

MZ-E60

SERVICE MANUAL

US Model
Canadian Model
AEP Model
E Model



(Photo: Silver)

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

Model Name Using Similar Mechanism	MZ-E90
MD Mechanism Type	MT-MZE60-169
Optical Pick-up Mechanism Type	LCX-2E

SPECIFICATIONS

System

Audio playing system
MiniDisc digital audio system
Laser diode properties
Material: GaAlAs
Wavelength: $\lambda = 790 \text{ nm}$
Emission duration: continuous
Laser output: less than $44.6 \mu\text{W}$
(This output is the value measured at a distance of 200 mm from the objective lens surface on the optical pick-up block with 7 mm aperture.)
Revolutions
800 rpm to 1,800 rpm
Error correction
Advanced Cross Interleave Reed Solomon Code (ACIRC)
Sampling frequency
44.1 kHz
Coding
Adaptive TRansform Acoustic Coding (ATRAC)
Modulation system
EFM (Eight to Fourteen Modulation)
Number of channels
2 stereo channels
1 monaural channel
Frequency response
20 to 20,000 Hz $\pm 3 \text{ dB}$
Wow and Flutter
Below measurable limit
Outputs
Headphones: stereo mini-jack, maximum output level 5 mW + 5 mW, load impedance 16 ohms

General

Power requirements
One LR6 (size AA) battery (not supplied)
Battery operation time
You can check the battery condition with the battery indication which is displayed while using the player.
 Battery power decreasing
↓
 Weak battery
↓
 The battery has gone out. "LOW BATT" flashes in the display on the remote control, and the power goes off.

Battery Life

Approximately 12 hours of playback can be expected with one LR6 (size AA) alkaline battery (not supplied).

Note

The battery life may shorter depending on operating conditions and temperature of the location.

– Continued on next page –

PORTABLE MINIDISC PLAYER



SONY®

Dimensions

Approx. 81 × 25 × 74 mm (w/h/d)
(3 1/4 × 1 × 3 in.) not including projecting
parts and controls

Mass

Approx. 95 g (3.4 oz.) the player only

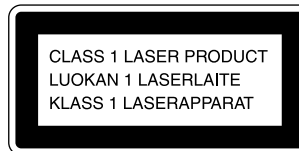
Approx. 136 g (4.8 oz.) incl. a mastered MD
and a LR6 (size AA) alkaline battery

Supplied accessories

Headphones with a remote control (1)

Carrying pouch (1)

Design and specifications are subject to change
without notice.



This MiniDisc player is classified as a CLASS 1 LASER product.

The CLASS 1 LASER PRODUCT label is located on the bottom exterior.

IN NO EVENT SHALL SELLER BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT OR THE USE OF ANY PRODUCT.

“MD WALKMAN” is a trademark of Sony Corporation.

CAUTION

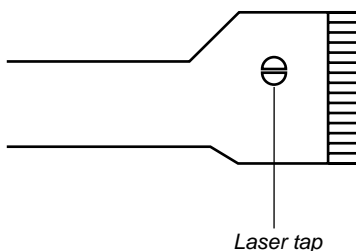
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Precautions for Laser Diode Emission Check

When checking the emission of the laser diode during adjustments, never view directly downwards as this may lead to blindness.

Precautions for Using Optical Pick-up (LCX-2E)

As the laser diode inside the optical pick-up damages by static electricity easily, solder the laser tap of the Optical pick-up flexible board when handling. Also take the necessary measures to prevent damages by static electricity. Handle the Optical pick-up flexible board with care as it breaks easily.



Optical Pick-up flexible board

Flexible Circuit Board Repairing

- Keep the temperature of the soldering iron around 270°C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK \triangle OR DOTTED LINE WITH MARK \triangle 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 \triangle 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.

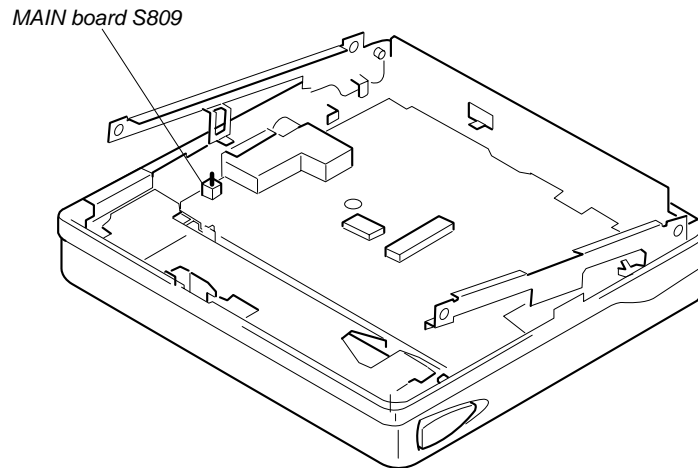
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SECTION 1 SERVICING NOTE

1) When repairing this device with the power on, if you remove the main board or open the upper panel assy, this device stops working.

In this case, you can work without the device stopping by fastening the hook of the OPEN/CLOSE switch (MAIN board S809) with tape.



2) This set is designed to perform automatic adjustment for each adjustment and write its value to EEPROM. Therefore, when EEPROM (MAIN board IC802) has been replaced in service, be sure to perform automatic adjustment and write resultant values to the new EEPROM.

Refer to section 4 Test Mode (page 10) for details.

This section is extracted from instruction manual.

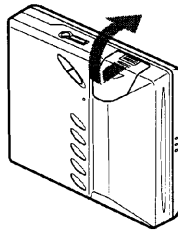
Playing an MD right away!

Stereo or monaural playback is automatically selected, depending on the sound source.

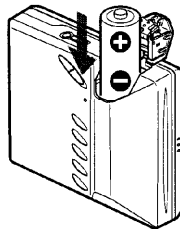
1 Insert the dry battery.

Use one LR6 (size AA) dry battery (not supplied) to power the player. For longer playback, an alkaline battery is recommended.

① Slide and open the battery compartment as shown in the illustration.



② Insert the battery.



Make sure the + and - terminals are correctly oriented.

When to replace the battery

You can check the battery condition with the battery indication which is displayed while using the player.

- Battery power decreasing
- Weak battery

The battery has gone out. "LOW BATT" flashes in the display on the remote control, and the power goes off.

Battery life

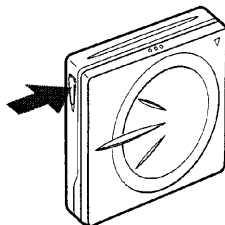
Approximately 12 hours of playback can be expected with one LR6 (size AA) alkaline battery (not supplied).

Note

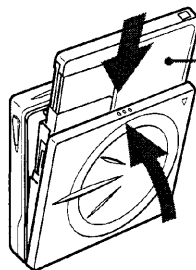
The battery life may shorter depending on operating conditions and temperature of the location.

2 Insert an MD.

① Press OPEN.



② Insert an MD and press the lid to close.



With label facing front, insert disc in direction of the arrow.

Other disc operation

To	Do this (Beeps in the headphones)
Pause	Press II on the remote control. (Continuous short beeps) Press II on the remote control again to resume play.*1
Find the beginning of the current track	Press II once. Press the control towards II on the remote control. (Three short beeps)
Find the beginning of the previous tracks	Press II repeatedly. Press the control towards II on the remote control repeatedly. (Continuous three short beeps)
Find the beginning of the next track	Press III once. Press the control towards III on the remote control. (Two short beeps)
Go backwards while playing*1	Hold down II . Press and hold the control towards II on the remote control.
Go forward while playing*1	Hold down III . Press and hold the control towards III on the remote control.
Remove the MD	Press ■ , and then press OPEN.*2

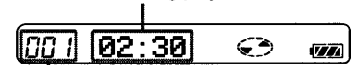
If playback does not start

Make sure the player is not locked. For details, see "To lock the controls (HOLD)".

Display window while playing back

For details, see "To know the track name and time".

Track name*3 or elapsed time of the track being played



Track number

Tips

- The OPERATE lamp on the player lights up during playback. When you press **■**, the lamp goes off.
- The display on the remote control disappears after a while after you have pressed **■**.

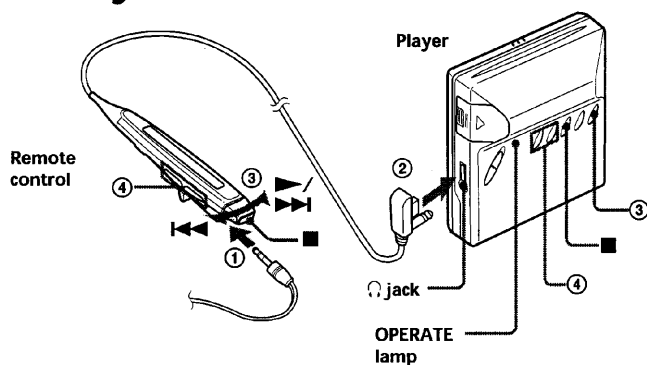
Note






Do not press OPEN during playback. If you do, the lid opens and playback stops.

When using optional headphones

Use headphones with a stereo-miniplug. You cannot use headphones with a microplug.









3 Play an MD.



- ① **Connect the headphones to the remote control.**
Plug it in firmly all the way.
- ② **Connect the headphones with the remote control to the  jack.**
- ③ **Press  or  (or press the control towards  or  on the remote control).**
The OPERATE lamp on the player lights up and the player starts to play the first track. When using the remote control, a short beep sounds in the headphones.
- ④ **Press VOL +/- to adjust the volume.**
The volume indicator appears on the remote control to allow you to check the volume.

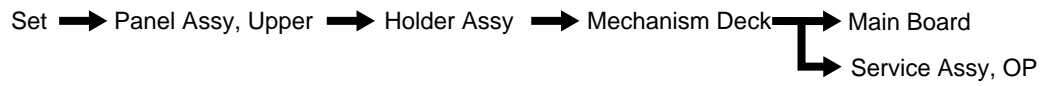
To stop play, press .

The OPERATE lamp on the player goes off. The display on the remote control disappears after a while. When using the remote control, a long beep sounds in the headphones.

- *1 When you press  or  on the player during pause (), the player resumes playback. If you hold down  or  on the player (or press and hold the control towards  or  on the remote control) during pause (), you can fast forward/rewind without listening to the playback sound.
- *2 Once you open the lid, the point to start playback will change to the beginning of the first track.
- *3 Appears only with MDs that have been electronically labeled.

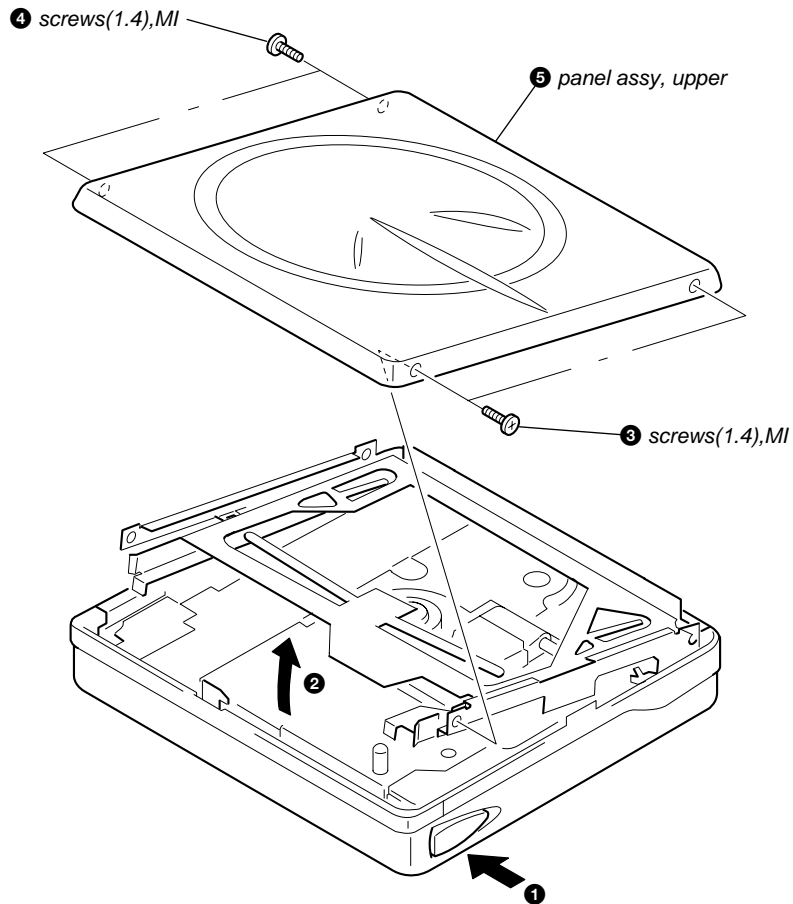
SECTION 3 DISASSEMBLY

Note : This set can be disassemble according to the following sequence.

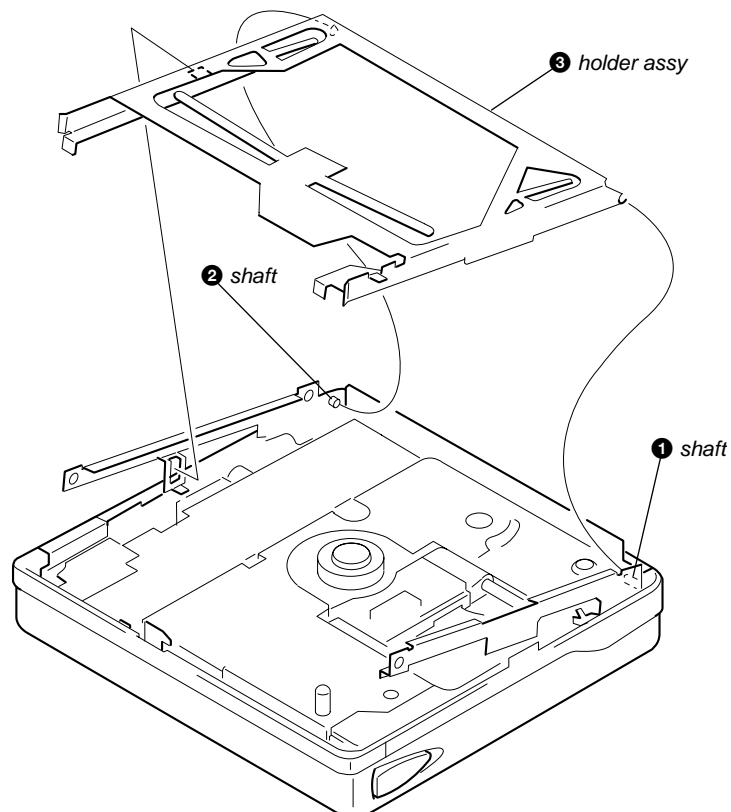


Note : Follow the disassembly procedure in the numerical order given.

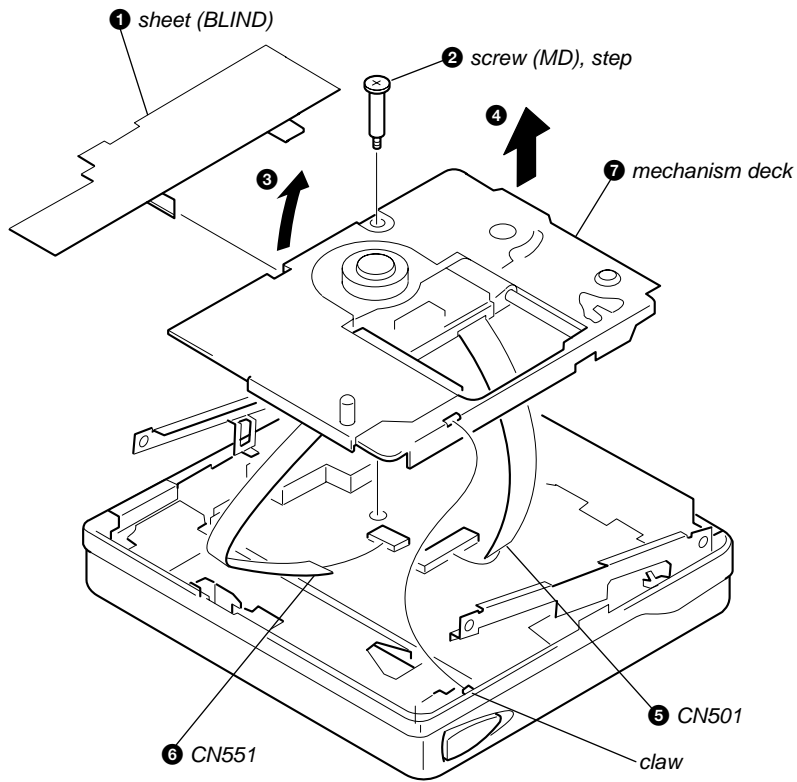
3-1. PANEL ASSY, UPPER



3-2. HOLDER ASSY

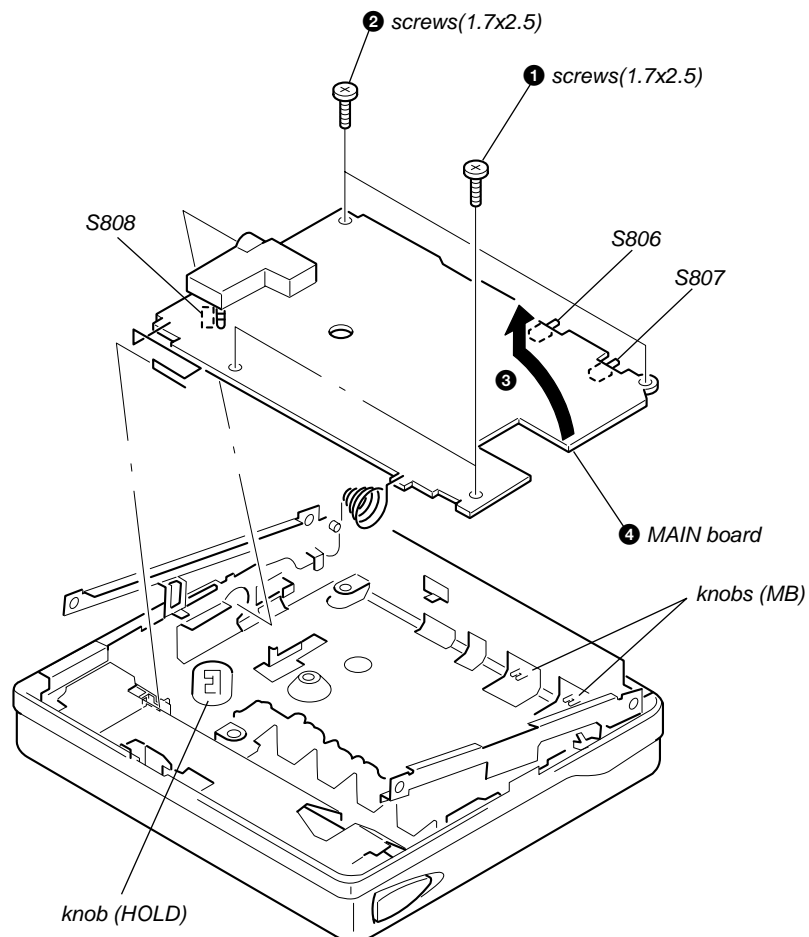


3-3. MECHANISM DECK

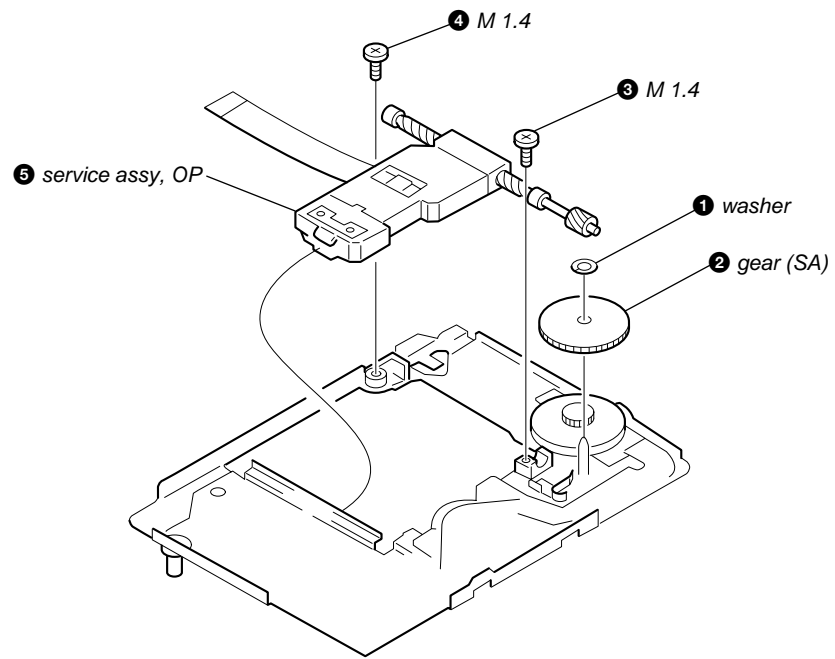


3-4. MAIN BOARD

Note : When installing, fit the knobs (HOLD, MB) and the switches (S806, 807, 808).



3-7. SERVICE ASSY, OP



SECTION 4 TEST MODE

4-1. GENERAL

- When entered in the TEST MODE, this set provides the Overall Adjustment mode which allows CD and MO discs to be automatically adjusted. In the Overall Adjustment mode, the system discriminates between CD and MO discs, performs adjustments in sequence automatically, and displays the faulty location if any fault is found. In the Manual mode, selected adjustments can be performed automatically.
- The attached remote control is used to operate the TEST MODE. Unless otherwise specified in the text, the key means that on the remote control.

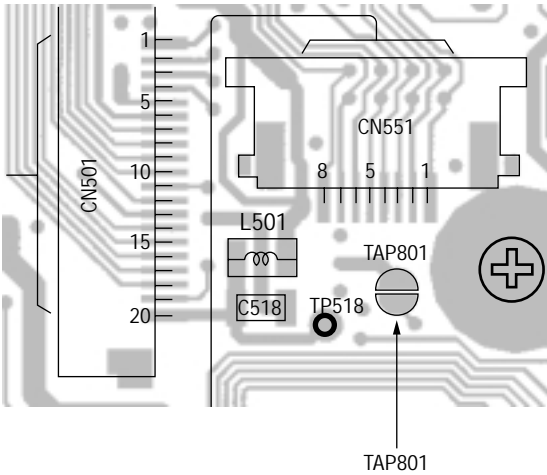
4-2. SETTING THE TEST MODE

4-2-1. How to set the TEST MODE

To set the TEST MODE, two methods are available.

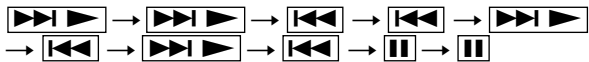
- ① Solder bridge and short TAP801 (TEST) on the main board. Then turn on the power.

【MAIN BOARD】 (SIDE B)



- ② In the normal mode, operate the keys on the set and those on the remote control as specified below:

Turn on HOLD switch on the set. Holding down [STOP] key on the set, press the keys on the remote control in the following sequence:

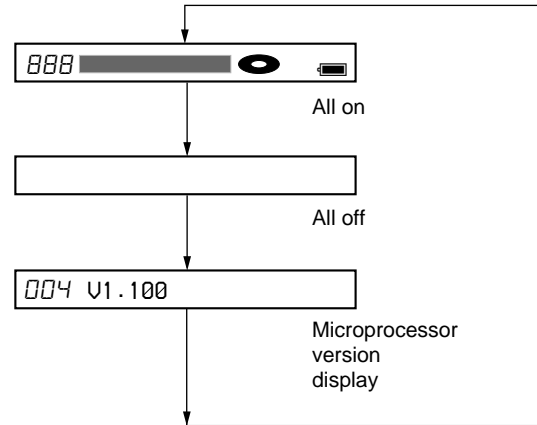


4-2-2. Operations when the TEST MODE is set

When the TEST MODE is entered, the system switches to the display check mode within the TEST MODE. From this mode, the other Test modes can be accessed.

When the TEST MODE is set, the LCD repeats a cycle of the following displays:

Remote control LCD



- Press and hold down [PLAY MODE] to hold the current display while the key is being pressed.

4-2-3. How to release the TEST MODE

When method ① was used:

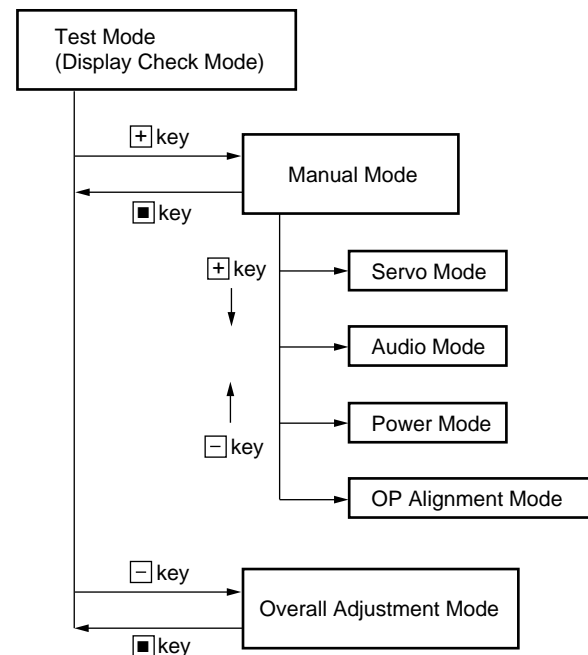
Turn off the power and open the solder bridge on TAP801 on the main board.

Note: The solder should be removed clean. The remaining solder may make a short with the chassis and other part.

When method ② was used:

Turn off the power.

4-3. TEST MODE STRUCTURE



4-4. MANUAL MODE

4-4-1. Outline of the function

The Manual mode is designed to perform adjustments and operational checks on the set's operation according to each individual function.

Usually, no adjustments are made in this mode.

However, the Manual mode is used to clear the memory before performing automatic adjustments in the Overall Adjustment mode.

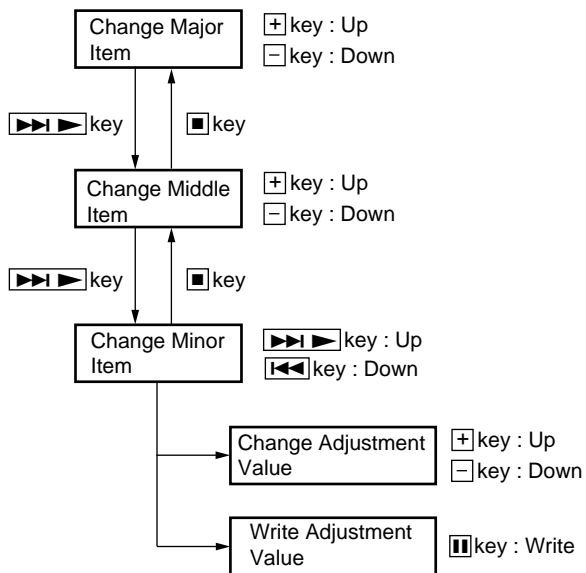
4-4-2. How to set the Manual mode

1. Set the TEST MODE and press **[+]** key to set the Manual mode.

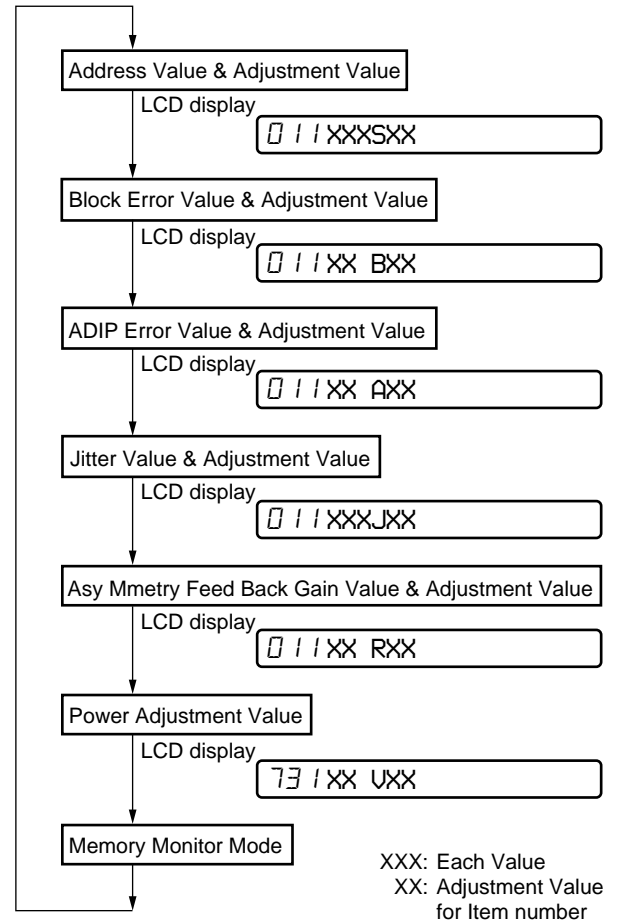
Remote control LCD display



2. Each test item is assigned with a three-digit item number. The third digit stands for a major item, the second digit for a middle item, and the first digit for a minor item.



3. During each test mode, the display is changed from one to another each time **[DISPLAY]** key is pressed.



Note: In the Power mode, the power adjustment value is only displayed.

4. During each test, press and hold down **[▶▶▶]** key or **[◀◀◀]** key for a while to move the optical pickup on the sled outer or inner perimeter.
5. To terminate the Manual mode and return to the TEST MODE, press **[■]** key.

4-5. OVERALL ADJUSTMENT MODE

4-5-1. Outline of the function

This mode is designed to adjust the servo system automatically by going through all the adjustment items.

Usually, this mode is used to perform automatic adjustments when servicing the set.

For further information, refer to section 5. ELECTRICALADJUSTMENTS (page 12).

SECTION 5 ELECTRICAL ADJUSTMENTS

5-1. GENERAL

In this set, CD and MO discs can be automatically adjusted by setting the Overall Adjustment mode within the TEST MODE. Before performing these automatic adjustments, it is necessary to clear the memory and adjust the power in the Manual mode.

5-2. NOTES FOR ADJUSTMENT

5-2-1. Jigs

- CD disc TDYS-1 (part code: 4-963-646-01)
- MO disc PTDM-1 (part code: J-2501-054-A)
or commercially available MO disc (recorded)
- Digital voltmeter

5-2-2. Adjustment sequence

The adjustments should be always performed in the following sequence:

- | | | | |
|---|-----------------------------|---|-------------------------|
| ① | Reset NV (Clear the memory) |) | Manual mode |
| ↓ | ② | ↓ | |
| | Overall CD adjustments |) | Overall adjustment mode |
| | ③ | | |

5-2-3. Power

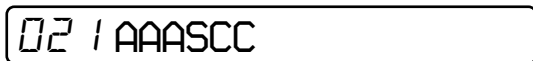
A stabilized power supply is used to supply 1.5 V DC to the battery terminal. Otherwise, an AA alkali battery with the remaining level of 1.5 V DC or more is used. (In this case, make sure that the battery indication on the remote control is "FULL")

5-3. RESET NV

5-3-1. How to reset NV

1. Set the TEST MODE. (See page 10)
2. Set the Manual mode and set the item No. 021, Reset NV.

LCD display



3. Press key on the remote control.

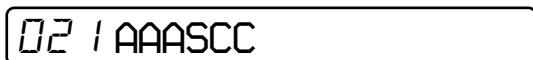
LCD display



Note: CC is blink.

4. Press key on the remote control again.

LCD display

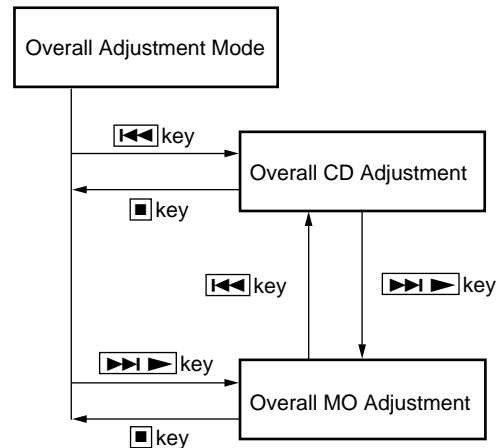


Note: CC blink. → Finish the CC light on.

5. Press key to terminate the Manual mode and return to the TEST MODE.

5-4. OVERALL ADJUSTMENT MODE

5-4-1. Overall adjustment mode structure

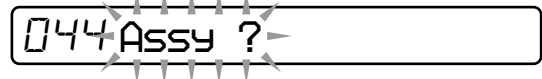


Note: The overall adjustments should be always performed in the sequence of CD → MD adjustments.

5-4-2. Overall CD and MO adjustment method

1. Set the TEST MODE (see page 10) and press key to set the Overall Adjustment mode.

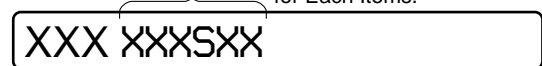
LCD display



2. Insert CD disc in the set, and press key to set the Overall CD Adjustment mode.

Automatic adjustments are made.

LCD display



XXX: Item No. for which an adjustment is being executed.

3. If NG in the overall CD adjustments, return to Reset NV and perform the adjustment again.

LCD display



XXX: NG item No.

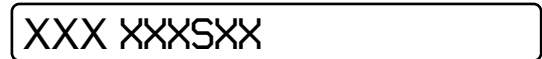
4. If OK through the overall CD adjustments, then perform overall MO adjustments.

LCD display



5. Insert MO disc in the set, and press key to set the Overall MO Adjustment mode. Automatic adjustments are made.

LCD display




XXX: Item No. for which an adjustment is being executed.

6. If NG in the overall MO adjustments, return to Reset NV and perform the adjustment again.

LCD display

XXX NGXX

XXX: NG item No.

7. If OK through the overall MO adjustments, press  key to return to the TEST MODE and terminate the Overall Adjustment mode.

LCD display

XXX End-OK

5-4-3. Overall CD and MO adjustment items

1. Overall CD adjustment items

Item No.	Contents
312	CD electrical offset adjustment
313	
314	
321	CD TE gain adjustment
328	CD TWPP gain adjustment
323	CD TE offset adjustment
336	CD ABCD gain adjustment
344	CD focus gain adjustment
345	CD tracking gain adjustment
521	CD two-axis sensitivity adjustment
522	
341	CD focus bias adjustment

2. Overall MO adjustment items

Item No.	Contents
112	MO electrical offset adjustment
113	
114	
221	Low reflective CD TE gain adjustment
223	Low reflective CD TE offset adjustment
236	Low reflective CD ABCD gain adjustment
244	Low reflective CD focus gain adjustment
245	Low reflective CD tracking gain adjustment
121	MO TE gain adjustment
122	MO TE offset adjustment
144	MO focus gain adjustment
145	MO tracking gain adjustment
131	MO TWPP offset adjustment
132	
136	MO ABCD gain adjustment
134	MO TWPP gain adjustment
141	MO focus bias adjustment

SECTION 6 DIAGRAMS

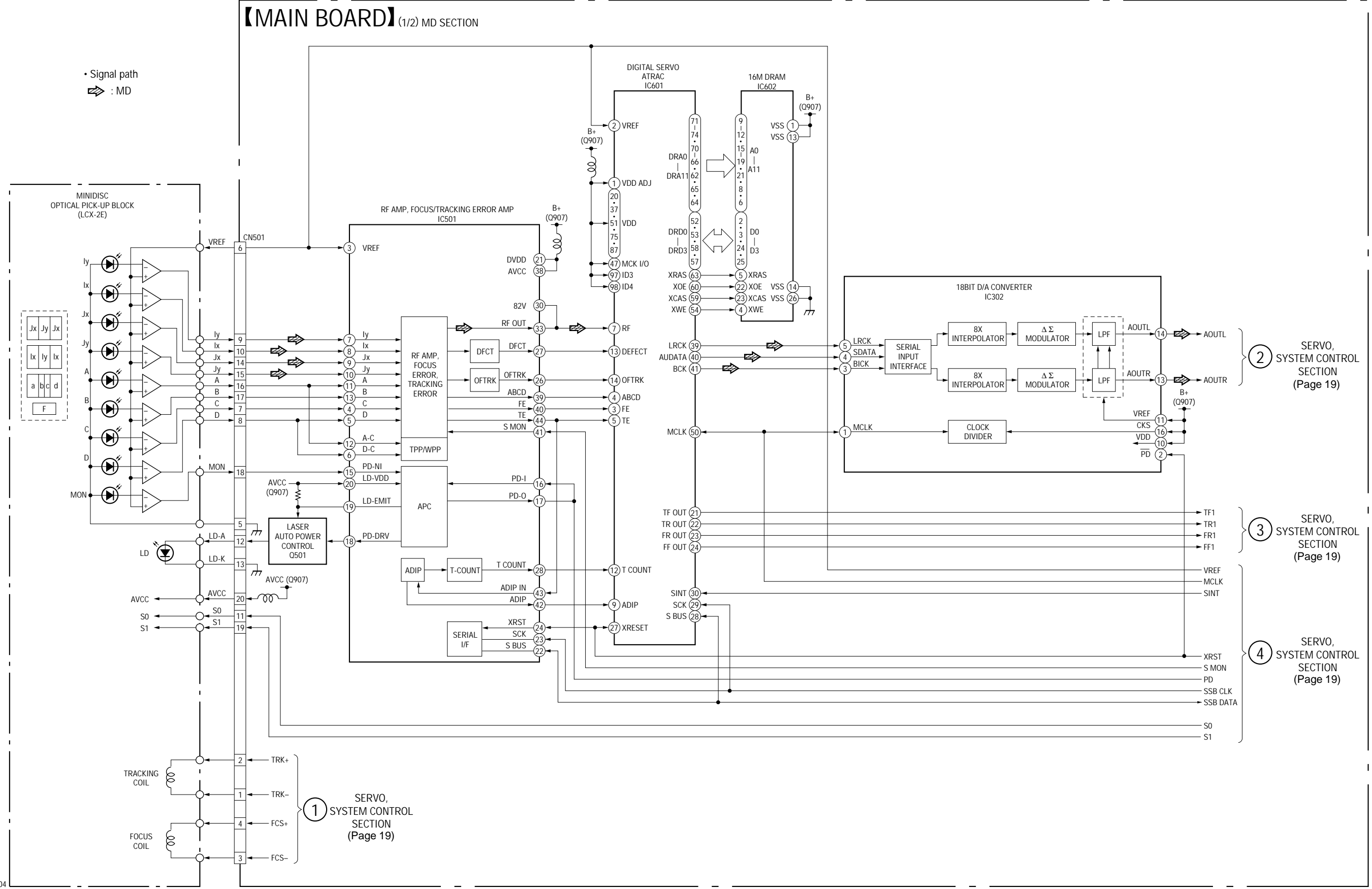
6-1. IC PIN DESCRIPTION

6-1-1. IC801 RU6915MF-0006 (SYSTEM CONTROL)

Pin No.	Pin Name	I/O	Description
1	S MON	I	S-MON monitor signal input from the μ PD63732GC (IC601)
2	UREG MON	I	Un-regulator power supply voltage monitor input terminal (A/D input)
3	NC	—	Not used. (open)
4	VREF	I	Input terminal for power supply voltage adjustment reference voltage (+2 V) (A/D input)
5	DVDD MON	I	Not used. (Fixed at "H".)
6	NC	—	Not used. (open)
7	RMC KEY	I	Remote commander with headphone key input terminal (A/D input)
8	SET KEY	I	Set key input terminal (A/D input) S801 to S804 (■, ►►/►►, ◀◀, +/- VOLUME keys input)
9	MRST	I	System reset signal input "L": reset For several hundreds msec. after the power supply rises, "L" is input, then it change to "H"
10	AVDD	—	Power supply pin (+2.4 V or +2.8 V)
11	AVSS	—	Ground terminal (for A/D converter)
12 – 15	TYPE0 – 3	I	Setting terminal for model discrimination (bit 0 to bit 3) Fixed at "L" in this set
16	XOUT	O	Main system clock output terminal (16.9344 MHz)
17	XIN	I	Main system clock input terminal (16.9344 MHz)
18	SX OUT	O	Sub system clock output terminal Not used. (open)
19	SXIN	I	Sub system clock input terminal Not used. (fixed at "L")
20	COUT	O	Not used. (open)
21	VDD	—	Power supply terminal (+2 V) (digital system)
22	VSS	—	Ground terminal (digital system)
23	HOLD SW	I	HOLD switch (S808) input terminal "L": hold off, "H": hold on
24	VG CON	O	Power supply control signal output to each ICs
25	XCLK	O	System clock supply output terminal (16.934 MHz) to the μ PD63732GC (IC601) or AK4352 (IC302)
26	KEY EN	O	Ground control output terminal of remote control
27	AVLS SW	I	AVLS switch (S803) input terminal "L": LIMIT "H": NORM
28	DSP SINT	I	Interruption status input from the μ PD63732GC (IC601)
29, 30	DBB0, DBB1	I	DIGITAL MEGABASS switch (S806) input terminal *1
31	OPR LED	O	OPERATE LED (D802) drive signal output terminal "H": LED on
32	OPEN CLS SW	I	Upper panel open/close detect switch (S801) input terminal "L": upper panel close, "H" : upper panel open
33	$\overline{\text{XWAKE RMC}}$	I	Wake up signal input from remote control key
34	$\overline{\text{XWAKE SET}}$	I	Wake up signal input from this set key
35	SBUS CLK	O	SSB serial clock signal output terminal
36	SBUS DATA	I/O	SSB serial data input/output terminal
37	$\overline{\text{XRST}}$	O	Reset signal output terminal to each ICs
38	SLD 1 MON	I	Sled servo timing signal input from the TLC372CPW (IC552)
39	SLD 2 MON	I	Sled servo timing signal input from the TLC372CPW (IC552)
40	VDD	—	Power supply terminal
41	VPP	—	Test terminal (fixed at "L")
42	CLV VCON	O	Spindle servo drive voltage control signal output to the BD6602KUT (IC551) or μ PD63732GC (IC601)
43	APC REF	O	Laser power control signal output terminal
44	RM VCON	O	Remote control power voltage select signal output to power circuit "L":2.4 V, "H": 2.8 V
45	CLV U MON	I	Spindle servo (U) timing signal input from the BD6602KUT (IC551)
46	CLV V MON	I	Spindle servo (V) timing signal input from the BD6602KUT (IC551)
47	CLV W MON	I	Spindle servo (W) timing signal input from the BD6602KUT (IC551)
48	CLV U CON	I	Spindle servo (U) drive signal input from the BD6602KUT (IC551)
49	CLV V CON	I	Spindle servo (V) drive signal input from the BD6602KUT (IC551)

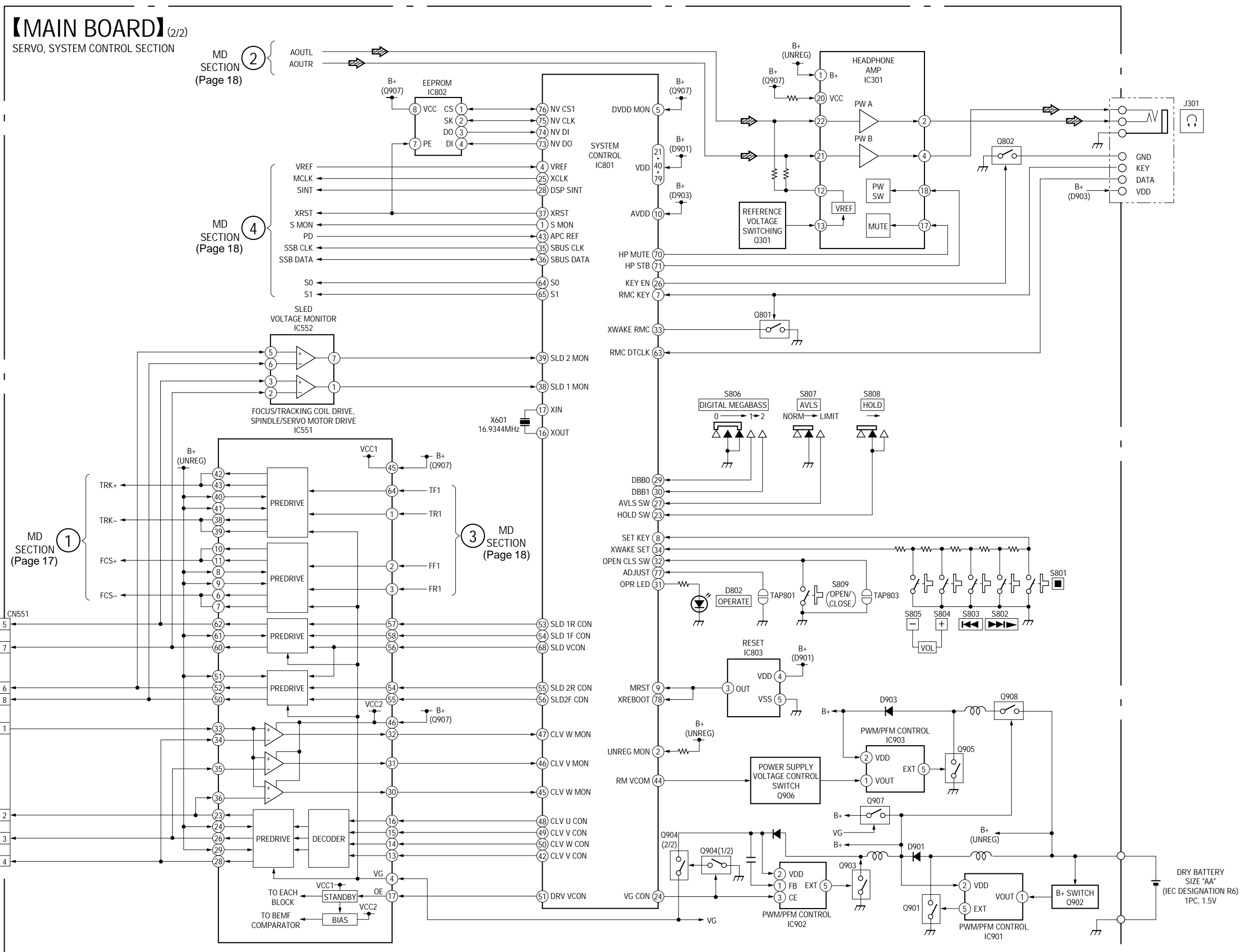
Pin No.	Pin Name	I/O	Description
50	CLV W CON	I	Spindle servo (W) drive signal input from the BD6602KUT (IC551)
51	DRV VCON	O	Driver output control terminal to the DB6602KUT (IC551) “L”: prohibited, “H”: permission
52	NC	—	Not used. (open)
53	SLED 1R CON	O	Sled motor control signal output to the BD6602KUT (IC551)
54	SLED 1F CON	O	Sled motor control signal output to the BD6602KUT (IC551)
55	SLED 2R CON	O	Sled motor control signal output to the BD6602KUT (IC551)
56	SLED 2F CON	O	Sled motor control signal output to the BD6602KUT (IC551)
57 – 60	NC	—	Not used. (open)
61	VSS	—	Ground terminal (digital system)
62	NC	—	Not used. (open)
63	RMC DTCK	I/O	TSB serial communication data input/output terminal for remote commander with headphone
64	S0	O	PD-IC mode select signal output
65	S1	O	PD-IC mode select signal output
66, 67	NC	—	Not used. (open)
68	SLD VCON	O	Sled servo control PWM signal output to the BD6602KUT (IC551)
69	NC	—	Not used. (open)
70	HP MUTE	O	Muting on/off control signal output to the headphone amplifier (IC301) “H”: muting on
71	HP STBY	O	Standby on/off control signal output to the headphone amplifier (IC301) “L”: standby mode, “H”: amplifier on
72	NC	—	Not used. (open)
73	NV DI	I	Serial data input from the EEPROM (IC802)
74	NV DO	O	Serial data output from the EEPROM (IC802)
75	NV CLK	O	Serial clock signal output to the EEPROM (IC802)
76	NV CS1	O	Chip select signal output to the EEPROM (IC802)
77	ADJUST	I	Test mode institution input terminal “L”: test mode (Normally, fixed at “H”)
78	$\overline{\text{XREBOOT}}$	O	System reboot control output terminal
79	VDD	—	Power supply terminal (+2 V) (digital system)
80	VSS	—	Ground terminal (digital system)

6-2. BLOCK DIAGRAMS
6-2-1. MD BLOCK DIAGRAM



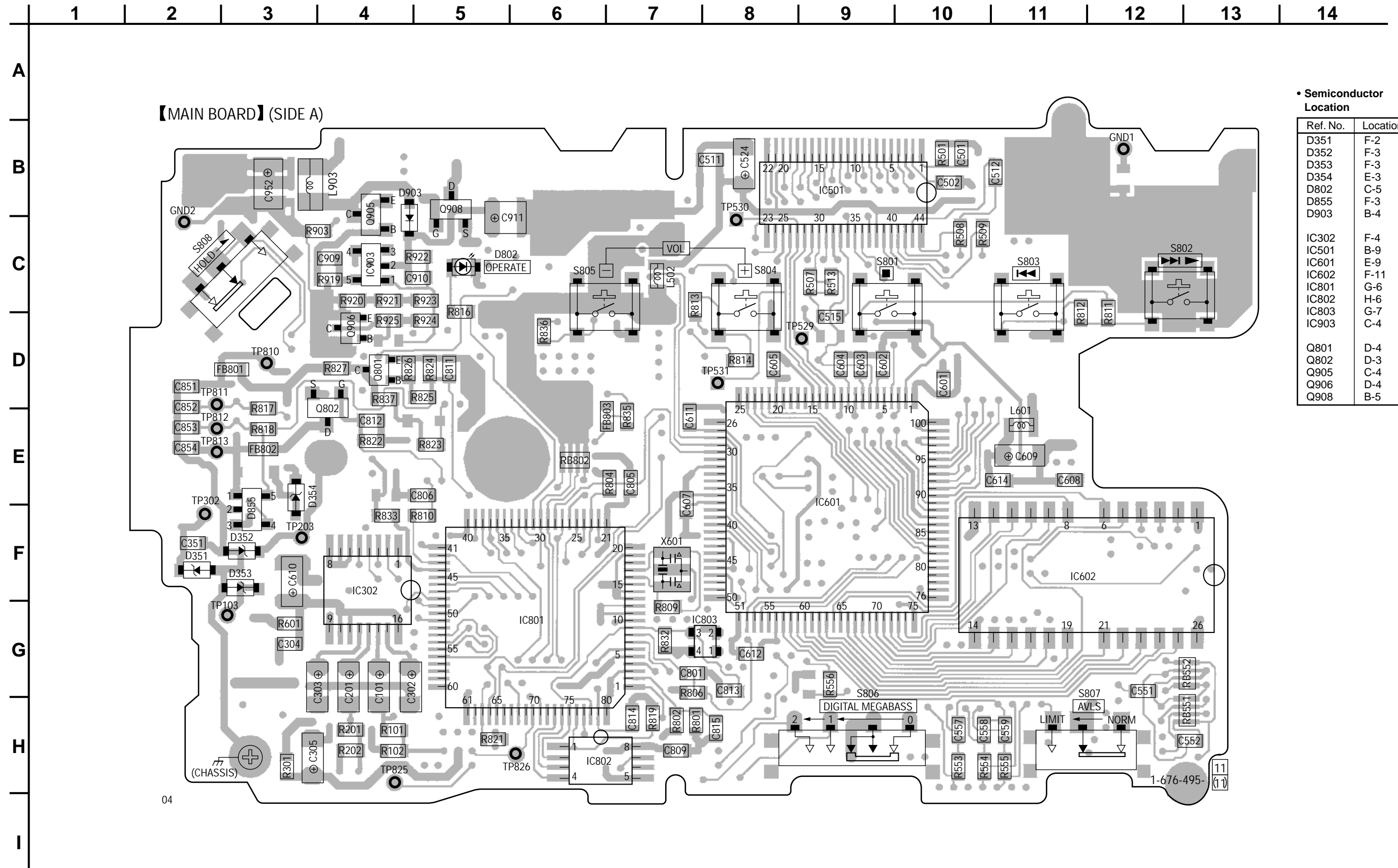
6-2-2. SERVO, SYSTEM CONTROL BLOCK DIAGRAM

• Signal path
 : MD



6-3. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

6-3-1. PRINTED WIRING BOARD — MAIN BOARD —



• Semiconductor Location

Ref. No.	Location
D351	F-2
D352	F-3
D353	F-3
D354	E-3
D802	C-5
D855	F-3
D903	B-4
IC302	F-4
IC501	B-9
IC601	E-9
IC602	F-11
IC801	G-6
IC802	H-6
IC803	G-7
IC903	C-4
Q801	D-4
Q802	D-3
Q905	C-4
Q906	D-4
Q908	B-5

Note:

- — : parts extracted from the conductor side.
- Δ : internal component.
- [Pattern] : Pattern from the side which enables seeing. (The other layer's patterns are not indicated.)

Caution:

Pattern face side: Parts on the pattern face side seen from the pattern face are indicated.
 Parts face side: Parts on the parts face side seen from the parts face are indicated.

• Main board is four-layer printed board. However, the patterns of layers 2 and 3 have not been included in this diagrams.

14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

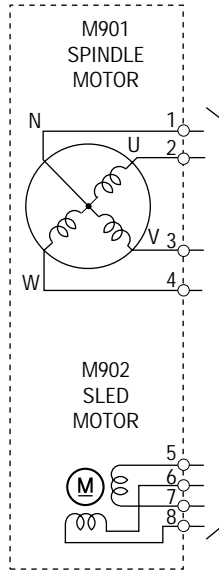
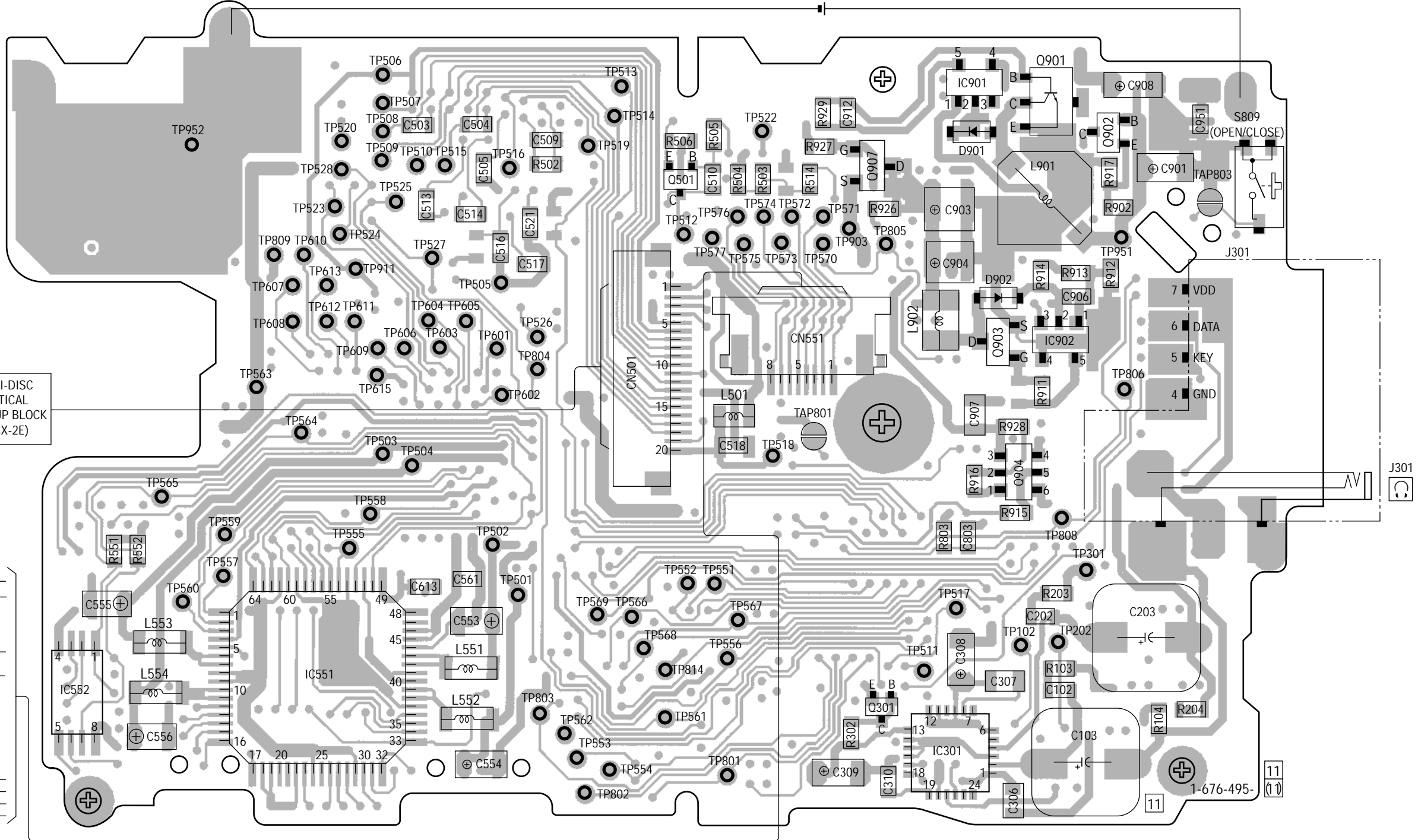
• Semiconductor Location

Ref. No.	Location
D901	C-5
D902	D-5
IC301	H-5
IC551	G-10
IC552	G-13
IC901	B-5
IC902	D-4
Q301	H-6
Q501	C-7
Q901	B-4
Q902	B-3
Q903	D-4
Q904	E-4
Q907	C-6

【MAIN BOARD】(SIDE B)

DRY BATTERY
SIZE"AA"
(IEC DESIGNATION R6)
1PC,1.5V

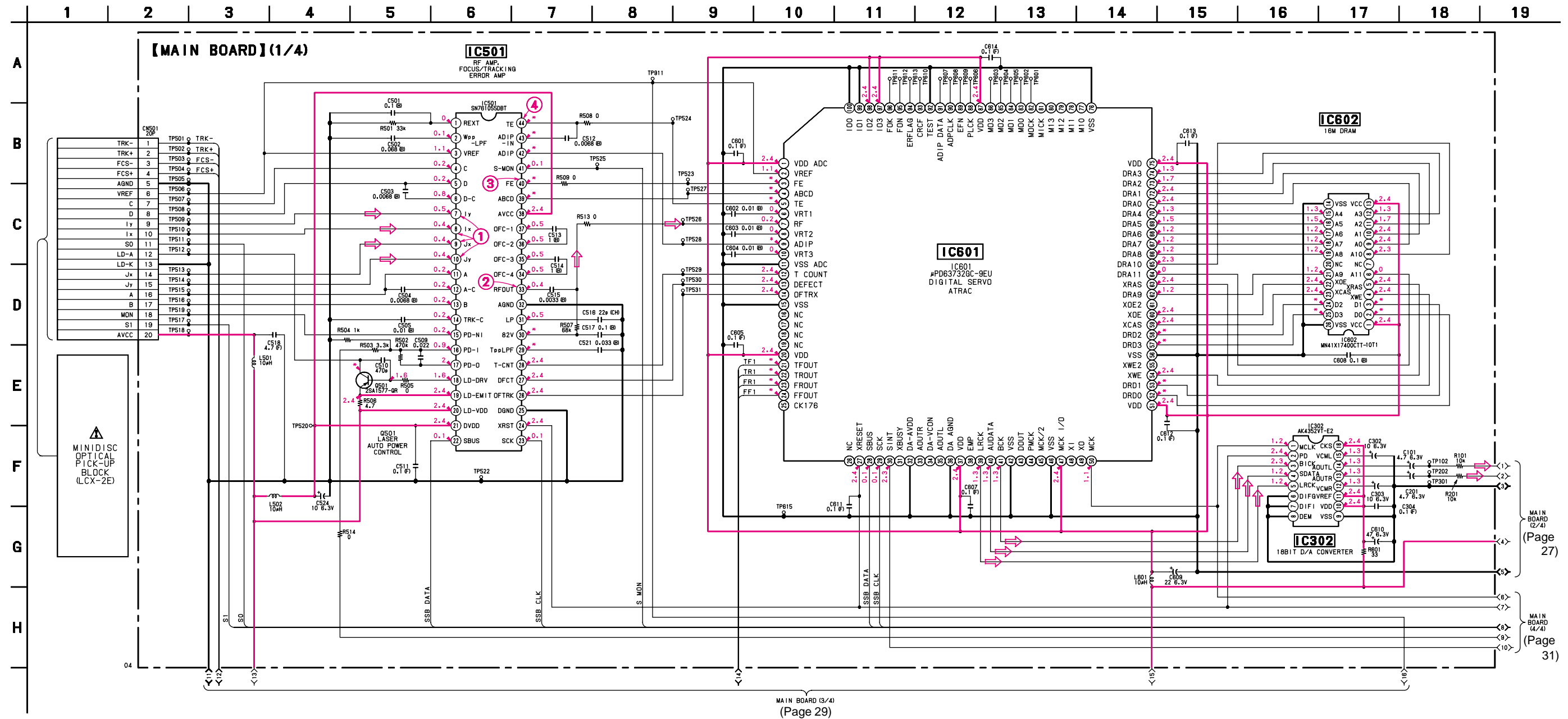
MINI-DISC
OPTICAL
PICK-UP BLOCK
(LCX-2E)



【MOTOR FLEXIBLE BOARD】1-675-668-12

04

6-3-2. SCHEMATIC DIAGRAM — MAIN BOARD (1/4) — • Refer to page 33 for IC Block Diagrams.

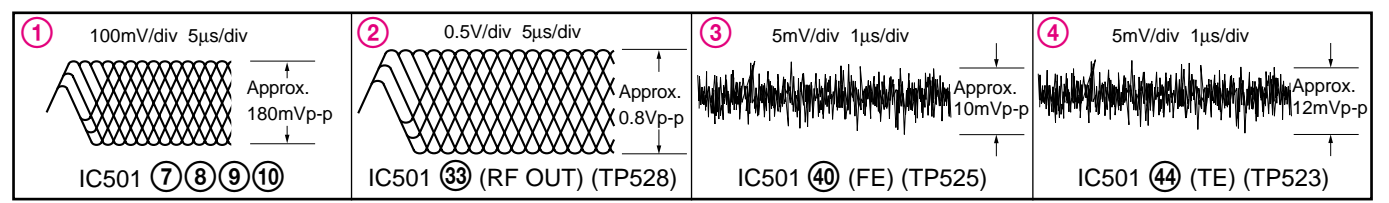


- Note:**
- All capacitors are in μF unless otherwise noted. pF: μpF 50 WV or less are not indicated except for electrolytics and tantalums.
 - All resistors are in Ω and $1/4\text{W}$ or less unless otherwise specified.

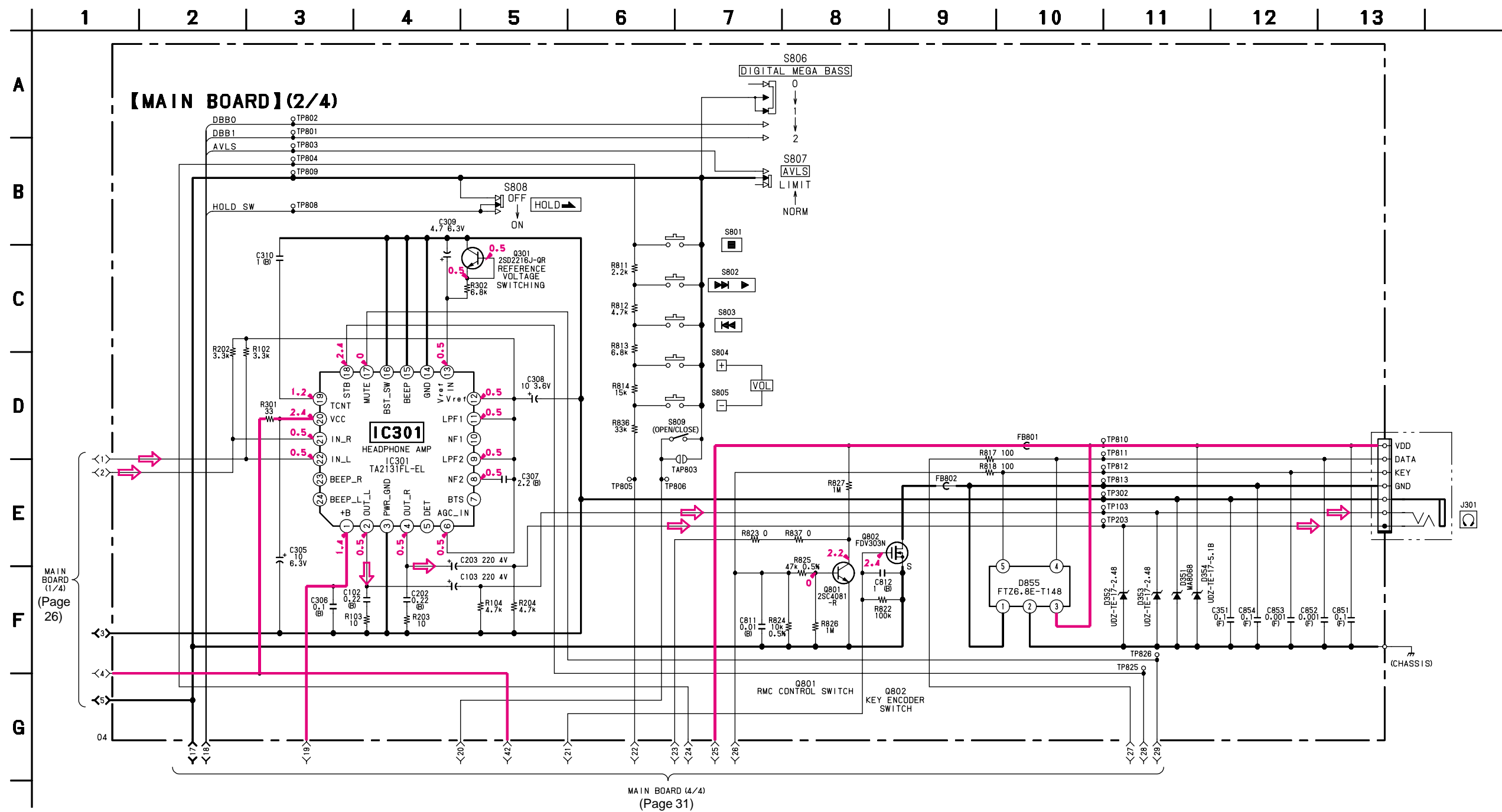
<p>Note: The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.</p>	<p>Note: Les composants identifiés par une marque Δ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.</p>
--	--

- — : B+ Line.
- Power voltage is dc 1.5V and fed with regulated dc power supply from battery terminal.
- Voltage and waveforms are dc with respect to ground under no-signal conditions.
- no mark : PB
- * : Impossible to measure
- Voltages are taken with a VOM (Input impedance 10 M Ω). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- Signal path.
- ⇨ : PB

•Waveforms (MODE:PLAY)



6-3-3. SCHEMATIC DIAGRAM — MAIN BOARD (2/4) — • Refer to page 34 for IC Block Diagrams.

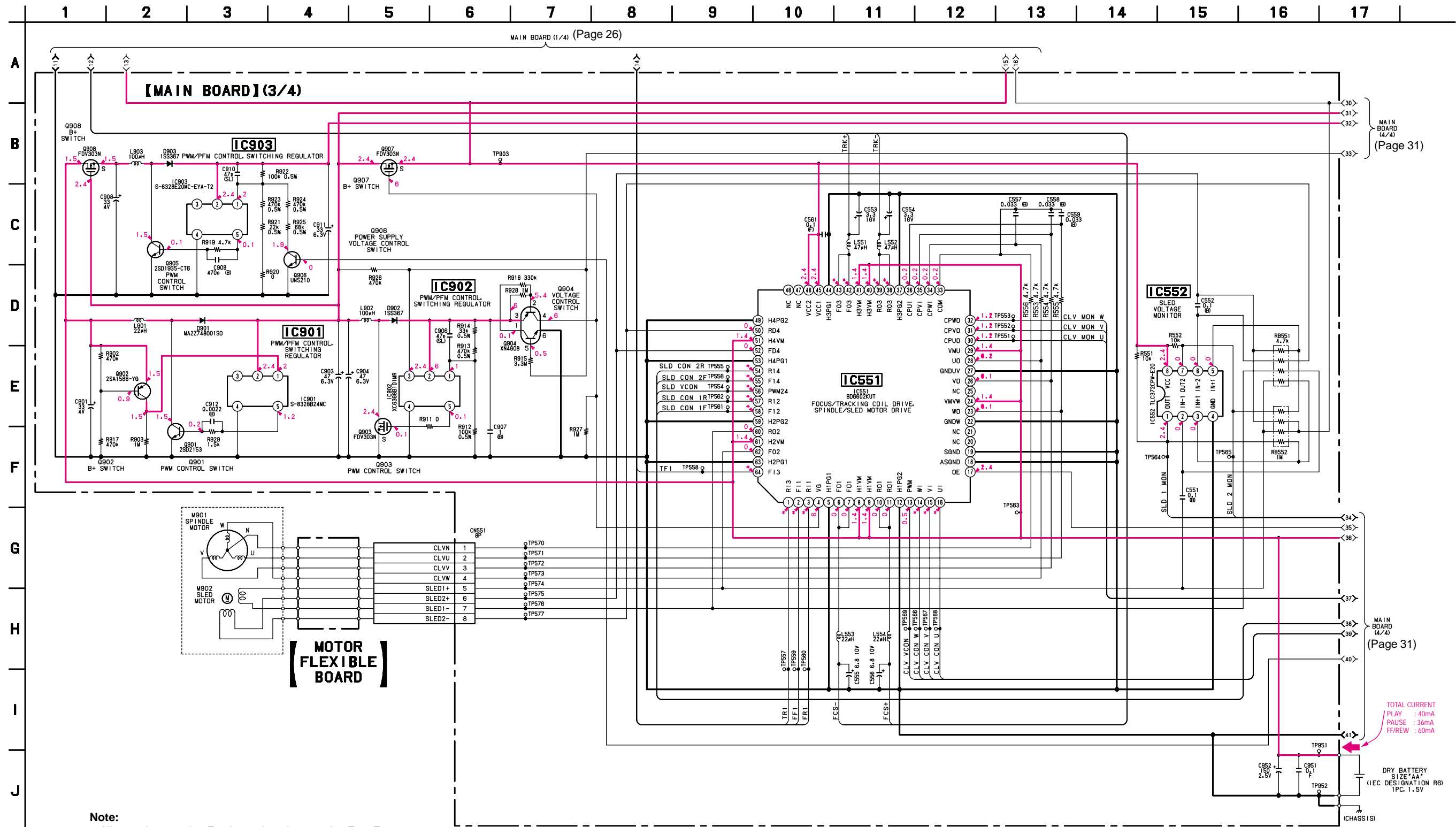


MAIN BOARD (1/4) (Page 26)

MAIN BOARD (4/4) (Page 31)

- Note:**
- All capacitors are in μF unless otherwise noted. pF : μpF
 - 50 WV or less are not indicated except for electrolytics and tantalums.
 - All resistors are in Ω and $1/4\text{W}$ or less unless otherwise specified.
 - % : indicates tolerance.
 - \square : panel designation.
 - **—** : B+ Line.
 - Power voltage is dc 1.5V and fed with regulated dc power supply from battery terminal.
 - Voltage is dc with respect to ground under no-signal condition.
 - no mark : PB
 - * : Impossible to measure
 - Voltages are taken with a VOM (Input impedance 10 M Ω). Voltage variations may be noted due to normal production tolerances.
 - Signal path.
 - **→** : PB

6-3-4. SCHEMATIC DIAGRAM — MAIN BOARD (3/4) — • Refer to page 34 for IC Block Diagrams.



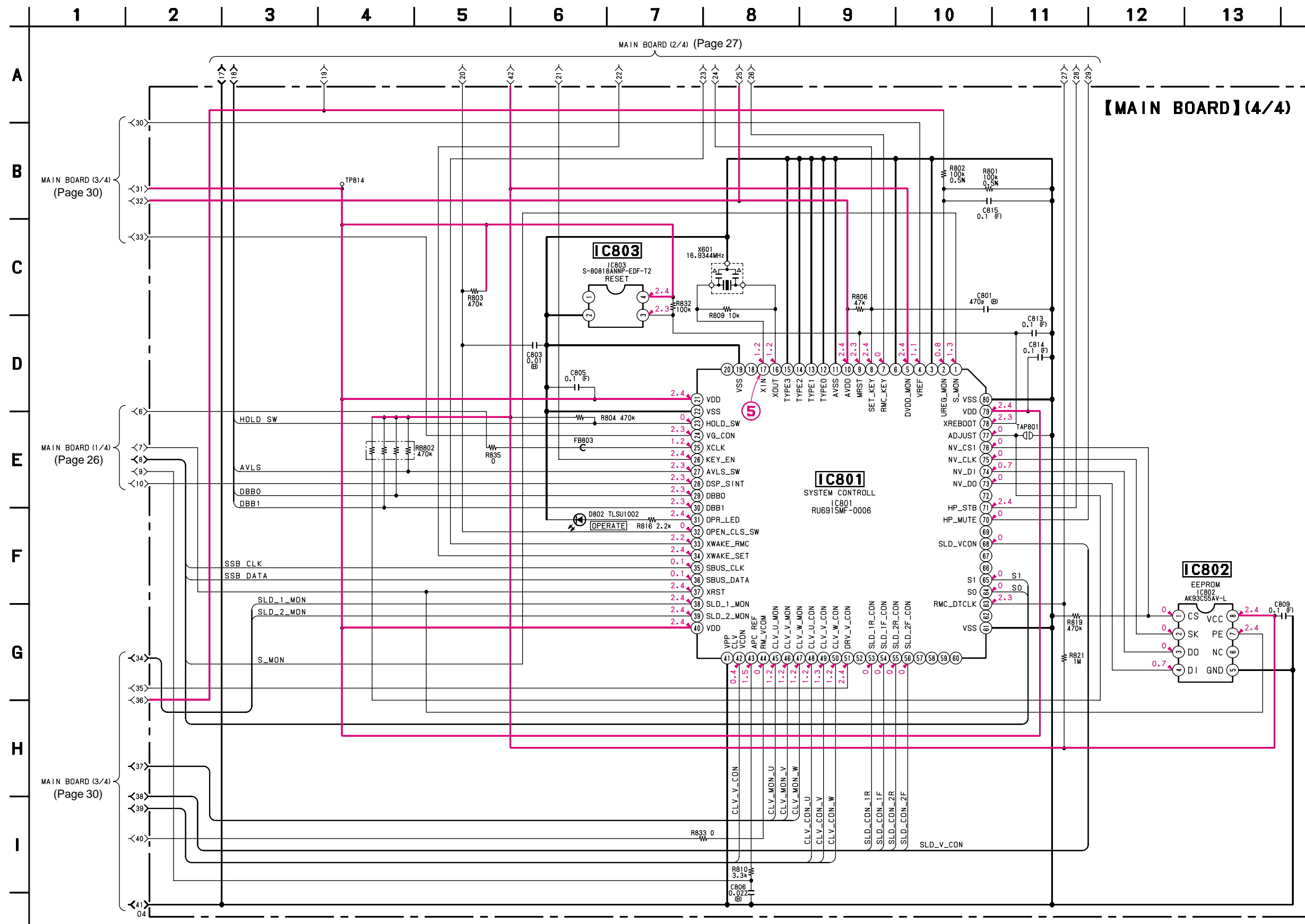
Note:

- All capacitors are in μF unless otherwise noted. pF : μF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and $1/4\text{W}$ or less unless otherwise specified.
- % : indicates tolerance.
- — : B+ Line.
- Power voltage is dc 1.5V and fed with regulated dc power supply from battery terminal.
- Voltage is dc with respect to ground under no-signal condition.
no mark : PB
- * : Impossible to measure
- Voltages are taken with a VOM (Input impedance 10 M Ω). Voltage variations may be noted due to normal production tolerances.

TOTAL CURRENT
PLAY : 40mA
PAUSE : 36mA
FF/REW : 60mA

DRY BATTERY
SIZE "AA"
(IEC DESIGNATION R6)
1PC. 1.5V

6-3-5. SCHEMATIC DIAGRAM — MAIN BOARD (4/4) — • Refer to page 35 for IC Block Diagrams.



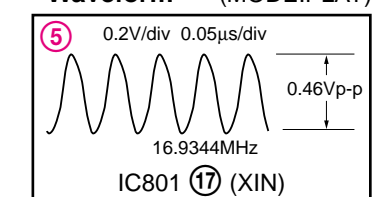
Note:

- All capacitors are in μF unless otherwise noted. pF: μF F
- 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and $1/4 \text{ W}$ or less unless otherwise specified.
- — : B+ Line.

- Power voltage is dc 1.5V and fed with regulated dc power supply from battery terminal.
- Voltage and waveforms are dc with respect to ground under no-signal conditions.
- no mark : PB

- Voltages are taken with a VOM (Input impedance 10 $\text{M}\Omega$). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with an oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.

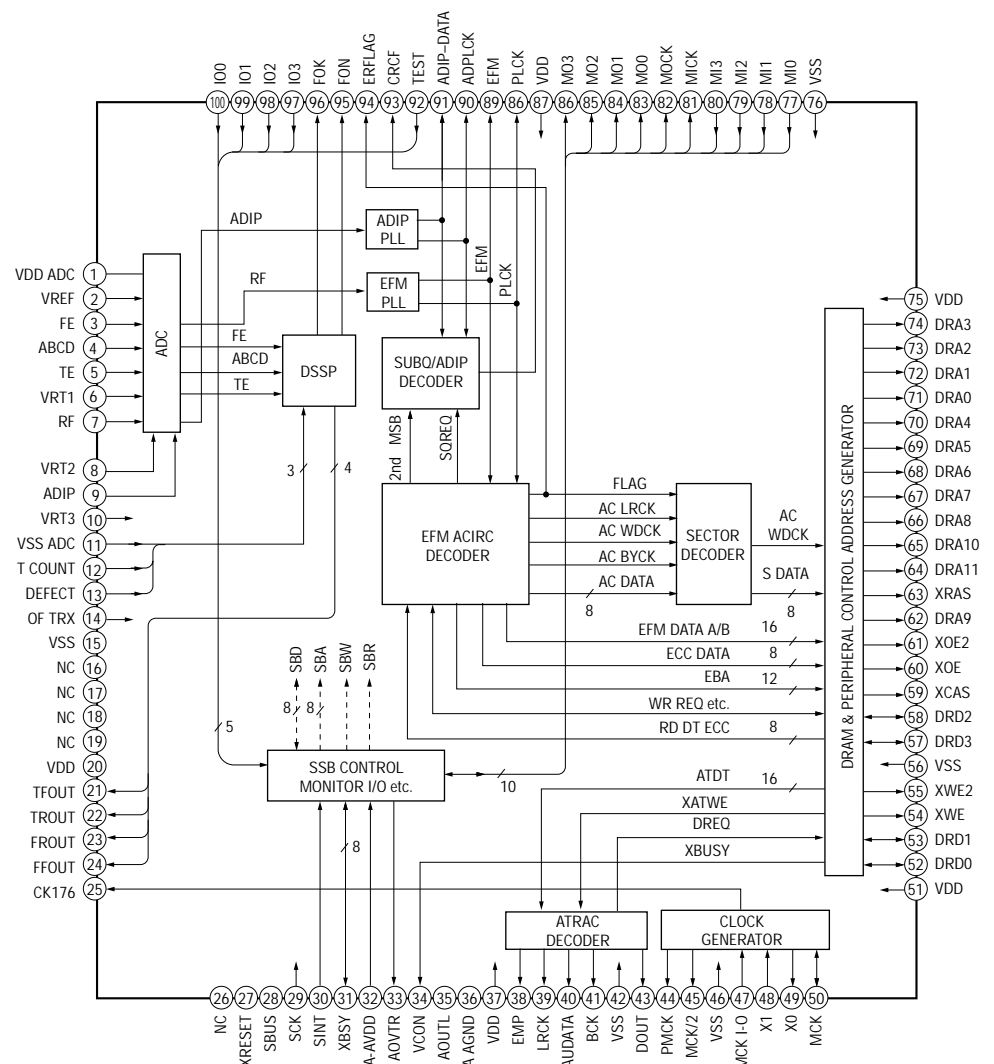
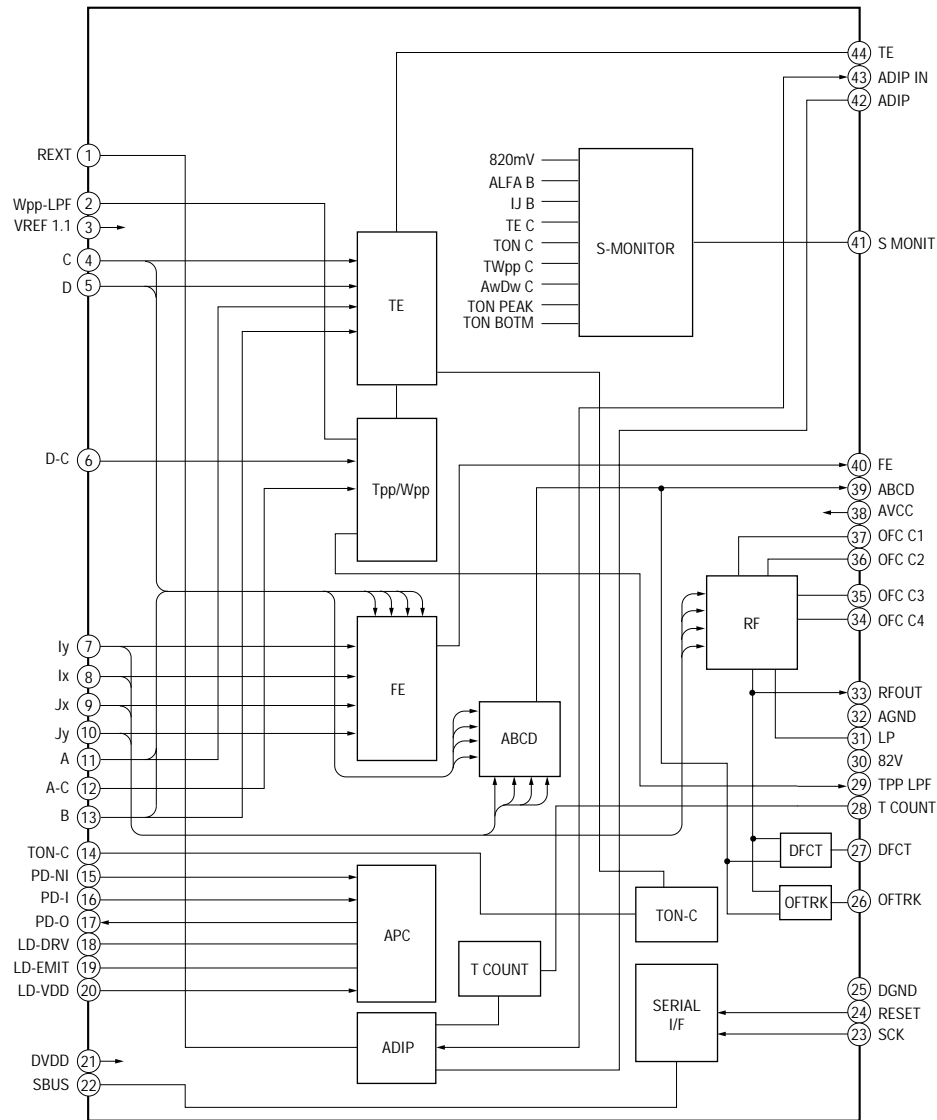
• Waveform (MODE:PLAY)



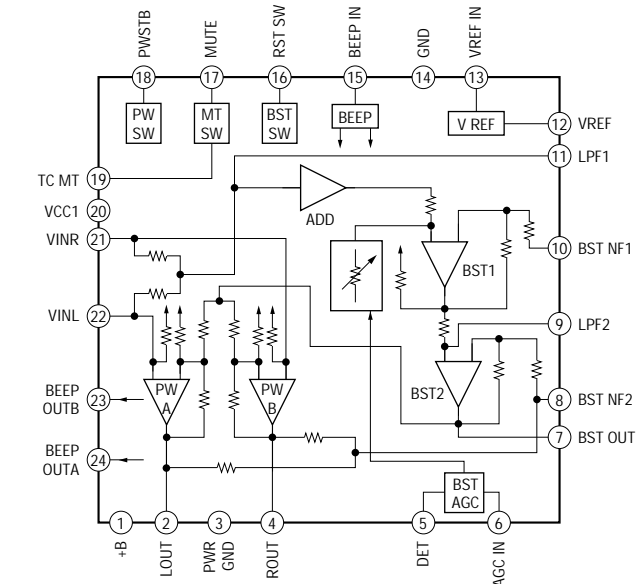
6-6. IC BLOCK DIAGRAMS

IC601 UPD63731GC-9EU

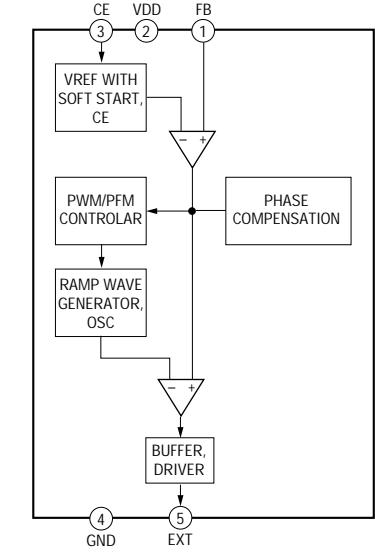
IC501 SN761056DBT



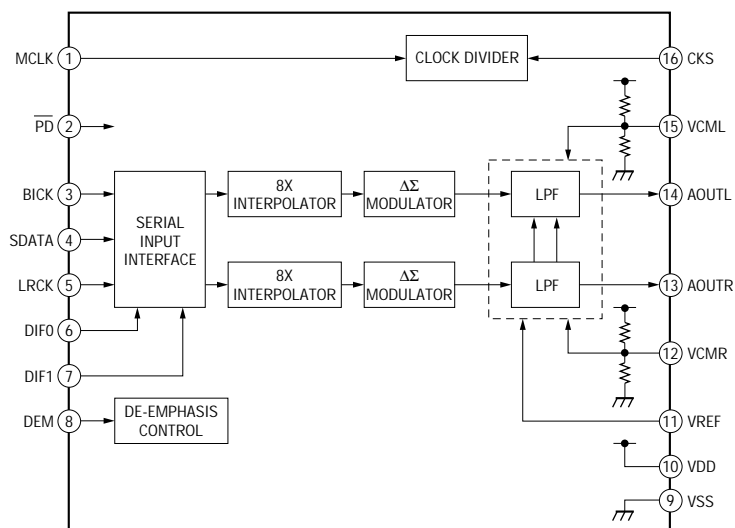
IC301 TA2131FL



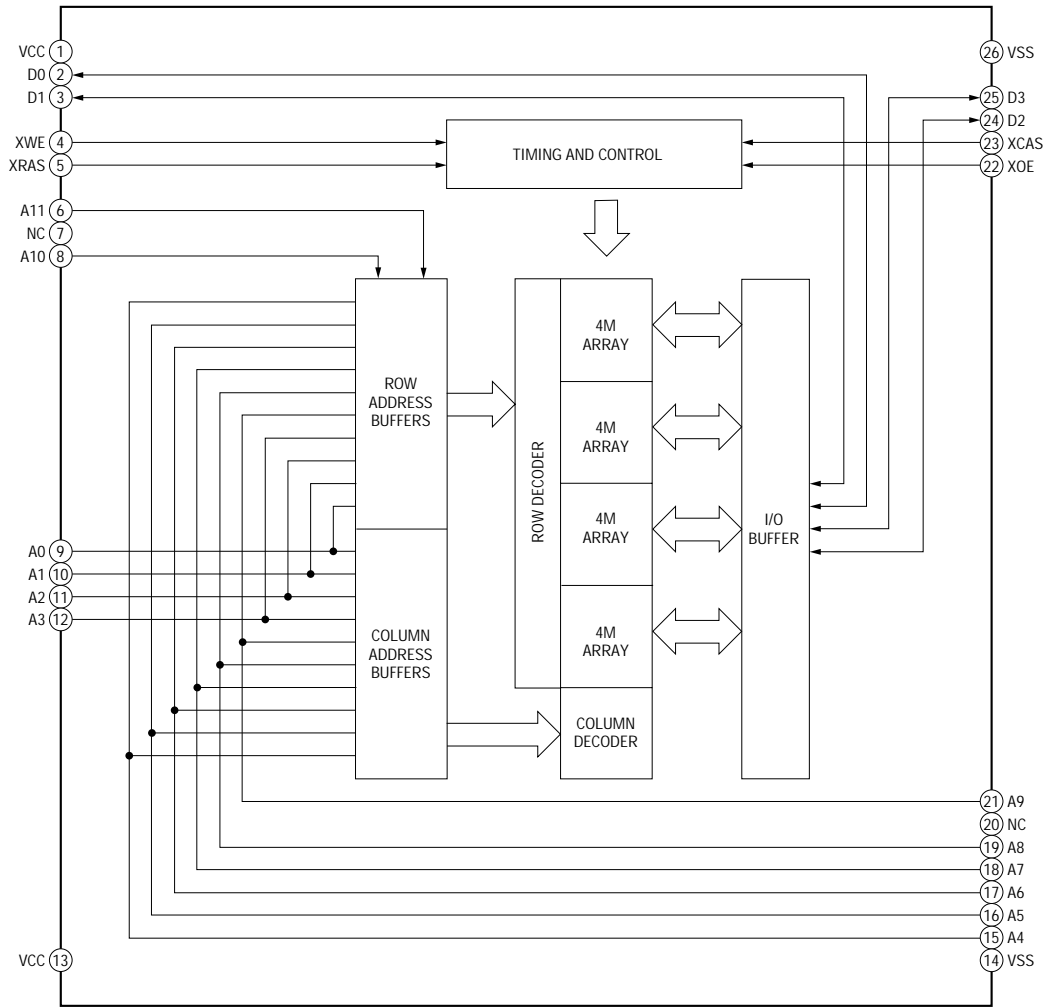
IC902 XC6368B101MR



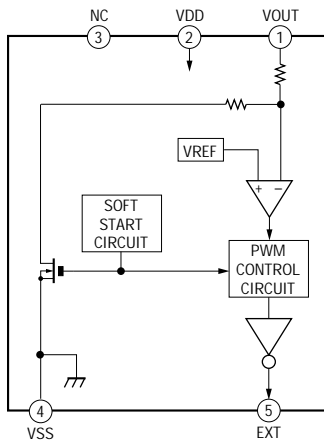
IC302 AK4352VT-E2



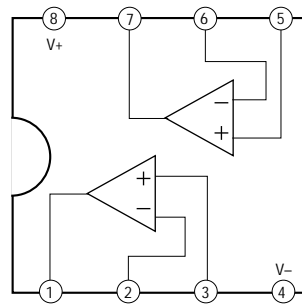
IC602 MN41X17400CTT-10T1



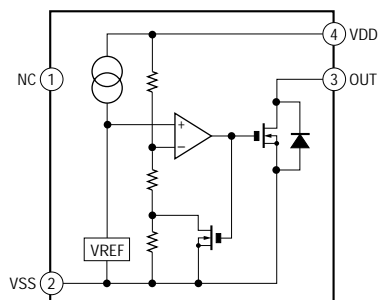
IC903 S-8328E20MC-EYA-T2



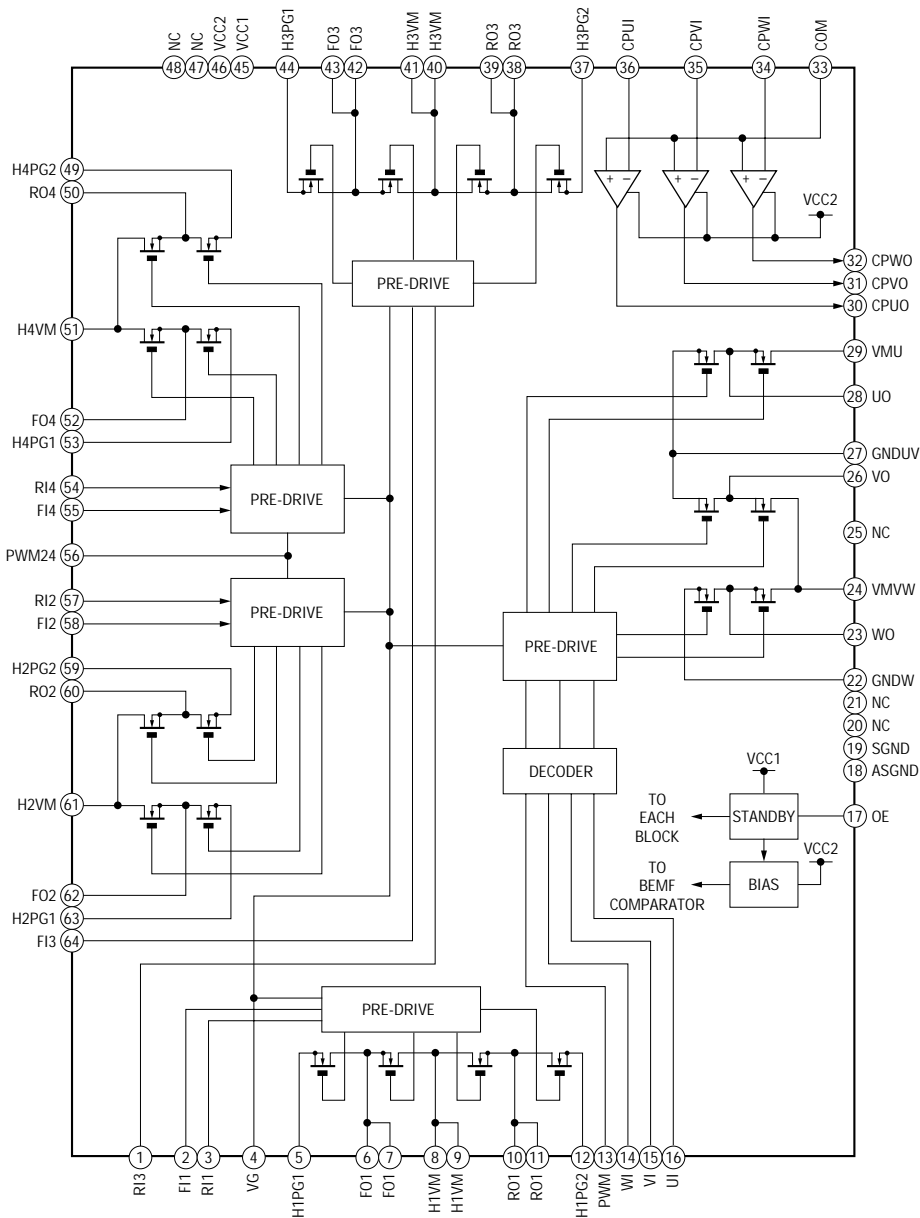
IC552 TLC372CPW



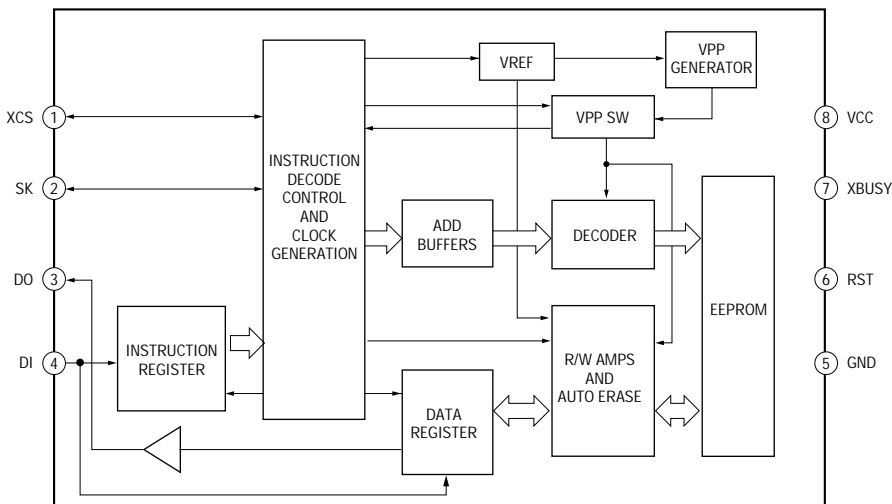
IC803 S-8081ANNP-EDF-T2



IC551 BD6602KUT



IC802 AK93C55AV-L



SECTION 7 EXPLODED VIEWS

NOTE:

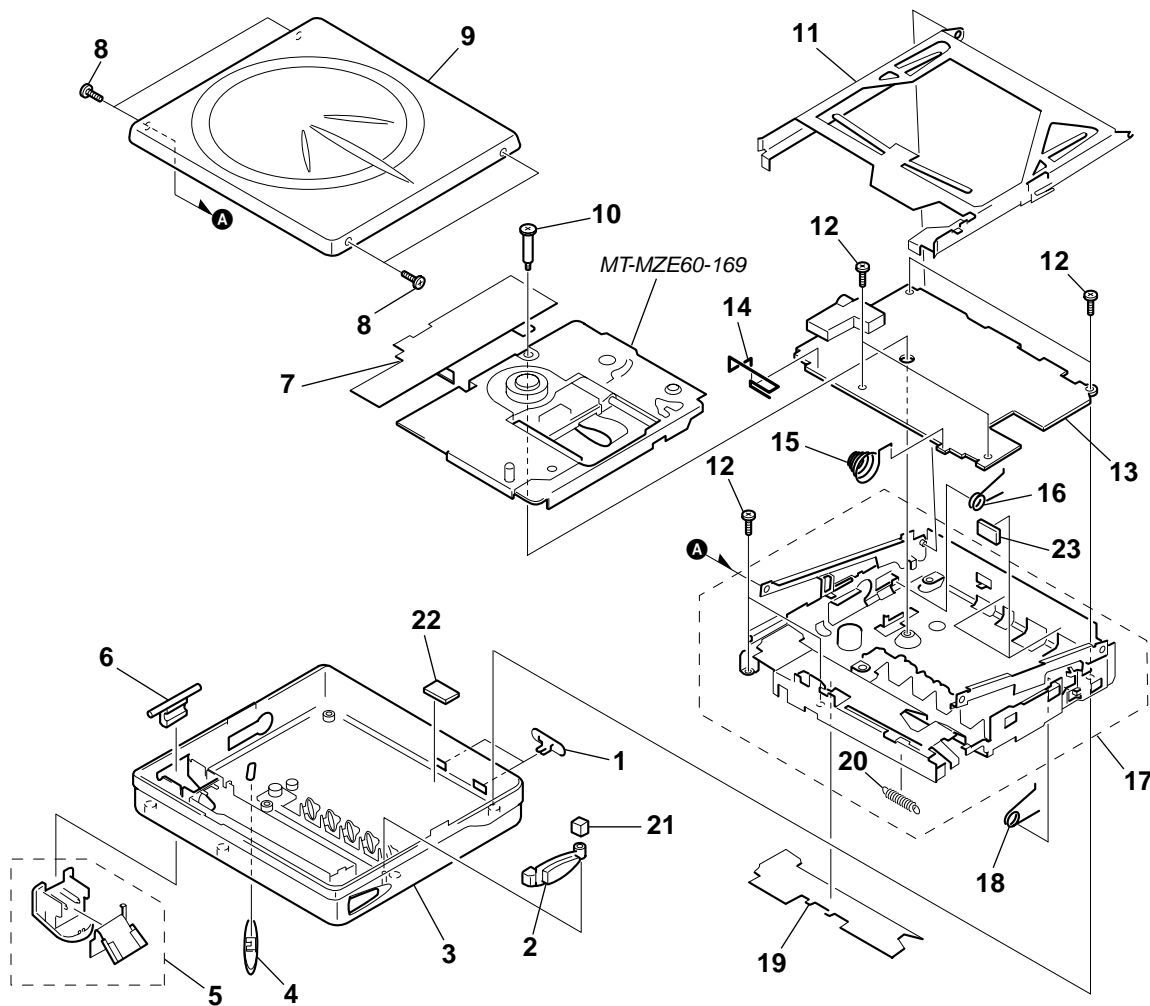
- The mechanical parts with no reference number in the exploded views are not supplied.
- Items marked “*” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Abbreviation
FR : French model

- -XX and -X mean standardized parts, so they may have some difference from the original one.
- Color Indication of Appearance Parts
Example :
KNOB, BALANCE (WHITE) ... (RED)
↑ ↑
Parts Color Cabinet's Color
- Accessories and packing materials are given in the last of this parts list.

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

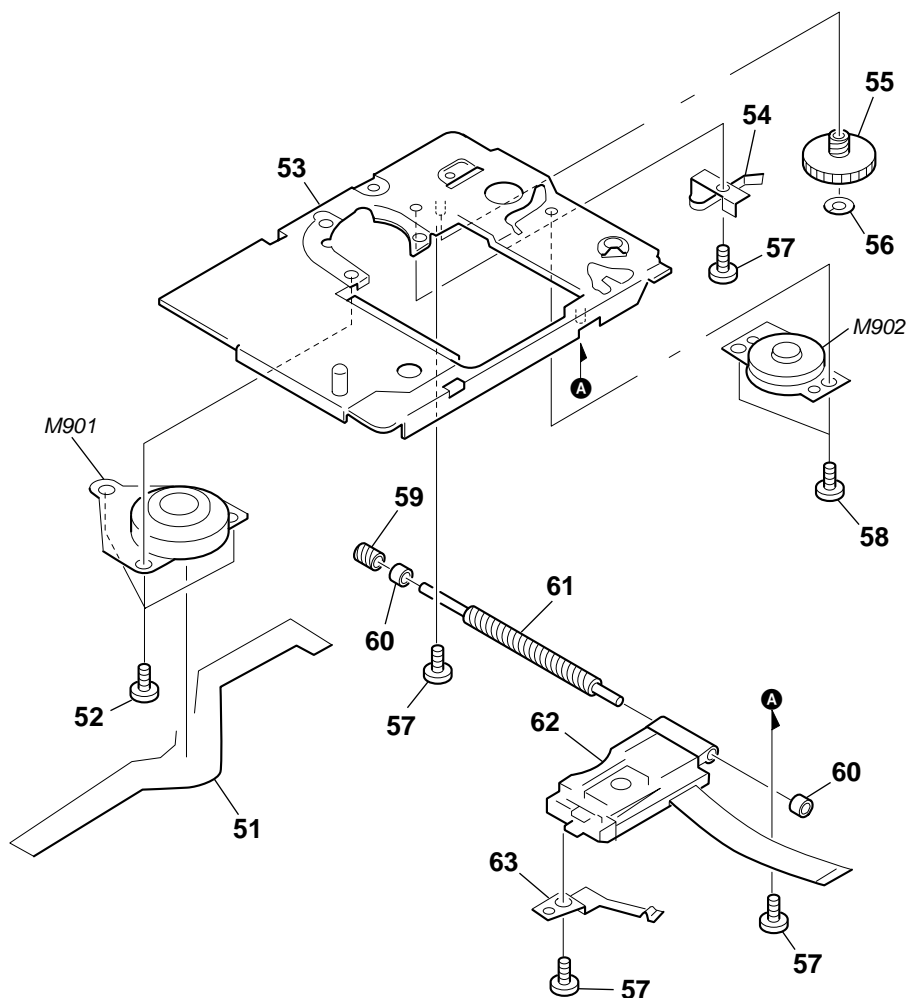
Les composants identifiés par une marque Δ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

7-1. MAIN UNIT SECTION



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
1	4-225-573-01	KNOB (MB)		9	X-3378-851-1	PANEL ASSY, (S-S), UPPER (SILVER)...(SILVER)	(EXCEPT US)
2	4-225-574-01	BUTTON (OPEN)		9	X-3378-852-1	PANEL ASSY, (S-L), UPPER (BLUE)...(BLUE)	
3	X-3378-853-1	CASE (REAR) ASSY (S1)	(SILVER)...(SILVER) (EXCEPT US)	10	4-225-587-01	SCREW (MD), STEP	
3	X-3378-854-1	CASE (REAR) ASSY (L1) (BLUE)...(BLUE)		11	X-4951-947-1	HOLDER ASSY	
4	4-225-572-01	KNOB (HOLD)		12	3-318-382-91	SCREW (1.7X2.5), TAPPING	
5	X-3378-849-1	LID ASSY (S), BATTERY CASE	(SILVER)...(SILVER) (EXCEPT US)	13	A-3323-416-A	MAIN BOARD, COMPLETE (EXCEPT FR)	
5	X-3378-850-1	LID ASSY (L), BATTERY CASE (BLUE)...(BLUE)		13	A-3323-417-A	MAIN BOARD, COMPLETE (FR)	
6	4-225-566-01	FULCRUM (BATTERY CASE LID)	(SILVER)...(SILVER) (EXCEPT US)	14	4-225-567-01	SPRING (CONTACT)	
6	4-225-566-11	FULCRUM (BATTERY CASE LID)	(BLUE)...(BLUE)	15	4-225-568-01	SPRING, BATTERY COIL	
7	4-225-569-01	SHEET (BLIND)		16	4-225-580-01	SPRING (POP UP L)	
8	4-218-229-17	SCREW (1.4), MI (SILVER)...(SILVER)	(EXCEPT US)	17	X-4952-479-1	CHASSIS ASSY, REAR	
8	4-218-229-19	SCREW (1.4), MI (BLUE)...(BLUE)		18	4-225-581-01	SPRING (POP UP R)	
				19	4-225-583-01	SHEET, INSULATING	
				20	4-989-078-01	SPRING (OPEN), TENSION	
				21	3-045-227-01	SPACER (HOOK)	
				22	3-045-576-01	SPACER (KNOB)	
				23	3-045-221-01	RETAINER (REAR), SPACER CHASSIS	

**7-2. MECHANISM DECK SECTION
(MT-MZE60-169)**



<p>The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.</p>	<p>Les composants identifiés par une marque Δ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.</p>
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Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
51	1-675-668-11	MOTOR FLEXIBLE BOARD		59	4-222-208-01	GEAR (SB)	
52	4-963-883-42	SCREW (M1.4), PRECISION PAN		60	4-222-204-01	BEARING	
53	X-4951-926-1	CHASSIS ASSY		61	4-222-203-01	SCREW, LEAD	
54	4-222-206-01	SPRING, THRUST		Δ 62	X-4952-387-1	SERVICE ASSY, OP (LCX-2E)	
55	4-222-216-01	GEAR (SA)		63	4-222-205-01	SPRING, RACK	
56	3-338-645-31	WASHER (0.8-2.5)		M901	8-835-666-01	MOTOR, DC SSM-01C14A/C-NP (SPINDLE)	
57	4-963-883-31	SCREW (M1.4), PRECISION PAN		M902	1-763-399-11	MOTOR, DC (SLED) (WITH PULLEY GEAR)	
58	3-349-825-21	SCREW					

SECTION 8 ELECTRICAL PARTS LIST

MAIN

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 and -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
- Abbreviation
FR : France model

- 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.. : μ A.. uPA.. : μ PA..
uPB.. : μ PB.. uPC.. : μ PC.. uPD.. : μ PD..
- CAPACITORS
uF : μ F
- COILS
uH : μ H

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

Les composants identifiés par une marque Δ 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	Ref. No.	Part No.	Description	Remark
	A-3323-416-A	MAIN BOARD, COMPLETE (EXCEPT FR)		C558	1-164-677-11	CERAMIC CHIP 0.033uF	10% 16V
	A-3323-417-A	MAIN BOARD, COMPLETE (FR)		C559	1-164-677-11	CERAMIC CHIP 0.033uF	10% 16V
		*****		C561	1-164-156-11	CERAMIC CHIP 0.1uF	25V
		< CAPACITOR >		C601	1-164-156-11	CERAMIC CHIP 0.1uF	25V
				C602	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C101	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C603	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C102	1-115-467-11	CERAMIC CHIP 0.22uF	10% 10V	C604	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C103	1-113-690-11	ELECT CHIP 220uF	20% 4V	C605	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C201	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C607	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C202	1-115-467-11	CERAMIC CHIP 0.22uF	10% 10V	C608	1-107-826-11	CERAMIC CHIP 0.1uF	10% 16V
C203	1-113-690-11	ELECT CHIP 220uF	20% 4V	C609	1-119-750-11	TANTAL. CHIP 22uF	20% 6.3V
C302	1-135-259-11	TANTAL. CHIP 10uF	20% 6.3V	C610	1-110-569-11	TANTAL. CHIP 47uF	20% 6.3V
C303	1-135-259-11	TANTAL. CHIP 10uF	20% 6.3V	C611	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C304	1-164-156-11	CERAMIC CHIP 0.1uF	25V	C612	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C305	1-135-259-11	TANTAL. CHIP 10uF	20% 6.3V	C613	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C306	1-107-826-11	CERAMIC CHIP 0.1uF	10% 16V	C614	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C307	1-125-838-11	CERAMIC CHIP 2.2uF	10% 6.3V	C801	1-162-962-11	CERAMIC CHIP 470PF	10% 50V
C308	1-135-259-11	TANTAL. CHIP 10uF	20% 6.3V	C803	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C309	1-135-181-21	TANTALUM CHIP 4.7uF	20% 6.3V	C805	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C310	1-125-837-11	CERAMIC CHIP 1uF	10% 6.3V	C806	1-164-227-11	CERAMIC CHIP 0.022uF	10% 25V
C351	1-164-156-11	CERAMIC CHIP 0.1uF	25V	C809	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C501	1-107-826-11	CERAMIC CHIP 0.1uF	10% 16V	C811	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V
C502	1-110-563-11	CERAMIC CHIP 0.068uF	10% 16V	C812	1-125-837-11	CERAMIC CHIP 1uF	10% 6.3V
C503	1-162-969-11	CERAMIC CHIP 0.0068uF	10% 25V	C813	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C504	1-162-969-11	CERAMIC CHIP 0.0068uF	10% 25V	C814	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C505	1-162-970-11	CERAMIC CHIP 0.01uF	10% 25V	C815	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C509	1-164-227-11	CERAMIC CHIP 0.022uF	10% 25V	C851	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C510	1-162-962-11	CERAMIC CHIP 470PF	10% 50V	C852	1-162-964-11	CERAMIC CHIP 0.001uF	10% 50V
C511	1-164-156-11	CERAMIC CHIP 0.1uF	25V	C853	1-162-964-11	CERAMIC CHIP 0.001uF	10% 50V
C512	1-162-969-11	CERAMIC CHIP 0.0068uF	10% 25V	C854	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C513	1-125-837-11	CERAMIC CHIP 1uF	10% 6.3V	C901	1-119-749-11	TANTAL. CHIP 33uF	20% 4V
C514	1-125-837-11	CERAMIC CHIP 1uF	10% 6.3V	C903	1-110-975-11	TANTAL. CHIP 47uF	20% 6.3V
C515	1-162-967-11	CERAMIC CHIP 0.0033uF	10% 50V	C904	1-110-975-11	TANTAL. CHIP 47uF	20% 6.3V
C516	1-162-945-11	CERAMIC CHIP 22PF	5% 50V	C906	1-162-923-11	CERAMIC CHIP 47PF	5% 50V
C517	1-107-826-11	CERAMIC CHIP 0.1uF	10% 16V	C907	1-109-982-11	CERAMIC CHIP 1uF	10% 10V
C518	1-117-720-11	CERAMIC CHIP 4.7uF	10V	C908	1-119-749-11	TANTAL. CHIP 33uF	20% 4V
C521	1-164-677-11	CERAMIC CHIP 0.033uF	10% 16V	C909	1-162-962-11	CERAMIC CHIP 470PF	10% 50V
C524	1-117-920-11	TANTAL. CHIP 10uF	20% 6.3V	C910	1-162-923-11	CERAMIC CHIP 47PF	5% 50V
C551	1-107-826-11	CERAMIC CHIP 0.1uF	10% 16V	C911	1-104-630-11	TANTAL. CHIP 33uF	20% 6.3V
C552	1-107-826-11	CERAMIC CHIP 0.1uF	10% 16V	C912	1-162-966-11	CERAMIC CHIP 0.0022uF	10% 50V
C553	1-107-765-11	TANTAL. CHIP 3.3uF	20% 16V	C951	1-164-156-11	CERAMIC CHIP 0.1uF	25V
C554	1-107-765-11	TANTAL. CHIP 3.3uF	20% 16V	C952	1-125-976-11	TANTAL. CHIP 150uF	20% 2.5V
C555	1-135-238-21	TANTAL. CHIP 6.8uF	20% 10V				
C556	1-135-238-21	TANTAL. CHIP 6.8uF	20% 10V				
C557	1-164-677-11	CERAMIC CHIP 0.033uF	10% 16V				

MAIN

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
		< CONNECTOR >					
* CN501	1-778-168-11	CONNECTOR, FFC/FPC (ZIF) 20P		Q801	8-729-905-35	TRANSISTOR 2SC4081-R	
CN551	1-784-228-21	CONNECTOR, FFC/FPC (ZIF) 8P		Q802	8-729-046-48	FET FDV303N	
		< DIODE >		Q901	8-729-044-50	TRANSISTOR 2SD2153	
D351	8-719-017-58	DIODE MA8068		Q902	8-729-230-60	TRANSISTOR 2SA1586-YG	
D352	8-719-056-72	DIODE UDZ-TE-17-2.4B		Q903	8-729-046-48	FET FDV303N	
D353	8-719-056-72	DIODE UDZ-TE-17-2.4B		Q904	8-729-402-16	TRANSISTOR XN4608	
D354	8-719-056-80	DIODE UDZ-TE-17-5.1B		Q905	8-729-809-46	TRANSISTOR 2SD1935-CT6	
D802	8-719-061-82	LED TLSU1002(TPX1,SONY) (OPERATE)		Q906	8-729-420-44	TRANSISTOR UN5210	
		< FERRITE BEAD >		Q907	8-729-046-48	FET FDV303N	
D855	8-719-066-17	DIODE FTZ6.8E-T148		Q908	8-729-046-48	FET FDV303N	
D901	8-719-072-27	DIODE MA2Z748001S0				< RESISTOR >	
D902	8-719-049-09	DIODE 1SS367-T3SONY		R101	1-216-833-11	RES-CHIP 10K 5%	1/16W
D903	8-719-049-09	DIODE 1SS367-T3SONY		R102	1-216-827-11	METAL CHIP 3.3K 5%	1/16W
		< IC >		R103	1-216-797-11	METAL CHIP 10 5%	1/16W
IC301	8-759-598-15	IC TA2131FL-EL		R104	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
IC302	8-759-665-50	IC AK4352VT-E2		R201	1-216-833-11	RES-CHIP 10K 5%	1/16W
IC501	8-759-657-49	IC SN761055DBT		R202	1-216-827-11	METAL CHIP 3.3K 5%	1/16W
IC551	8-759-657-50	IC BD6602KUT		R203	1-216-797-11	METAL CHIP 10 5%	1/16W
IC552	8-759-358-40	IC TLC372CPW-E20		R204	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
IC601	8-759-657-48	IC uPD63732GC-9EU		R301	1-216-803-11	METAL CHIP 33 5%	1/16W
IC602	8-759-559-57	IC MN41X17400CTT-10T1		R302	1-216-831-11	METAL CHIP 6.8K 5%	1/16W
IC801	8-759-659-63	IC RU6915MF-0006		R501	1-216-839-11	METAL CHIP 33K 5%	1/16W
IC802	8-759-449-23	IC AK93C55AV-L		R502	1-216-853-11	METAL CHIP 470K 5%	1/16W
IC803	8-759-665-49	IC S-80818ANNP-EDF-T2		R503	1-216-827-11	METAL CHIP 3.3K 5%	1/16W
IC901	8-759-665-47	IC S-8328B24MC		R504	1-216-821-11	METAL CHIP 1K 5%	1/16W
IC902	8-759-657-26	IC XC6368B101MR		R505	1-216-864-11	METAL CHIP 0 5%	1/16W
IC903	8-759-665-48	IC S-8328E20MC-EYA-T2		R506	1-216-793-11	RES-CHIP 4.7 5%	1/16W
		< JACK >		R507	1-216-843-11	METAL CHIP 68K 5%	1/16W
J301	1-778-368-11	JACK, HEADPHONE (Ω)		R508	1-216-864-11	METAL CHIP 0 5%	1/16W
		< COIL >		R509	1-216-864-11	METAL CHIP 0 5%	1/16W
L501	1-412-006-31	INDUCTOR CHIP 10uH		R513	1-216-864-11	METAL CHIP 0 5%	1/16W
L502	1-412-006-31	INDUCTOR CHIP 10uH		R514	1-216-864-11	METAL CHIP 0 5%	1/16W
L551	1-410-389-31	INDUCTOR CHIP 47uH		R551	1-216-833-11	RES-CHIP 10K 5%	1/16W
L552	1-410-389-31	INDUCTOR CHIP 47uH		R552	1-216-833-11	RES-CHIP 10K 5%	1/16W
L553	1-414-400-41	INDUCTOR 22uH		R553	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
L554	1-414-400-41	INDUCTOR 22uH		R554	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
L601	1-412-006-31	INDUCTOR CHIP 10uH		R555	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
L901	1-419-478-11	COIL, CHOKE 22uH		R556	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
L902	1-412-064-11	INDUCTOR CHIP 100uH		R601	1-216-803-11	METAL CHIP 33 5%	1/16W
L903	1-412-064-11	INDUCTOR CHIP 100uH		R801	1-218-895-11	METAL CHIP 100K 0.5%	1/16W
		< TRANSISTOR >		R802	1-218-895-11	METAL CHIP 100K 0.5%	1/16W
Q301	8-729-037-52	TRANSISTOR 2SD2216J-QR		R803	1-216-853-11	METAL CHIP 470K 5%	1/16W
Q501	8-729-922-10	TRANSISTOR 2SA1577-QR		R804	1-216-853-11	METAL CHIP 470K 5%	1/16W
				R806	1-216-841-11	METAL CHIP 47K 5%	1/16W
				R809	1-216-833-11	RES-CHIP 10K 5%	1/16W
				R810	1-216-827-11	METAL CHIP 3.3K 5%	1/16W
				R811	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
				R812	1-216-829-11	METAL CHIP 4.7K 5%	1/16W
				R813	1-216-831-11	METAL CHIP 6.8K 5%	1/16W
				R814	1-216-835-11	METAL CHIP 15K 5%	1/16W
				R816	1-216-825-11	METAL CHIP 2.2K 5%	1/16W
				R817	1-216-809-11	METAL CHIP 100 5%	1/16W

