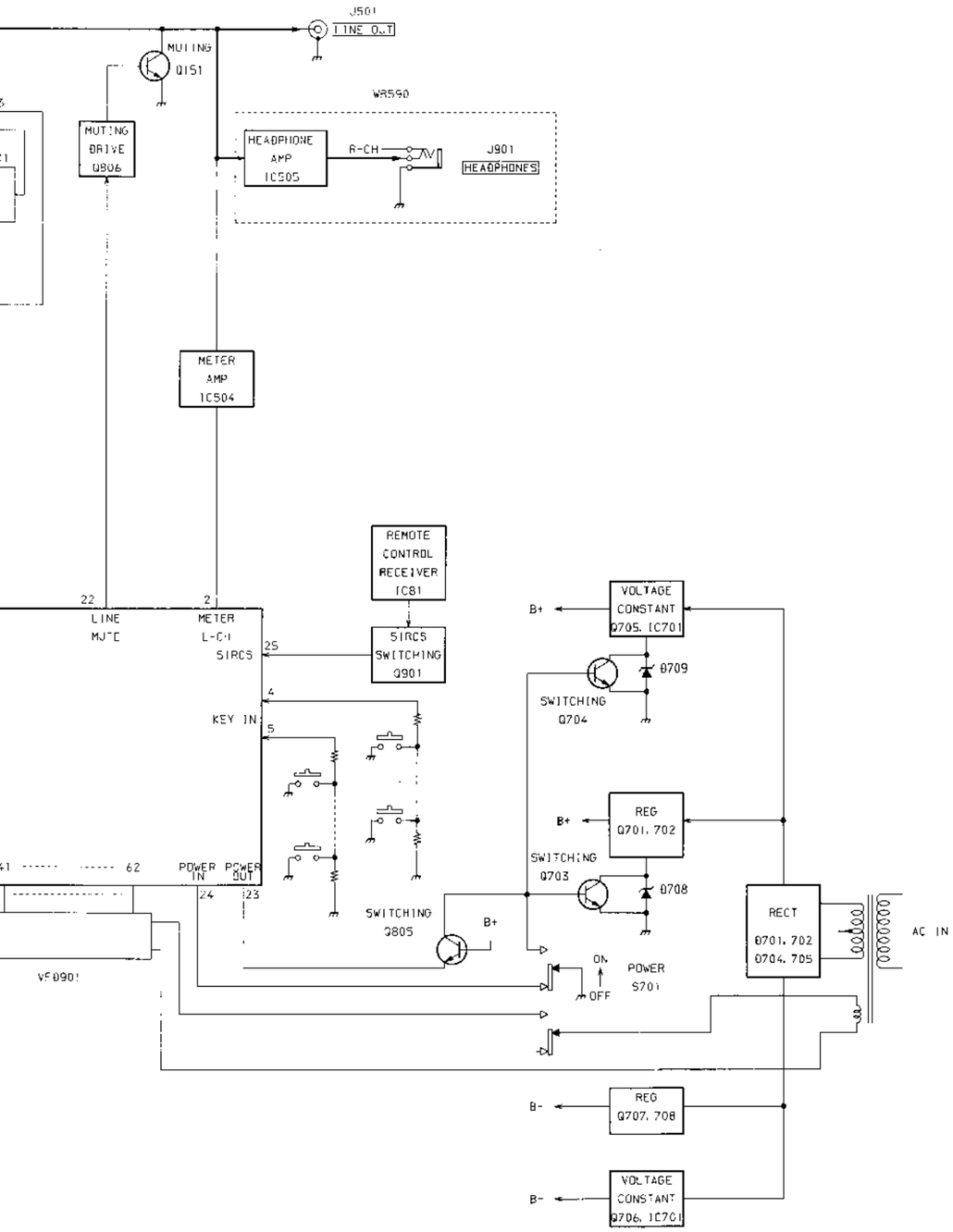
WR521
DECK B



SECTION 5
DIAGRAMS

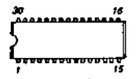
5-1. BLOCK DIAGRAM



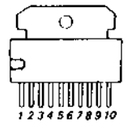


• SEMICONDUCTOR LEAD LAYOUTS.

CXA1331S

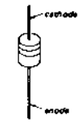


TA7272P

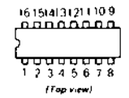


DTA114ES
DTC114ES
2SC2603-EF

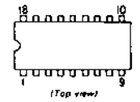
HZS6A1L



CXA1578P

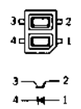


μ PC1297CA

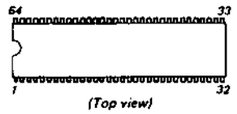


2SA1162

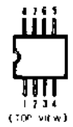
NJL5165K-B



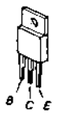
N50941-712SP



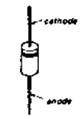
μ PC4570G2



2SB1094-LK
2SD2012



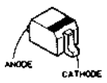
1N4148M
10E2N



RC4558P

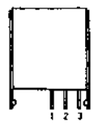
2SB1116A-L
2SD1387

1SS355



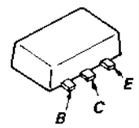
BN1L3Z-K
DTC114ES
DTC143TD
2SA1175-HFE

SBX1610-59



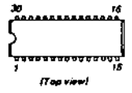
1 Vcc
2 Vout
3 GND

2SD1622-S

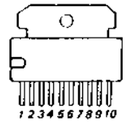


• SEMICONDUCTOR LEAD LAYOUTS.

CXA1331S

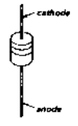


TA7272P

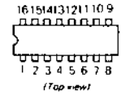


DTA114ES
DTC114ES
2SC2603-EF

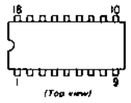
HZS6A1L



CXA1578P

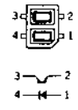


μ PC1297CA

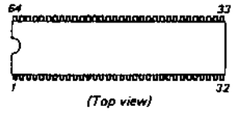


2SA1162

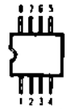
NJL5165K-B



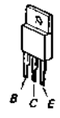
N50941-712SP



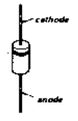
μ PC4570G2



2SB1094-LK
2SD2012

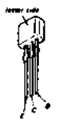


1N4148M
10E2N



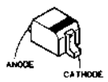
RC4558P

BN1L3Z-K
DTC114ES
DTC143TD
2SA1175-HFE

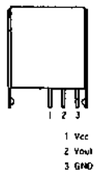


2SB1116A-L
2SD1387

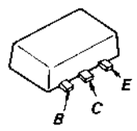
1SS355



SBX1610-59



2SD1622-S



AC IN

5-2. PRINTED WIRING BOARDS

• See page 16 for Semiconductor Lead Layouts.

• SEMICONDUCTOR LOCATION

Ref. No.	Location	Ref. No.	Location
D151	F - 21	Q102	G - 23
D251	F - 21	Q103	G - 24
D501	G - 21	Q151	D - 21
D502	G - 21	Q202	G - 22
D701	D - 16	Q203	G - 22
D702	D - 16	Q251	G - 20
D703	D - 15	Q501	G - 22
D704	D - 15	Q502	G - 21
D705	D - 16	Q511	D - 23
D706	D - 16	Q701	D - 18
D707	D - 15	Q702	C - 18
D708	D - 17	Q703	D - 17
D709	D - 20	Q704	D - 20
D710	E - 18	Q705	C - 19
D711	E - 16	Q706	E - 18
D712	E - 16	Q707	E - 16
D713	E - 17	Q708	E - 16
D714	E - 16	Q801	E - 17
D802	H - 15	Q802	E - 18
D803	H - 15	Q803	F - 18
D804	G - 20	Q804	H - 18
D805	G - 20	Q805	F - 18
D806	H - 20	Q806	F - 18
D807	I - 22	Q807	H - 18
D808	H - 18	Q808	H - 15
D809	J - 21	Q809	H - 18
D810	E - 18	Q810	J - 20
		Q811	J - 20
		Q812	J - 22
IC501	F - 23	Q813	I - 21
IC502	G - 21		
IC503	D - 23	Q814	I - 21
IC504	F - 21	Q815	I - 21
IC505	E - 21	Q816	J - 21
		Q817	I - 20
IC701	D - 19	Q818	J - 21
IC801	F - 17		
IC802	G - 18		
IC901	G - 8	Q901	G - 8

SW-A BOARD (DECK A)

Ref. No.	Location
IC81	C - 5

SW-B BOARD (DECK B)

Ref. No.	Location
IC81	H - 32

AUDIO BOARD (DECK A)

Ref. No.	Location
IC31	F - 3
Q71	F - 5

AUDIO BOARD (DECK B) : TC-WR521

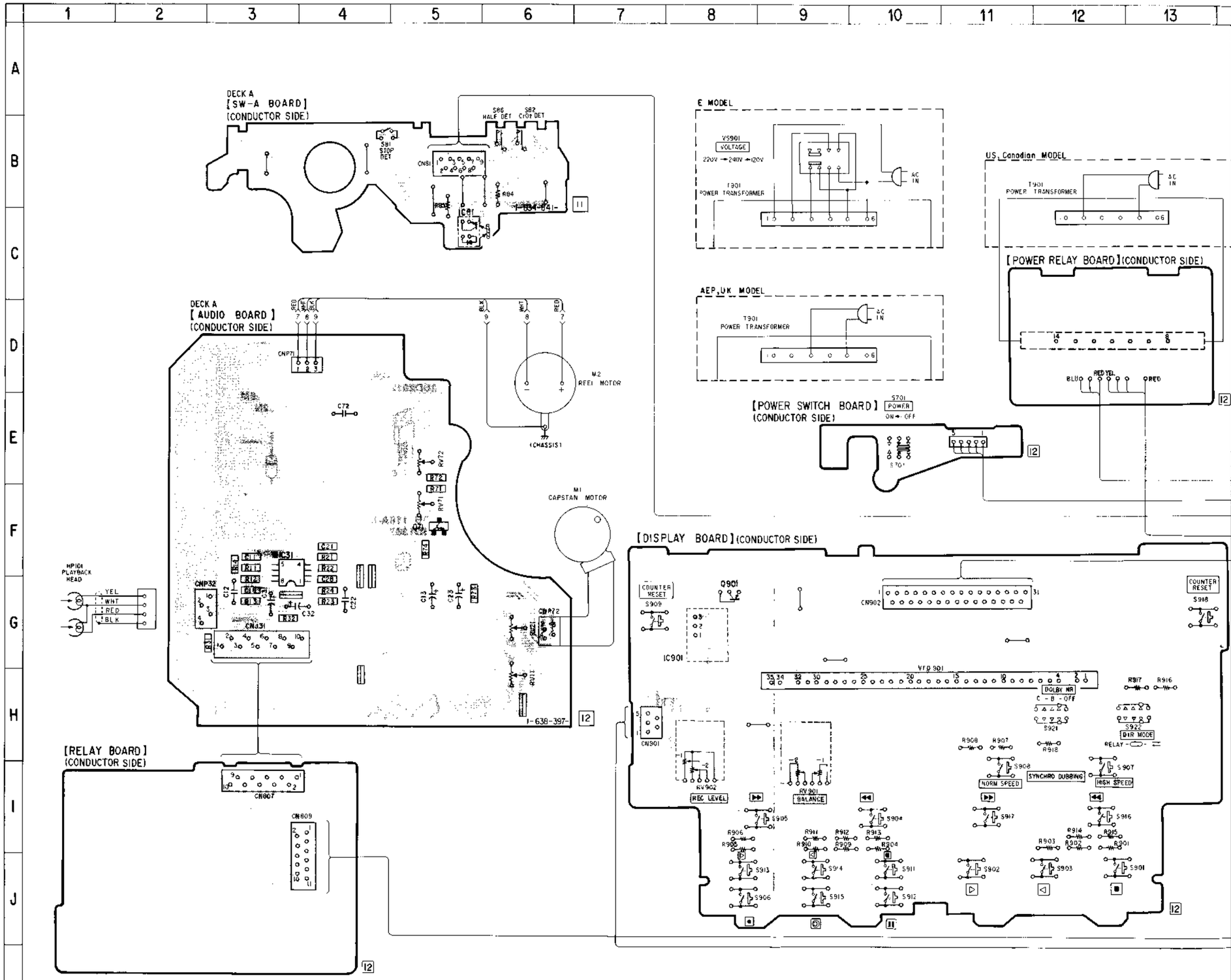
Ref. No.	Location
D31	D - 26
IC31	D - 28
Q51	C - 27
Q52	C - 27
Q53	C - 27
Q71	D - 29

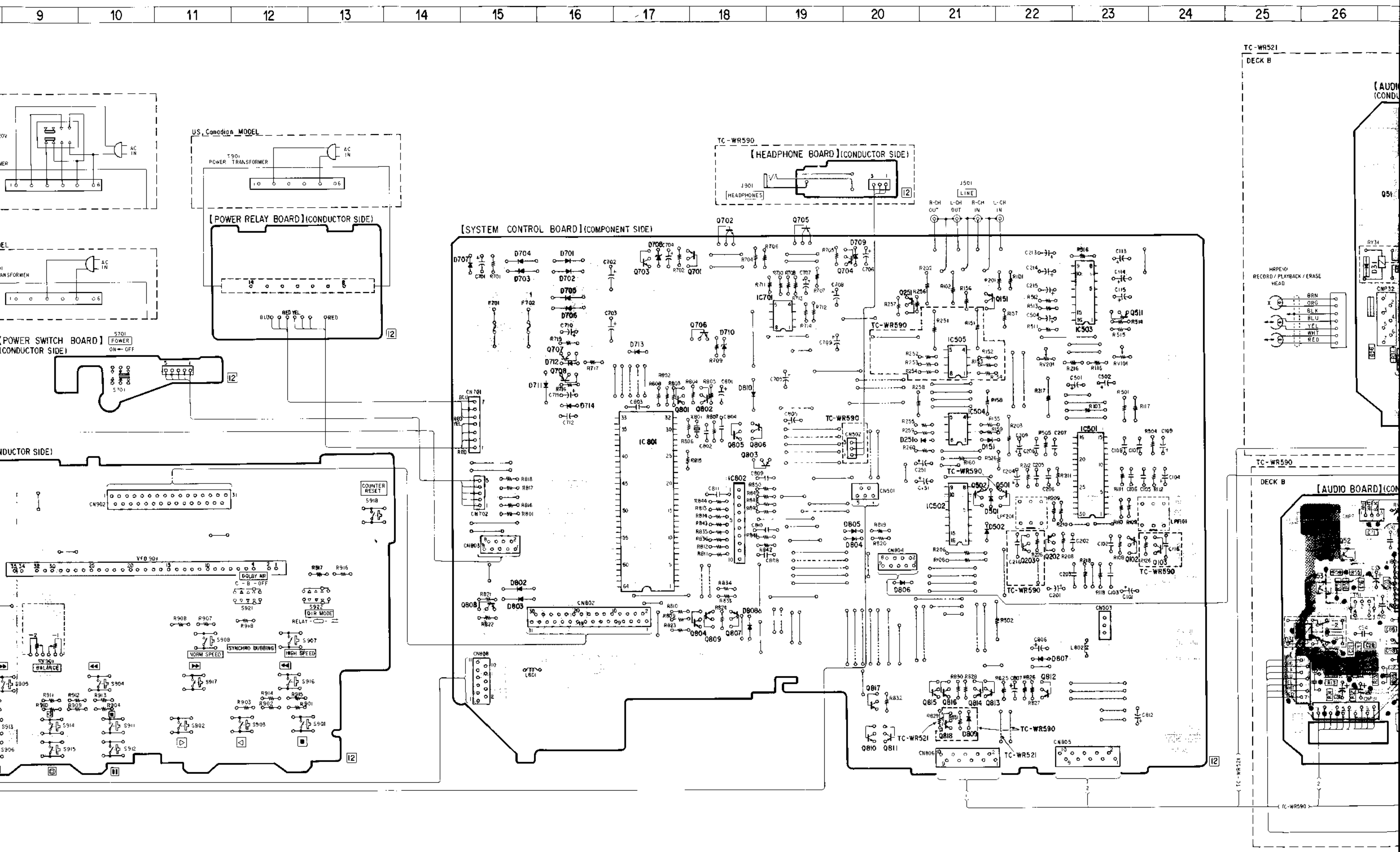
AUDIO BOARD (DECK B) : TC-WR590

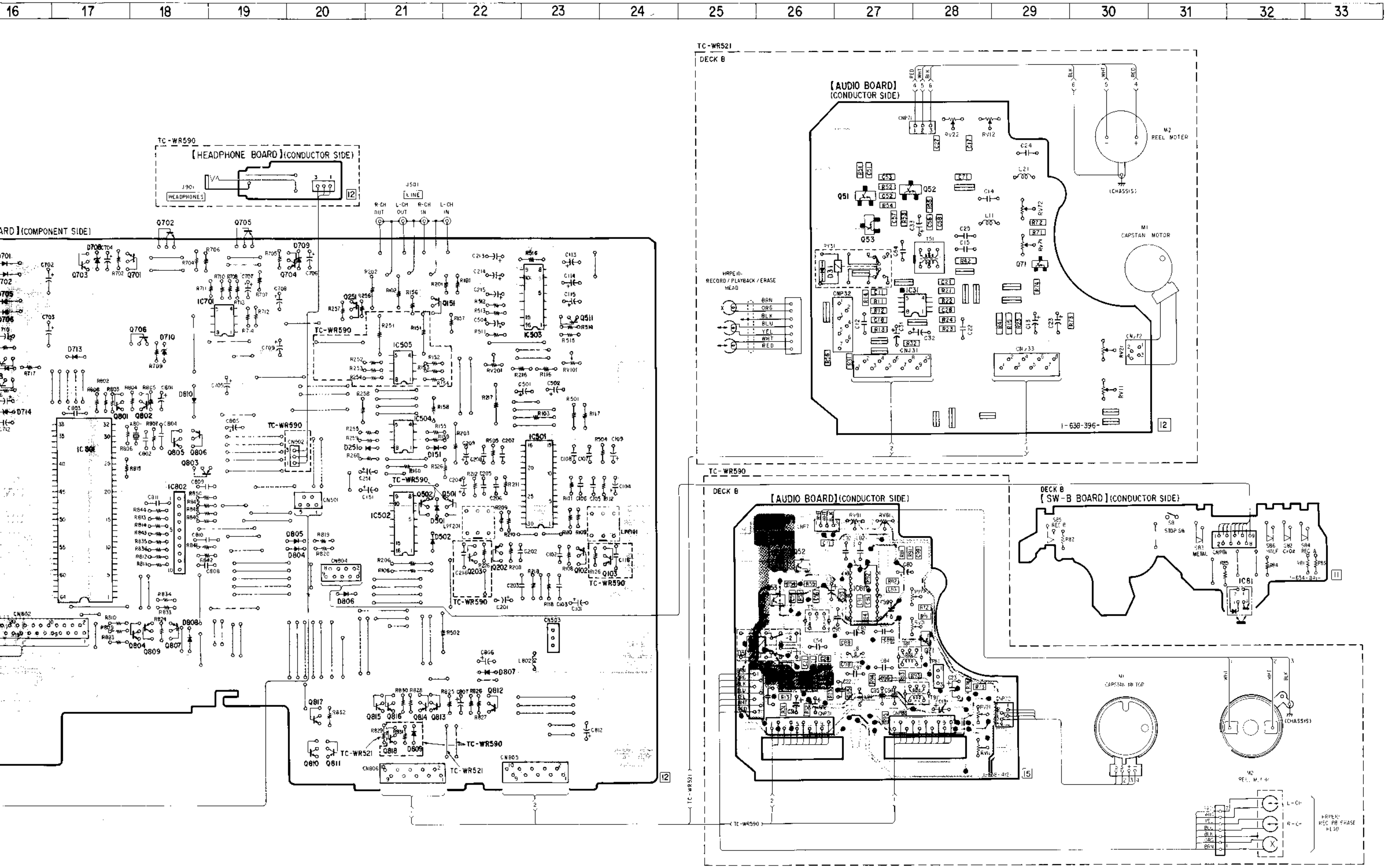
Ref. No.	Location
D31	H - 25
IC31	I - 26
IC81	H - 27
Q51	G - 26
Q52	G - 26
Q53	H - 26
Q71	H - 28

Note :

- ○— : parts extracted from the component side.
- ●— : parts extracted from the conductor side.
- [▪]— indicates side identified with part number.
- ▒▒ : Pattern on the side which is seen.
- ▒▒ : Pattern of the rear side.
- CND : Canadian model
- G : Germany model

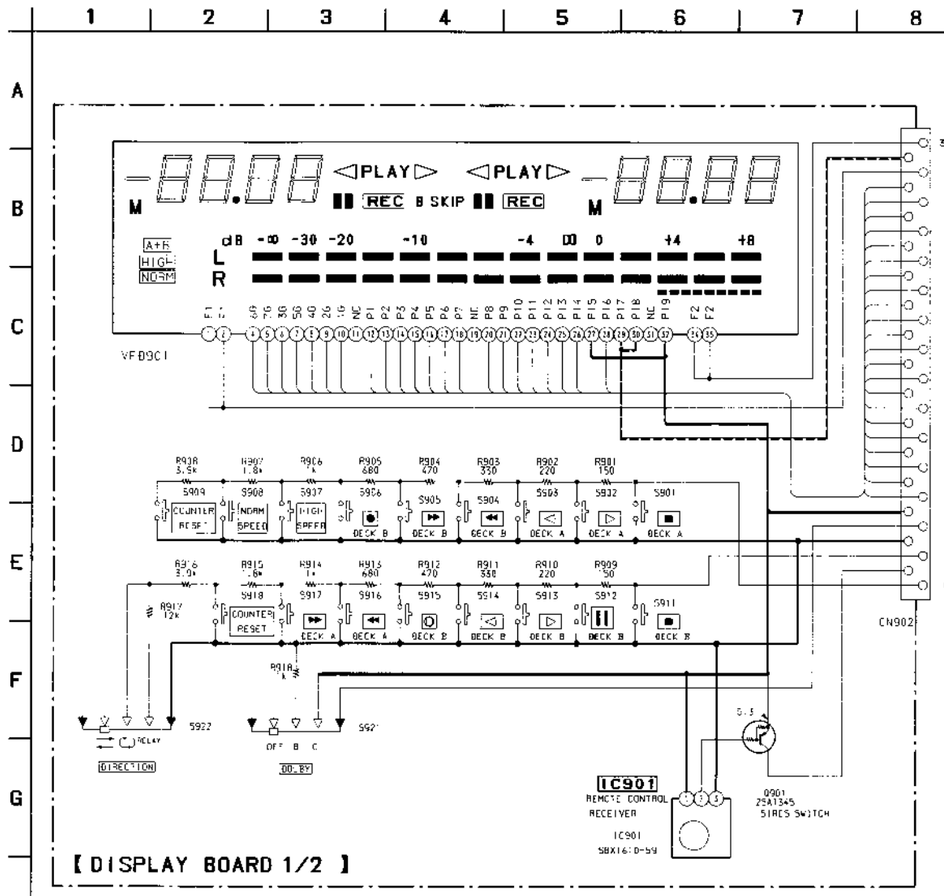


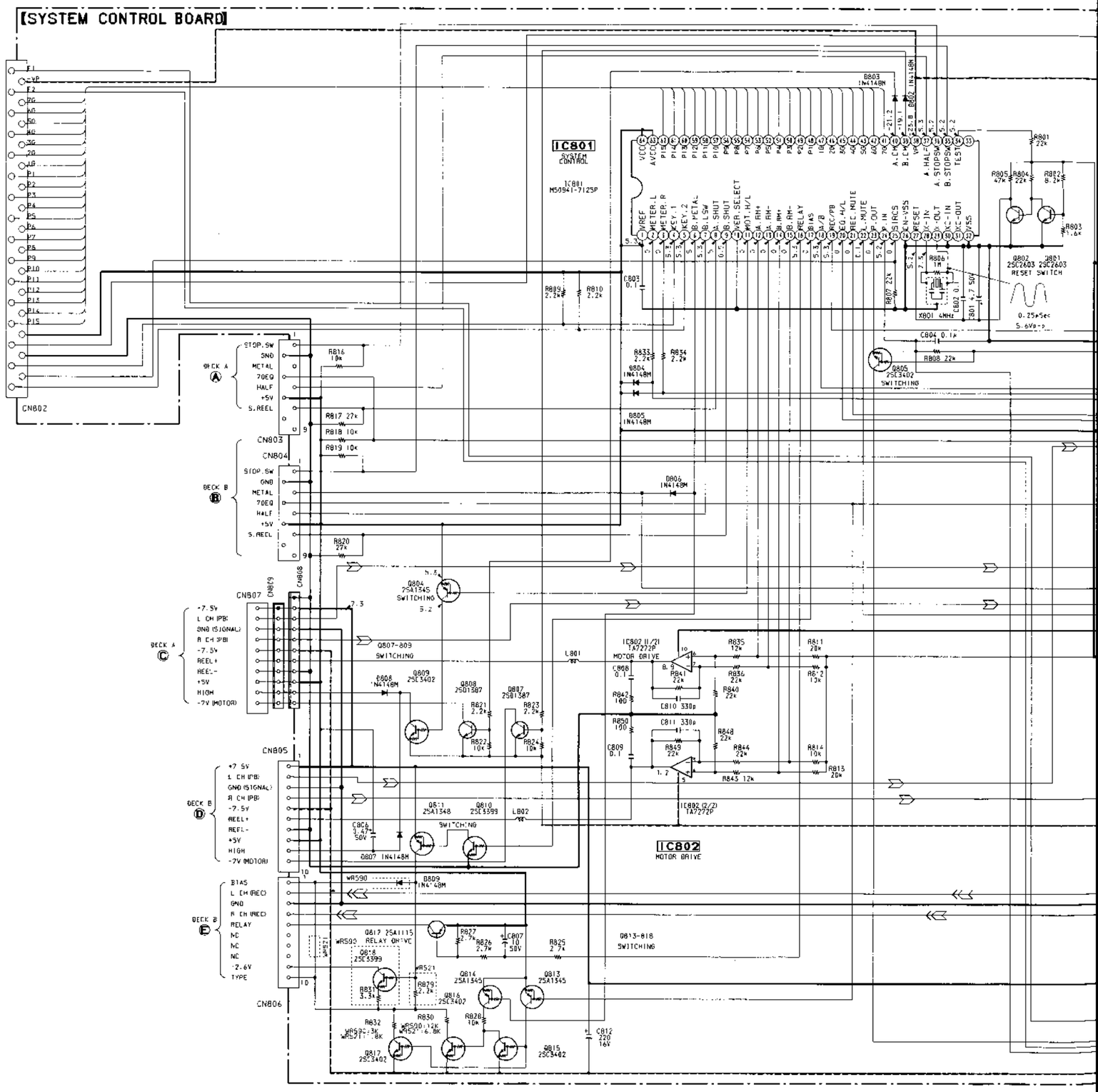

US, Canadian MODEL
T901 POWER TRANSFORMER
[POWER RELAY BOARD] (CONDUCTOR SIDE)
[POWER SWITCH BOARD] (CONDUCTOR SIDE)
S701 POWER ON ← OFF
TC-WR590
[HEADPHONE BOARD] (CONDUCTOR SIDE)
J901 HEADPHONES
J501 LINE
R-CH OUT L-CH OUT R-CH IN L-CH IN
[SYSTEM CONTROL BOARD] (COMPONENT SIDE)
IC801
IC802
IC701
IC501
IC502
IC503
IC504
IC505
COUNTER RESET
VFD 901
DOLBY NR
DIR MODE
NORM SPEED
SYNCHRO DUBBING
HIGH SPEED
BALANCE
TC-WR521
DECK B
HRPE101 RECORD / PLAYBACK / ERASE HEAD
[AUDIO BOARD] (CONDUCTOR SIDE)

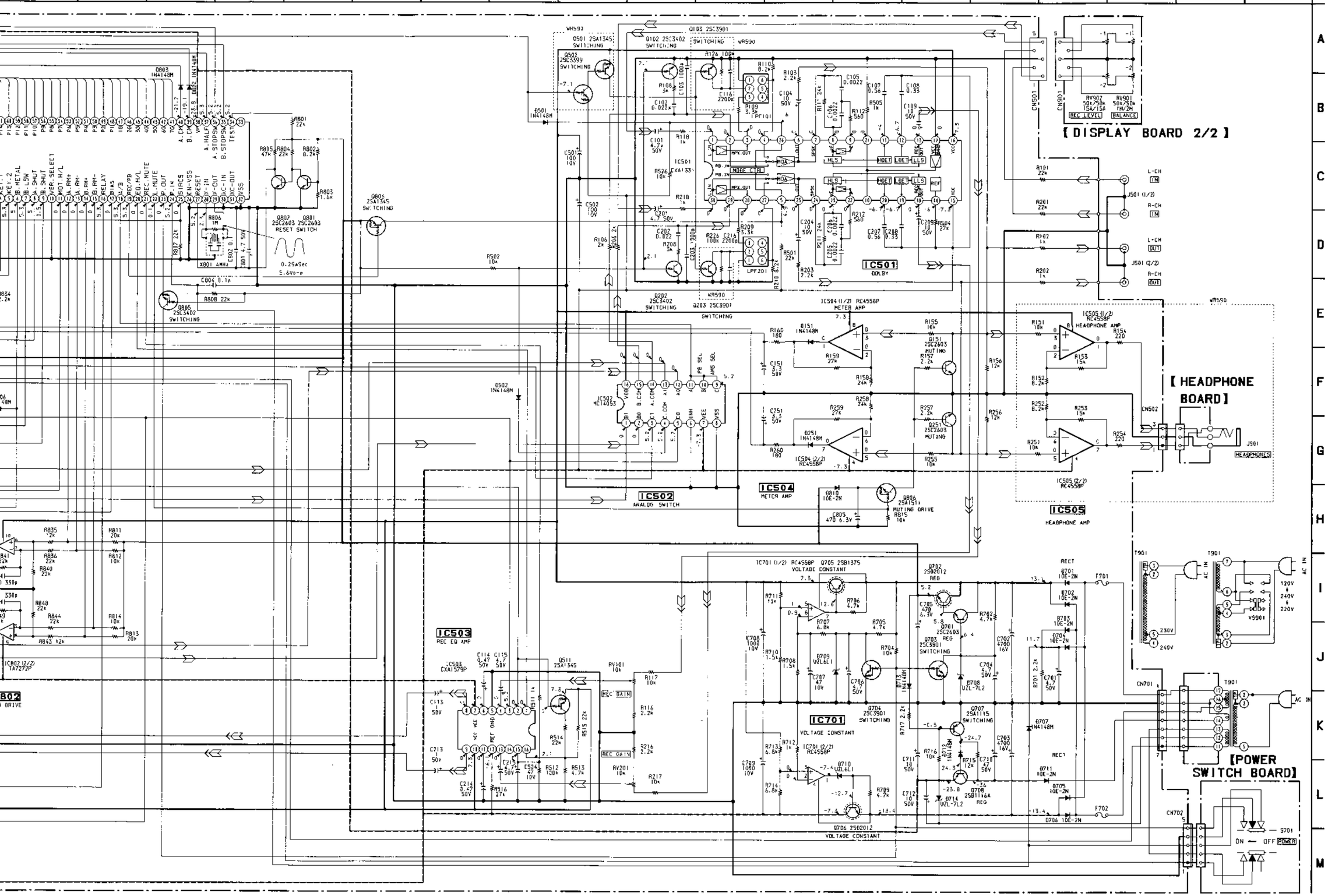


16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
TC-WR590
[HEADPHONE BOARD] (CONDUCTOR SIDE)
J901
HEADPHONES
J501
LINE
R-CH OUT
L-CH OUT
R-CH IN
L-CH IN
ARD] (COMPONENT SIDE)
IC801
IC802
IC701
IC502
IC503
IC504
IC505
IC501
TC-WR590
TC-WR521
CN501
CN502
CN503
CN804
CN805
CN806
TC-WR521
DECK B
[AUDIO BOARD]
(CONDUCTOR SIDE)
M2
REEL MOTOR
(CHASSIS)
M1
CAPSTAN MOTOR
HRPE10-
RECORD / PLAYBACK / ERASE
HEAD
BRN
ORG
BLK
BLU
YEL
WHT
RED
IC31
CNP32
CNJ31
CNJ33
1-638-396-
TC-WR590
DECK B
[AUDIO BOARD] (CONDUCTOR SIDE)
DECK B
[SW-B BOARD] (CONDUCTOR SIDE)
STOP SW
METAL
CNP81
IC81

5-3. SCHEMATIC DIAGRAM (SYSTEM CONTROL SECTION)

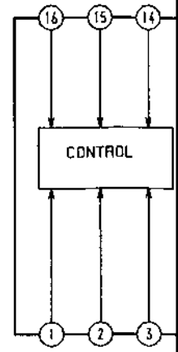






• IC BLOCK DIAGRA

CXA1398P
CXA1579P

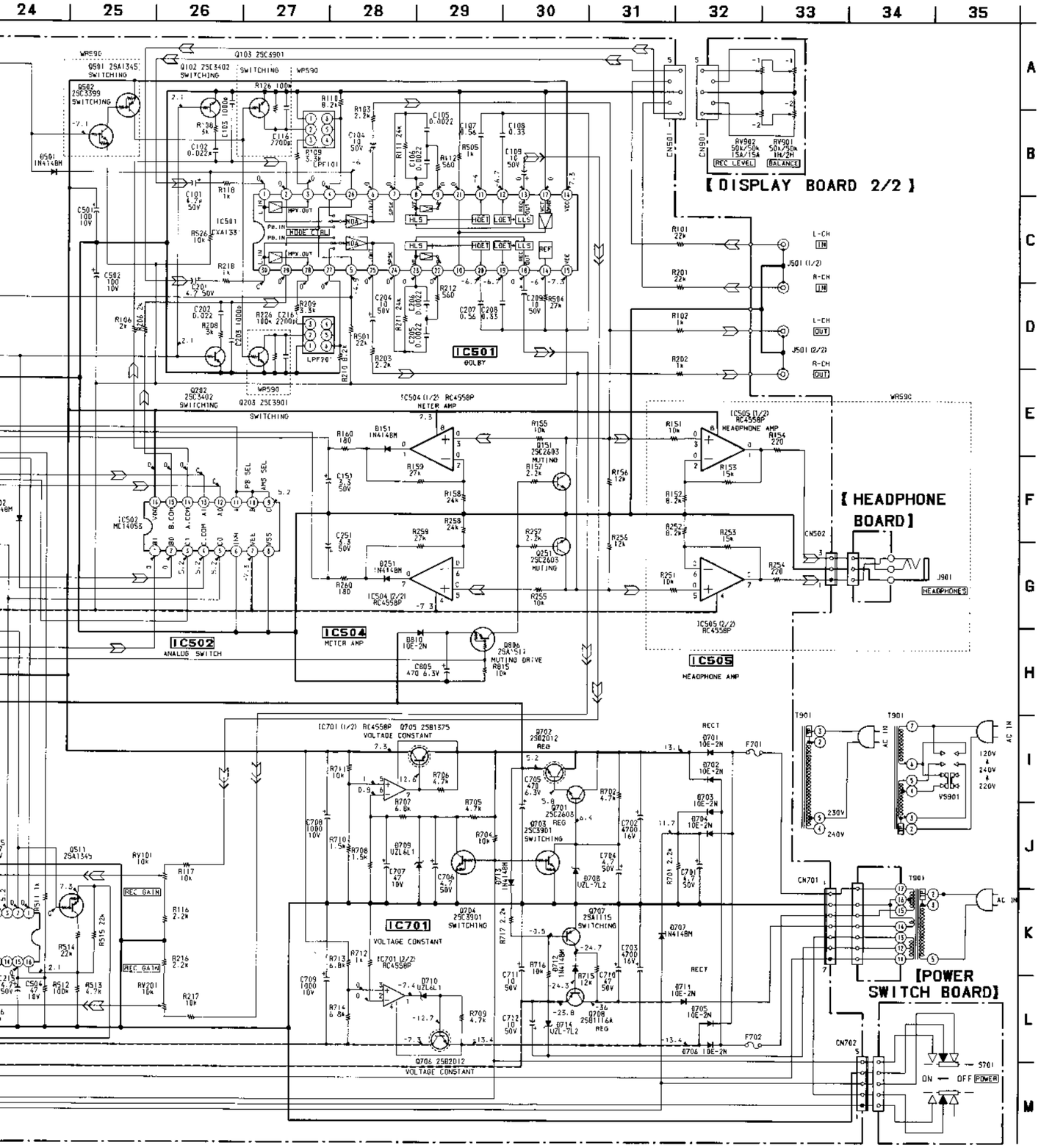


Note :

- All capacitors are in
  50WV or less are not
  and tantalums.
- All resistors are in Ω
  specified.
- % : indicates toleran

Note:
The components iden
fied by mark ⚠ or d
ted line with mark
are critical for safety.
Replace only with p
number specified.

- ▭ : adjustment for
- Voltage and waveform
  under no-signal.
- no mark : STOP
  ● : REC
- Voltages are taken wi
  Voltage variations may
  tion tolerances.
- Signal path.
  ▷ : PB (DECK B)
  ▷ : PB (DECK A)
  ▷» : REC (DECK
- CND : Canadian model
- G : Germany model

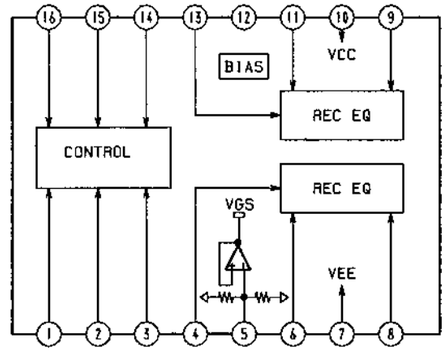


— 25 —

— 26 —

• **IC BLOCK DIAGRAM**

CXA1398P
CXA1579P



Note :

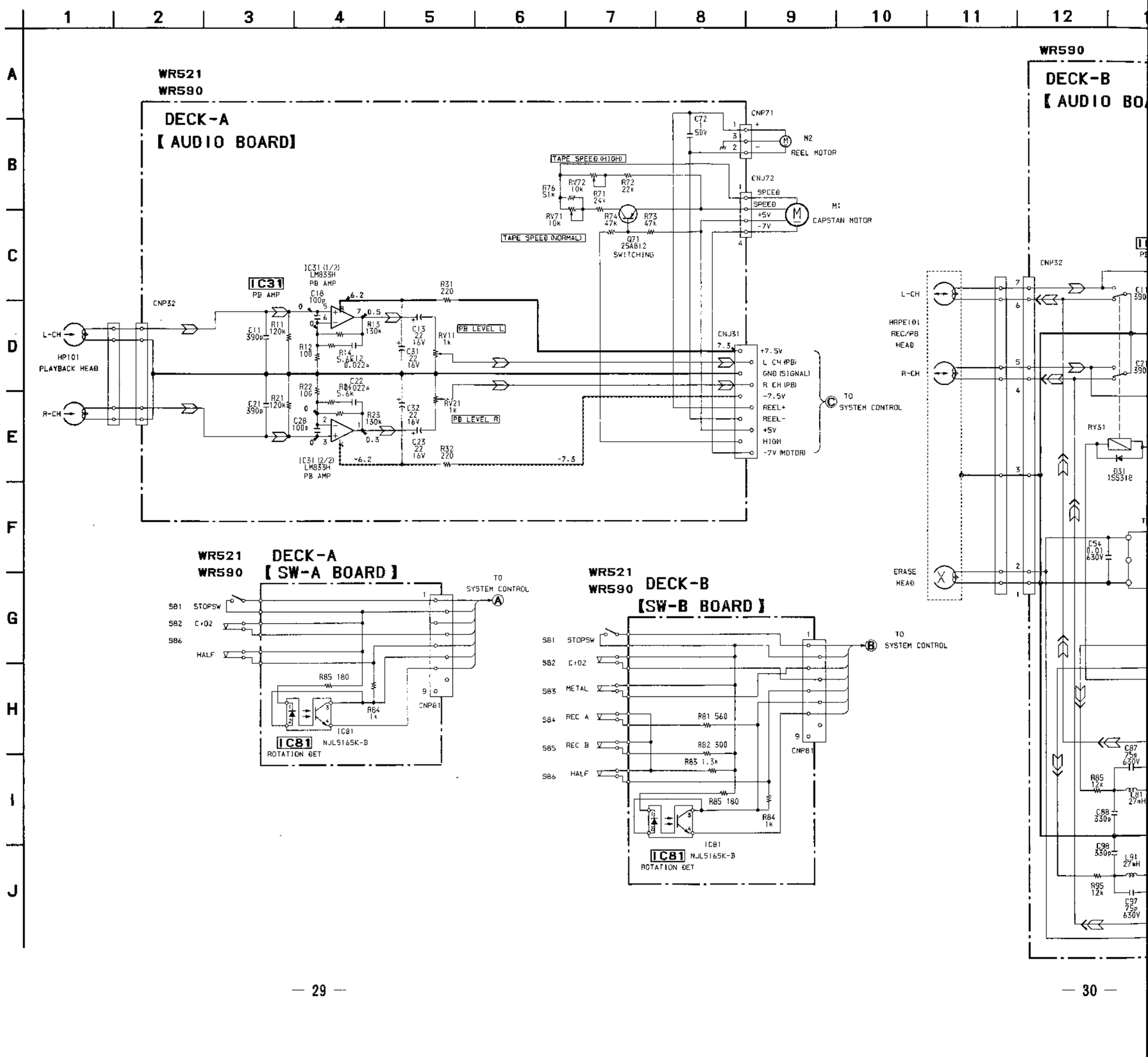
- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and ¼W or less unless otherwise specified.
- % : indicates tolerance.

Note: The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	**Note:** Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- ▭ : adjustment for repair.
- Voltage and waveforms are dc with respect to ground under no-signal.
- no mark : STOP
  ● : REC
- Voltages are taken with a VOM (Input impedance 10MΩ). Voltage variations may be noted due to normal production tolerances.
- Signal path.
  ⊃ : PB (DECK B)
  ⊐ : PB (DECK A)
  ⊐» : REC (DECK B)
- CND : Canadian model
- G : Germany model

— 27 —

5-4. SCHEMATIC DIAGRAM (AUDIO SECTION)



Note :

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and ¼W or less unless otherwise specified.
- % : indicates tolerance.
- Δ : internal component.
- ▭ : adjustment for repair.
- Voltage and waveforms are dc with respect to ground under no-signal.
- no mark : STOP
  - ▶ : FWD
  - ◀ : REV
  - ● : REC
- Voltages are taken with a VOM (input impedance 10MΩ). Voltage variations may be noted due to normal production tolerances.
- Signal path.
  - ⇨ : PB (DECK A)
  - ⇨ : REC (DECK B)

WR590

DECK-B
【AUDIO BOARD】

M2
REEL MOTOR

M1
CAPSTAN MOTOR

TO
SYSTEM CONTROL

TO
SYSTEM CONTROL

TO
SYSTEM CONTROL

CNP81

CNP71
M2
REEL MOTOR

CNP72
M1
CAPSTAN MOTOR

TAPE SPEED (HIGH)
TAPE SPEED (NORMAL)
Q71 2SA812 SWITCHING

CNP31
+7.5V
L CH (PB)
GND (SIGNAL)
R CH (PB)
-7.5V
REEL+
REEL-
+5V
HIGH
-7V (MOTOR)

CNP32
L-CH
R-CH
HRPE101
REC/PB
HEAD
ERASE
HEAD

IC31 (1/2) LM833H PB AMP
IC31 (2/2) LM833H PB AMP
IC31 PB AMP
PB LEVEL L
PB LEVEL R
Q53 2SB1622S SWITCHING
RY31
D31 1SS318

Q51 2SD1622S BIAS OSC
Q52 2SB1622S BIAS OSC
T51

CNP33
BIAS
L CH (REC)
GND
R CH (REC)
RELAY
+5V
DIRECTION
QUICK
-2.6V
TYPE

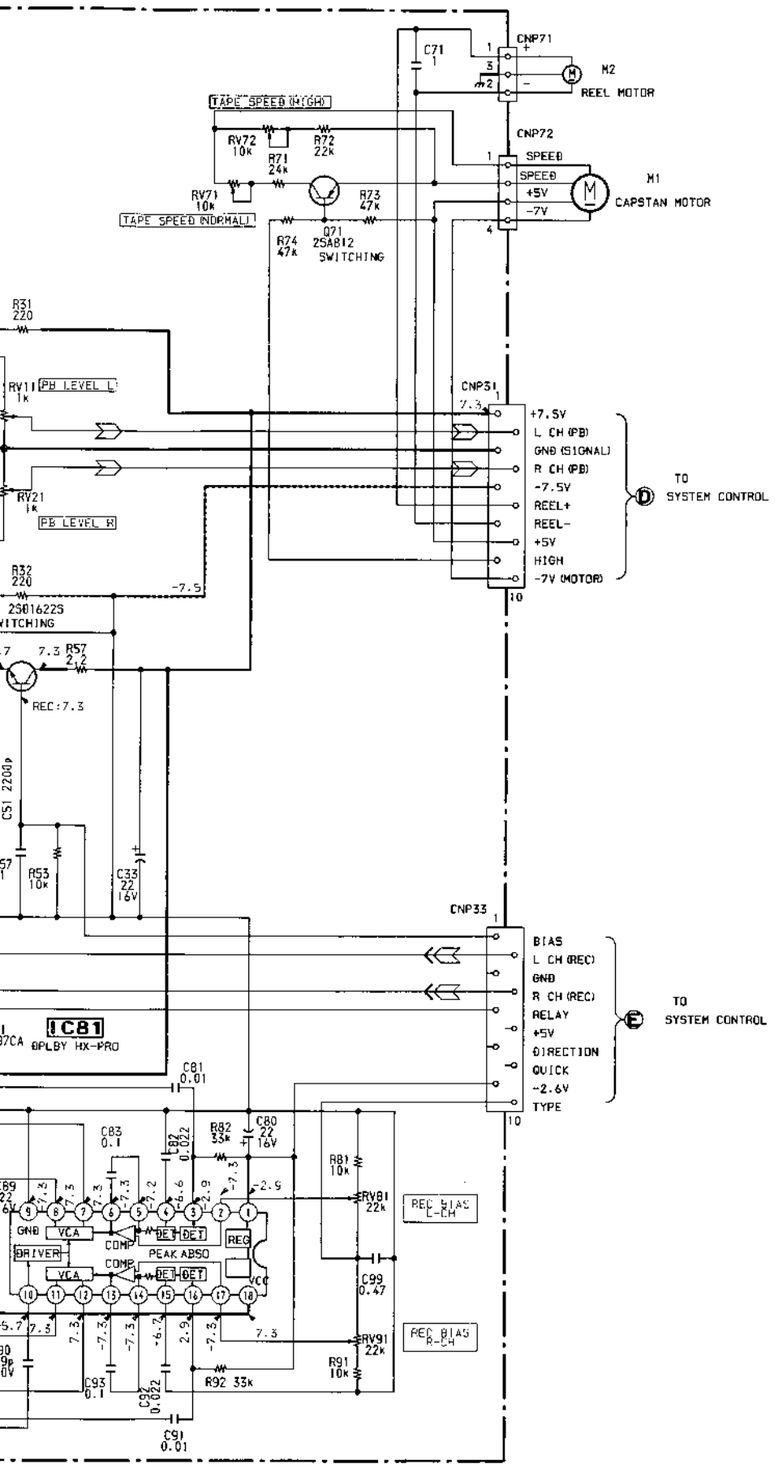
IC81 μPC1297CA ΦPLBY HX-PRO
BIAS CONSUMPTION CURRENT ADJUSTMENT
GND VCA DRIVER COMP PEAK ABSO VCA COMP DET DET REG VC
REC BIAS L-CH
REC BIAS R-CH
T81
T91
TP81

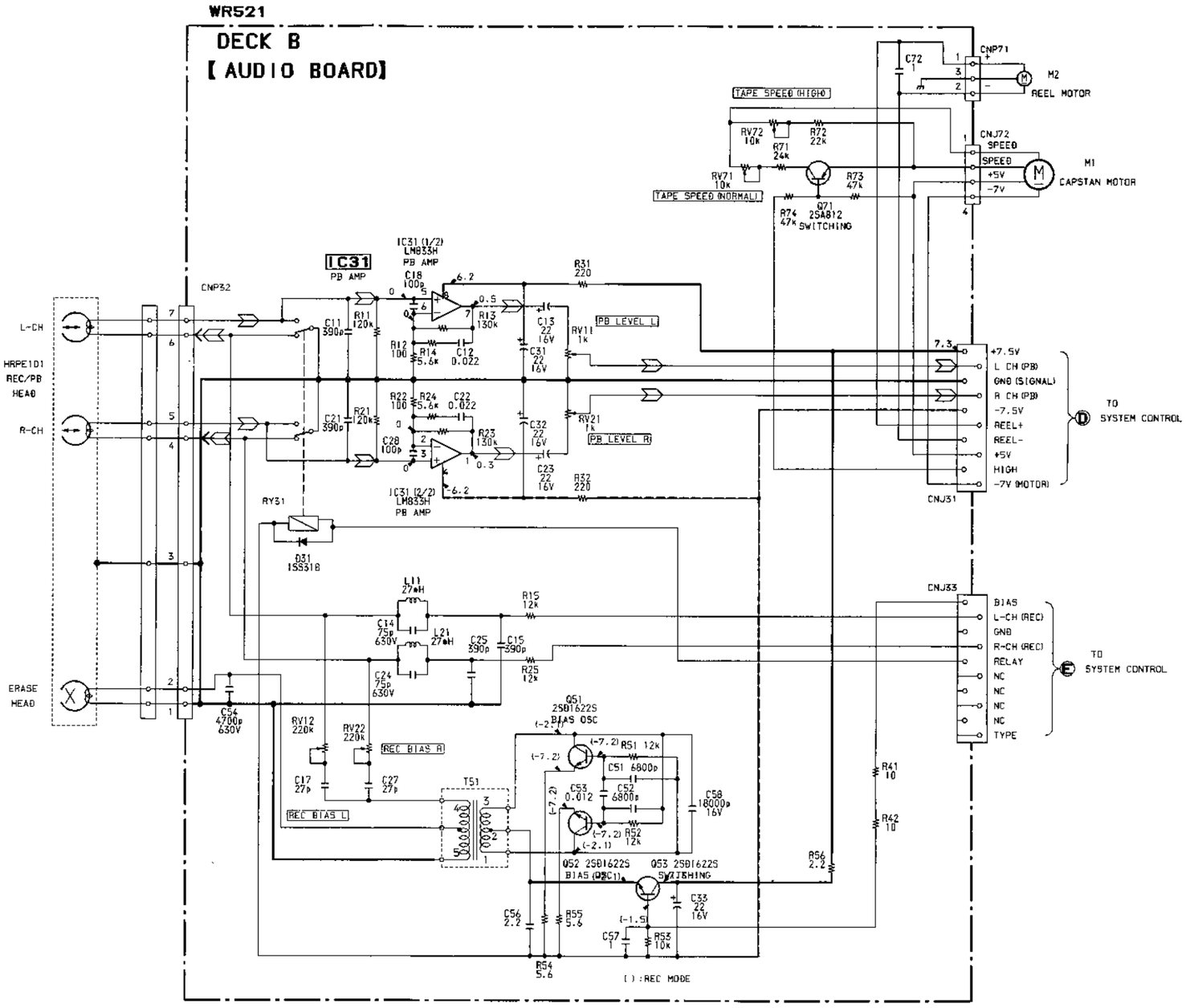
WR521

DECK B
【AUDIO BOARD】

WR521

DECK B
【AUDIO BOARD】





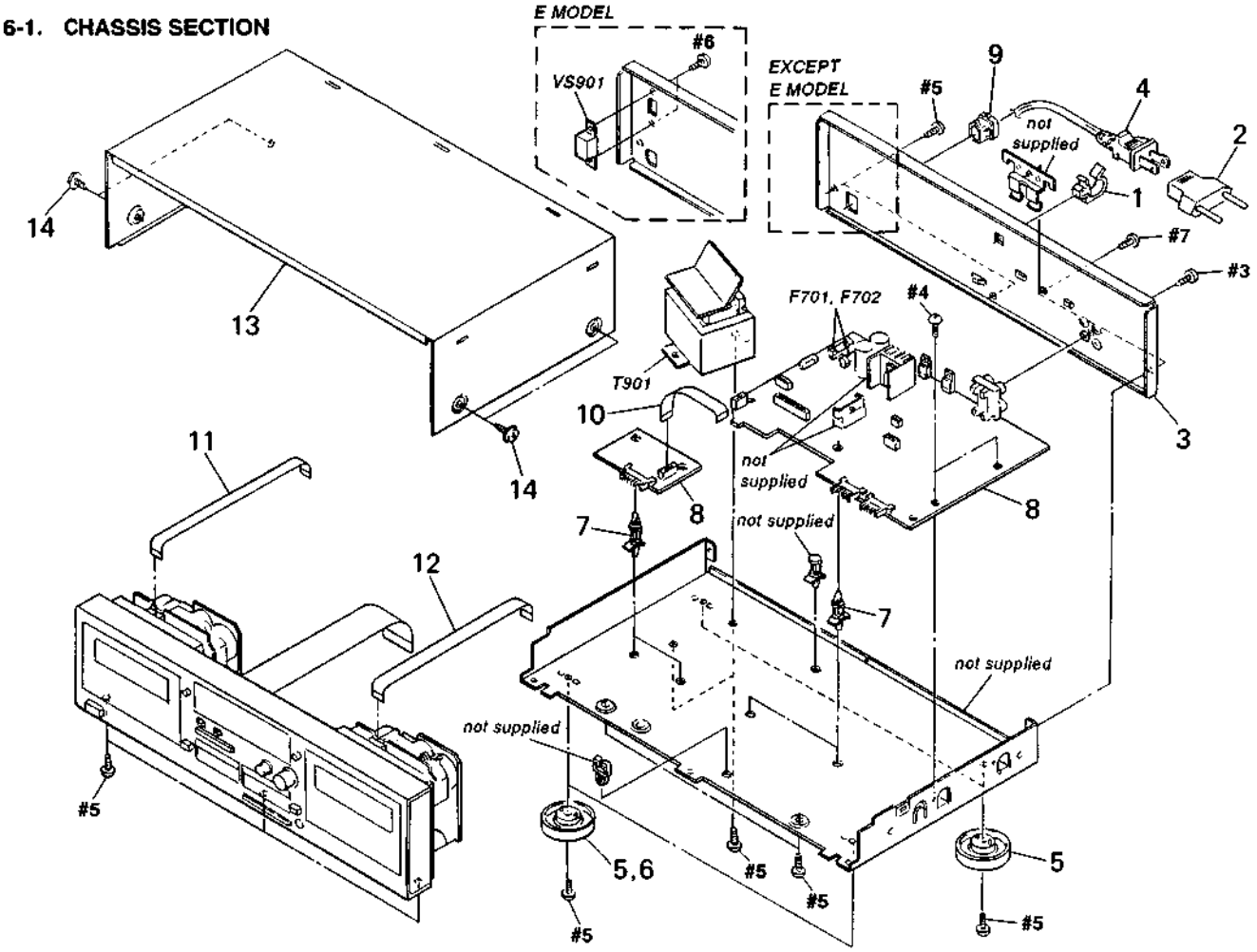
SECTION 6
EXPLODED VIEWS

NOTE:
- -XX, -X mean standardized parts, so they may have some differences from the original one.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Color indication of Appearance Parts Example:
  KNOB, BALANCE (WHITE) .... (RED)
  ↑ Parts color ↑ Cabinet's color
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list is given in the last of this parts list.

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

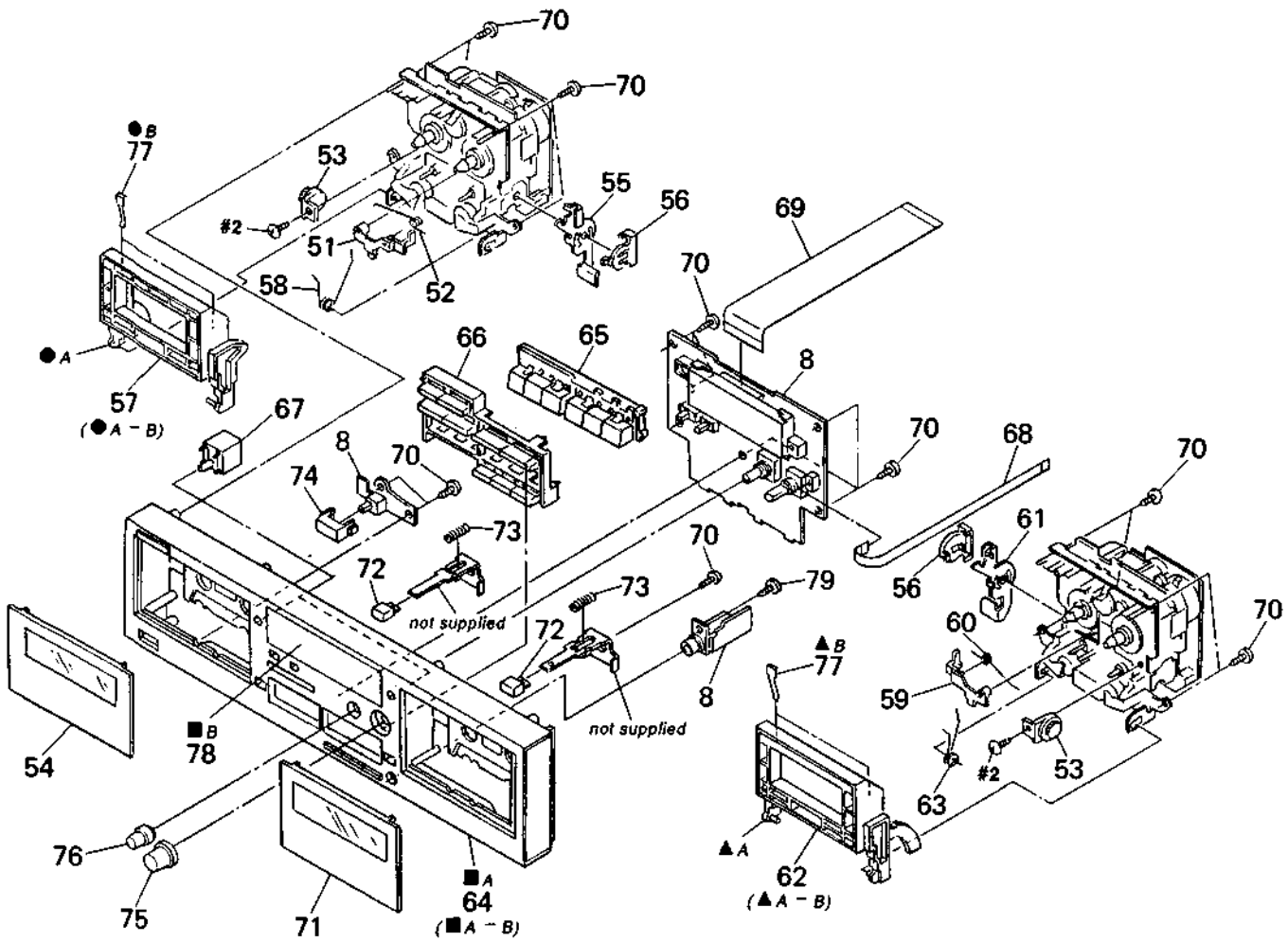
6-1. CHASSIS SECTION



Ref.No.	Part No.	Description	Remark
* 1	4-949-235-01	HOOK	
⚠2	1-569-007-11	ADAPTER, CONVERSION 2P (WR590:E)	
* 3	3-377-349-01	PANEL, BACK (WR590:US, Canadian)	
* 3	3-377-349-11	PANEL, BACK (WR590:GERMANY)	
* 3	3-377-349-21	PANEL, BACK (WR590:AEP)	
* 3	3-377-349-31	PANEL, BACK (WR590:UK)	
* 3	3-377-349-41	PANEL, BACK (WR590:E)	
* 3	3-377-349-51	PANEL, BACK (WR521)	
⚠4	1-551-188-XX	CORD, POWER (WR590:E)	
⚠4	1-555-795-00	CORD, POWER, EULO PLUG (WR590:AEP)	
⚠4	1-556-035-00	CORD, POWER (WR590:UK)	
⚠4	1-558-945-11	CORD, POWER (WR521/WR590:US, Canadian)	
5	4-933-601-01	FOOT (WR521)	
5	4-943-148-32	FOOT (WR590:US, Canadian)	
5	4-943-148-42	FOOT (WR590:AEP, UK)	
6	X-4911-201-1	FOOT ASSY (WR521)	
* 7	3-346-265-11	HOLDER, PC BOARD	

Ref.No.	Part No.	Description	Remark
* 8	A-2006-736-A	SYSTEM CONTROL BOARD, COMPLETE (WR590)	
* 8	A-2006-758-A	SYSTEM CONTROL BOARD, COMPLETE (WR521)	
* 9	3-703-244-00	BUSHING, CORD (WR590:AEP, UK)	
* 9	3-703-571-11	BUSHING(S), CORD (WR521/WR590:US, Canadian, E)	
10	1-690-891-11	WIRE, FLAT TYPE (11 CORE)	
11	1-690-889-11	WIRE, FLAT TYPE (9 CORE)	
12	1-690-890-11	WIRE, FLAT TYPE (9 CORE)	
13	3-332-578-61	CASE	
14	3-704-366-01	SCREW (CASE) (M3X8)	
⚠F701	1-532-285-00	FUSE 1.25A 250V (WR590:AEP, UK, E)	
⚠F701	1-576-103-11	FUSE 1.6A 250V (WR521/WR590:US, Canadian)	
⚠F702	1-532-285-00	FUSE 1.25A 250V (WR590:AEP, UK, E)	
⚠F702	1-576-103-11	FUSE 1.6A 250V (WR521/WR590:US, Canadian)	
⚠T901	1-450-837-11	TRANSFORMER, POWER (WR521/WR590:US, Canadian)	
⚠T901	1-450-838-11	TRANSFORMER, POWER (WR590:AEP, UK)	
⚠T901	1-450-839-11	TRANSFORMER, POWER (WR590:E)	
⚠VS901	1-692-155-11	VOLTAGE SELECTOR (VOLTAGE) (WR590:E)	

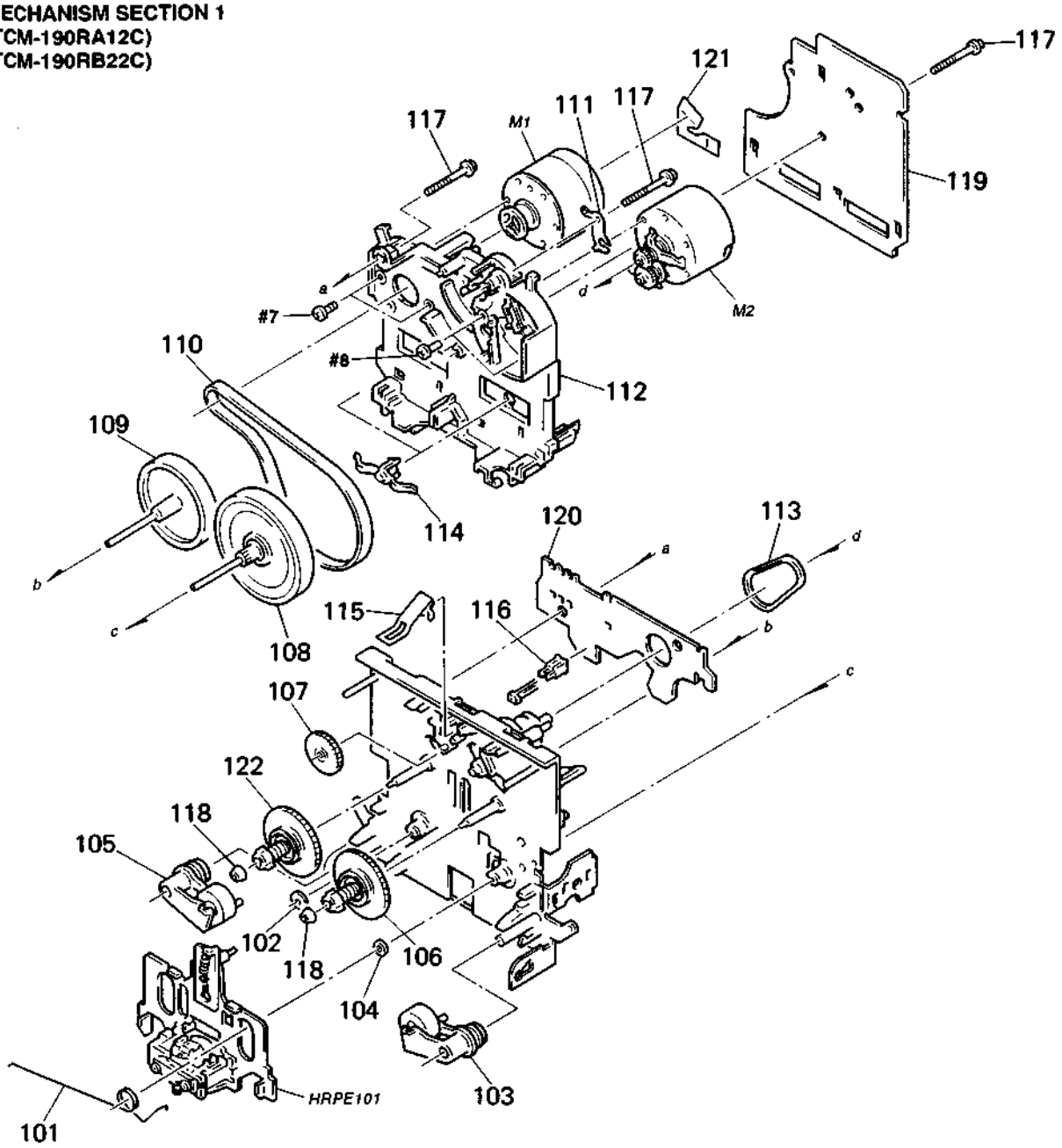
6-2. FRONT PANEL SECTION



Ref.No.	Part No.	Description	Remark
51	3-354-956-01	LEVER (EJ SAFTY LEVER R)	
52	3-354-962-01	SPRING (EJ SAFTY SPRING R)	
53	3-354-963-01	DAMPER	
54	X-3364-740-1	LID (A) ASSY, CASSETTE (WR590)	
54	X-3364-744-1	LID (A) ASSY, CASSETTE (WR521)	
* 55	3-354-954-01	LEVER (LOCK LEVER R)	
56	3-354-957-01	JOINT (LOCK LEVER)	
57	X-3340-195-1	HOLDER (R) ASSY, CASSETTE	
58	3-354-960-01	SPRING (LOADING R), TORSION	
59	3-354-955-01	LEVER (EJ SAFTY LEVER L)	
60	3-354-961-01	SPRING (EJ SAFTY SPRING L)	
* 61	3-354-953-01	LEVER (LOCK LEVER L)	
62	X-3340-194-1	HOLDER (L) ASSY, CASSETTE	
63	3-354-959-01	SPRING (LOADING L), TORSION	
64	X-3364-746-1	PANEL ASSY, FRONT (WR590:US,Canadian)	
64	X-3364-747-1	PANEL ASSY, FRONT (WR590:AEP,UK,E)	
64	X-3364-771-1	PANEL ASSY, FRONT (WR521)	
65	3-377-339-01	BUTTON (FR)	
66	3-377-341-01	BUTTON (SR)	
67	3-377-329-01	BUTTON (COUNTER)	

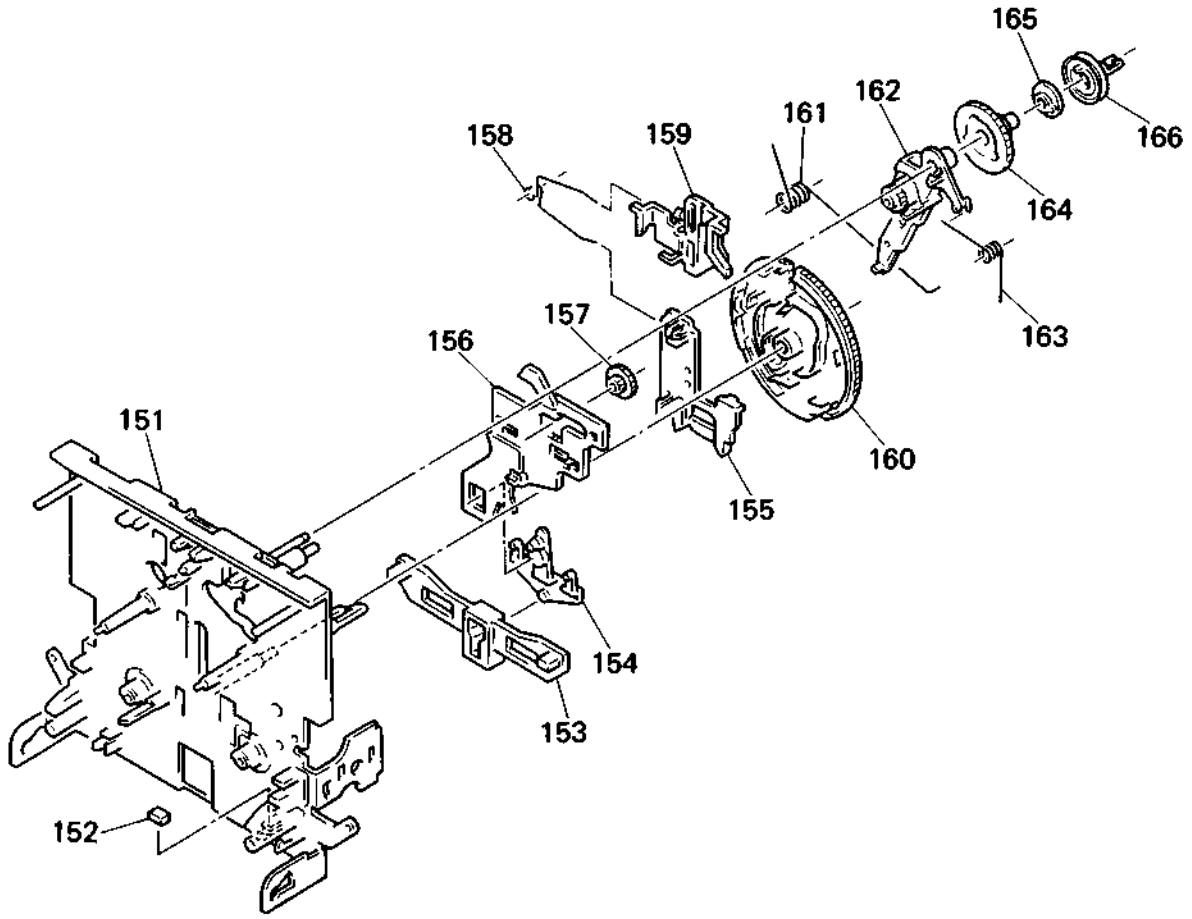
Ref.No.	Part No.	Description	Remark
68	1-690-888-11	WIRE, FLAT TYPE (31 CORE)	
69	1-690-901-11	WIRE (FLAT TYPE) (5 CORE)	
70	4-951-620-01	SCREW BVTP 2.6X8	
71	X-3364-741-1	LID (B) ASSY, CASSETTE (WR590)	
71	X-3364-745-1	LID (B) ASSY, CASSETTE (WR521)	
72	3-377-328-01	BUTTON (EJECT)	
73	3-359-906-01	SPRING, COMPRESSION	
74	3-354-932-01	BUTTON (POWER)	
75	3-377-334-01	KNOB (REC)	
76	3-367-431-01	KNOB (BAL)	
77	3-308-823-11	SPRING	
78	3-377-335-01	WINDOW (M)	
79	3-683-421-01	SCREW PTPWH 2.6X8	

6-3. MECHANISM SECTION 1
(TCM-190RA12C)
(TCM-190RB22C)



Ref.No.	Part No.	Description	Remark
101	3-359-455-01	SPRING, TORSION	
102	3-356-714-01	WASHER	
103	X-3359-408-1	LEVER (PINCH LEVER FWD) ASSY	
104	3-356-713-01	WASHER	
105	X-3359-409-1	LEVER (PINCH LEVER REV) ASSY	
106	X-3359-404-1	TABLE ASSY, REEL	
107	3-359-424-01	GEAR (REV GEAR)	
108	X-3359-406-1	FLYWHEEL (FWD) COMPLETE ASSY	
109	X-3359-410-1	FLYWHEEL (REV) ASSY	
110	3-359-417-01	BELT (FLAT), CAPSTAN	
111	3-359-450-01	PLATE, GROUND	
* 112	3-359-436-01	BASE (THRUST RETAINER), FITTING	
113	3-359-466-01	BELT (FR), SQUARE	
114	3-575-321-00	RETAINER, THRUST, CAPSTAN	
115	3-359-430-01	SPRING(CASSETTE RETAINER), LEAF	
116	3-343-419-01	HOLFER(S SENSER A)	
117	3-359-414-01	SCREW (+PTPWH 2X23)	
118	3-362-308-01	CAP (REEL)	
* 119	A-2006-399-A	MOUNTED PCB (RA12A), AUDIO (DECK A)	
* 119	A-2006-400-A	MOUNTED PCB (RB22A), AUDIO (DECK B) (WR521)	
* 119	A-2006-401-A	MOUNTED PCB (RB12A), AUDIO (DECK B) (WR590)	
* 120	1-634-841-14	SW-A BOARD	
121	1-638-983-11	PC BOARD, MOTOR FLEXIBLE	
122	X-3362-078-1	TABLE ASSY (B), REEL	
HP101	A-2003-837-A	BASE ASSY, HEAD (DECK A)(PB)	
HRPE101	A-2003-838-A	BASE ASSY, HEAD (DECK B)(PB/REC/ERASE)	
M1	X-3359-417-1	MOTOR(CAPSTAN) ASSY	
M2	X-3363-501-1	MOTOR ASSY, REEL	

6-4. MECHANISM SECTION 2 (TCM-190RB22C)



Ref.No.	Part No.	Description	Remark
151	X-3359-415-1	CHASSIS ASSY, MECHANICAL	
152	3-359-469-01	SPACER	
* 153	3-359-425-01	SLIDER (REVERSE SLIDER)	
154	3-359-426-01	LEVER (REVERSE LEVER)	
* 155	3-359-427-01	SLIDER (LEVERSE SLIDER)	
* 156	3-359-415-01	SLIDER (TRIGGER SLIDER)	
157	3-359-448-01	GEAR (TRIGGER)	
158	3-359-454-01	SPRING, TORSION	
159	3-359-429-01	SLIDER (BRAKE PLATE)	
160	3-359-420-01	GEAR (CAM GEAR)	

Ref.No.	Part No.	Description	Remark
161	3-359-456-01	SPRING(TRIGGER SPRING), TORSION	
162	X-3359-405-1	LEVER (FR ARM) ASSY	
163	3-359-453-01	SPRING (FR ARM), TORSION	
164	3-359-419-01	GEAR (FR GEAR)	
165	3-359-421-01	CLUTCH (REEL DISK)	
166	3-359-418-01	PULLEY (FR PULLEY)	

SECTION 7
ELECTRICAL PARTS LIST

AUDIO

NOTE:
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE: Metal oxide-film resistor
  F : nonflammable
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u: μ, for example:
  uA....: μA...., uPA....: μPA....
  uPB....: μPB...., uPC....: μPC....
  uPD....: μPD....
- CAPACITORS
  uF: μF
- COILS
  uH: μH

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

When indicating parts by reference number, please include the board.

Ref.No.	Part No.	Description			Remark
*	A-2006-399-A	AUDIO BOARD(RA12A), COMPLETE (DECK A)			
		**********			
		< CAPACITOR >			
C11	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C12	1-136-157-00	FILM	0.022uF	5%	50V
C13	1-124-234-00	ELECT	22uF	20%	16V
C18	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C21	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C22	1-136-157-00	FILM	0.022uF	5%	50V
C23	1-124-234-00	ELECT	22uF	20%	16V
C28	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C31	1-124-234-00	ELECT	22uF	20%	16V
C32	1-124-234-00	ELECT	22uF	20%	16V
C72	1-124-499-11	ELECT, NONPOLAR	1uF	20%	50V
		< CONNECTOR >			
* CNJ31	1-580-782-11	CONNECTOR, BOARD TO BOARD			
* CNJ72	1-580-411-11	SOCKET, CONNECTOR 4P			
* CNP32	1-580-772-11	PIN, CONNECTOR (PC BOARD) 4P			
* CNP71	1-564-719-11	PIN, CONNECTOR (SMALL TYPE) 3P			
		< IC >			
IC31	8-759-106-02	IC uPC4570G2			
		< JUMPER >			
JW1	1-216-295-00	METAL CHIP	0	5%	1/10W
JW51	1-216-296-00	METAL CHIP	0	5%	1/8W
JW52	1-216-296-00	METAL CHIP	0	5%	1/8W
JW53	1-216-296-00	METAL CHIP	0	5%	1/8W
JW54	1-216-296-00	METAL CHIP	0	5%	1/8W
		< TRANSISTOR >			
Q71	8-729-602-36	TRANSISTOR 2SA1602			
		< RESISTOR >			
R11	1-216-099-00	METAL CHIP	120K	5%	1/10W
R12	1-216-025-00	METAL CHIP	100	5%	1/10W
R13	1-216-100-00	METAL GLAZE	130K	5%	1/10W
R14	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R21	1-216-099-00	METAL CHIP	120K	5%	1/10W
R22	1-216-025-00	METAL CHIP	100	5%	1/10W
R23	1-216-100-00	METAL GLAZE	130K	5%	1/10W
R24	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R31	1-216-033-00	METAL CHIP	220	5%	1/10W
R32	1-216-033-00	METAL CHIP	220	5%	1/10W
R71	1-216-082-00	METAL GLAZE	24K	5%	1/10W
R72	1-216-081-00	METAL CHIP	22K	5%	1/10W
R73	1-216-089-00	METAL CHIP	47K	5%	1/10W
R74	1-216-089-00	METAL CHIP	47K	5%	1/10W
		< VARIABLE RESISTOR >			
RV11	1-238-012-11	RES, ADJ, CARBON 1K			
RV21	1-238-012-11	RES, ADJ, CARBON 1K			
RV71	1-238-016-11	RES, ADJ, CARBON 10K			
RV72	1-238-016-11	RES, ADJ, CARBON 10K			
**********					
*	A-2006-400-A	AUDIO BOARD (RB22A), COMPLETE (DECK B)			(WR521)
*	A-2006-401-A	AUDIO BOARD (RB12A), COMPLETE (DECK B)			(WR590)
		**********			
		< CAPACITOR >			
C11	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C12	1-136-157-00	FILM	0.022uF	5%	50V
C13	1-124-234-00	ELECT	22uF	20%	16V
C14	1-136-273-91	FILM	75PF	5%	630V (WR521)
C15	1-164-080-11	CERAMIC	390PF	10%	50V (WR521)
C17	1-163-103-00	CERAMIC CHIP	27PF	5%	50V (WR521)
C18	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C21	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C22	1-136-157-00	FILM	0.022uF	5%	50V
C23	1-124-234-00	ELECT	22uF	20%	16V
C24	1-136-273-91	FILM	75PF	5%	630V (WR521)
C25	1-164-080-11	CERAMIC	390PF	10%	50V (WR521)
C27	1-163-103-00	CERAMIC CHIP	27PF	5%	50V (WR521)
C28	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C31	1-124-234-00	ELECT	22uF	20%	16V
C32	1-124-234-00	ELECT	22uF	20%	16V
C33	1-124-234-00	ELECT	22uF	20%	16V
C51	1-163-019-00	CERAMIC CHIP	0.0068uF	10%	50V (WR521)
C51	1-164-161-11	CERAMIC CHIP	0.0022uF	10%	100V (WR590)

AUDIO

Ref.No.	Part No.	Description		Remark
C52	1-163-019-00	CERAMIC CHIP	0.0068uF	10% 50V (WR521)
C52	1-164-161-11	CERAMIC CHIP	0.0022uF	10% 100V (WR590)
C53	1-163-022-00	CERAMIC CHIP	0.012uF	10% 50V (WR521)
C53	1-163-019-00	CERAMIC CHIP	0.0068uF	10% 50V (WR590)
C54	1-136-559-11	FILM	0.0047uF	5% 630V (WR521)
C54	1-136-601-11	FILM	0.01uF	5% 630V (WR590)
C56	1-164-505-11	CERAMIC CHIP	2.2uF	16V
C57	1-164-346-11	CERAMIC CHIP	1uF	16V
C58	1-163-024-00	CERAMIC CHIP	0.018uF	10% 50V (WR521)
C71	1-164-346-11	CERAMIC CHIP	1uF	16V (WR590)
C72	1-124-499-11	ELECT, NONPOLAR	1uF	20% 50V (WR521)
C80	1-124-234-00	ELECT	22uF	20% 16V (WR590)
C81	1-164-232-11	CERAMIC CHIP	0.01uF	50V (WR590)
C82	1-136-157-00	FILM	0.022uF	5% 50V (WR590)
C83	1-164-004-11	CERAMIC CHIP	0.1uF	10% 25V (WR590)
C84	1-136-439-11	FILM	330PF	5% 630V (WR590)
C85	1-136-433-11	FILM	100PF	5% 630V (WR590)
C86	1-163-143-00	CERAMIC CHIP	0.0012uF	5% 50V (WR590)
C87	1-136-273-91	FILM	75PF	5% 630V (WR590)
C88	1-163-003-11	CERAMIC CHIP	330PF	10% 50V (WR590)
C89	1-124-234-00	ELECT	22uF	20% 16V (WR590)
C90	1-107-045-00	MICA	3.9PF	500V (WR590)
C91	1-164-232-11	CERAMIC CHIP	0.01uF	50V (WR590)
C92	1-136-157-00	FILM	0.022uF	5% 50V (WR590)
C93	1-164-004-11	CERAMIC CHIP	0.1uF	10% 25V (WR590)
C94	1-136-439-11	FILM	330PF	5% 630V (WR590)
C95	1-136-433-11	FILM	100PF	5% 630V (WR590)
C96	1-163-143-00	CERAMIC CHIP	0.0012uF	5% 50V (WR590)
C97	1-136-273-91	FILM	75PF	5% 630V (WR590)
C98	1-163-003-11	CERAMIC CHIP	330PF	10% 50V (WR590)
C99	1-164-005-11	CERAMIC CHIP	0.47uF	25V (WR590)
		< CONNECTOR >		
* CNJ31	1-580-782-11	CONNECTOR, BOARD TO BOARD		(WR521)
* CNJ33	1-580-782-11	CONNECTOR, BOARD TO BOARD		(WR521)
* CNJ72	1-580-411-11	SOCKET, CONNECTOR 4P		(WR521)
* CNP31	1-580-782-11	CONNECTOR, BOARD TO BOARD		(WR590)
* CNP32	1-580-781-11	PIN, CONNECTOR (PC BOARD) 7P		
* CNP33	1-580-782-11	CONNECTOR, BOARD TO BOARD		(WR590)
* CNP71	1-564-719-11	PIN, CONNECTOR (SMALL TYPE) 3P		
* CNP72	1-580-411-11	SOCKET, CONNECTOR 4P		(WR590)
		< DIODE >		
D31	8-719-988-62	DIODE 1SS355		
		< IC >		
IC31	8-759-106-02	IC uPC4570G2		
IC81	8-759-106-56	IC uPC1297CA		(WR590)
		< JUMPER >		
JW1	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW2	1-216-295-00	METAL CHIP	0 5%	1/10W(WR521)
JW3	1-216-295-00	METAL CHIP	0 5%	1/10W(WR521)
JW4	1-216-295-00	METAL CHIP	0 5%	1/10W(WR521)
JW5	1-216-295-00	METAL CHIP	0 5%	1/10W(WR521)
JW6	1-216-295-00	METAL CHIP	0 5%	1/10W(WR521)
JW7	1-216-295-00	METAL CHIP	0 5%	1/10W(WR521)
JW52	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW53	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW54	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW55	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW56	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW57	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW58	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW59	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW60	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)
JW61	1-216-296-00	METAL CHIP	0 5%	1/8W (WR521)

Ref.No.	Part No.	Description			Remark
		< COIL >			
L11	1-410-780-11	INDUCTOR	27mH		(WR521)
L21	1-410-780-11	INDUCTOR	27mH		(WR521)
L81	1-410-780-11	INDUCTOR	27mH		(WR590)
L91	1-410-780-11	INDUCTOR	27mH		(WR590)
		< TRANSISTOR >			
Q51	8-729-808-01	TRANSISTOR	2SD1622-S		
Q52	8-729-808-01	TRANSISTOR	2SD1622-S		
Q53	8-729-808-01	TRANSISTOR	2SD1622-S		
Q71	8-729-602-36	TRANSISTOR	2SA1602		(WR521)
Q71	8-729-216-22	TRANSISTOR	2SA1162		(WR590)
		< RESISTOR >			
R11	1-216-099-00	METAL CHIP	120K	5%	1/10W
R12	1-216-025-00	METAL CHIP	100	5%	1/10W
R13	1-216-100-00	METAL GLAZE	130K	5%	1/10W
R14	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R15	1-249-430-11	CARBON	12K	5%	1/4W (WR521)
R21	1-216-099-00	METAL CHIP	120K	5%	1/10W
R22	1-216-025-00	METAL CHIP	100	5%	1/10W
R23	1-216-100-00	METAL GLAZE	130K	5%	1/10W
R24	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R25	1-249-430-11	CARBON	12K	5%	1/4W (WR521)
R31	1-216-033-00	METAL CHIP	220	5%	1/10W
R32	1-216-033-00	METAL CHIP	220	5%	1/10W
R41	1-249-393-11	CARBON	10	5%	1/4W (WR521)
R42	1-249-393-11	CARBON	10	5%	1/4W (WR521)
R51	1-216-075-00	METAL CHIP	12K	5%	1/10W(WR521)
R51	1-216-097-00	METAL CHIP	100K	5%	1/10W(WR590)
R52	1-216-075-00	METAL CHIP	12K	5%	1/10W(WR521)
R52	1-216-097-00	METAL CHIP	100K	5%	1/10W(WR590)
R53	1-216-073-00	METAL CHIP	10K	5%	1/10W
R54	1-216-309-00	METAL CHIP	5.6	5%	1/10W
R55	1-216-309-00	METAL CHIP	5.6	5%	1/10W
R56	1-216-298-00	METAL CHIP	2.2	5%	1/10W(WR521)
R57	1-216-298-00	METAL CHIP	2.2	5%	1/10W(WR590)
R71	1-216-082-00	METAL GLAZE	24K	5%	1/10W
R72	1-216-081-00	METAL CHIP	22K	5%	1/10W
R73	1-216-089-00	METAL CHIP	47K	5%	1/10W
R74	1-216-089-00	METAL CHIP	47K	5%	1/10W
R81	1-216-073-00	METAL CHIP	10K	5%	1/10W(WR590)
R82	1-216-085-00	METAL CHIP	33K	5%	1/10W(WR590)
R83	1-216-001-00	METAL CHIP	10	5%	1/10W(WR590)
R84	1-216-101-00	METAL CHIP	150K	5%	1/10W(WR590)
R85	1-216-075-00	METAL CHIP	12K	5%	1/10W(WR590)
R91	1-216-073-00	METAL CHIP	10K	5%	1/10W(WR590)
R92	1-216-085-00	METAL CHIP	33K	5%	1/10W(WR590)
R93	1-216-001-00	METAL CHIP	10	5%	1/10W(WR590)
R94	1-216-101-00	METAL CHIP	150K	5%	1/10W(WR590)
R95	1-216-075-00	METAL CHIP	12K	5%	1/10W(WR590)
		< VARIABLE RESISTOR >			
RV11	1-238-012-11	RES, ADJ, CARBON 1K			
RV12	1-238-551-11	RES, ADJ, CARBON 220K			(WR521)
RV21	1-238-012-11	RES, ADJ, CARBON 1K			
RV22	1-238-551-11	RES, ADJ, CARBON 220K			(WR521)
RV71	1-238-016-11	RES, ADJ, CARBON 10K			
RV72	1-238-016-11	RES, ADJ, CARBON 10K			
RV81	1-241-122-11	RES, ADJ, CARBON 22K			(WR590)
RV91	1-241-122-11	RES, ADJ, CARBON 22K			(WR590)
		< RELAY >			
RY31	1-515-726-11	RELAY			
		< COIL >			
T51	1-406-419-11	COIL, BIAS OSCILLATION			(WR521)
T51	1-406-417-11	COIL, BIAS OSCILLATION			(WR590)
T81	1-433-398-11	TRANSFORMER, BIAS OSCILLATOR			(WR590)
T91	1-433-398-11	TRANSFORMER, BIAS OSCILLATOR			(WR590)
		< CONNECTOR>			
* TP81	1-568-449-11	HOUSING, CONNECTOR(PC BOARD)3P			(WR590)
**********					
*	1-634-841-14	SW-A BOARD (DECK A)			
		**********			
	3-343-419-01	HOLDER (S SENSER A)			
		< CONNECTOR >			
* CNP81	1-568-852-11	SOCKET, CONNECTOR 9P			
		< IC >			
IC81	8-719-710-03	DIODE	NJL5165K-B		
		< RESISTOR >			
R84	1-249-417-11	CARBON	1K	5%	1/4W
R85	1-249-408-11	CARBON	180	5%	1/4W
		< SWITCH >			
S81	1-571-958-11	SWITCH, PUSH (STOP)			
S82	1-571-281-21	SWITCH, LEAF (Cr02)			
S86	1-571-281-21	SWITCH, LEAF (HALF)			
**********					

SW-B SYSTEM CONTROL

Ref.No.	Part No.	Description			Remark
*	1-634-841-14	SW-B BOARD (DECK B)			
		**********			
	3-343-419-01	HOLDER (S SENSER A)			
		< CONNECTOR >			
* CNP81	1-568-852-11	SOCKET, CONNECTOR 9P			
		< IC >			
IC81	8-719-710-03	DIODE	NJL5165K-B		
		< RESISTOR >			
R81	1-249-414-11	CARBON	560	5%	1/4W
R82	1-247-818-11	CARBON	300	5%	1/4W
R83	1-247-834-11	CARBON	1.3K	5%	1/4W
R84	1-249-417-11	CARBON	1K	5%	1/4W
R85	1-249-408-11	CARBON	180	5%	1/4W
		< SWITCH >			
S81	1-571-958-11	SWITCH, PUSH (STOP)			
S82	1-571-281-21	SWITCH, LEAF (CrO2)			
S83	1-571-281-21	SWITCH, LEAF (METAL)			
S84	1-571-281-21	SWITCH, LEAF (REC A)			
S85	1-571-281-21	SWITCH, LEAF (REC B)			
S86	1-571-281-21	SWITCH, LEAF (HALF)			
**********					
*	A-2006-758-A	SYSTEM CONTROL BOARD, COMPLETE			(WR521)
*	A-2006-736-A	SYSTEM CONTROL BOARD, COMPLETE			(WR590)
		**********			
*	1-533-213-31	HOLDER, FUSE			
	7-685-646-79	SCREW +BVTP 3X8 TYPE2 IT-3			
	7-682-547-04	SCREW +BVTT 3X6 (S)			
		< CAPACITOR >			
C101	1-124-927-11	ELECT	4.7uF	20%	100V
C102	1-136-157-00	FILM	0.022uF	5%	50V
C103	1-162-294-31	CERAMIC	0.001uF	10%	50V
C104	1-124-907-11	ELECT	10uF	20%	50V
C105	1-130-475-00	MYLAR	0.0022uF	5%	50V
C106	1-130-475-00	MYLAR	0.0022uF	5%	50V
C107	1-136-174-00	FILM	0.56uF	5%	50V
C108	1-136-171-00	FILM	0.33uF	5%	50V
C109	1-124-907-11	ELECT	10uF	20%	50V
C113	1-124-903-11	ELECT	1uF	20%	50V
C114	1-124-902-00	ELECT	0.47uF	20%	50V
C115	1-124-927-11	ELECT	4.7uF	20%	100V
C116	1-161-375-00	CERAMIC	0.0022uF	20%	50V (WR590)

Ref.No.	Part No.	Description			Remark
C151	1-123-382-00	ELECT	3.3uF	20%	100V
C201	1-124-927-11	ELECT	4.7uF	20%	100V
C202	1-136-157-00	FILM	0.022uF	5%	50V
C203	1-162-294-31	CERAMIC	0.001uF	10%	50V
C204	1-124-907-11	ELECT	10uF	20%	50V
C205	1-130-475-00	MYLAR	0.0022uF	5%	50V
C206	1-130-475-00	MYLAR	0.0022uF	5%	50V
C207	1-136-174-00	FILM	0.56uF	5%	50V
C208	1-136-171-00	FILM	0.33uF	5%	50V
C209	1-124-907-11	ELECT	10uF	20%	50V
C213	1-124-903-11	ELECT	1uF	20%	50V
C214	1-124-902-00	ELECT	0.47uF	20%	50V
C215	1-124-927-11	ELECT	4.7uF	20%	100V
C216	1-161-375-00	CERAMIC	0.0022uF	20%	50V (WR590)
C251	1-123-382-00	ELECT	3.3uF	20%	100V
C501	1-124-443-00	ELECT	100uF	20%	10V
C502	1-124-443-00	ELECT	100uF	20%	10V
C504	1-124-126-00	ELECT	47uF	20%	10V
C701	1-124-927-11	ELECT	4.7uF	20%	100V
C702	1-124-898-11	ELECT	4700uF	20%	16V
C703	1-124-898-11	ELECT	4700uF	20%	16V
C704	1-124-927-11	ELECT	4.7uF	20%	100V
C705	1-124-472-11	ELECT	470uF	20%	10V
C706	1-124-927-11	ELECT	4.7uF	20%	100V
C707	1-124-126-00	ELECT	47uF	20%	10V
C708	1-124-473-11	ELECT	1000uF	20%	10V
C709	1-124-473-11	ELECT	1000uF	20%	10V
C710	1-124-910-11	ELECT	47uF	20%	50V
C711	1-124-907-11	ELECT	10uF	20%	50V
C712	1-124-907-11	ELECT	10uF	20%	50V
C801	1-124-927-11	ELECT	4.7uF	20%	100V
C802	1-164-159-11	CERAMIC	0.1uF		50V
C803	1-164-159-11	CERAMIC	0.1uF		50V
C804	1-164-159-11	CERAMIC	0.1uF		50V
C805	1-124-472-11	ELECT	470uF	20%	10V
C806	1-124-902-00	ELECT	0.47uF	20%	50V
C807	1-124-907-11	ELECT	10uF	20%	50V
C808	1-136-165-00	FILM	0.1uF	5%	50V
C809	1-136-165-00	FILM	0.1uF	5%	50V
C810	1-162-288-31	CERAMIC	330PF	10%	50V
C811	1-162-288-31	CERAMIC	330PF	10%	50V
C812	1-124-120-11	ELECT	220uF	20%	25V
		< CONNECTOR >			
* CN501	1-568-824-11	SOCKET, CONNECTOR 5P			
CN502	1-506-468-11	CONNECTOR	3P, MALE		(WR590)
* CN503	1-562-327-00	SOCKET, CONNECTOR 3P			

Ref.No.	Part No.	Description	Remark
* CN701	1-564-510-11	PLUG, CONNECTOR 7P	
* CN702	1-568-954-11	PIN, CONNECTOR 5P	
* CN802	1-568-845-11	SOCKET, CONNECTOR 31P	
* CN803	1-568-828-11	SOCKET, CONNECTOR 9P	
* CN804	1-568-828-11	SOCKET, CONNECTOR 9P	
* CN805	1-691-916-11	CONNECTOR, BOARD TO BOARD	
* CN806	1-691-916-11	CONNECTOR, BOARD TO BOARD	
* CN807	1-691-916-11	CONNECTOR, BOARD TO BOARD	
* CN808	1-568-830-11	SOCKET, CONNECTOR 11P	
* CN809	1-568-830-11	SOCKET, CONNECTOR 11P	
* CN901	1-568-824-11	SOCKET, CONNECTOR 5P	
* CN902	1-568-873-11	SOCKET, CONNECTOR 31P	
		< DIODE >	
D151	8-719-987-63	DIODE 1N4148M	
D251	8-719-987-63	DIODE 1N4148M	
D501	8-719-987-63	DIODE 1N4148M	
D502	8-719-987-63	DIODE 1N4148M	
D701	8-719-200-77	DIODE 10E2N	
D702	8-719-200-77	DIODE 10E2N	
D703	8-719-200-77	DIODE 10E2N	
D704	8-719-200-77	DIODE 10E2N	
D705	8-719-200-77	DIODE 10E2N	
D706	8-719-200-77	DIODE 10E2N	
D707	8-719-987-63	DIODE 1N4148M	
D708	8-719-000-78	DIODE HZS7A1L	
D709	8-719-933-33	DIODE HZS6A1L	
D710	8-719-933-33	DIODE HZS6A1L	
D711	8-719-200-77	DIODE 10E2N	
D712	8-719-987-63	DIODE 1N4148M	
D713	8-719-987-63	DIODE 1N4148M	
D714	8-719-000-78	DIODE HZS7A1L	
D802	8-719-987-63	DIODE 1N4148M	
D803	8-719-987-63	DIODE 1N4148M	
D804	8-719-987-63	DIODE 1N4148M	
D805	8-719-987-63	DIODE 1N4148M	
D806	8-719-987-63	DIODE 1N4148M	
D807	8-719-987-63	DIODE 1N4148M	
D808	8-719-987-63	DIODE 1N4148M	
D809	8-719-987-63	DIODE 1N4148M	(WR590)
D810	8-719-200-77	DIODE 10E2N	
		< IC >	
IC501	8-752-059-55	IC CXA1331S	
IC502	8-759-140-53	IC MC14053BCP	
IC503	8-752-055-61	IC CXA1578P	
IC504	8-759-945-58	IC RC4558P	
IC505	8-759-945-58	IC RC4558P	(WR590)
IC701	8-759-945-58	IC RC4558P	
IC801	8-759-062-38	IC M50941-712SP	
IC802	8-759-207-05	IC TA7272P	
IC901	8-741-100-48	IC SBX1610-59	
		< JACK >	
J501	1-565-258-11	JACK, PIN 4P(LINE IN/OUT)	
J901	1-507-796-71	JACK(HEADPHONES)(WR590)	
		< COIL >	
* L801	1-420-872-00	COIL, AIR CORE	
* L802	1-420-872-00	COIL, AIR CORE	
		< FILTER >	
LPF101	1-236-087-11	FILTER, LOW PASS	
LPF201	1-236-087-11	FILTER, LOW PASS	
		< TRANSISTOR >	
Q102	8-729-900-80	TRANSISTOR DTC114ES	
Q103	8-729-900-74	TRANSISTOR DTC143TS (WR590)	
Q151	8-729-620-05	TRANSISTOR 2SC2603-EF	
Q202	8-729-900-80	TRANSISTOR DTC114ES	
Q203	8-729-900-74	TRANSISTOR DTC143TS (WR590)	
Q251	8-729-620-05	TRANSISTOR 2SC2603-EF	
Q501	8-729-900-65	TRANSISTOR DTA144ES (WR590)	
Q502	8-729-900-89	TRANSISTOR DTC144ES (WR590)	
Q511	8-729-900-65	TRANSISTOR DTA144ES	
Q701	8-729-620-05	TRANSISTOR 2SC2603-EF	
Q702	8-729-209-15	TRANSISTOR 2SD2012	
Q703	8-729-900-74	TRANSISTOR DTC143TS	
Q704	8-729-900-74	TRANSISTOR DTC143TS	
Q705	8-729-141-83	TRANSISTOR 2SB1094-LK	
Q706	8-729-209-15	TRANSISTOR 2SD2012	
Q707	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q708	8-729-140-04	TRANSISTOR 2SB1116A-L	
Q801	8-729-620-05	TRANSISTOR 2SC2603-EF	
Q802	8-729-620-05	TRANSISTOR 2SC2603-EF	
Q803	8-729-900-65	TRANSISTOR DTA144ES	
Q804	8-729-900-65	TRANSISTOR DTA144ES	
Q805	8-729-900-80	TRANSISTOR DTC114ES	
Q806	8-729-115-28	TRANSISTOR BN1L3Z-K	
Q807	8-729-801-93	TRANSISTOR 2SD1387	
Q808	8-729-801-93	TRANSISTOR 2SD1387	
Q809	8-729-900-80	TRANSISTOR DTC114ES	
Q810	8-729-900-89	TRANSISTOR DTC144ES	
Q811	8-729-900-61	TRANSISTOR DTA114ES	

SYSTEM CONTROL

Ref.No.	Part No.	Description			Remark
Q812	8-729-119-76	TRANSISTOR	2SA1175-HFE		
Q813	8-729-900-65	TRANSISTOR	DTA144ES		
Q814	8-729-900-65	TRANSISTOR	DTA144ES		
Q815	8-729-900-80	TRANSISTOR	DTC114ES		
Q816	8-729-900-80	TRANSISTOR	DTC114ES		
Q817	8-729-900-80	TRANSISTOR	DTC114ES		
Q818	8-729-900-89	TRANSISTOR	DTC144ES (WR590)		
Q901	8-729-900-65	TRANSISTOR	DTA144ES		
		< RESISTOR >			
R101	1-249-433-11	CARBON	22K	5%	1/4W
R102	1-249-417-11	CARBON	1K	5%	1/4W
R103	1-249-421-11	CARBON	2.2K	5%	1/4W
R106	1-247-838-00	CARBON	2K	5%	1/4W
R108	1-247-842-11	CARBON	3K	5%	1/4W
R109	1-249-423-11	CARBON	3.3K	5%	1/4W
R110	1-249-428-11	CARBON	8.2K	5%	1/4W
R111	1-247-864-11	CARBON	24K	5%	1/4W
R112	1-249-414-11	CARBON	560	5%	1/4W
R116	1-249-421-11	CARBON	2.2K	5%	1/4W
R117	1-249-429-11	CARBON	10K	5%	1/4W
R118	1-249-417-11	CARBON	1K	5%	1/4W
R126	1-249-441-11	CARBON	100K	5%	1/4W(WR590)
R151	1-249-429-11	CARBON	10K	5%	1/4W(WR590)
R152	1-249-428-11	CARBON	8.2K	5%	1/4W(WR590)
R153	1-249-431-11	CARBON	15K	5%	1/4W(WR590)
R154	1-249-409-11	CARBON	220	5%	1/4W(WR590)
R155	1-249-429-11	CARBON	10K	5%	1/4W
R156	1-249-430-11	CARBON	12K	5%	1/4W
R157	1-249-421-11	CARBON	2.2K	5%	1/4W
R158	1-247-864-11	CARBON	24K	5%	1/4W
R159	1-249-434-11	CARBON	27K	5%	1/4W
R160	1-249-408-11	CARBON	180	5%	1/4W
R201	1-249-433-11	CARBON	22K	5%	1/4W
R202	1-249-417-11	CARBON	1K	5%	1/4W
R203	1-249-421-11	CARBON	2.2K	5%	1/4W
R206	1-247-838-00	CARBON	2K	5%	1/4W
R208	1-247-842-11	CARBON	3K	5%	1/4W
R209	1-249-423-11	CARBON	3.3K	5%	1/4W
R210	1-249-428-11	CARBON	8.2K	5%	1/4W
R211	1-247-864-11	CARBON	24K	5%	1/4W
R212	1-249-414-11	CARBON	560	5%	1/4W
R216	1-249-421-11	CARBON	2.2K	5%	1/4W
R217	1-249-429-11	CARBON	10K	5%	1/4W
R218	1-249-417-11	CARBON	1K	5%	1/4W
R226	1-249-441-11	CARBON	100K	5%	1/4W(WR590)
R251	1-249-429-11	CARBON	10K	5%	1/4W(WR590)
R252	1-249-428-11	CARBON	8.2K	5%	1/4W(WR590)

Ref.No.	Part No.	Description			Remark
R253	1-249-431-11	CARBON	15K	5%	1/4W(WR590)
R254	1-249-409-11	CARBON	220	5%	1/4W(WR590)
R255	1-249-429-11	CARBON	10K	5%	1/4W
R256	1-249-430-11	CARBON	12K	5%	1/4W
R257	1-249-421-11	CARBON	2.2K	5%	1/4W
R258	1-247-864-11	CARBON	24K	5%	1/4W
R259	1-249-434-11	CARBON	27K	5%	1/4W
R260	1-249-408-11	CARBON	180	5%	1/4W
R501	1-249-433-11	CARBON	22K	5%	1/4W
R502	1-249-429-11	CARBON	10K	5%	1/4W
R504	1-249-434-11	CARBON	27K	1%	1/4W
R505	1-249-417-11	CARBON	1K	5%	1/4W
R511	1-249-417-11	CARBON	1K	5%	1/4W
R512	1-249-441-11	CARBON	100K	5%	1/4W
R513	1-249-425-11	CARBON	4.7K	5%	1/4W
R514	1-249-433-11	CARBON	22K	5%	1/4W
R515	1-249-433-11	CARBON	22K	5%	1/4W
R516	1-249-434-11	CARBON	27K	1%	1/4W
R526	1-249-429-11	CARBON	10K	5%	1/4W
R701	1-249-421-11	CARBON	2.2K	5%	1/4W
R702	1-249-425-11	CARBON	4.7K	5%	1/4W
R704	1-249-429-11	CARBON	10K	5%	1/4W
R705	1-249-425-11	CARBON	4.7K	5%	1/4W
R706	1-249-425-11	CARBON	4.7K	5%	1/4W
R707	1-249-427-11	CARBON	6.8K	5%	1/4W
R708	1-249-419-11	CARBON	1.5K	5%	1/4W
R709	1-249-425-11	CARBON	4.7K	5%	1/4W
R710	1-249-419-11	CARBON	1.5K	5%	1/4W
R711	1-249-429-11	CARBON	10K	5%	1/4W
R712	1-249-417-11	CARBON	1K	5%	1/4W
R713	1-249-427-11	CARBON	6.8K	5%	1/4W
R714	1-249-427-11	CARBON	6.8K	5%	1/4W
R715	1-249-430-11	CARBON	12K	5%	1/4W
R716	1-249-429-11	CARBON	10K	5%	1/4W
R717	1-249-421-11	CARBON	2.2K	5%	1/4W
R801	1-249-433-11	CARBON	22K	5%	1/4W
R802	1-249-428-11	CARBON	8.2K	5%	1/4W
R803	1-247-836-11	CARBON	1.6K	5%	1/4W
R804	1-249-433-11	CARBON	22K	5%	1/4W
R805	1-249-437-11	CARBON	47K	5%	1/4W
R806	1-247-903-00	CARBON	1M	5%	1/4W
R807	1-249-433-11	CARBON	22K	5%	1/4W
R808	1-249-433-11	CARBON	22K	5%	1/4W
R809	1-249-421-11	CARBON	2.2K	5%	1/4W
R810	1-249-421-11	CARBON	2.2K	5%	1/4W
R811	1-247-862-11	CARBON	20K	5%	1/4W
R812	1-249-429-11	CARBON	10K	5%	1/4W

SYSTEM CONTROL

Ref. No.	Part No.	Description			Remark
R813	1-247-862-11	CARBON	20K	5%	1/4W
R814	1-249-429-11	CARBON	10K	5%	1/4W
R815	1-249-429-11	CARBON	10K	5%	1/4W
R816	1-249-429-11	CARBON	10K	5%	1/4W
R817	1-249-434-11	CARBON	27K	5%	1/4W
R818	1-249-429-11	CARBON	10K	5%	1/4W
R819	1-249-429-11	CARBON	10K	5%	1/4W
R820	1-249-434-11	CARBON	27K	5%	1/4W
R821	1-249-421-11	CARBON	2.2K	5%	1/4W
R822	1-249-429-11	CARBON	10K	5%	1/4W
R823	1-249-421-11	CARBON	2.2K	5%	1/4W
R824	1-249-429-11	CARBON	10K	5%	1/4W
R825	1-249-422-11	CARBON	2.7K	5%	1/4W
R826	1-249-422-11	CARBON	2.7K	5%	1/4W
R827	1-249-422-11	CARBON	2.7K	5%	1/4W
R828	1-249-429-11	CARBON	10K	5%	1/4W
R829	1-249-421-11	CARBON	2.2K	5%	1/4W(WR521)
R830	1-249-427-11	CARBON	6.8K	5%	1/4W(WR521)
R830	1-249-430-11	CARBON	12K	5%	1/4W(WR590)
R831	1-249-423-11	CARBON	3.3K	5%	1/4W(WR590)
R832	1-249-420-11	CARBON	1.8K	5%	1/4W(WR521)
R832	1-247-842-11	CARBON	3K	5%	1/4W(WR590)
R833	1-249-421-11	CARBON	2.2K	5%	1/4W
R834	1-249-421-11	CARBON	2.2K	5%	1/4W
R835	1-249-430-11	CARBON	12K	5%	1/4W
R836	1-249-433-11	CARBON	22K	5%	1/4W
R840	1-249-433-11	CARBON	22K	5%	1/4W
R841	1-249-433-11	CARBON	22K	5%	1/4W
R842	1-249-405-11	CARBON	100	5%	1/4W
R843	1-249-430-11	CARBON	12K	5%	1/4W
R844	1-249-433-11	CARBON	22K	5%	1/4W
R848	1-249-433-11	CARBON	22K	5%	1/4W
R849	1-249-433-11	CARBON	22K	5%	1/4W
R850	1-249-405-11	CARBON	100	5%	1/4W
R901	1-249-407-11	CARBON	150	5%	1/4W
R902	1-249-409-11	CARBON	220	5%	1/4W
R903	1-249-411-11	CARBON	330	5%	1/4W
R904	1-249-413-11	CARBON	470	5%	1/4W
R905	1-249-415-11	CARBON	680	5%	1/4W
R906	1-249-417-11	CARBON	1K	5%	1/4W
R907	1-249-420-11	CARBON	1.8K	5%	1/4W
R908	1-249-424-11	CARBON	3.9K	5%	1/4W
R909	1-249-407-11	CARBON	150	5%	1/4W
R910	1-249-409-11	CARBON	220	5%	1/4W
R911	1-249-411-11	CARBON	330	5%	1/4W
R912	1-249-413-11	CARBON	470	5%	1/4W
R913	1-249-415-11	CARBON	680	5%	1/4W
R914	1-249-417-11	CARBON	1K	5%	1/4W
R915	1-249-420-11	CARBON	1.8K	5%	1/4W

Ref. No.	Part No.	Description			Remark
R916	1-249-424-11	CARBON	3.9K	5%	1/4W
R917	1-249-430-11	CARBON	12K	5%	1/4W
R918	1-249-417-11	CARBON	1K	5%	1/4W
		< VARIABLE RESISTOR >			
RV101	1-238-016-11	RES, ADJ, CARBON 10K			
RV201	1-238-016-11	RES, ADJ, CARBON 10K			
RV901	1-241-901-11	RES, VAR, CARBON 50K/50K (BALANCE)			
RV902	1-241-133-11	RES, VAR, CARBON 50K/50K (REC LEVEL)			
		< SWITCH >			
S701	1-554-118-00	SWITCH, PUSH (POWER)			
S901	1-554-303-21	SWITCH, TACTILE (■)			
S902	1-554-303-21	SWITCH, TACTILE (▷)			
S903	1-554-303-21	SWITCH, TACTILE (◁)			
S904	1-554-303-21	SWITCH, TACTILE (◀◀)			
S905	1-554-303-21	SWITCH, TACTILE (▶▶)			
S906	1-554-303-21	SWITCH, TACTILE (●)			
S907	1-554-303-21	SWITCH, TACTILE (HIGH SPEED)			
S908	1-554-303-21	SWITCH, TACTILE (NORMAL SPEED)			
S909	1-554-303-21	SWITCH, TACTILE (COUNTER RESET)			
S911	1-554-303-21	SWITCH, TACTILE (■)			
S912	1-554-303-21	SWITCH, TACTILE (❚❚)			
S913	1-554-303-21	SWITCH, TACTILE (▷)			
S914	1-554-303-21	SWITCH, TACTILE (◁)			
S915	1-554-303-21	SWITCH, TACTILE (⏻)			
S916	1-554-303-21	SWITCH, TACTILE (◀◀)			
S917	1-554-303-21	SWITCH, TACTILE (▶▶)			
S918	1-554-303-21	SWITCH, TACTILE (COUNTER RESET)			
S921	1-692-126-11	SWITCH, SLIDE (DOLBY NR)			
S922	1-692-126-11	SWITCH, SLIDE (DIR MODE)			
		< INDICATOR TUBE >			
VFD901	1-519-712-11	INDICATOR TUBE, FLUORESCENT			
		< VIBRATOR >			
X801	1-577-358-21	VIBRATOR, CERAMIC (4MHz)			

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MISCELLANEOUS

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⚠2	1-569-007-11	ADAPTER, CONVERSION 2P (WR590:E)
⚠4	1-551-188-XX	CORD, POWER (WR590:E)
⚠4	1-555-795-00	CORD, POWER, EULO PLUG (WR590:AEP)
⚠4	1-556-035-00	CORD, POWER (WR590:UK)
⚠4	1-558-945-11	CORD, POWER (WR521/WR590:US, Canadian)

Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Note:
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Ref.No.	Part No.	Description	Remark
10	1-690-891-11	WIRE, FLAT TYPE (11 CORE)	
11	1-690-889-11	WIRE, FLAT TYPE (9 CORE)	
12	1-690-890-11	WIRE, FLAT TYPE (9 CORE)	
68	1-690-888-11	WIRE, FLAT TYPE (31 CORE)	
69	1-690-901-11	WIRE (FLAT TYPE) (5 CORE)	
121	1-638-983-11	PC BOARD, MOTOR FLEXIBLE	
⚠F701	1-532-285-00	FUSE 1.25A 250V	(WR590:AEP,UK,E)
⚠F701	1-576-103-11	FUSE 1.6A 250V	(WR521/WR590:US,Canadian)
⚠F702	1-532-285-00	FUSE 1.25A 250V	(WR590:AEP,UK,E)
⚠F702	1-576-103-11	FUSE 1.6A 250V	(WR521/WR590:US,Canadian)
HP101	A-2003-837-A	BASE ASSY, HEAD (DECK A)(PB)	
HRPB101	A-2003-838-A	BASE ASSY, HEAD (DECK B)(PB/REC/ERASE)	
M1	X-3359-417-1	MOTOR(CAPSTAN) ASSY	
M2	X-3363-501-1	MOTOR ASSY, REEL	
⚠T901	1-450-837-11	TRANSFORMER, POWER	(WR521/WR590:US,Canadian)
⚠T901	1-450-838-11	TRANSFORMER, POWER	(WR590:AEP,UK)
⚠T901	1-450-839-11	TRANSFORMER, POWER	(WR590:E)
⚠VS901	1-692-155-11	VOLTAGE SELECTOR(VOLTAGE)	(WR590:E)

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ACCESSORIES & PACKING MATERIALS

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	1-558-271-11	CORD, CONNECTION	
	1-559-533-11	CORD, CONNECTION	(WR521:Canadian)
*	3-354-917-01	CUSHION	(WR521:Canadian)
*	3-366-701-41	INDIVIDUAL CARTON	(WR590)
*	3-366-701-51	INDIVIDUAL CARTON	(WR521)
*	3-376-446-01	CUSHION	(WR521:U/WR590)
*	3-704-343-01	SHEET (STANDARD), PROTECTION	
	3-754-778-11	MANUAL, INSTRUCTION (English/French/Spanish/Portuguese)	(WR590:AEP,E)
	3-754-778-21	MANUAL, INSTRUCTION (English)	(WR521:U/WR590:US,Canadian,UK)
	3-754-778-31	MANUAL, INSTRUCTION (French)	(WR590:Canadian)
	3-754-778-41	MANUAL, INSTRUCTION (Germany,Dutch,Italian,Swedish)	(WR590:AEP)
	3-754-778-61	MANUAL, INSTRUCTION (Chinese)	(WR590:E)
	3-754-778-71	MANUAL, INSTRUCTION (Danish)	(WR590:AEP)
	9-910-999-33	INSTRUCTION	(WR521:U)

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Ref.No.	Part No.	Description	Remark
#1	7-621-773-93	SCREW (PANEL 2.6 TP2)	
#2	7-621-773-95	SCREW +BVTT 2.6X6 (S)	
#3	7-621-849-00	SCREW (BV/RING)	
#4	7-682-547-04	SCREW +BVTT 3X6 (S)	
#5	7-682-548-09	SCREW +BVTT 3X8 (S)	
#6	7-685-646-79	SCREW +BVTP 3X8	TYPE2 IT-3
#7	7-682-547-09	SCREW +BVTT 3X6 (S)	

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HARDWARE LIST

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Note:	Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

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