

SHARP SERVICE MANUAL

No. S1309MDR470HS

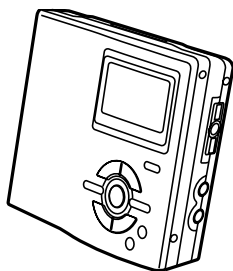


Illustration: MD-DR470H

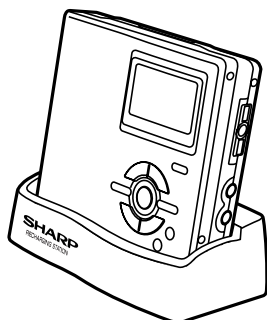


Illustration: MD-DR480H

1-BIT PORTABLE MINIDISC RECORDER

MD-DR470H(S) MD-DR470H(BL) MD-DR480H(S) MODEL MD-DR480H(BL)



• In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

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SAFETY PRECAUTION FOR SERVICE MANUAL

Precaution to be taken when replacing and servicing the Laser Pickup.

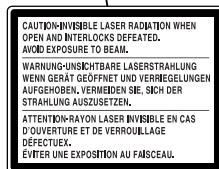
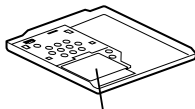
The AEL (Accessible Emission Level) of Laser Power Output for this model is specified to be lower than Class 1 Requirements. However, the following precautions must be observed during servicing to protect your eyes against exposure to the laser beam.

- (1) When the cabinet has been removed, the power is turned on without a compact disc, and the Pickup is on a position outer than the lead-in position, the Laser will light for several seconds to detect a disc. Do not look into the Pickup Lens.
- (2) The Laser Power Output of the Pickup inside the unit and replacement service parts have already been adjusted prior to shipping.
- (3) No adjustment to the Laser Power should be attempted when replacing or servicing the Pickup.
- (4) Under no circumstances look directly into the Pickup Lens at any time.
- (5) CAUTION - Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

For MD-DR470H

Laser Diode Properties

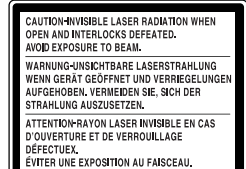
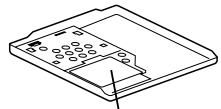
- Material: GaAlAs
- Wavelength: 785 nm
- Pulse time:
- Read mode: 0.8 mW Continuous
- Write mode: max 10 mW 0.5S
min cycle 1.5S
Repetition



For MD-DR480H

Laser Diode Properties

- Material: GaAlAs
- Wavelength: 785 nm
- Pulse time:
- Read mode: 0.8 mW Continuous
- Write mode: max 10 mW 0.5S
min cycle 1.5S
Repetition



ADVARSEL-USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSÅFBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.

VARO! AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTÖN LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESSEN.

VARNING-OSYNLIG LASERSTRÅLING NÅR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRakta EJ STRÅLEN.

Precaution to be taken when replacing and servicing the laser pickup.

The following precautions must be observed during servicing to protect your eyes against exposure to the laser.

Warning of possible eye damage when repairing:

If the AC adaptor or batteries are connected when the top housing (disc cover) of the unit is removed, and the PLAY key is pressed, the laser will light up during focus access (2-3 seconds). (Fig. 2-1) During the operation, the laser will leak from the opening between the magnetic head and the mechanical chassis (Fig. 2-2). In order to protect your eyes, you must not look at the laser during repair. Before repairing be sure to disconnect the AC adaptor and remove the batteries.

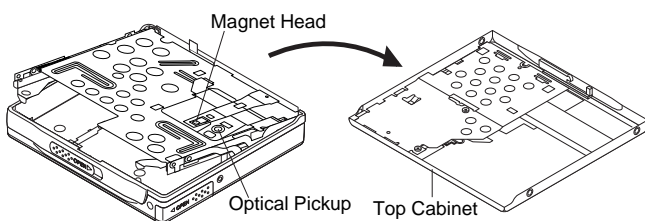


Figure 2-1

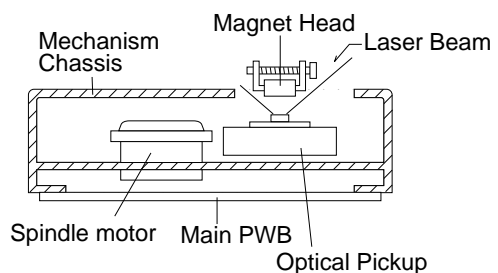


Figure 2-2

FOR A COMPLETE DESCRIPTION OF THE OPERATION OF THIS UNIT, PLEASE REFER TO THE OPERATION MANUAL.

SPECIFICATIONS

For MD-DR470H

- Power source:** DC 5 V: AC adaptor (AC 230 V, 50/60 Hz)
 DC 1.5 V: Commercially available, "AA" size (LR6), alkaline battery x 1
 DC 1.2 V: Rechargeable Nickel-Metal Hydride battery AD-N55BT x 1
 DC 4.5 V: Optional car adaptor, AD-CA20X (for cars with a 12 - 24 V DC negative earth electrical system)
- Power consumption:** 7 W (AC adaptor)
- Output power:** RMS: 16 mW (8 mW + 8 mW)
(0.2 % T.H.D.)
- Charging time:** Approx. 3.5 hours (90 %)
Approx. 5.5 hours (fully charged)
- Dimensions:** Width: 78.9 mm (3-1/8") Height: 17.8 mm (23/32") Depth: 71.9 mm (2-27/32")
- Weight:** 140 g (0.31 lbs.) with rechargeable battery
- Input socket:** Line/optical digital, microphone (powered by the main unit)
- Output socket:** Earphones (impedance: 32 ohms)/remote control unit
- Type:** Portable MiniDisc recorder
- Signal readout:** Non-contact, 3-beam semiconductor laser pickup
- Audio channels:** Stereo 2 channels/monaural 1 channel
- Frequency response:** 20 - 20,000 Hz (± 3 dB)
- Rotation speed:** Approx. 400 - 1,800 rpm
- Error correction:** ACIRC (Advanced Cross Interleave Reed-Solomon Code)
- Coding:** ATRAC/ATRAC3 (Adaptive TRansform Acoustic Coding)
- Recording method:** Magnetic modulation overwrite method
- Sampling frequency:** 44.1 kHz (32 kHz and 48 kHz signals are converted to 44.1 kHz, and then recorded.)
- Wow and flutter:** Unmeasurable (less than ± 0.001 % W. peak)

Battery life:

	Stereo		2 times long		4 times long	
When using the rechargeable battery (fully charged) included with the unit	Continuous recording: Approx. 10.5 hours	Continuous play: Approx. 27 hours	Continuous recording: Approx. 15 hours	Continuous play: Approx. 35 hours	Continuous recording: Approx. 22 hours	Continuous play: Approx. 42 hours
When using one, commercially available, high capacity, "AA" size (LR6), alkaline battery (The rechargeable battery is in the unit, discharged.)	Continuous recording: Approx. 13 hours	Continuous play: Approx. 41 hours	Continuous recording: Approx. 22 hours	Continuous play: Approx. 59 hours	Continuous recording: Approx. 30 hours	Continuous play: Approx. 71 hours
When using one, commercially available, high capacity, "AA" size (LR6), alkaline battery with the rechargeable battery (fully charged)	Continuous recording: Approx. 28 hours	Continuous play: Approx. 72 hours	Continuous recording: Approx. 42 hours	Continuous play: Approx. 100 hours	Continuous recording: Approx. 57 hours	Continuous play: Approx. 122 hours

Input sensitivity:

	Reference input level	Input impedance
MIC H	0.25 mV	10 kohms
MIC L	2.5 mV	10 kohms
LINE	100 mV	20 kohms

Output level:

	Specified output	Maximum output level	Load impedance
Earphones	-	8 mW + 8 mW	32 ohms
LINE	250 mV (-12 dB)	-	10 kohms

- The continuous recording time is for analogue inputs when the volume level is set to "VOL 0".
- The continuous play time shows the value when the volume level is set to "VOL 15".
- The above values are the standard values when the unit is charged and used at an ambient temperature of 25°C (77°F).
- The operating time when using an alkaline battery may be different, depending on the type and manufacturer of the battery, and on the operating temperature.
- The setting for the REMOTE LCD is set to "AUTO OFF".

Specifications for this model are subject to change without prior notice

MD-DR470H/MD-DR480H

For MD-DR480H

Power source:	DC 5 V: DC 1.5 V: DC 1.2 V: DC 4.5 V:	AC adaptor (AC 110 - 240 V, 50/60 Hz) Commercially available, "AA" size (LR6), alkaline battery x 1 Rechargeable Nickel-Metal Hydride battery AD-N55BT x 1 Optional car adaptor, AD-CA20X (for cars with a 12 - 24 V DC negative earth electrical system)
Power consumption:	0.15 A (AC adaptor)	
Output power:	RMS: 16 mW (8 mW + 8 mW) (0.2 % T.H.D.)	
Charging time:	Approx. 3.5 hours (90 %) Approx. 5.5 hours (fully charged)	
Dimensions:	Width: 78.9 mm (3-1/8") Height: 17.8 mm (23/32") Depth: 71.9 mm (2-27/32")	
Weight:	140 g (0.31 lbs.) with rechargeable battery	
Input socket:	Line/optical digital, microphone (powered by the main unit)	
Output socket:	Earphones (impedance: 32 ohms)/remote control unit	
Type:	Portable MiniDisc recorder	
Signal readout:	Non-contact, 3-beam semiconductor laser pickup	
Audio channels:	Stereo 2 channels/monaural 1 channel	
Frequency response:	20 - 20,000 Hz (± 3 dB)	
Rotation speed:	Approx. 400 - 1,800 rpm	
Error correction:	ACIRC (Advanced Cross Interleave Reed-Solomon Code)	
Coding:	ATRAC/ATRAC3 (Adaptive Transform Acoustic Coding)	
Recording method:	Magnetic modulation overwrite method	
Sampling frequency:	44.1 kHz (32 kHz and 48 kHz signals are converted to 44.1 kHz, and then recorded.)	
Wow and flutter:	Unmeasurable (less than ± 0.001 % W. peak)	

Battery life:

	Stereo		2 times long		4 times long	
When using the rechargeable battery (fully charged) included with the unit	Continuous recording: Approx. 10.5 hours	Continuous play: Approx. 27 hours	Continuous recording: Approx. 15 hours	Continuous play: Approx. 35 hours	Continuous recording: Approx. 22 hours	Continuous play: Approx. 42 hours
When using one, commercially available, high capacity, "AA" size (LR6), alkaline battery (The rechargeable battery is in the unit, discharged.)	Continuous recording: Approx. 13 hours	Continuous play: Approx. 41 hours	Continuous recording: Approx. 22 hours	Continuous play: Approx. 59 hours	Continuous recording: Approx. 30 hours	Continuous play: Approx. 71 hours
When using one, commercially available, high capacity, "AA" size (LR6), alkaline battery with the rechargeable battery (fully charged)	Continuous recording: Approx. 28 hours	Continuous play: Approx. 72 hours	Continuous recording: Approx. 42 hours	Continuous play: Approx. 100 hours	Continuous recording: Approx. 57 hours	Continuous play: Approx. 122 hours

Input sensitivity:

	Reference input level	Input impedance
MIC H	0.25 mV	10 k ohms
MIC L	2.5 mV	10 k ohms
LINE	100 mV	20 k ohms

Output level:

	Specified output	Maximum output level	Load impedance
Earphones	-	8 mW + 8 mW	32 ohms
LINE	250 mV (-12 dB)	-	10 kohms

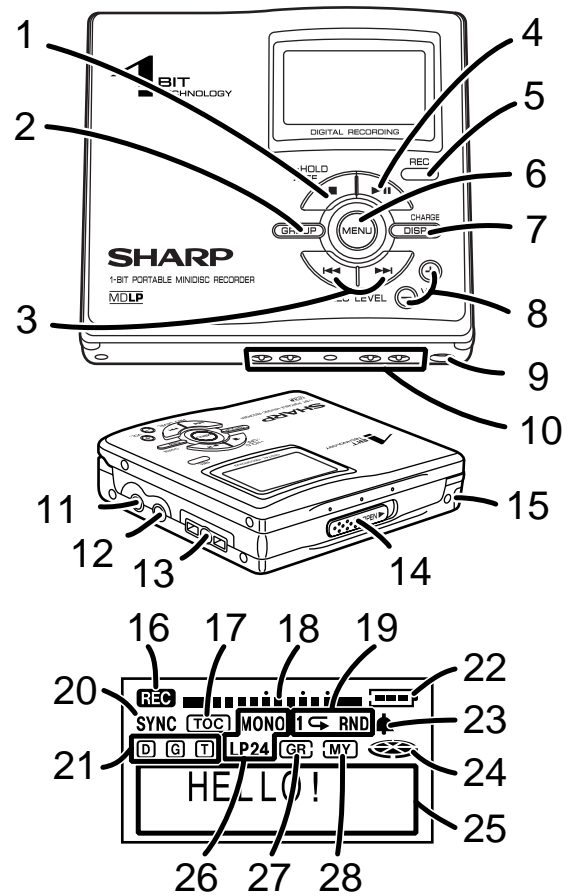
- The continuous recording time is for analogue inputs when the volume level is set to "VOL 0".
- The continuous play time shows the value when the volume level is set to "VOL 15".
- The above values are the standard values when the unit is charged and used at an ambient temperature of 25°C (77°F).
- The operating time when using an alkaline battery may be different, depending on the type and manufacturer of the battery, and on the operating temperature.
- The setting for the REMOTE LCD is set to "AUTO OFF".

Specifications for this model are subject to change without prior notice

NAMES OF PARTS

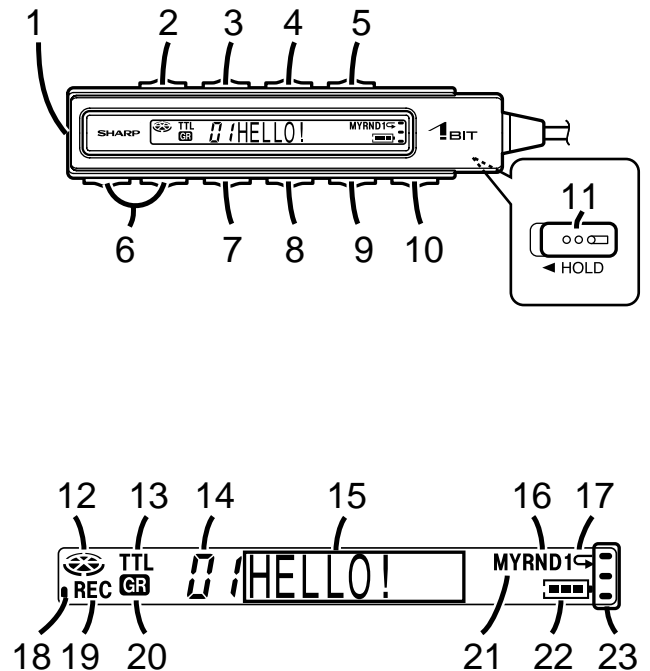
Main unit

1. Stop/Power Off/Hold Button
2. Group Button
3. Fast Forward/Fast Reverse/Recording Level/Name Select Buttons
4. Play/Pause Button
5. Record Button
6. Menu Button
7. Display Button
8. Volume Buttons
9. 5 V DC Input Socket
10. Battery Connection Terminals
11. Optical/Line Input Socket
12. Microphone Input Socket
13. Remote Control/Earphones/Line Output Socket
14. Open Lever
15. Rechargeable Battery Cover
16. Record Indicator
17. TOC Indicator
18. Level Meter
19. Repeat/Random Indicators
20. Synchro Recording Indicator
21. Disc/Group/Track Information Indicators
22. Battery Indicator
23. Alarm Indicator
24. Disc Mode Indicator
25. Character/Time Information Indicator
26. Recording Mode Indicators
27. Group Indicator
28. My Entry Indicator



Remote control unit

1. Earphones Socket
2. Bass Button
3. Display Button
4. Mode Button
5. Group Button
6. Volume Buttons
7. Stop/Power Off Button
8. Fast Reverse Button
9. Play/Pause Button
10. Fast Forward Button
11. Hold Switch
12. Disc Mode Indicator
13. Total Track Number Indicator
14. Track Number Indicator
15. Character/Time Information Indicator
16. Random Indicator
17. Repeat Indicator
18. Synchro Recording Indicator
19. Record Indicator
20. Group Indicator
21. My Entry Indicator
22. Battery Indicator
23. Recording Mode Indicators



DISASSEMBLY

Cares before disassembling

When assembling the machine after disassembling or repair, observe the following requirements so as to ensure safety and performance.

1. Remove the batteries from the machine, and take out the mini-disc.
2. When assembling after repair, be sure to position the wires in the same location.
Use the specified screws to fix the cabinet and the mechanism unit. The use of the screws with length other than specified may cause contact with the mechanism unit resulting in malfunction.
3. When repairing, pay close attention so not to damage the IC from static electricity.

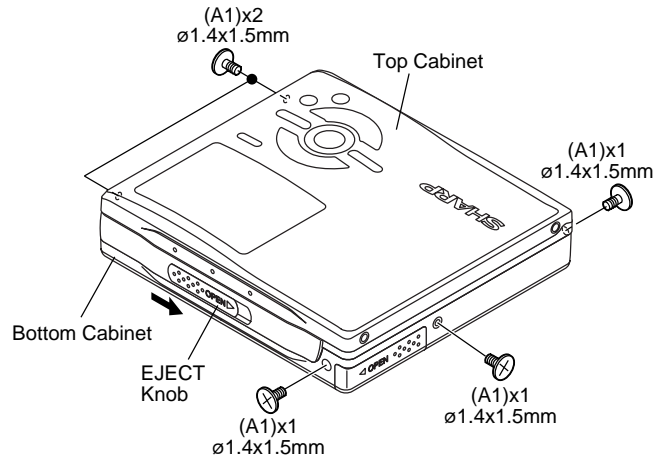


Figure 6-1

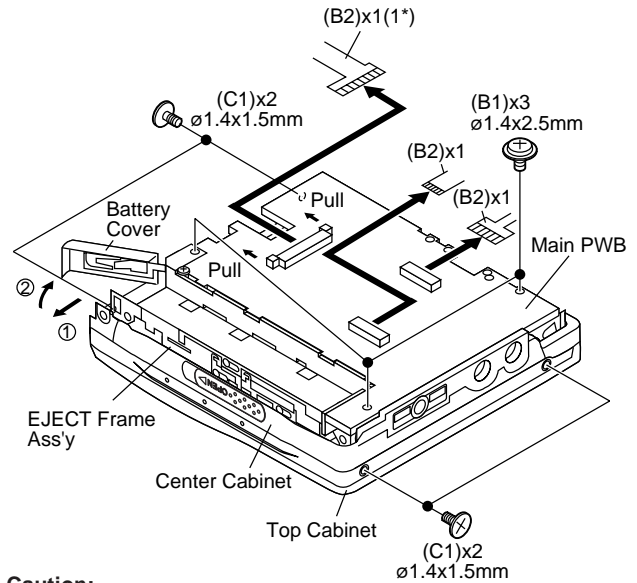


Figure 6-2

Caution:

Carefully handle the main PWB and flexible PWB. After removing the flexible PWB (1*) for the optical pickup from the connector, do not touch directly the front end of flexible PWB with your hand so as to prevent damage of optical pickup by static electricity.

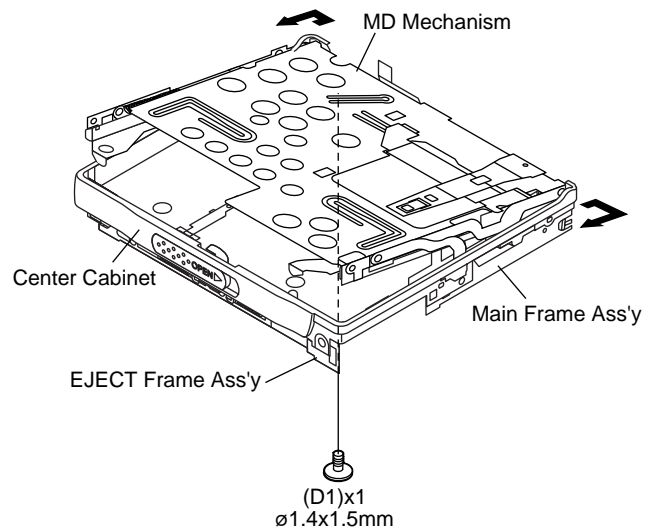


Figure 6-3

STEP	REMOVAL	PROCEDURE	FIGURE
1	Bottom Cabinet	1. Remove the rechargeable battery cover as indicated by the arrow. 2. Screw (A1) x5	6-2 6-1
2	Main PWB	1. Screw (B1) x3 2. Flexible PWB (B2) x3	6-2
3	Top Cabinet	1. Open the Top cabinet. 2. Screw (C1) x4	6-1 6-2
4	MD Mechanism	1. Remove the center cabinet as indicated by the arrow. 2. Screw (D1) x1	6-3
5	LCD Unit/ Operation Button Flexible PWB Ass'y	1. Screw (E1) x2	6-4

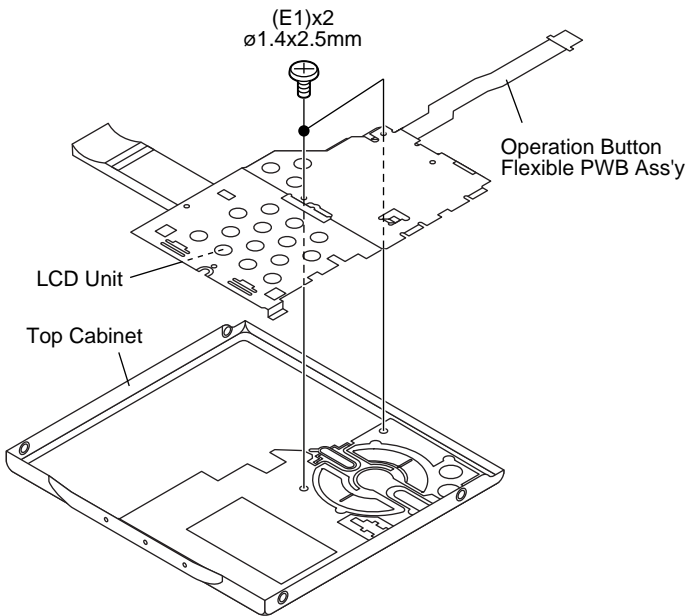


Figure 6-4

REMOVING AND REINSTALLING THE MAIN PARTS

Remove the MD mechanism according to the disassembling methods 1 to 4. (See Page 6.)

How to remove the spindle motor

(See Fig. 7-1.)

1. Remove the solder joints (A1) x 4 of flexible PWB.
2. Remove the screws (A2) x 3 pcs., and remove the spindle motor.

How to remove the lift motor (See Fig. 7-2.)

1. Remove the solder joints (B1) x 2 of lift motor lead wire.
2. Remove the screw (B2) x 1 pc., and remove the lift motor.

Note:

Take care so that the motor gear is not damaged.
(If the gear is damaged, noise is caused.)

How to remove the sled motor (See Fig. 7-3.)

1. Remove the stop washer (C1) x 1 pc., and remove the drive gear (C2) x 1 pc.
2. Remove the screws (C3) x 2 pcs.
3. Remove the solder joints (C4) x 3 of flexible PWB., and remove the sled motor.

Note:

Take care so that the motor gear is not damaged.
(If the gear is damaged, noise is caused.)

How to remove the magnetic head ass'y

(See Fig. 7-4.)

1. Remove the screws (D1) x 2 pcs. of the magnetic head ass'y and the optical pickup, and remove the solder joints (D2) x 2 of the head flexible plate.

Note:

Mount carefully so as not to damage the magnetic head.

How to reinstall the optical pickup

(See Fig. 7-4.)

1. Remove the screw (E1) x 1 pc., and remove the grip spring.
2. Remove the screw (E2) x 1 pc. to remove the thrust spring, and remove the drive screw and the optical pickup from MD mechanism.

Then, remove the drive screw from the optical pickup.

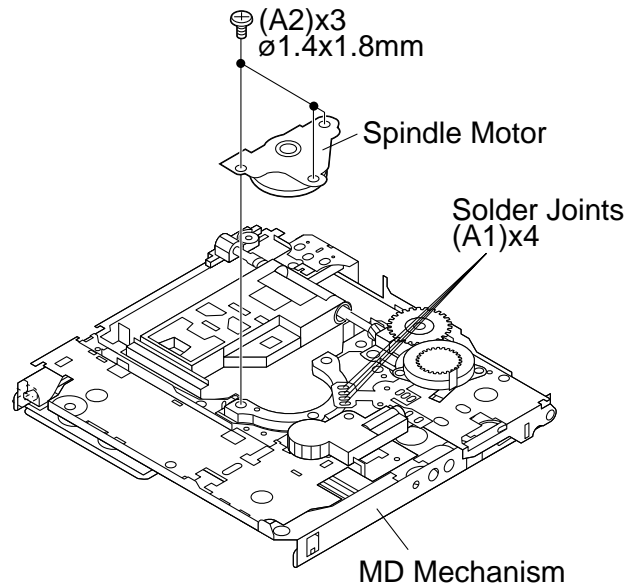


Figure 7-1

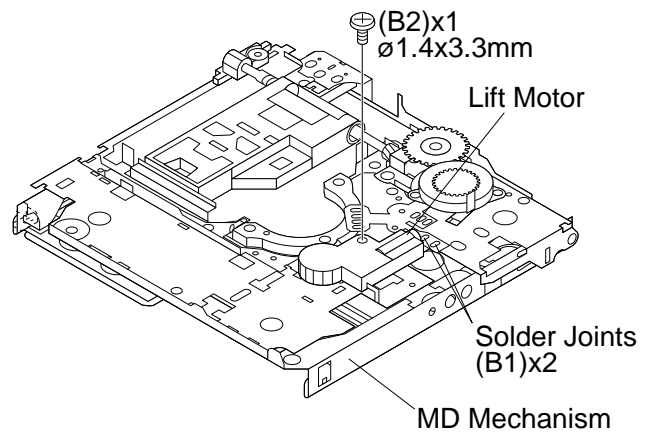


Figure 7-2

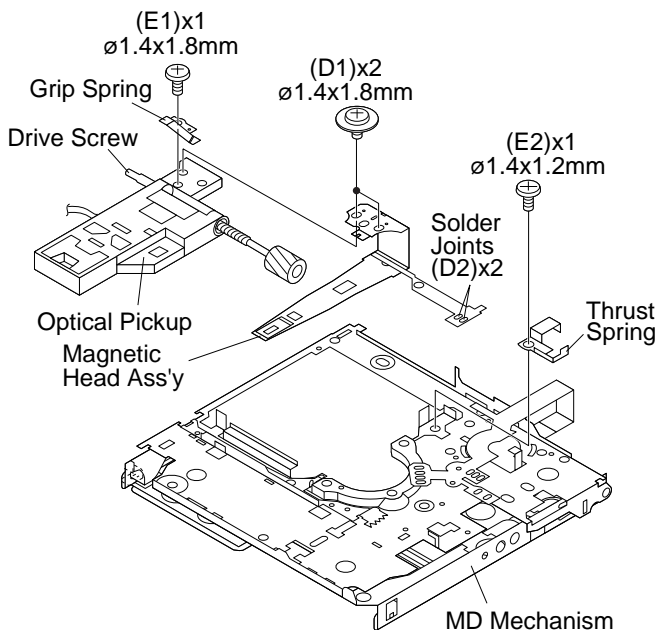


Figure 7-4

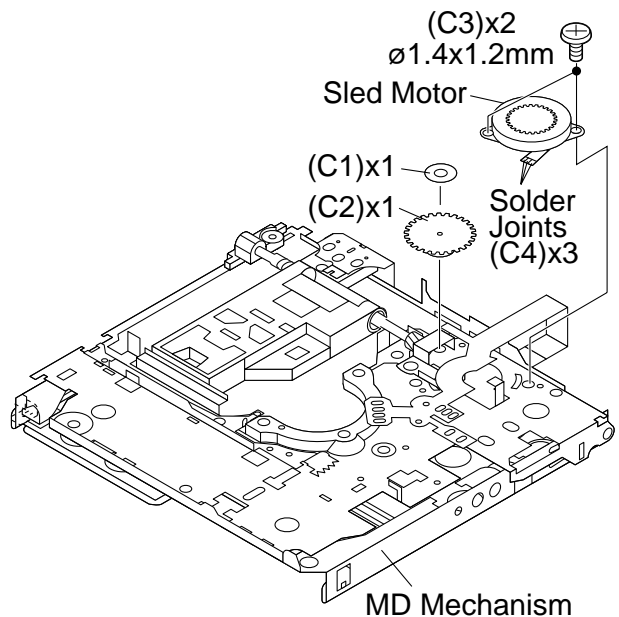


Figure 7-3

ADJUSTMENT

● Test disc

MD adjustment needs two types of disc, namely recording disc (low reflection disc) and playback-only disc (high reflection disc).

	Type	Test disc	Parts No.
1	High reflection disc	MMD-110 (TEAC Test MD)	88GMMD-110
2	Low reflection disc	MMD-213A (TEAC Test MD)	88GMMD-213A
3	Low reflection disc	Recording mini disc	UDSKM0001AFZZ
4	Extension cable	Performance test (extension cable for motors)	QCNWN6936AFZZ
5	Extension relay PWB	Performance test (extension relay PWB for motors)	RUNTK0613AFZZ

Note: Use the low reflection disc on which music has been recorded.

● Entering the TEST mode

1. Setting by the main unit operation (when in the stand-by mode)

- ① Keep holding down the VOLUME + button and press the PLAY button.
- ② With the PLAY button pressed, release the VOLUME + button.
- ③ With the PLAY button pressed, release the VOLUME – button.
- ④ Keep holding down the VOLUME – button, release the PLAY button and then release the VOLUME – button.
- ⑤ The test mode stops, and [T E S T _] appears.

2. Setting by the remote control operation (when in the stand-by mode)

- ① Switch the HOLD button from OFF to ON.
- ② Hold down the VOLUME – button.
- ③ With the VOLUME – button pressed, switch the HOLD button to from ON to OFF. (Complete steps ① to ③ within 2 seconds.)

- ④ Keep holding down the VOLUME – button and release the PLAY button.
- ⑤ With the PLAY button pressed, release the VOLUME – button and then release the PLAY button.
- ⑥ The test mode stops, and [T E S T _] appears.
- ⑦ Press “VOLUME +” to check the version of the microcomputer. (It is displayed on the remote control only.)
- ⑧ Press “VOLUME –” to light up the whole LCD.

● Leaving the TEST mode

- ① Press the STOP button in the test mode stop state, and with the version displayed or the whole LCD on.
- ② Update the rewritable area of EEPROM.
- ③ Switch to the standby mode.

● Shipping setting method

- ① Keep holding down the VOLUME – and the PLAY button on the main unit, and then plug in the AC adapter.
- ② Make sure [INIT] changes to [BYE OK] on the main unit or the remote control.

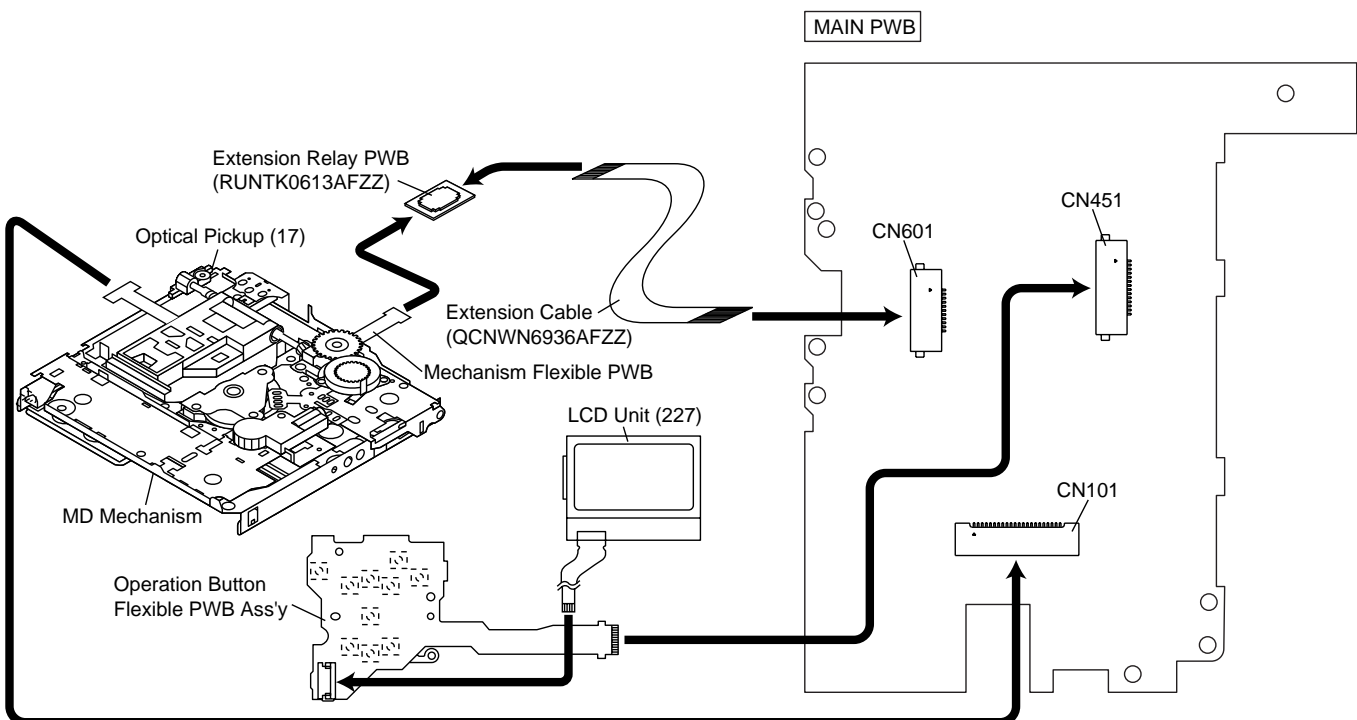


Figure 8

● Test Mode

1. AUTO 1 Mode	<ul style="list-style-type: none"> Perform preliminary automatic adjustment. If the combination of mechanism and pickup PWB has been changed, be sure to start from AUTO1.
2. AUTO 2 Mode	<ul style="list-style-type: none"> Perform ATT (attenuator) automatic adjustment. Perform continuous playback. (error rate display, jump test.)
3. PLAY Mode	<ul style="list-style-type: none"> Continuous playback from the specified address is performed. 1 jump or 10 jumps and manual movement. C1 error rate display (pit section), ADIP error rate display (groove section). The temperature correction is performed only when servo start is performed, but the posture correction is not performed during continuous playback.
4. REC Mode	<ul style="list-style-type: none"> Continuous record from the specified address is performed. Change of record laser output. (servo gain is also changed according to laser output.) The temperature correction is performed only when servo start is performed, but the posture correction is not performed during continuous recording.
5. MANU 1 Mode	<ul style="list-style-type: none"> Temperature is displayed. Seeing the displayed adjustment value, perform preliminary manual adjustment. (Error rate indication, jump test.)

6. MANU 2 Mode	<ul style="list-style-type: none"> Temperature is displayed. Seeing the displayed adjustment value, perform ATT (attenuator) manual adjustment. Continuous playback is performed. (error rate display, jump test.)
7. E_DATA display Mode	<ul style="list-style-type: none"> Error information is displayed. Error information is initialized.
8. NORMAL Mode	<ul style="list-style-type: none"> The mode is changed from the TEST mode to the normal mode without adjustment. In the normal mode the internal operation mode, memory capacity, etc. are indicated. In the normal mode both temperature correction and posture correction are performed.
9. EEPROM Mode	<ul style="list-style-type: none"> Factors of digital servo are changed manually. Cut-off frequency of BASS1, BASS2 and BASS3 is changed manually. Temperature detection terminal voltage is measured, and the reference value is set. Defaults are selected and set. Setting of EEPROM protect area is updated.

● Operation in each TEST mode

1. AUTO1 Mode

- When the STOP button is pressed while the AUTO1 menu appears or during automatic adjustment, the mode changes to the TEST mode stop state. At this time the adjustment value is not output.
- Be sure to adjust, using the specified disc MMD-213A.
- Adjustment NG; Adjustment item out of range, focus ON failure, and adjustment error.
- When the PLAY button is pressed while ADJ. OK is displayed, AUTO2 is executed.

2. AUTO2 Mode

- When the STOP button is pressed while the AUTO2 menu appears or during automatic adjustment, the mode changes to the TEST mode stop state. At this time the adjustment value is not output.
- Adjustment NG; Adjustment item out of range, and adjustment error.
- When the PLAY button is pressed while ADJ. OK is displayed, TEST_PLAY is executed.

3. MANU1 Mode

- Adjustment item to be made in AUTO1 mode is performed manually.
- When the VOLUME + button is pressed during adjustment, the setting increases, and the new setting is output.
- When the VOLUME – button is pressed during adjustment, the setting decreases and the new setting is output.
- If the VOLUME +/- button is held down, the setting changes continuously with 100 ms cycle.
- *In this operation, the setting change is performed for each digit. The digit is changed by pressing the REC button.
- If the setting is within the allowable range, the RND display lights.
- When the STOP button is pressed during MANU1 menu or measurement or adjustment, the state is changed to the TEST mode stop state.

4. MANU2 Mode

- Adjustment item to be made in AUTO2 mode is performed manually.
- When the VOLUME + button is pressed during adjustment, the setting increases, and the new setting is output.
- When the VOLUME – button is pressed during adjustment, the setting decreases and the new setting is output.
- If the VOLUME +/- button is held down, the setting changes continuously with 100 ms cycle.
- *In this operation, the setting change is performed for each digit. The digit is changed by pressing the REC button.
- If the setting is within the allowable range, the RND display lights.

- When the STOP button is pressed during MANU2 menu or measurement or adjustment, the state is changed to the TEST mode stop state.
- When the PLAY button is pressed in B-ATT set state, the mode is changed to the continuous playback mode.
- As for operation during continuous playback refer to "PLAY mode explanation".

5. PLAY Mode

- When the STOP button is pressed while the PLAY menu appears, or in PLAY or continuous playback mode, the mode changes to the TEST mode stop state.
- When the PLAY button is pressed while the PLAY menu appears, continuous playback is initiated from the current pickup position.
- Whenever the DISP button is pressed in the PLAY menu, the target address changes as follows.
0032 → 03C0 → 0700 → 08A0 → 0950 → 0032 → ...
When the PLAY button is pressed while a target address is displayed, continuous playback is performed after searching that address.
- Each time the REC button is pressed while the PLAY mode target address is displayed, the digit which is changed by pressing the FORWARD/REVERSE button is changed as follows.
0032 → 0032 → 0032 → 0032 → ...
- When the FORWARD button is pressed in the PLAY mode target address is displayed, the digit of address specified by the REC button is set to +1h. (0 to F)
- When the REVERSE button is pressed in the PLAY mode target address is displayed, the digit of address specified by the REC button is set to -1h. (0 to F)
- * When the fast FORWARD/REVERSE button is kept pressed, the selected digit number continuously varies in a cycle of 100 ms.
- If you press the BASS button on the remote control in the continuous playback mode, the number of jumps changes as follows.
1 → 10 → 100 step → 1 ...
- * After the number of jump lines is indicated for one second, the address indication is restored. [▲▲▲ TR _]
- When the FORWARD button is pressed in the continuous playback mode, the specified number of lines is jumped in the FWD direction.
- When the REVERSE button is pressed in the continuous playback mode, the specified number of lines is jumped in the REV direction.
- * When the FORWARD/REVERSE button is held down, jump is repeated every approx. 100 ms.
- Whenever the DISP button is pressed in the continuous playback mode, the indication changes as follows.

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* Pre-mastered disc Continuous playback (SUBQ address indication)	[S Q □ □ □ □]
↓	
Continuous playback (C1 error indication)	[C E ☆ ☆ ☆ ☆]
↓	
Continuous playback (SUBQ address indication)	[S Q □ □ □ □]
* Recordable disk Continuous playback (ADIP address indication)	[A P □ □ □ □]
↓	
Continuous playback (C1 error indication)	[C E ☆ ☆ ☆ ☆]
↓	
Continuous playback (ADIP error indication)	[A E ★ ★ ★ ★]
↓	
Continuous playback (Integrating jitter indication)	[* * b △ △ △]
↓	
Continuous playback (ADIP address indication)	[A P □ □ □ □]

6. REC Mode

- When the STOP button is pressed while the REC menu appears, or in the REC mode or continuous record mode, the mode changes to the TEST mode stop state.
- Whenever the DISP button is pressed in the REC menu, the target address changes as follows.
0032 → 03C0 → 0700 → 08A0 → 0950 → 0032 → ...
When the PLAY button is pressed while a target address is displayed, continuous playback is performed after searching that address.
- Whenever the REC button is pressed in the REC mode target address is displayed, the digit which is changed by the VOLUME +/- button changes as follows.
0032 → 0032 → 0032 → 0032 → ...
- When the FORWARD button is pressed in the REC mode target address is displayed, the digit of address specified by the REC button is set to +1h. (0 to F)
- When the REVERSE button is pressed in the REC mode target address is displayed, the digit of address specified by the REC button is set to -1h. (0 to F)
- * When the FORWARD/REVERSE button is held down, the setting changes continuously, one cycle being 100 ms.

● Explanation of error history code

- 13 h : Adjustment servo retraction excessive retrial
- 16 h : C. IN detection time-over
- 17 h : A, B, E, F, and TCRSO offset measurement value out of tolerable range
- 21 h : Focus retraction completion allowable time-over
- 22 h : Unable to activate the spindle motor
- 23 h : Track search completion allowable time-over
- 32 h : P-TOC read failure
- 42 h : U-TOC read failure
- 44 h : U-TOC write data write disabled/read check error

● Error messages

Can't READ (*)

- * = f : Focus pulled
- a : Servo adjustment
- s : Track search
- r : TOC information reading
- p : Spindle start

Er-MD (**)

- ** = 80
- "Er-MD 80" appears when EEPROM data cannot be read correctly (inconsistency of data and the checksum results). EEPROM or communication paths including the microcomputer may be defective.
- When you change EEPROM, reset data by referring to the service manual.

- When the VOLUME +/- button is pressed in the REC mode or continuous record mode, the laser record power changes. (Servo gain changes also according to record power.)
- * After the laser record power is indicated for one second, the address indication is restored. [R P W _ ▽ ▽]
- □ □ □ : Address
- ▽ ▽ : Laser power cord
- Operation is disabled if the premastered disc or disc is in miserase-protected state.

7. NORMAL Mode

- When the STOP button is pressed while the NORMAL menu appears, the mode changes to the TEST mode stop state.
- Indication during operation Indication of memory capacity on main unit LCD [□ □ _ * * * * _ * *] + Level meter
□ □ : Internal mode
* * * * : Address (Cluster section)
* * : Address (Sector section)
- Selection of sound volume, BASS, etc. is possible. (without indication)
- Recording is also possible.
- If the STOP button is pressed during operation in the NORMAL mode, the NORMAL mode is cancelled, and the power is turned off.

8. E_DATA display Mode

- Reversing when REVERSE button is pressed.
- When the STOP button is pressed while the error data indication menu appears or during error data indication, the mode changes to the TEST mode stop state.
- Error data 0 is the latest error.
- Error which occurred in the TEST mode is also stored in the memory.
- When the DISP button is pressed while the error data indication menu appears, the error data is initialized.
[C L E A R _]
◇ ◇ : Error Code

- 45 h : U-TOC write test failure
- 52 h : SD write data write disabled
- 72 h : EEPROM data read check sum error
- 73 h : Record head drive disabled (by EJECT lever)
- 82 h : Power overvoltage detection
- 83 h : The temperature sensor output error
- 91 h : Ambient temperature is higher than the allowable temperature

** = 41

- "Er-MD41" appears when writing U-TOC fails. (Only recorders) (Reading of the written data reveals errors.)
- The record head, the recording signal generator circuit including system LSI or the pickup laser may be defective.

TOC Form (*)

- * = t_ : TNO information
- a_ : Address information
- Ln: Pointer information
(n = 0, 1, 2 or 4: UTOC sector number)

Temperature reference setting method.

[1] Measurement, calculation and setting procedure.

- ① Set the TEST mode.
- ② Activate the "Temp" menu in the "EEPROM" mode.
 - In the test mode stop state, press the MENU button, SKIP-DOWN button (three times), and PLAY button (twice) in this order.
 - "TM\$\$%%" appears. (\$\$ = temperature code, %% = temperature reference value)
- ③ "TPin##" will appear when pressing the SKIP-UP button once. (## = TEMP input AD value)
- ④ Calculate the temperature correction value by referring to the ambient temperature and the "Temperature measurement value correction table".
- ⑤ Calculate the temperature reference value according to the formula below.
 - Temperature reference value = Microcomputer TEMP input AD value + Temperature correction value
- ⑥ Press the SKIP-DOWN button once to display "TM\$\$%%". Press the VOLUME -/+ button to set "%%" to the value calculated in step ⑤.
- ⑦ Check if the temperature code (\$\$) is the same as in the "Temperature measurement value correction table"

[2] Temperature measurement value correction table.

Ambient temperature	Temperature correction	Center temperature
+ 8 °C ~ +10 °C	- 05 h	+ 9.2 °C
+11 °C ~ +13 °C	- 04 h	+ 12.1 °C
+14 °C ~ +16 °C	- 03 h	+ 14.9 °C
+17 °C ~ +19 °C	- 02 h	+ 17.8 °C
+20 °C ~ +22 °C	- 01 h	+ 20.7 °C
+23 °C ~ +25 °C	± 00 h	+ 23.6 °C
+26 °C ~ +27 °C	+ 01 h	+ 26.5 °C
+28 °C ~ +30 °C	+ 02 h	+ 29.4 °C
+31 °C ~ +33 °C	+ 03 h	+ 32.3 °C

[3] Temperature code identification.

Ambient temperature	Temperature correction	Center temperature
- 8 °C ~ +10 °C	08 h	+ 0.5 °C
+ 3 °C ~ +21 °C	07 h	+ 12.0 °C
+14 °C ~ +33 °C	06 h	+ 23.6 °C
+26 °C ~ +43 °C	05 h	+ 35.0 °C

● EEPROM DATA LIST (EEPROM version : Y06BhX)

Fucus setting

Item display	Set values
FG 1 _○○	40 H
FG 2 _○○	90 H
FF 0 _○○	10 H
FF 1 _○○	70 H
FF 2 _○○	E5 H
Ff 0 _○○	10 H
Ff 1 _○○	48 H
Ff 2 _○○	EA H
FZH _○○	ED H
FLn _○○	09 H
FLp _○○	06 H
DJG _○○	0E H
FSS _○○	28 H
FTS _○○	18 H
FSB _○○	40 H
FTB _○○	28 H
FGM _○○	66 H
TVG _○○	84 H
TO1 _○○	50 H
TO5 _○○	58 H
TOR _○○	58 H
PLE _○○	8B H
RFT _○○	00 H

Spindle setting

Item display	Set values
SPG _○○	30 H
SPi _○○	9A H
SPm _○○	62 H
SPo _○○	4F H
PGM _○○	E0 H
SP1 _○○	10 H
SP2 _○○	60 H
SP3 _○○	F2 H
SP4 _○○	F2 H
SP5 _○○	10 H
Sp2 _○○	60 H
Sp5 _○○	10 H
SD1 _○○	7F H
SD2 _○○	7F H
SPK _○○	EB H
MPG _○○	28 H
SPL _○○	60 H
SPW _○○	0F H
SPB _○○	66 H
SRi _○○	C0 H
SRm _○○	9A H
SRo _○○	7B H
SBR _○○	60 H
OSL _○○	14 H
PJG _○○	46 H

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Tracking setting

Item display	Set values
TG1 _○○	17 H
TG2 _○○	40 H
TF0 _○○	10 H
TF1 _○○	70 H
TF2 _○○	E0 H
Tf0 _○○	10 H
Tf1 _○○	40 H
Tf2 _○○	E4 H
TFS _○○	00 H
TBo _○○	20 H
TBt _○○	34 H
TKo _○○	20 H
TKt _○○	32 H
TKT _○○	16 H
TDo _○○	67 H
TDt _○○	0E H
TDT _○○	16 H
SCo _○○	00 H
SCt _○○	3A H
SCm _○○	48 H
CLp _○○	24 H
CLr _○○	38 H
JPI _○○	0E H
THP _○○	02 H
THG _○○	02 H
T0P _○○	F0 H
T0G _○○	EF H
T1P _○○	18 H
TKn _○○	11 H
TKN _○○	26 H
TKL _○○	40 H

BASS setting

Item display	Set values
BS0 _○○	00 H
BS1 _○○	00 H
BS2 _○○	50 H
BS3 _○○	00 H
BS4 _○○	00 H
BS5 _○○	00 H
BS6 _○○	00 H
BS7 _○○	22 H
BS8 _○○	00 H

ADJ. SET setting

Item display	Set values
COK _○○	28 H
FAT _○○	C0 H
TAT _○○	3E H
CAT _○○	40 H
FAB _○○	64 H

Sled setting

Item display	Set values
SKS _○○	7F H
SKL _○○	7F H
SLC _○○	22 H
STL _○○	08 H
STM _○○	42 H
STE _○○	A6 H
SDV _○○	60 H
SJP _○○	03 H
WTm _○○	18 H
SRV _○○	54 H
SLT _○○	58 H
MVS _○○	0A H
SLS _○○	28 H
SKE _○○	25 H
SDE _○○	1C H
BPE _○○	71 H
BPW _○○	75 H
BP1 _○○	43 H
BRE _○○	94 H
BRW _○○	34 H
SRS _○○	00 H

Digital EQ setting

Item display	Set values
HQ1 _○○	90 H
HQ2 _○○	90 H
HSG _○○	11 H
HSO _○○	FF H
LQ1 _○○	90 H
LQ2 _○○	90 H
LSG _○○	12 H
LSO _○○	00 H
GQ1 _○○	98 H
GQ2 _○○	84 H
GSG _○○	12 H
ALS _○○	3F H
RCN _○○	00 H
EQR _○○	00 H

Control setting

Item display	Set values
CT0 _○○	07 H
CT1 _○○	01 H
CT2 _○○	BB H
CT3 _○○	50 H
USA _○○	18 H
RCE _○○	94 H
X2T _○○	FF H
SDF _○○	1F H
FBO _○○	FC H
BHS _○○	01 H
FBL _○○	16 H
MC2 _○○	00 H
MC4 _○○	00 H
L2H _○○	81 H
L4H _○○	80 H
BS0 _○○	3A H
BS1 _○○	98 H
BU0 _○○	01 H
BD0 _○○	05 H
BD1 _○○	DC H
BMK _○○	1E H
CST _○○	65 H
IJU _○○	81 H
IJD _○○	55 H
MCT _○○	A1 H
ERC _○○	5A H
CV0 _○○	27 H
CV1 _○○	10 H
SSK _○○	E9 H
ACT _○○	60 H
C1E _○○	52 H
ADE _○○	C0 H
LCV _○○	12 H
RC0 _○○	D7 H
RC1 _○○	D6 H
R20 _○○	80 H
R21 _○○	20 H
R40 _○○	BF H
R41 _○○	02 H
MFP _○○	4B H
SPM _○○	00 H
MSL _○○	00 H
US0 _○○	00 H
US1 _○○	00 H
US2 _○○	00 H
wE0p ○○	54 H
wE2 _○○	46 H
wE3p ○○	05 H
wE3g ○○	00 H

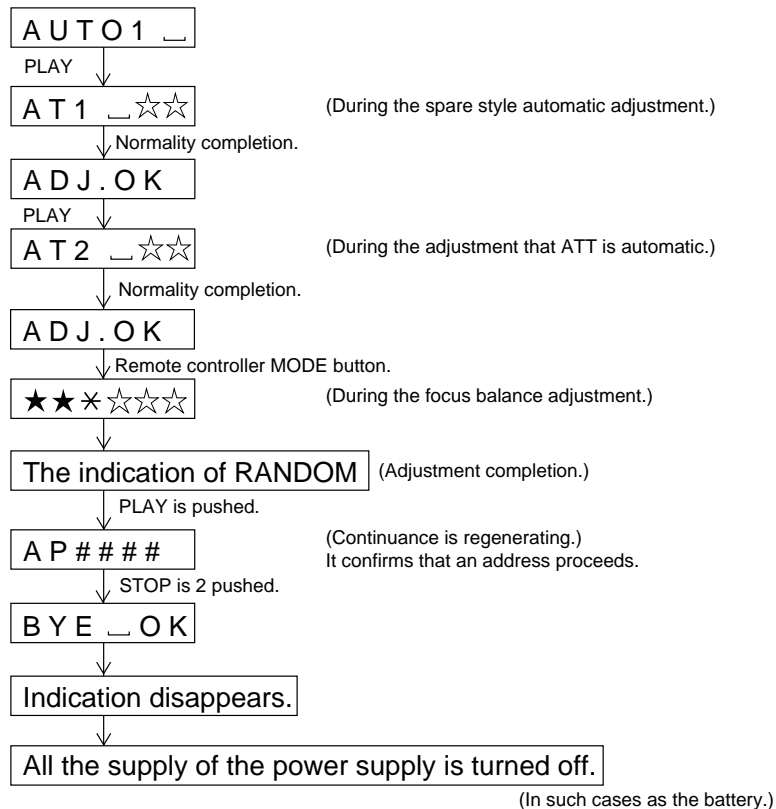
Item display	Set values
wEA _○○	16 H
wEF _○○	00 H
K10 _○○	0F H
K11 _○○	8E H

ROM Correction setting

Item display	Set values
RM00 ○○	59 H
RM01 ○○	30 H
RM02 ○○	36 H
RM03 ○○	42 H
RM04 ○○	0C H
RM05 ○○	0D H
RM06 ○○	3F H
RM07 ○○	30 H
RM08 ○○	42 H
RM09 ○○	5F H
RM0A ○○	41 H
RM0B ○○	5F H
RM0C ○○	FD H
RM0D ○○	6F H
RM0E ○○	40 H
RM0F ○○	0D H
RM10 ○○	FC H
RM11 ○○	33 H
RM12 ○○	3F H
RM13 ○○	0D H
RM14 ○○	10 H
RM15 ○○	0D H
RM16 ○○	B6 H
RM17 ○○	60 H
RM18 ○○	FD H
RM19 ○○	B6 H
RM1A ○○	9E H
RM1B ○○	0C H
RM1C ○○	7E H
RM1D ○○	BF H
RM1E ○○	90 H
RM1F ○○	30 H
RM20 ○○	7E H
RM21 ○○	5E H
RM22 ○○	FB H
RM23 ○○	03 H
RM24 ○○	FC H
RM25 ○○	64 H
RM26 ○○	B6 H
RM27 ○○	0D H
RM28 ○○	00 H

Do the following when replacing the mechanism, the pickup, the EEPROM (IC402), the LSI (IC201) or the main PWB unit.

Enter the test mode, move the pickup to the most internal periphery and execute AUTO1.
(Use the disc of MMD-213A.)



Before you replace EEPROM, be sure to set the EEPROM set value to the latest version.
(Note) After that, be sure to perform the shipment setting.

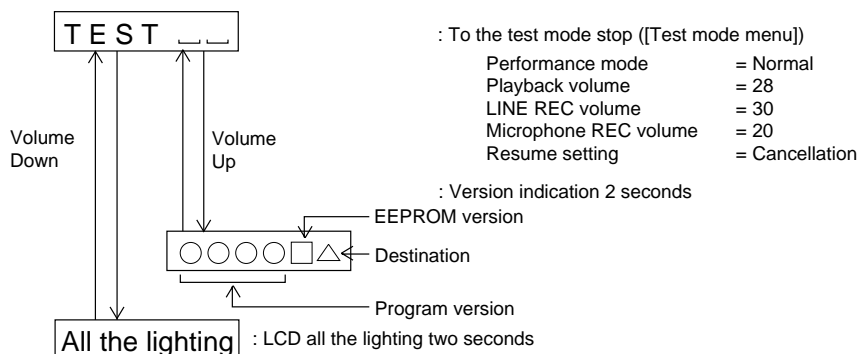
(The battery indicator starts to operate correctly after you complete the setting.)

Test Mode Start · Completion method

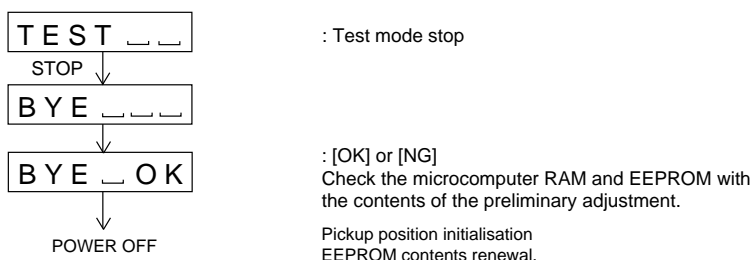
• Starting method of the test mode

When the unit is in the stand-by state (with no display), the test mode is started by performing the following operation using the remote control.
Switch the [HOLD] button from OFF to ON.
Keep holding down the [VOLUME DOWN] button and switch the [HOLD] button from ON to OFF within 2 seconds, and then press the [PLAY] button.
Keep holding down the [PLAY] button, release the [VOLUME DOWN] button and then the [PLAY] button.

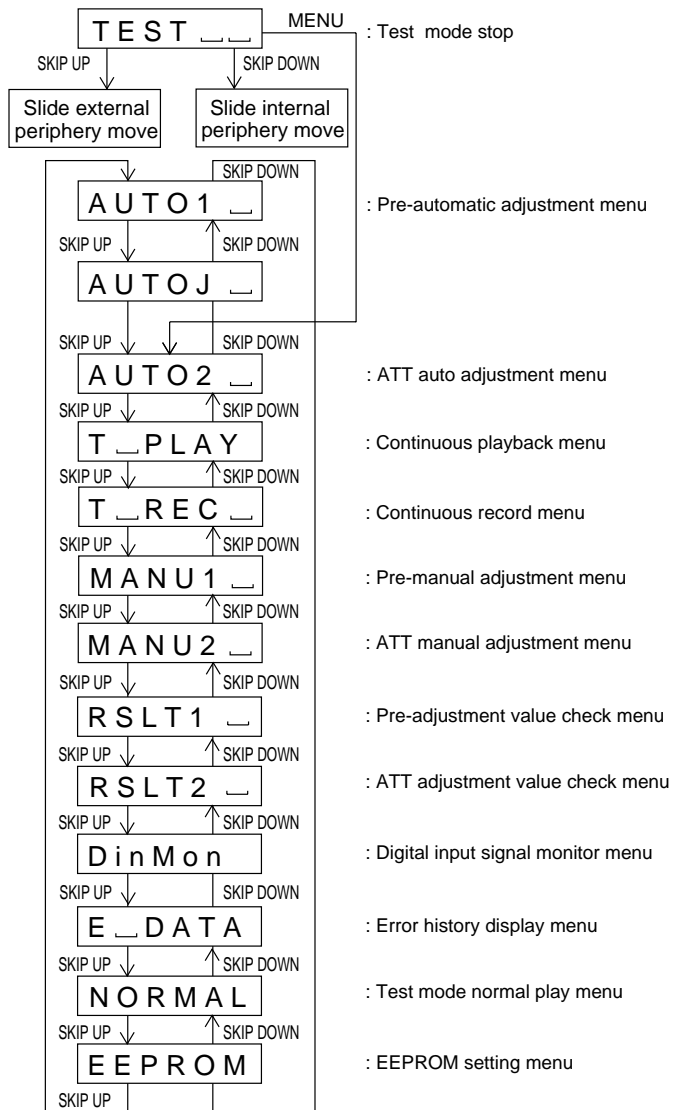
Indication after the start :



• How to cancel the test mode



Change of Test Mode Menus

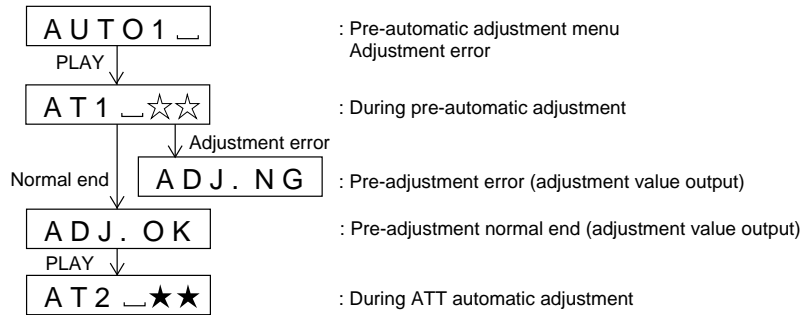


* When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

* When the [VOLUME UP] button is pressed in the "TEST MODE STOP" state, the program version is displayed for 2 seconds.

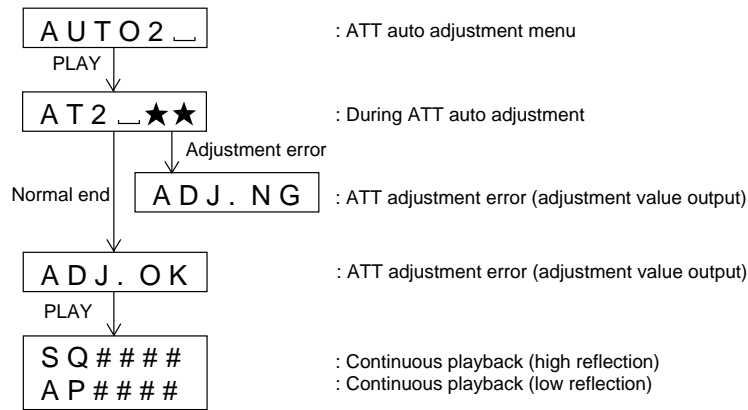
* When the [VOLUME DOWN] button is pressed in the "TEST MODE STOP" state, all the displays appear for 2 seconds.

Servo Pre-automatic Adjustment



- * When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.
- * Move the pickup lens manually to the innermost periphery before performing the servo preliminary auto adjustment. (Refer to "Change of test mode menus" for the operation method.)
- * "☆☆☆" is the internal processing number, the meanings of the numbers are as follows.
 - 0 2 : ABEF input offset measurement
 - 0 4 : AB input (ABMAXO) level setting
 - 0 5 : Focus ATT tentative setting
 - 0 6 : Pit section EF input level setting
 - 0 7 : COUT level setting for pit section adjustment
 - 0 8 : Sled external periphery move
 - 0 9 : Groove section EF input level setting
 - 1 0 : COUT level setting for groove section adjustment
 - 1 1 : TCRS input level setting
 - 1 2 : Tracking ATT initial setting
 - 1 3 : AB input (LPFABO) level setting
 - 1 4 : Focus ATT initial setting
 - 1 6 : TCRS input offset measurement
- * It is necessary for each test mode where servo operation is made to complete the preliminary adjustment. (Otherwise, "ErADJ." appears.)
- * The preliminary adjustment complete state is stored on the EEPROM (protected field).

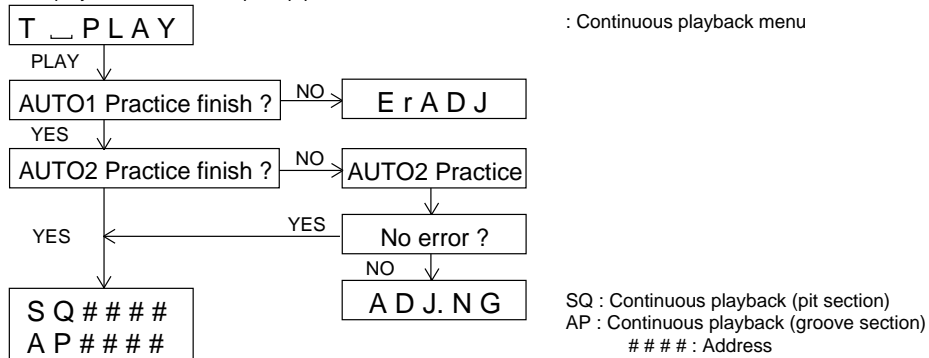
Servo ATT Auto Adjustment



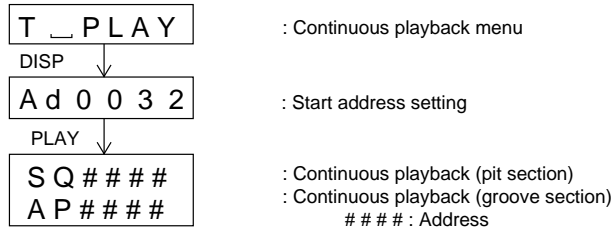
- * When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.
- * Move the pickup lens manually to the innermost periphery before performing the servo ATT auto adjustment. (Refer to "Change of test mode menus" for the operation method.)
- * "★★" represent the adjustment number as follows.
 - 0 0 : Initial setting
 - 0 3 : Pit section tracking ATT setting
 - 0 4 : Pit section focus ATT setting
 - 0 6 : Sled external periphery move (low reflection only)
 - 0 7 : TCRS ATT setting (low reflection only)
 - 0 8 : Groove section tracking ATT setting (low reflection only)
 - 0 9 : Groove section focus ATT setting (low reflection only)

Continuous Playback

- Continuous playback from current pickup position

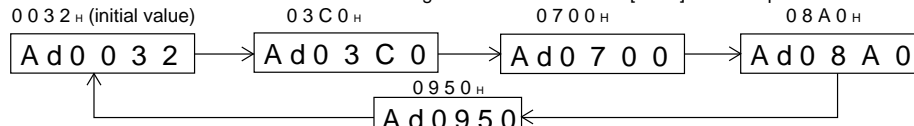


- Continuous playback from any address

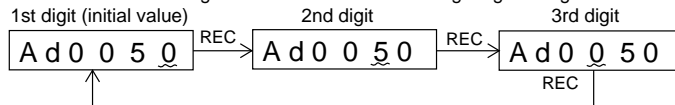


* When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

* In the start address set state the start address changes as follows when the [DISP] button is pressed.

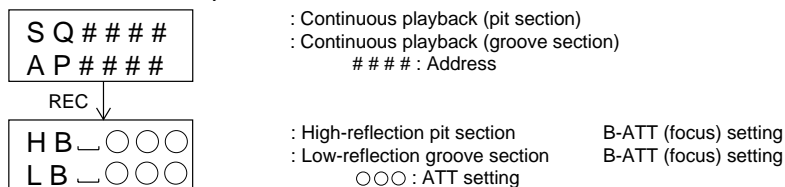


* In the start address setting state the start address change digit changes when the [REC] button is pressed.

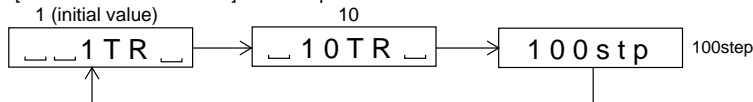


* In the start address set state the value of selection digit changes in the range of "0h to Fh" when the [SKIP UP/DOWN] button is pressed.

* If the [REC] button is pressed in the continuous playback state, the mode is changed to the B-ATT setting state of the ATT manual adjustment.



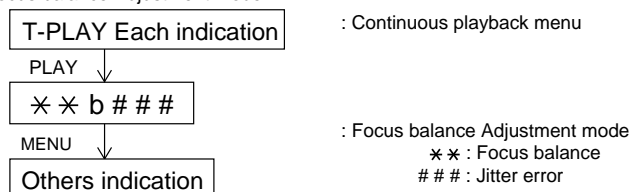
* In the continuous playback state the number of jump lines changes as follows shown the [Remote Controller BASS] button is pressed.



* When the [SKIP UP] button is pressed in the continued playback mode, jump of specified number of lines occurs in the external periphery direction. If the key is held down jump occurs continuously. (100 ms cycle)

* When the [SKIP DOWN] button is pressed in the continuous playback mode, jump of specified number of lines occurs in the internal periphery direction. If the key is held down, jump occurs continuously. (100 ms cycle)

- Focus balance Adjustment mode



* The focus balance adjustment mode is available only for low reflection discs.

* The RANDOM marker lights up in the focus balance adjustment mode.

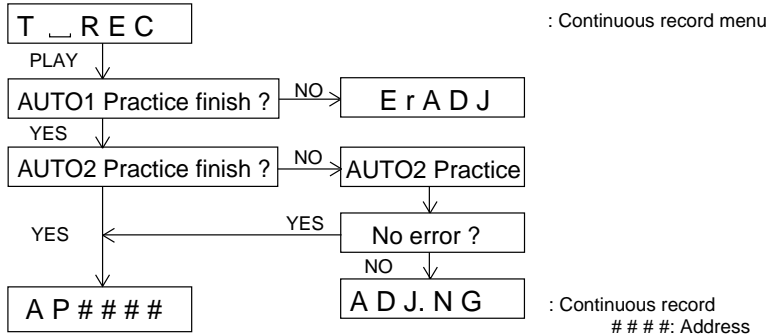
* The focus balance (× ×) can be changed by the VOLUME UP/DOWN button operation.

* If the PLAY button is pressed in the focus balance adjustment mode, the unit returns to the continuous playback mode.

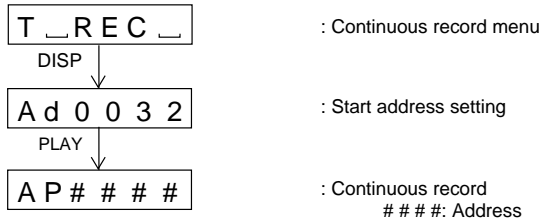
Continuous Record

Enter the EEPROM setting mode, and press the SKIP UP button.
 Change the MSL setting value from 00 to 08 by using CTRL_ (control setting menu).
 (If the MSL remains in 00, no signal is recorded.)

- Continuous record from the current pickup position

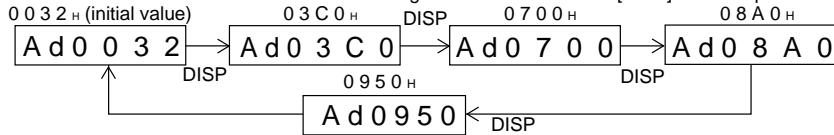


- Continuous record playback from any address

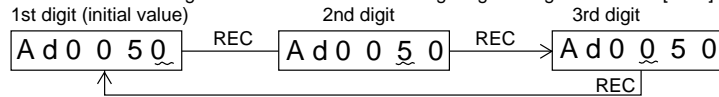


* When the [STOP] button is pressed in specific condition, the "TEST MODE STOP" state is set.

* In the start address set state the start address changes as follows when the [DISP] button is pressed.



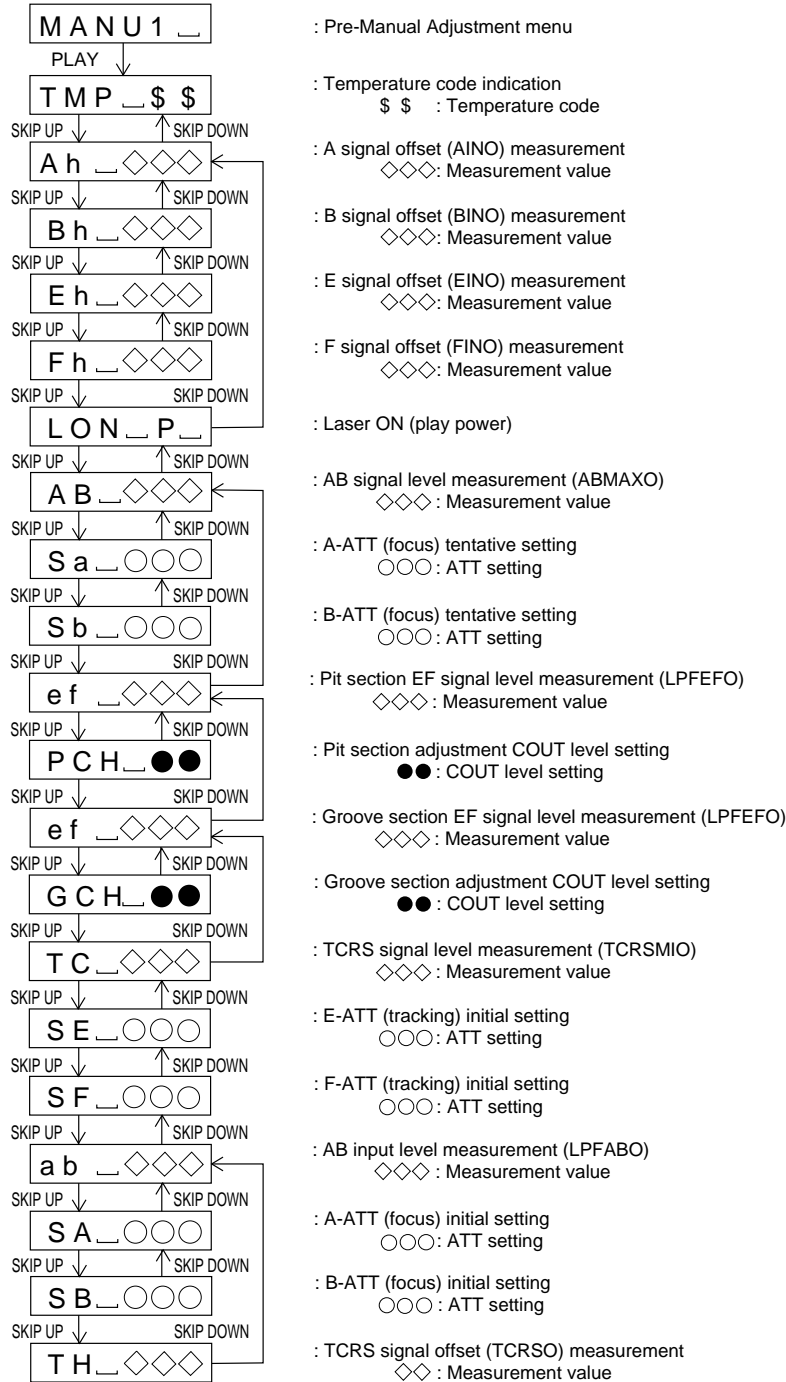
* In the start address setting state the start address change digit changes when the [REC] button is pressed.



* In the start address set state the value of selection digit changes in the range of 0h to Fh when the [SKIP UP/DOWN] button is pressed.

* In the continuous record state and start address set state the record laser power changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed. (Initial value 0DH)

Servo Pre-Manual Adjustment



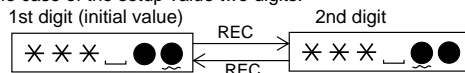
* When the [STOP] button is pressed in specific condition, the "TEST MODE STOP" state is set.

* When you press the [Remote Controller BASS] button with the laser ON (lid open), the laser power shifts as follows.

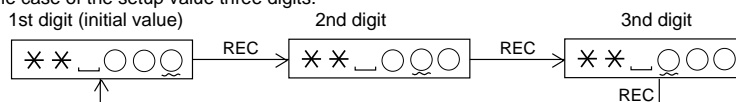


* In the specific setting display state the setting change digit changes when the [REC] button is pressed.

• In the case of the setup value two digits.



• In the case of the setup value three digits.

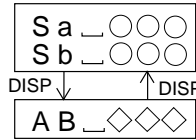


* In the specific state the setting changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed.

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* If the [DISP] button is pressed, the display changes as follows.

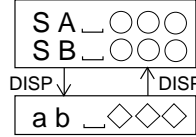
• ABMAXO measurement value



: A-ATT (focus) tentative setting
: B-ATT (focus) tentative setting

: ABMAXO measurement value indication
"1" Mark lighting

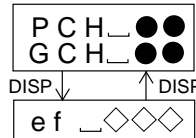
• LPFABO measurement value



: A-ATT (focus) tentative setting
: B-ATT (focus) tentative setting

: LPFABO measurement value indication
"1" Mark lighting

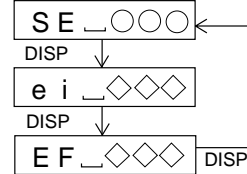
• LPFEFO measurement value



: Pit section adjustment COUT level setting
: Group section adjustment COUT level setting

: LPFEFO measurement value indication
"1" Mark lighting

• LPFEINO/EFMIO measurement value

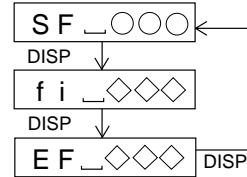


: E-ATT (tracking) initial setting

: LPFEINO measurement value indication
"1" Mark lighting

: EFMIO measurement value indication
"REPEAT", "1" Mark lighting

• LPFFINO/EFMIO measurement value

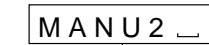


: F-ATT (tracking) initial setting

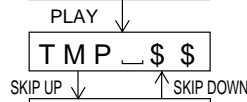
: LPFFINO measurement value indication
"1" Mark lighting

: EFMIO measurement value indication
"REPEAT", "1" Mark lighting

Servo ATT Manual Adjustment



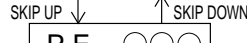
: ATT manual adjustment menu



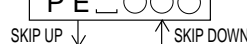
: Temperature code indication
\$ \$: Temperature code



: Laser ON (play power)



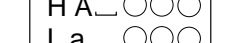
: Pit section E-ATT (tracking) setting
○○○ : ATT setting



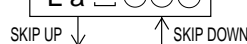
: Pit section F-ATT (tracking) setting
○○○ : ATT setting



: High reflection A-ATT (focus) setting
: Low reflection A-ATT (focus) setting
○○○ : ATT setting



: High reflection B-ATT (focus) setting
: Low reflection B-ATT (focus) setting
○○○ : ATT setting



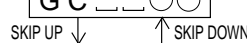
: TCRS ATT setting
○○ : ATT setting



: Groove section E-ATT (tracking) setting
○○○ : ATT setting



: Groove section F-ATT (tracking) setting
○○○ : ATT setting



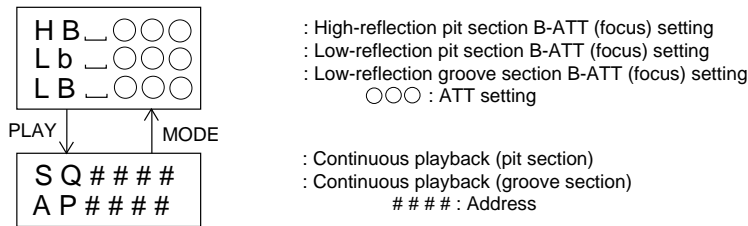
: Low reflection A-ATT (focus) setting
○○○ : ATT setting



: Low reflection B-ATT (focus) setting
○○○ : ATT setting

* When the [STOP] button is pressed in specific condition, the "TEST MODE STOP" state is set.

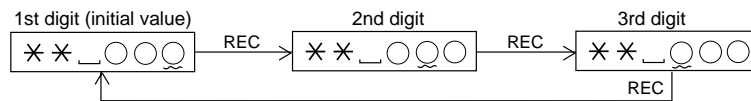
* If the [PLAY] button is pressed in the B-ATT setting state, the mode is changed to the continuous playback mode.
 And if the [Remote Controller MODE] button is pressed in the continuous playback state, the mode is changed to the B-ATT setting state of the ATT manual adjustment.



* If the [Remote Controller BASS] button is pressed in the laser ON state (with no disc or the lid open), laser power changes as follows.



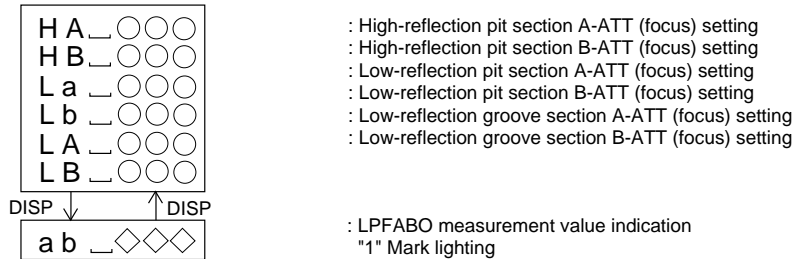
* In the specific setting display state the setting change digit changes when the [REC] button is pressed.



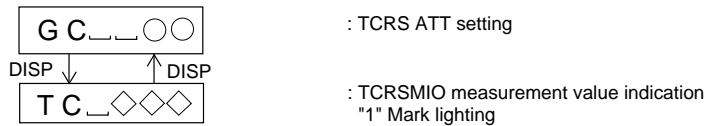
* In the specific state the setting changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed.

* If the [DISP] button is pressed, the display changes as follows.

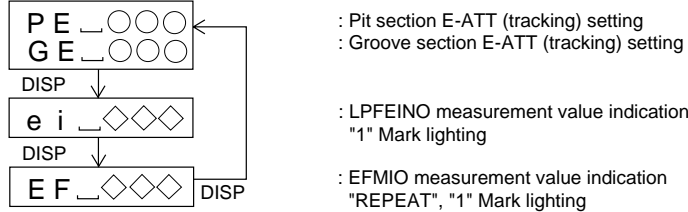
• LPFABO measurement value



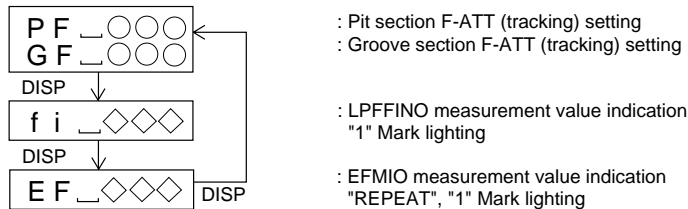
• TCRSMIO measurement value



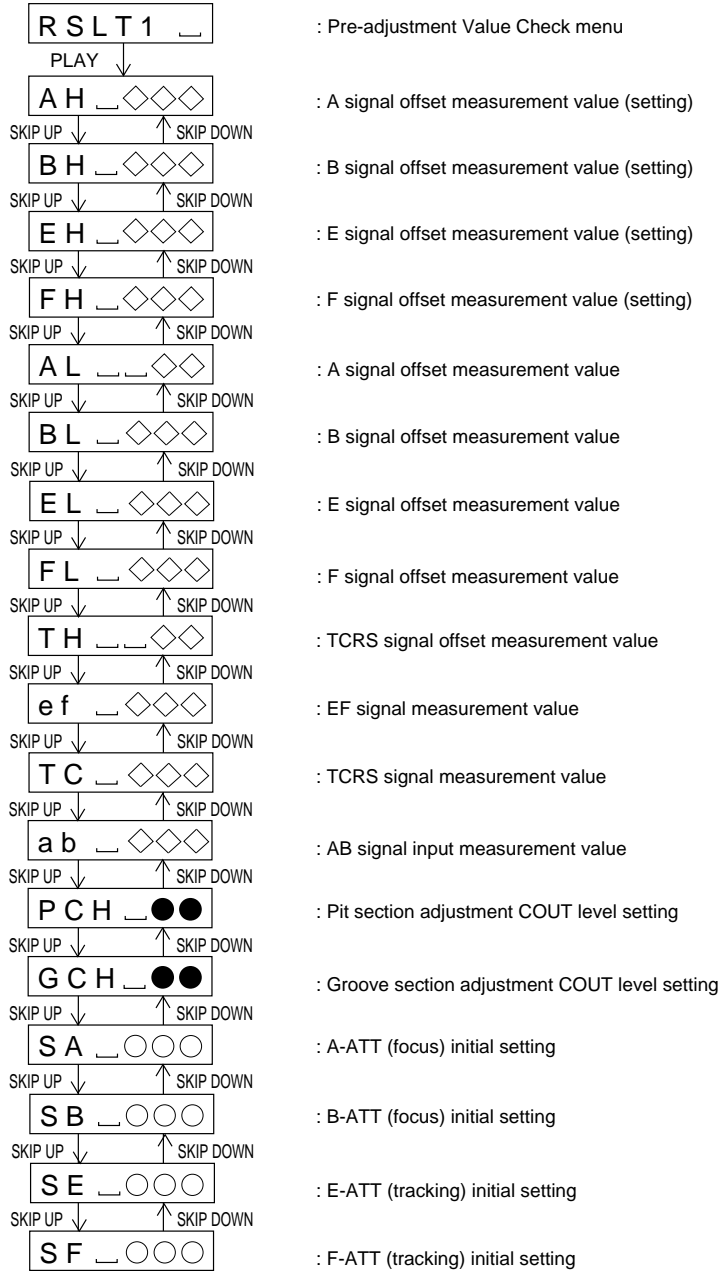
• LPFEINO/EFMIO measurement value



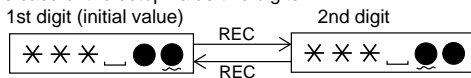
• LPFFINO/EFMIO measurement value



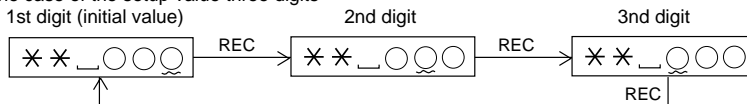
Servo Pre-adjustment Value Check



- * When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.
- * In the specific setting display state the setting change digit changes when the [REC] button is pressed.
- In the case of the setup value two digits

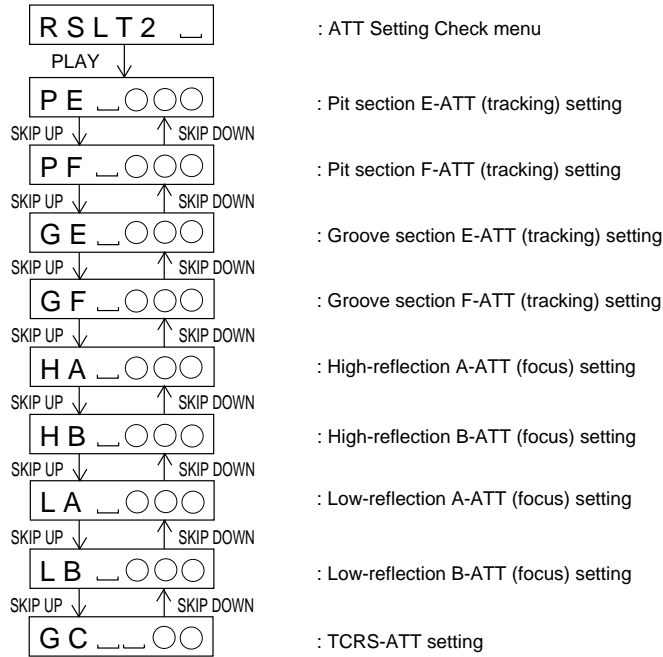


- In the case of the setup value three digits

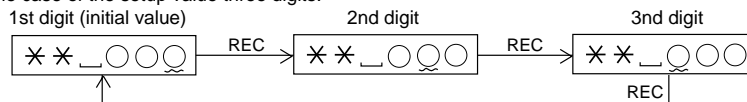


- * In the specific state the setting changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed.

ATT Setting Check

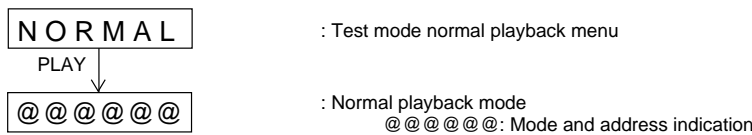


- * When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.
- * In the specific setting display state the setting change digit changes when the [REC] button is pressed.
- In the case of the setup value three digits.



- * In the specific state the setting changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed.

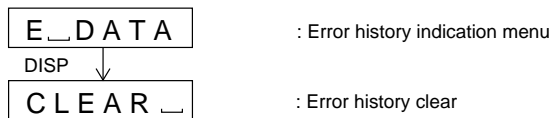
Test Mode Normal Playback



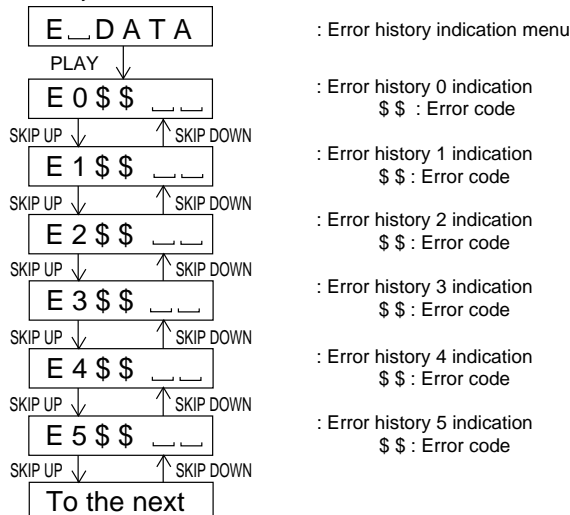
- * When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

Error History Display

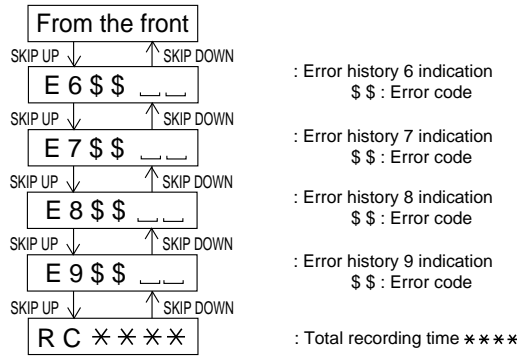
- Error history clear



- Error history indication



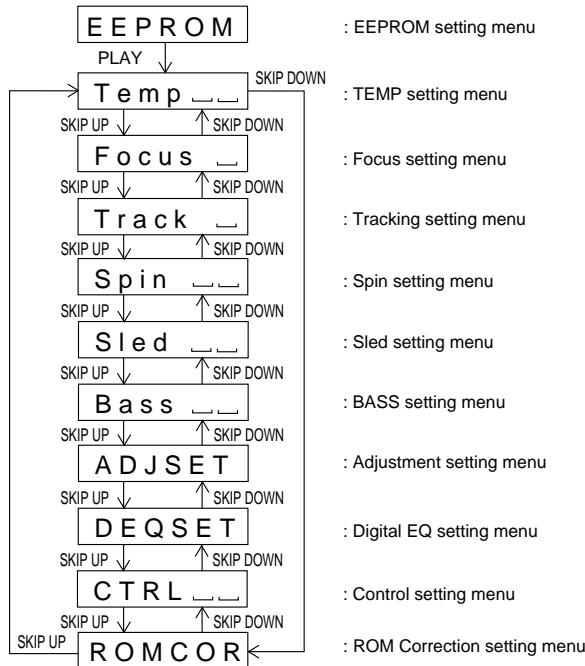
MD-DR470H/MD-DR480H



* When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

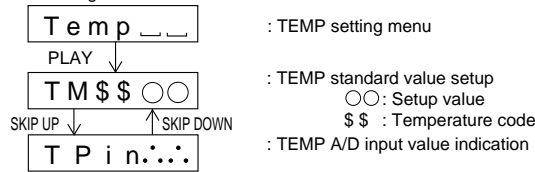
EEPROM Setting

• Menu transition



* When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

• TEMP Setting



* When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

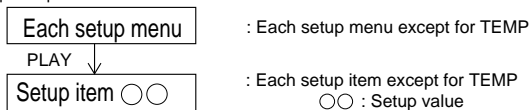
* When the [DISP] button operation is performed in the specific state, the menu changes to "TEMP SETTING menu".

* When the [REC] button is pressed in each state, the set digit is changed.



* In the specific state the setting changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed.

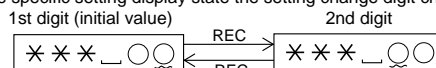
• Setup except for TEMP



* When the [STOP] button is pressed in specific menu, the "TEST MODE STOP" state is set.

* When the [DISP] button operation is performed in the specific state, the menu changes to "TEMP SETTING menu".

* In the specific setting display state the setting change digit changes when the [REC] button is pressed.



* In the specific state the setting changes in the range of "0h to Fh" when the [VOLUME UP/DOWN] button is pressed.

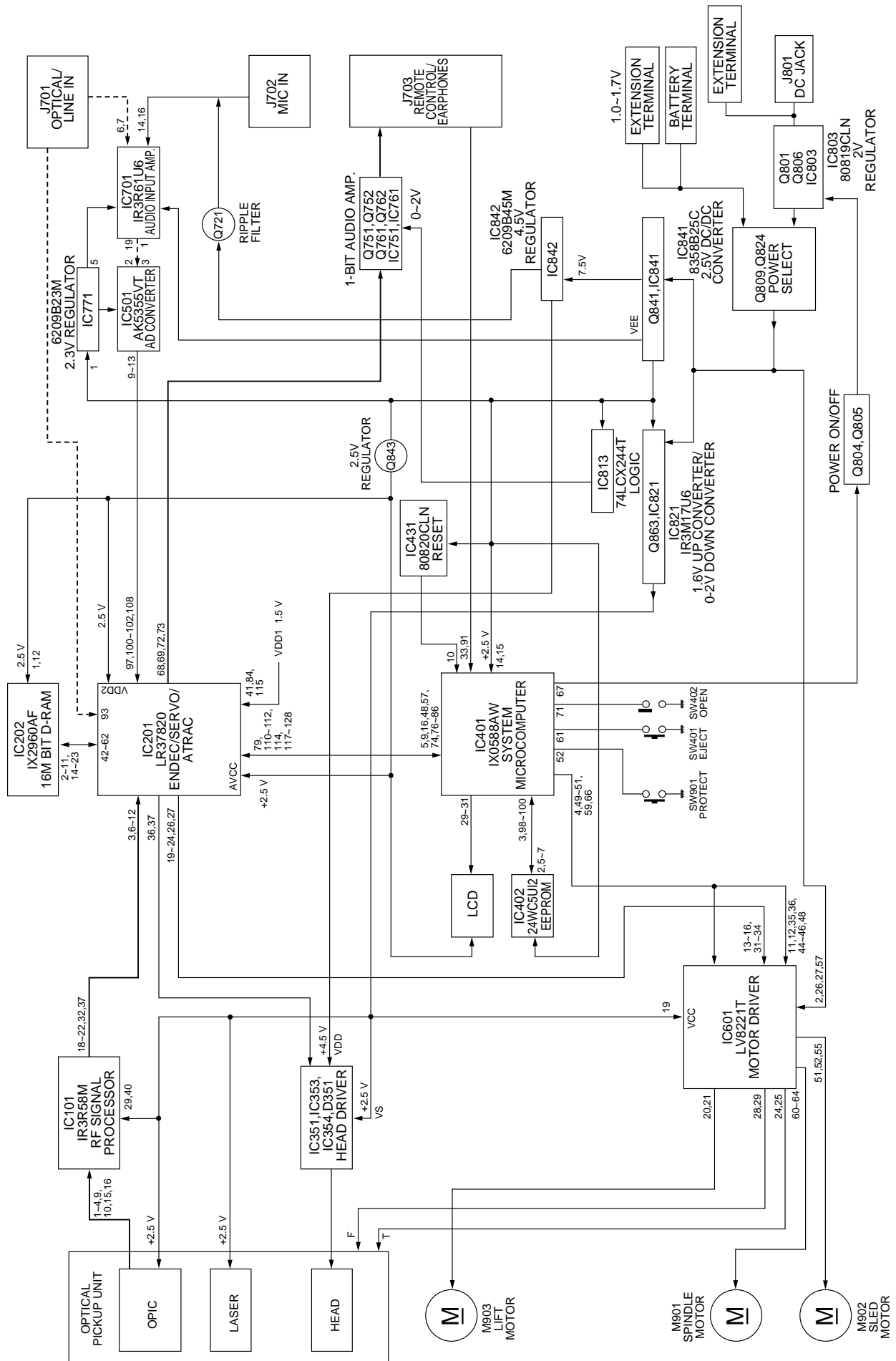
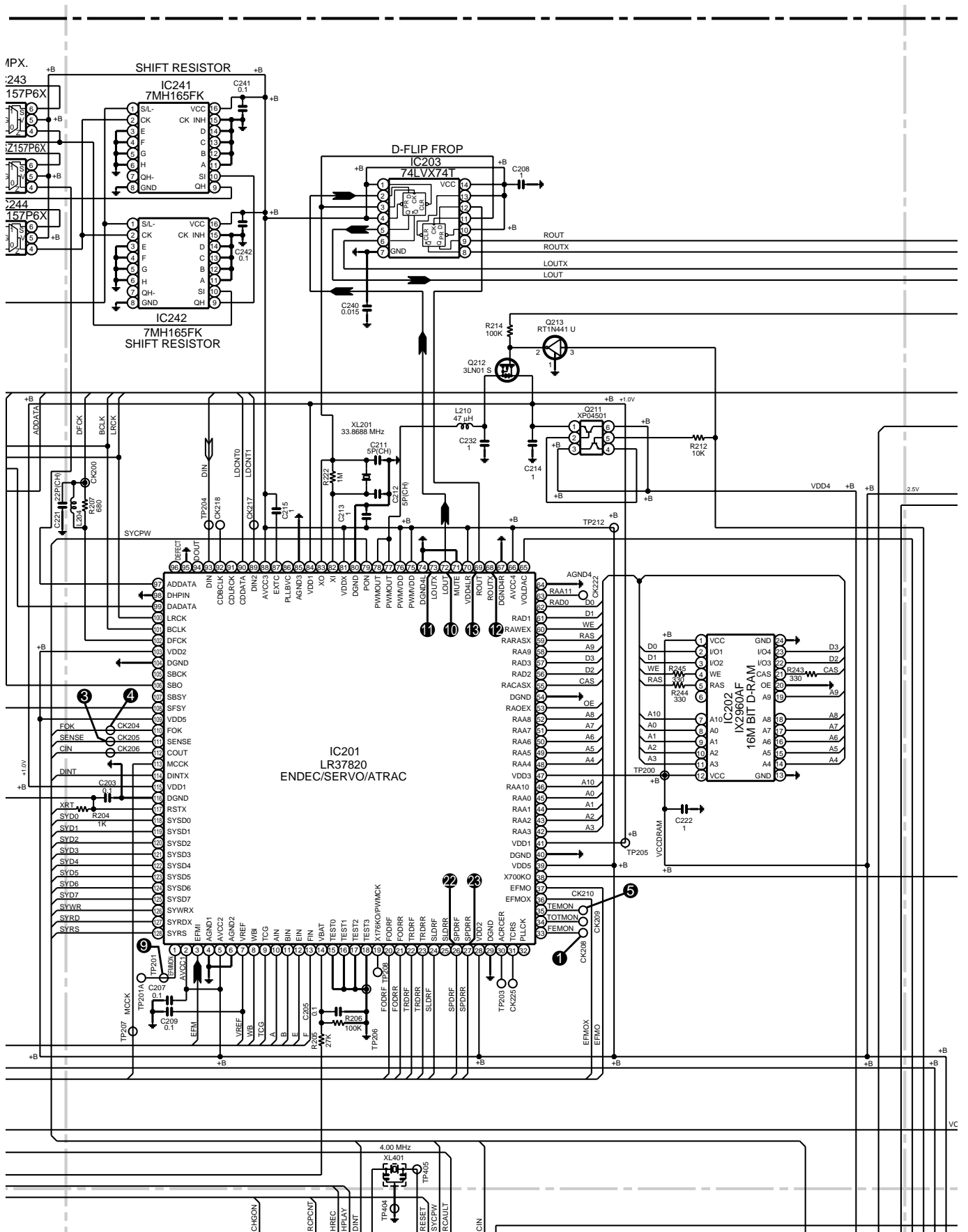


Figure 25 BLOCK DIAGRAM



• The numbers 1 to 5, 8 to 13, 22, 23 are waveform numbers shown in page 39, 40.

7	8	9	10	11	12
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Figure 27 SCHEMATIC DIAGRAM (2/8)

MD-DR470H/MD-DR480H

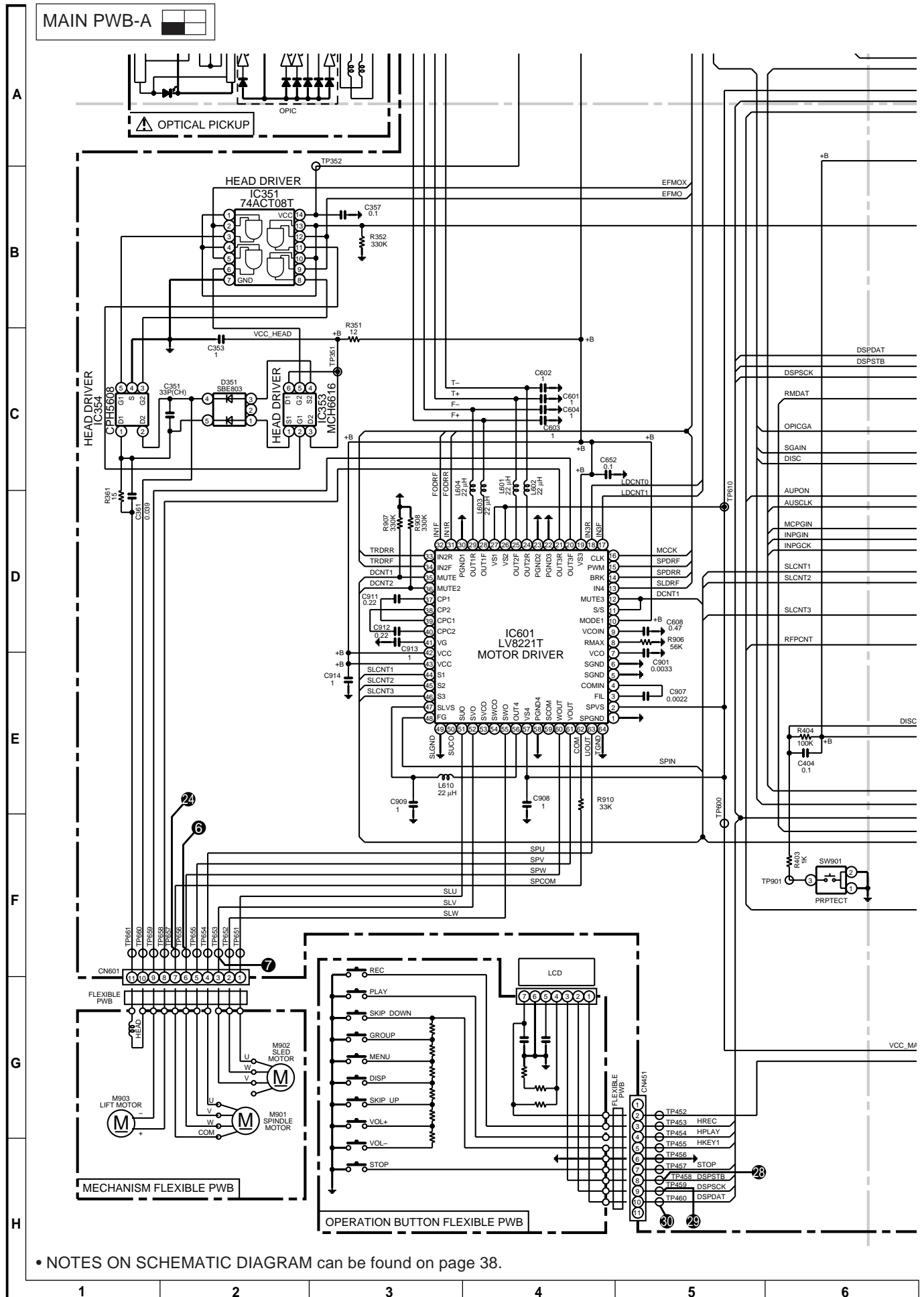
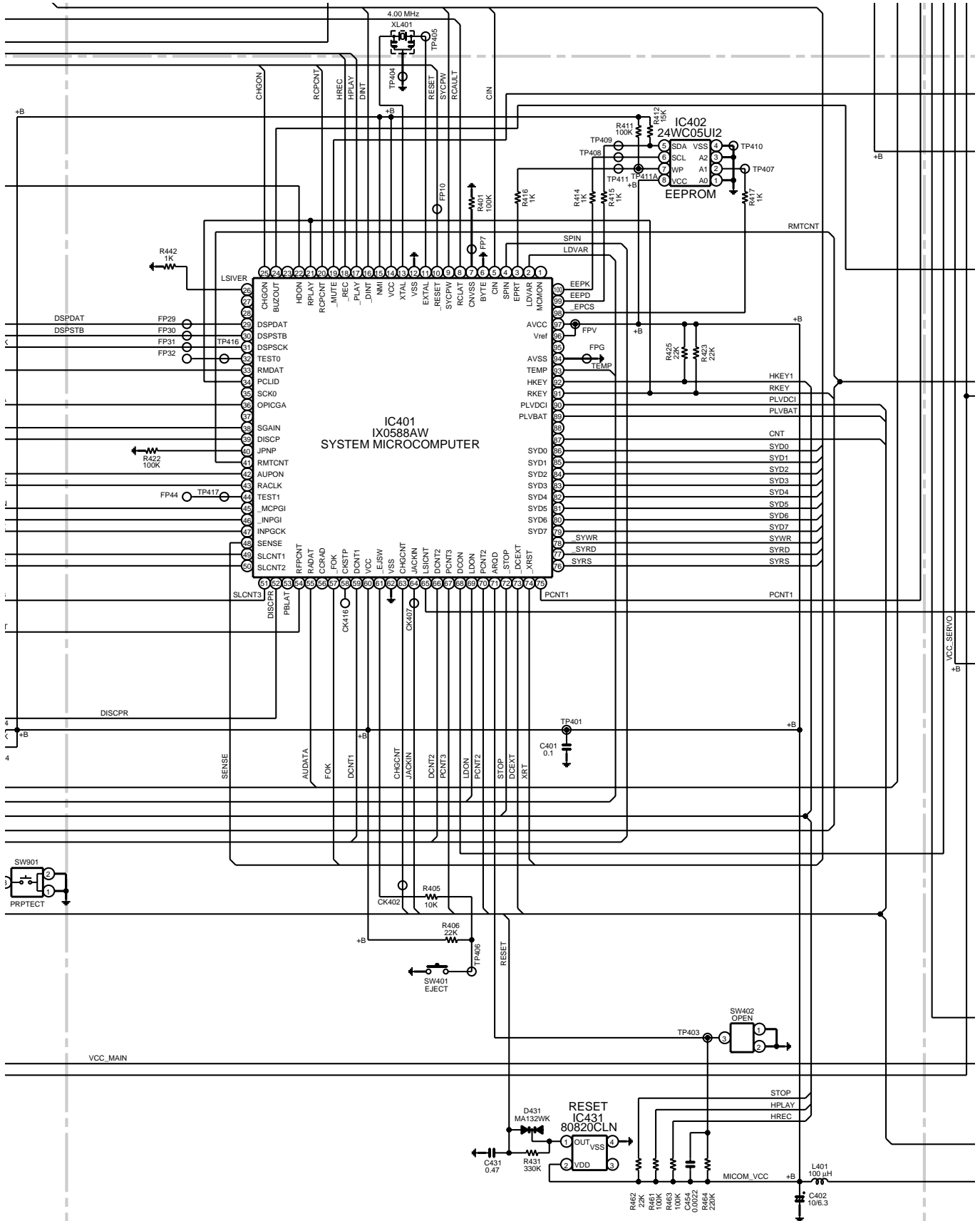


Figure 28 SCHEMATIC DIAGRAM (3/8)

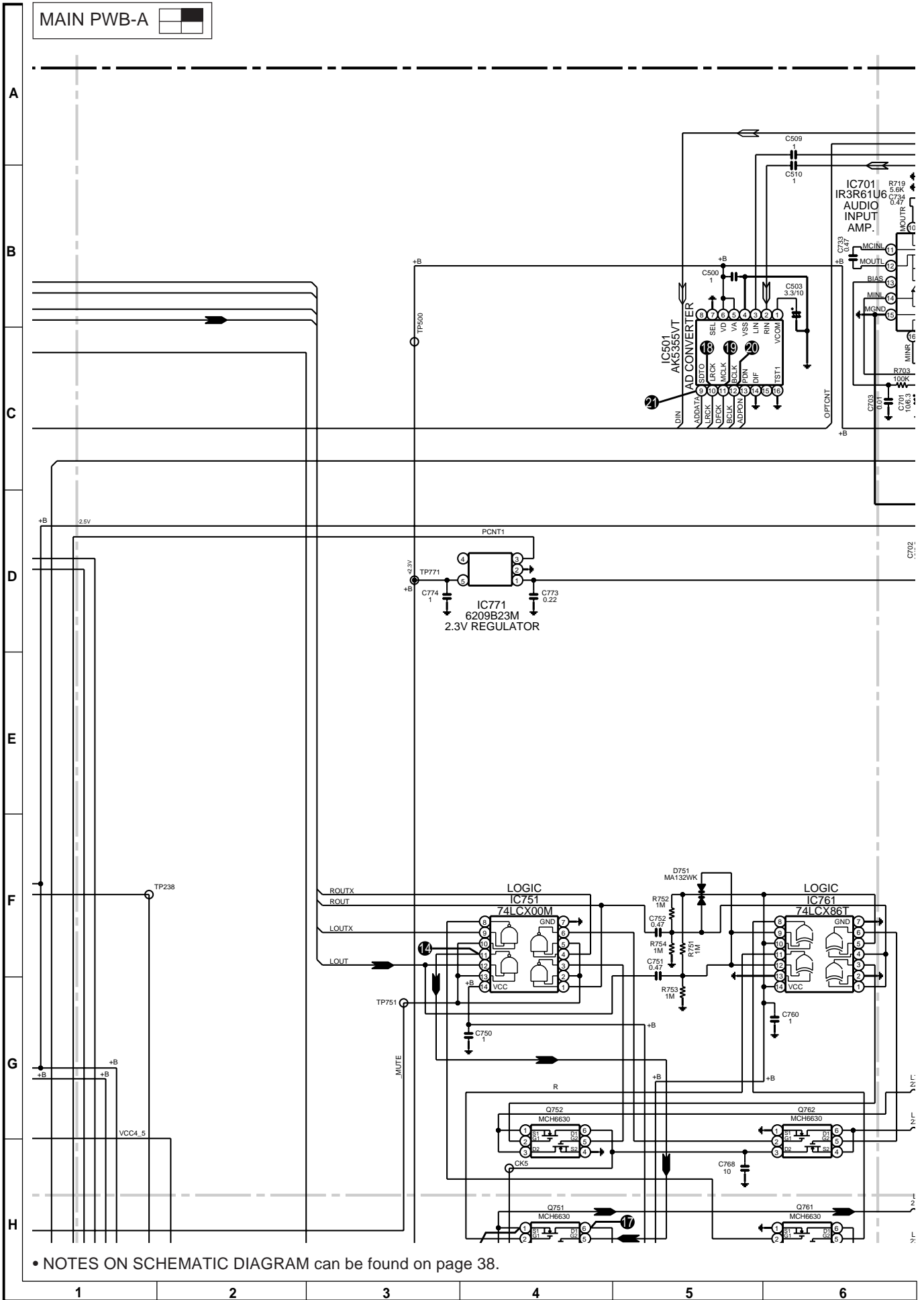


• The numbers 6, 7, 24, 28 to 30, are waveform numbers shown in page 39, 40.

7	8	9	10	11	12
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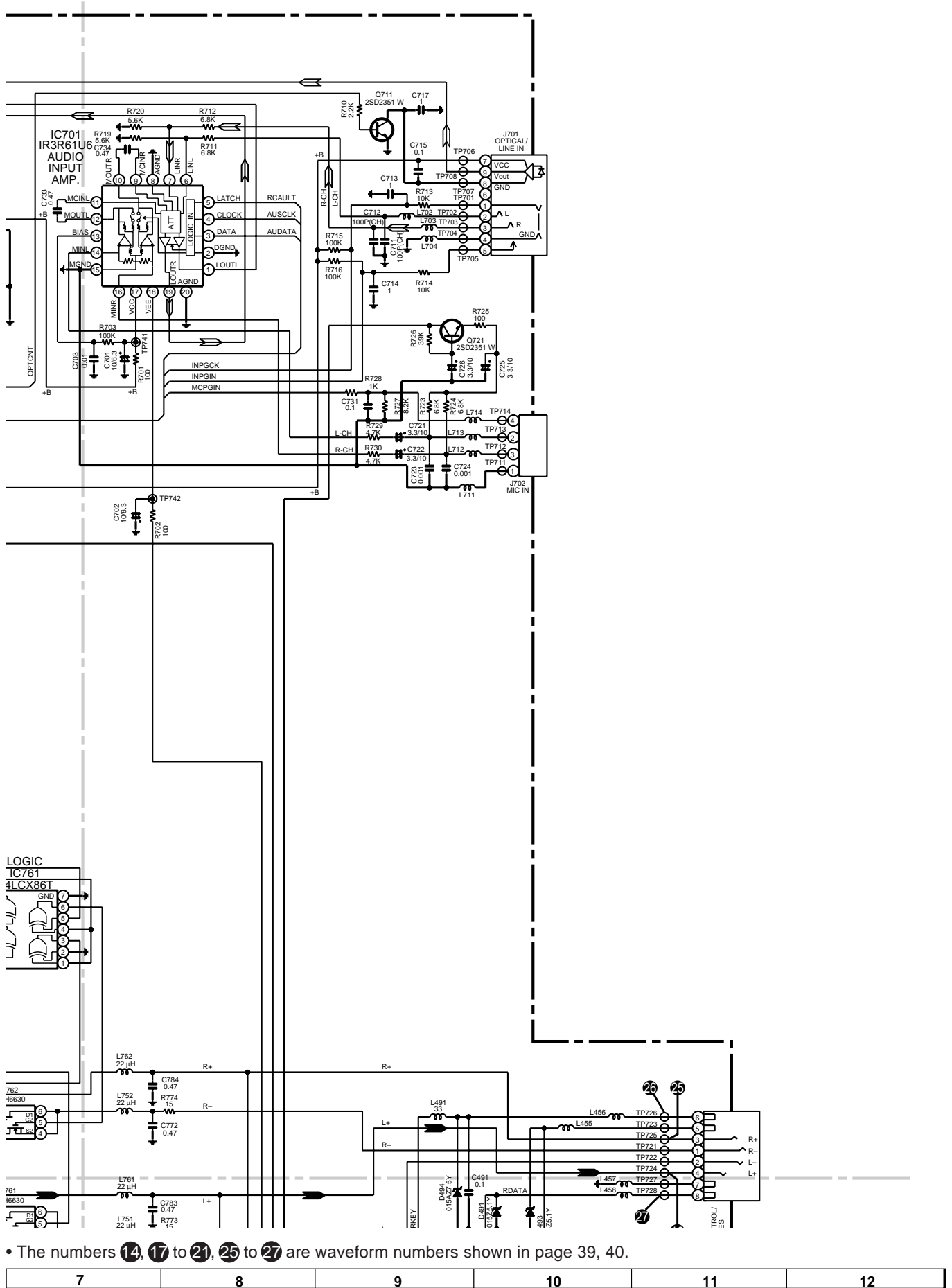
Figure 29 SCHEMATIC DIAGRAM (4/8)

MAIN PWB-A 



• NOTES ON SCHEMATIC DIAGRAM can be found on page 38.

Figure 30 SCHEMATIC DIAGRAM (5/8)

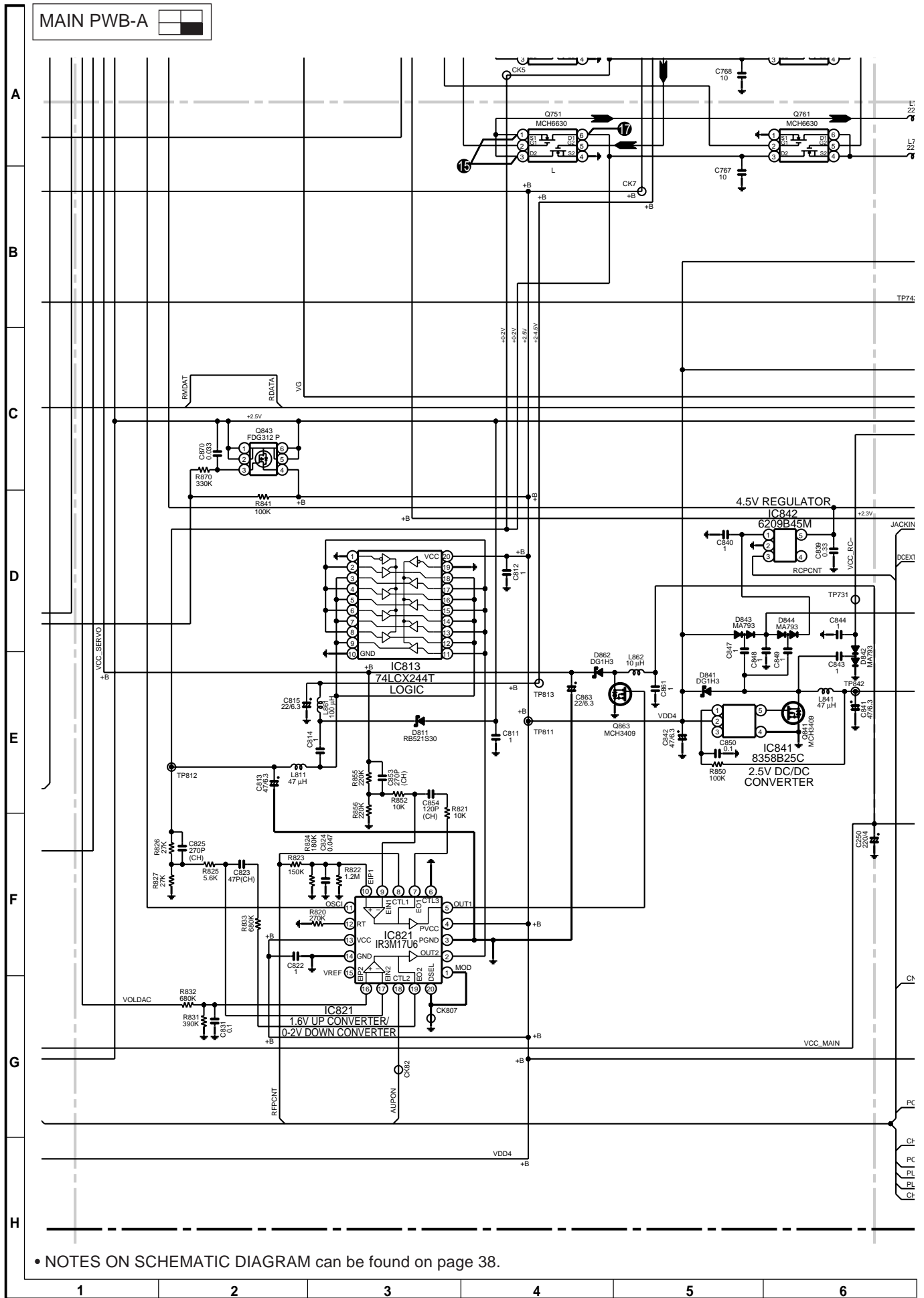


• The numbers 14, 17 to 21, 25 to 27 are waveform numbers shown in page 39, 40.

7	8	9	10	11	12
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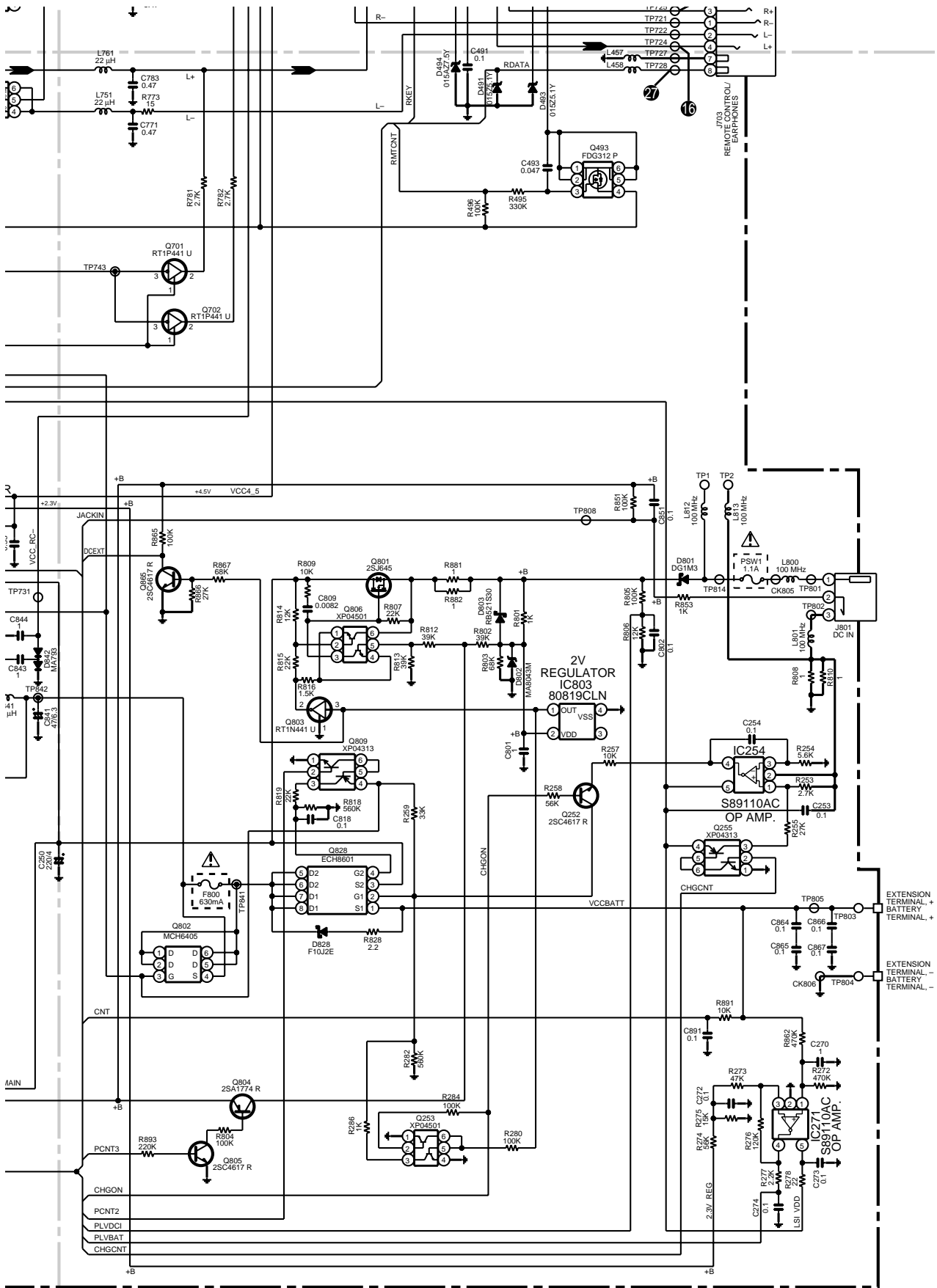
Figure 31 SCHEMATIC DIAGRAM (6/8)

MD-DR470H/MD-DR480H



• NOTES ON SCHEMATIC DIAGRAM can be found on page 38.

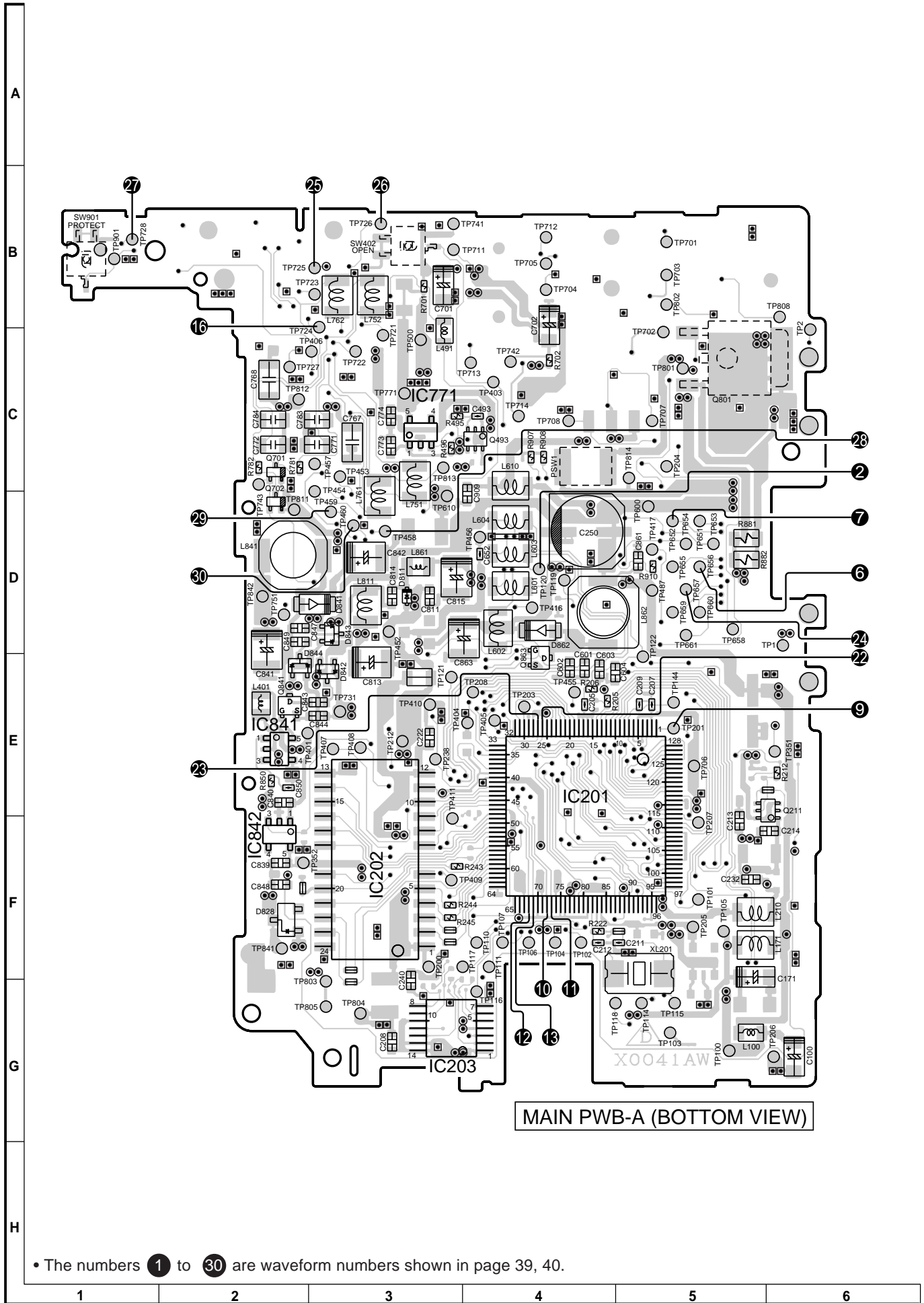
Figure 32 SCHEMATIC DIAGRAM (7/8)



• The numbers 15 to 17, 27 are waveform numbers shown in page 39, 40.

7	8	9	10	11	12
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Figure 33 SCHEMATIC DIAGRAM (8/8)

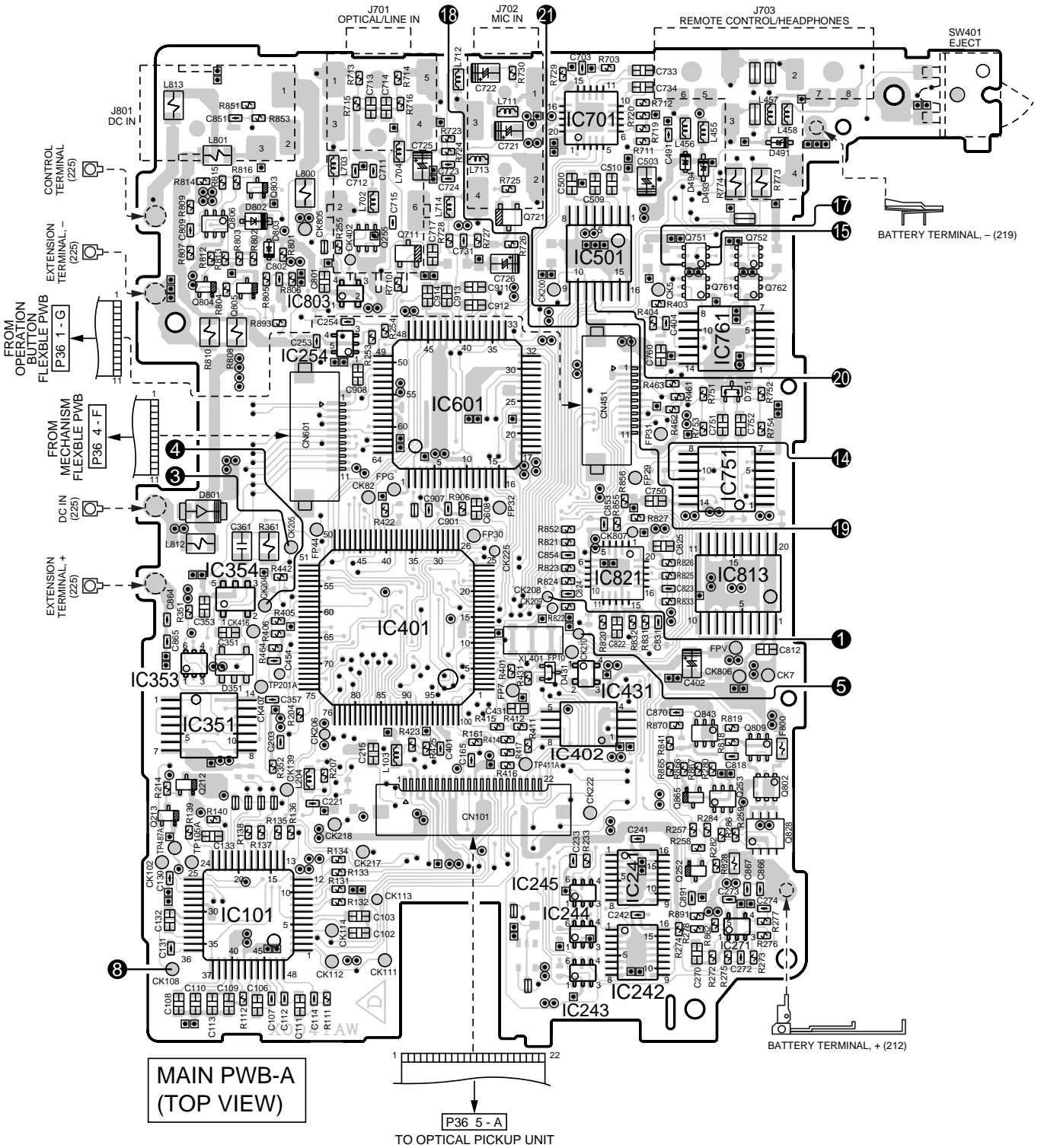


MAIN PWB-A (BOTTOM VIEW)

• The numbers ① to ③① are waveform numbers shown in page 39, 40.

Figure 34 WIRING SIDE OF P.W.BOARD (1/3)

- : Through-hole where the top, bottom and +B patterns are connected.
- ◻ : Through-hole where the top, bottom and ground patterns are connected.
- : Through-hole where the top and bottom patterns are connected.



7	8	9	10	11	12
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Figure 35 WIRING SIDE OF P.W.BOARD (2/3)

MD-DR470H/MD-DR480H

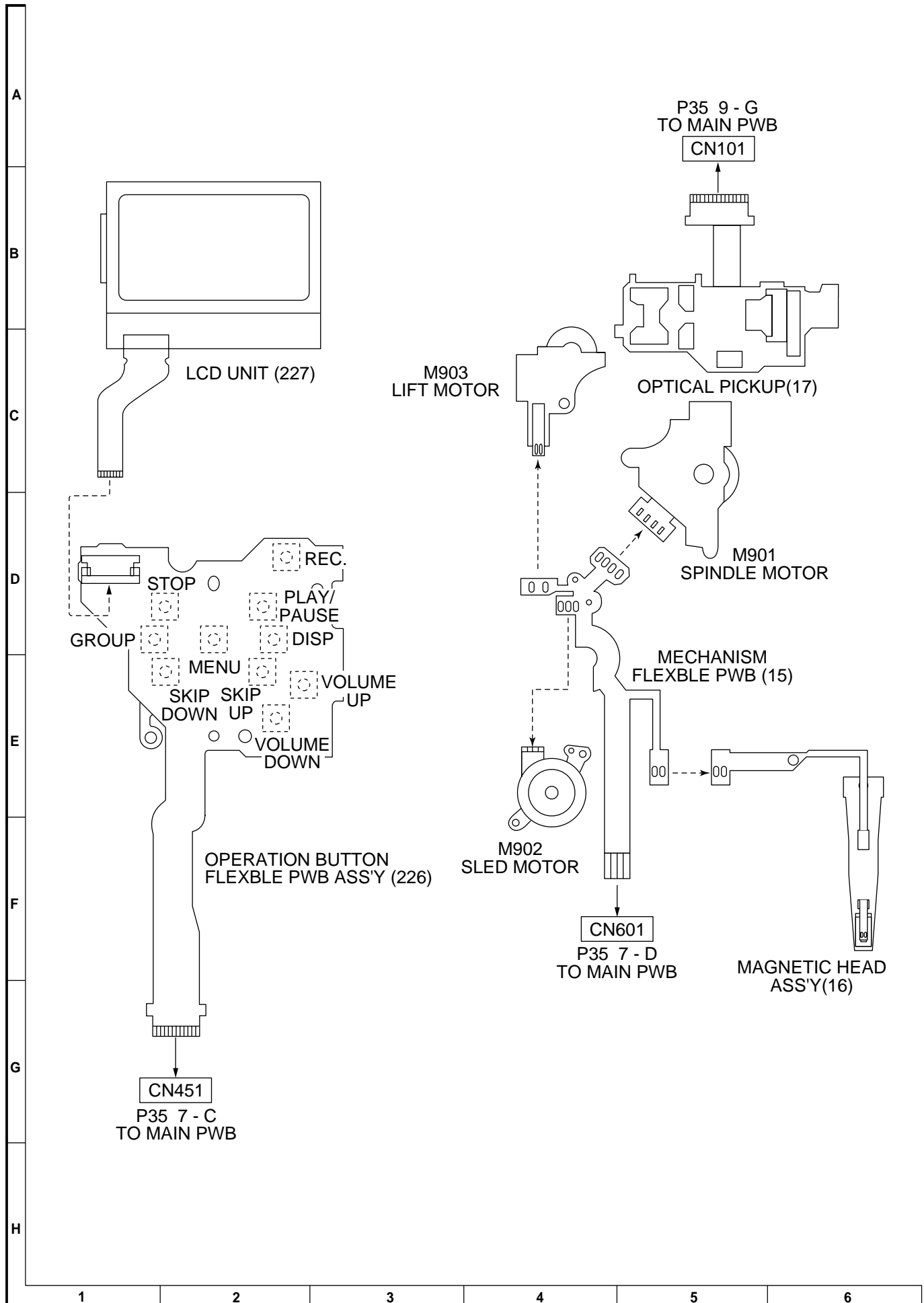


Figure 36 WIRING SIDE OF P.W.BOARD (3/3)

VOLTAGE

(TEST mode: "TEST" on the LCD display)
 'P' in the VOLTAGE column indicates pulse signals.

IC101	
PIN NO.	VOLTAGE
1	0.7 V
2	0.7 V
3	0.7 V
4	0.7 V
5	1.3 V
6	1.3 V
7	1.3 V
8	1.3 V
9	1.3 V
10	1.3 V
11	1.3 V
12	1.3 V
13	1.3 V
14	1.3 V
15	1.3 V
16	1.3 V
17	1.3 V
18	1.3 V
19	1.3 V
20	1.3 V
21	1.3 V
22	1.3 V
23	1.3 V
24	0.7 V
25	0 V
26	2.5 V
27	2.5 V
28	2.5 V
29	2.5 V
30	P
31	0 V
32	1.3 V
33	1.3 V
34	0 V
35	1.3 V
36	1.3 V
37	1.3 V
38	1.3 V
39	0 V
40	2.5 V
41	2.5 V
42	0 V
43	1.3 V
44	0 V
45	0 V
46	1.3 V
47	0 V
48	0.7 V

IC201			
PIN NO.	VOLTAGE	PIN NO.	VOLTAGE
1	1.2 V	65	0 V
2	2.5 V	66	2.5 V
3	1.3 V	67	0 V
4	0 V	68	P
5	2.5 V	69	P
6	0 V	70	2.5 V
7	1.3 V	71	0 V
8	1.3 V	72	P
9	1.3 V	73	P
10	1.3 V	74	0 V
11	1.3 V	75	2.5 V
12	1.3 V	76	2.5 V
13	1.3 V	77	2.5 V
14	1.6 V	78	2.5 V
15	0 V	79	2.5 V
16	0 V	80	0 V
17	0 V	81	2.5 V
18	0 V	82	1.1 V
19	P	83	1.1 V
20	0 V	84	2.4 V
21	0 V	85	0 V
22	0 V	86	2.5 V
23	0 V	87	0 V
24	0 V	88	2.5 V
25	0 V	89	0 V
26	0 V	90	0 V
27	2.5 V	91	0 V
28	2.5 V	92	0 V
29	0 V	93	1.4 V
30	P	94	P
31	0 V	95	0 V
32	P	96	2.5 V
33	1.2 V	97	0 V
34	1.2 V	98	0 V
35	1.2 V	99	0 V
36	P	100	P
37	P	101	P
38	P	102	P
39	2.5 V	103	2.5 V
40	0 V	104	0 V
41	2.4 V	105	0 V
42	0 V	106	0 V
43	0 V	107	0 V
44	0 V	108	0 V
45	2.5 V	109	2.5 V
46	0 V	110	2.5 V
47	2.5 V	111	0 V
48	0 V	112	0 V
49	0 V	113	0 V
50	0 V	114	2.5 V
51	0 V	115	2.4 V
52	0 V	116	0 V
53	2.5 V	117	2.5 V
54	0 V	118	P
55	P	119	P
56	0 V	120	P
57	0 V	121	P
58	0 V	122	0 V
59	P	123	P
60	2.5 V	124	0 V
61	0 V	125	0 V
62	0 V	126	P
63	0 V	127	P
64	0 V	128	P

IC401			
PIN NO.	VOLTAGE	PIN NO.	VOLTAGE
1	0 V	51	2.5 V
2	0 V	52	0 V
3	2.5 V	53	0 V
4	0 V	54	2.5 V
5	0 V	55	0 V
6	0 V	56	0 V
7	0 V	57	2.5 V
8	0 V	58	P
9	2.5 V	59	2.5 V
10	2.4 V	60	2.5 V
11	P	61	2.5 V
12	0 V	62	0 V
13	P	63	2.5 V
14	2.5 V	64	0 V
15	2.5 V	65	0 V
16	2.5 V	66	0 V
17	2.5 V	67	2.5 V
18	2.5 V	68	2.5 V
19	2.5 V	69	0 V
20	2.5 V	70	2.5 V
21	2.3 V	71	0 V
22	0 V	72	2.5 V
23	2.5 V	73	0 V
24	0 V	74	2.5 V
25	0 V	75	2.5 V
26	0 V	76	P
27	0 V	77	P
28	0 V	78	P
29	P	79	0 V
30	P	80	0 V
31	P	81	P
32	2.5 V	82	0 V
33	P	83	P
34	2.3 V	84	P
35	P	85	P
36	0 V	86	P
37	P	87	0 V
38	2.5 V	88	0 V
39	2.5 V	89	2.1 V
40	2.5 V	90	0.5 V
41	0 V	91	2.3 V
42	2.5 V	92	2.5 V
43	30 V	93	1.5 V
44	2.5 V	94	0 V
45	2.1 V	95	0 V
46	2.5 V	96	2.5 V
47	2.5 V	97	2.5 V
48	0 V	98	2.5 V
49	2.5 V	99	2.5 V
50	2.5 V	100	0 V

IC601	
PIN NO.	VOLTAGE
1	0 V
2	2 V
3	2 V
4	0 V
5	0 V
6	0 V
7	0 V
8	0 V
9	0 V
10	2.5 V
11	0 V
12	0 V
13	0 V
14	2.5 V
15	0 V
16	0 V
17	0 V
18	0 V
19	2.5 V
20	0 V
21	0 V
22	0 V
23	0 V
24	0 V
25	0 V
26	2 V
27	2 V
28	0 V
29	0 V
30	0 V
31	0 V
32	0 V
33	0 V
34	0 V
35	2.5 V
36	0 V
37	P
38	0 V
39	2.5 V+P
40	6.3 V+P
41	6.3 V
42	2.5 V
43	2.5 V
44	0 V
45	2.5 V
46	2.5 V
47	0 V
48	2.5 V
49	0 V
50	0 V
51	0 V
52	0 V
53	0 V
54	0 V
55	0 V
56	0 V
57	2 V
58	0 V
59	1.3 V
60	2 V
61	2 V
62	2 V
63	2 V
64	0 V

IC701	
PIN NO.	VOLTAGE
1	0 V
2	0 V
3	0 V
4	0 V
5	0 V
6	0 V
7	0 V
8	0 V
9	0 V
10	0 V
11	0 V
12	0 V
13	0.9 V
14	0 V
15	0 V
16	0 V
17	2.3 V
18	0 V
19	0 V
20	0 V

IC761	
PIN NO.	VOLTAGE
1	P
2	0 V
3	P
4	P
5	2.4 V
6	P
7	0 V
8	P
9	P
10	2.4 V
11	P
12	P
13	0 V
14	2.4 V

IC803	
PIN NO.	VOLTAGE
1	3.5 V
2	3.6 V
3	0 V
4	0 V

IC813	
PIN NO.	VOLTAGE
1	0 V
2	P
3	P
4	P
5	P
6	P
7	P
8	P
9	P
10	0 V
11	P
12	P
13	P
14	P
15	P
16	P
17	P
18	P
19	0 V
20	2.5 V

IC821	
PIN NO.	VOLTAGE
1	P
2	0 V
3	2.5 V
4	P
5	0 V
6	1.1 V
7	2.5 V
8	1.2 V
9	0 V
10	2.5 V
11	0 V
12	1.3 V
13	2.5 V
14	0 V
15	0 V
16	0 V
17	0 V
18	2.5 V
19	1.1 V
20	0 V

IC842	
PIN NO.	VOLTAGE
1	0 V
2	0 V
3	2.5 V
4	0 V
5	4.5 V

Q252	
PIN NO.	VOLTAGE
1	0 V
2	2.5 V
3	0.2 V

Q253	
PIN NO.	VOLTAGE
1	0 V
2	0 V
3	0 V
4	0 V
5	0.6 V
6	0.6 V

Q721	
PIN NO.	VOLTAGE
1	4.5 V
2	4 V
3	4.5 V

Q761	
PIN NO.	VOLTAGE
1	0 V
2	P
3	0 V
4	0 V
5	P
6	0 V

Q751	
PIN NO.	VOLTAGE
1	0 V
2	P
3	0 V
4	0 V
5	P
6	0 V

Q752	
PIN NO.	VOLTAGE
1	0 V
2	P
3	0 V
4	0 V
5	P
6	0 V

Q762	
PIN NO.	VOLTAGE
1	0 V
2	P
3	0 V
4	0 V
5	P
6	0 V

Q255	
PIN NO.	VOLTAGE
1	0 V
2	2.5 V
3	0 V
4	0 V
5	0.6 V
6	0.6 V

Q809	
PIN NO.	VOLTAGE
1	0 V
2	2.5 V
3	4.8 V
4	4.8 V
5	0 V
6	0 V

Q828	
PIN NO.	VOLTAGE
1	2 V
2	0.2 V
3	2 V
4	4.6 V
5	0 V
6	2 V
7	2 V
8	2 V

Q841	
PIN NO.	VOLTAGE
1	P
2	0 V
3	P

Q843	
PIN NO.	VOLTAGE
1	2.5 V
2	2.5 V
3	0 V
4	2.5 V
5	2.5 V
6	2.5 V

Q865	
PIN NO.	VOLTAGE
1	0.6 V
2	0 V
3	0 V

Q863	
PIN NO.	VOLTAGE
1	P
2	0 V
3	P

IC202	
PIN NO.	VOLTAGE
1	2.5 V
2	0 V
3	0 V
4	2.5 V
5	P
6	0 V
7	0 V
8	2.5 V
9	0 V
10	0 V
11	0 V
12	2.5 V
13	0 V
14	0 V
15	0 V
16	0 V
17	0 V
18	0 V
19	0 V
20	2.5 V
21	P
22	0 V
23	0 V
24	0 V

IC353			
PIN NO.	VOLTAGE	PIN NO.	VOLTAGE
1	0 V	1	0 V
2	0 V	2	0 V
3	2.5 V	3	0 V
4	0 V	4	0 V
5	0 V	5	2.3 V
6	2.5 V	6	2.3 V

IC501	
PIN NO.	VOLTAGE
1	0 V
2	0 V
3	0 V
4	0 V
5	2.3 V
6	2.3 V
7	0 V
8	0 V
9	0 V
10	P
11	P
12	P
13	0 V
14	0 V
15	0 V
16	0 V

IC354	
PIN NO.	VOLTAGE
1	0 V
2	0 V
3	0 V
4	0 V
5	0 V

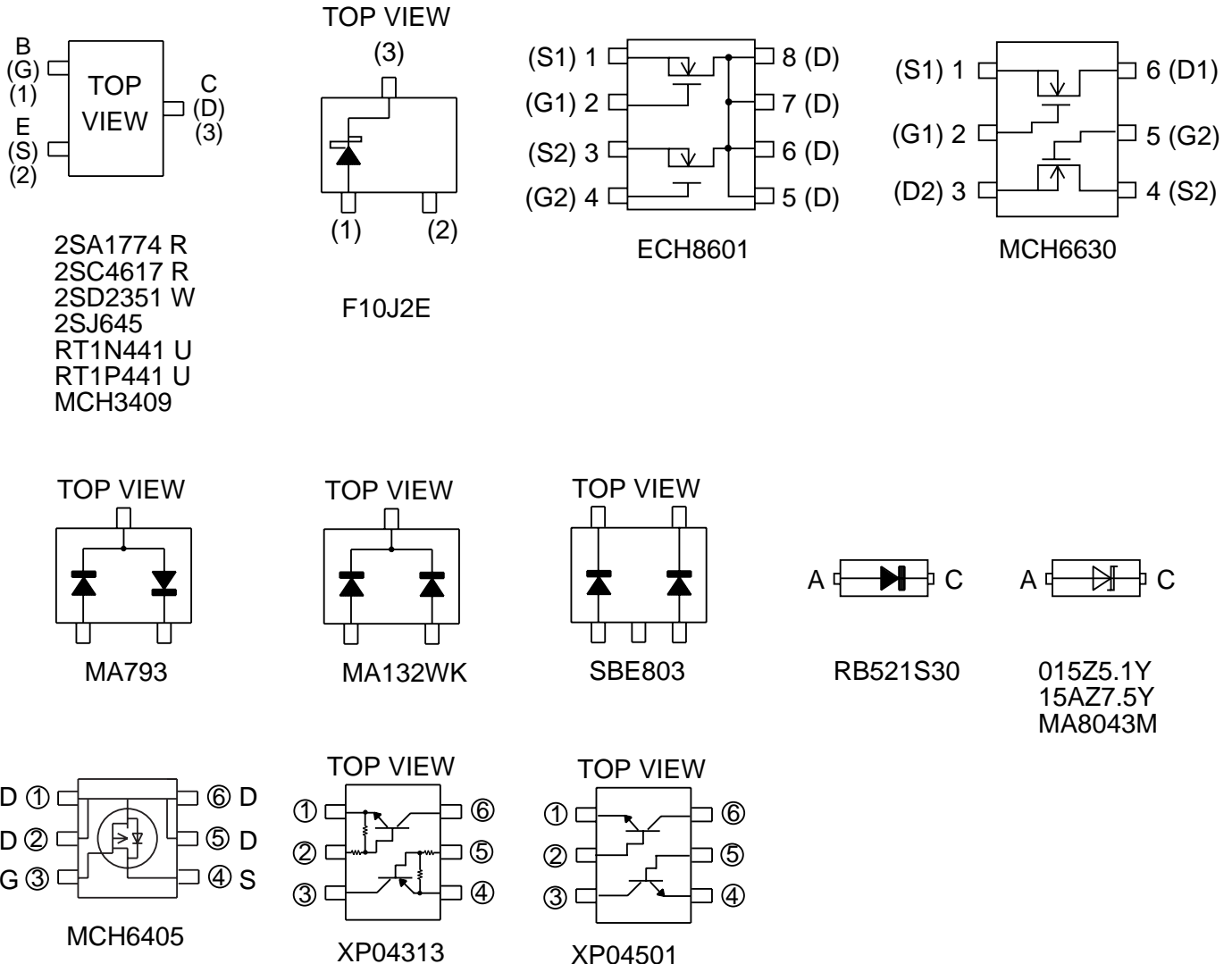
IC402	
PIN NO.	VOLTAGE
1	

NOTES ON SCHEMATIC DIAGRAM

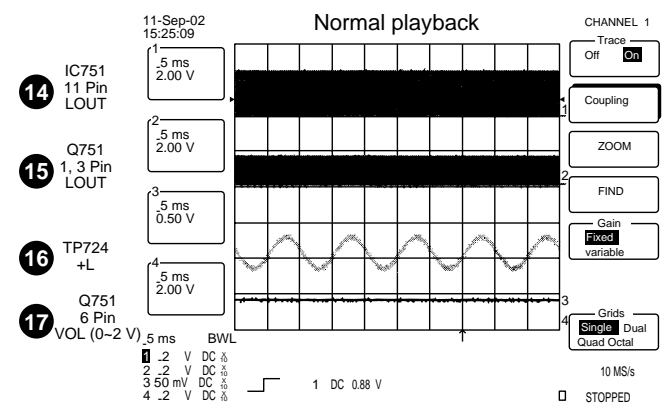
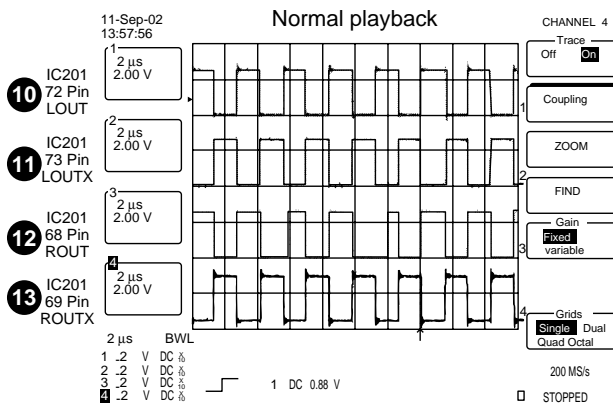
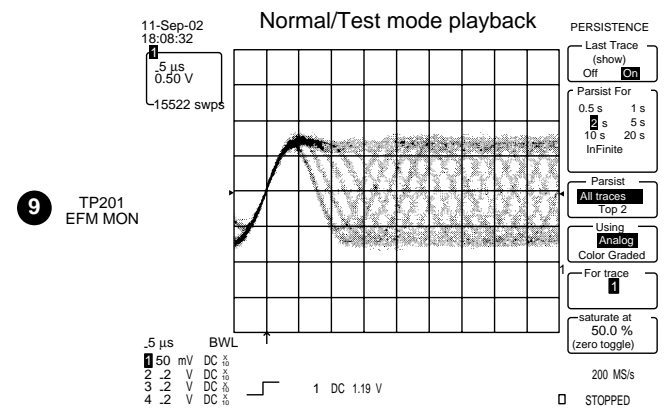
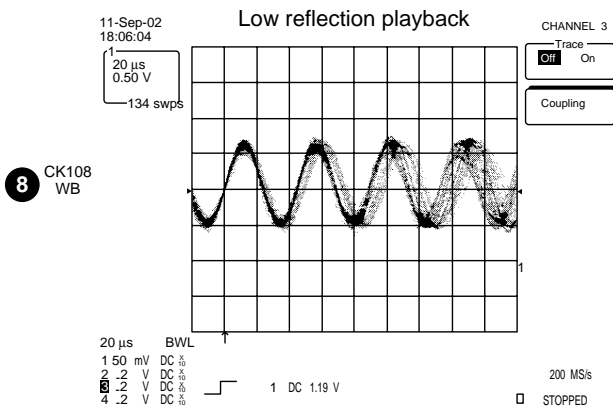
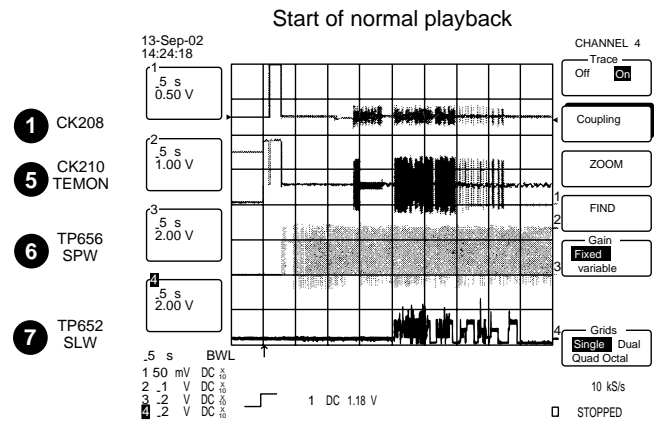
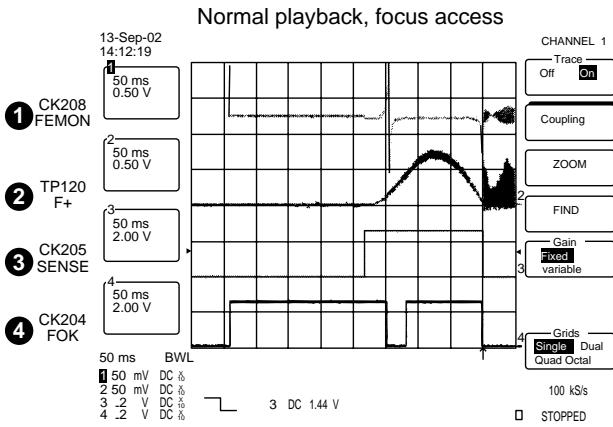
- Resistor:
To differentiate the units of resistors, such symbol as K and M are used: the symbol K means 1000 ohm and the symbol M means 1000 kohm and the resistor without any symbol is ohm-type resistor. Besides, the one with "Fusible" is a fuse type.
- Capacitor:
To indicate the unit of capacitor, a symbol P is used: this symbol P means pico-farad and the unit of the capacitor without such a symbol is microfarad. As to electrolytic capacitor, the expression "capacitance/withstand voltage" is used.
(CH), (TH), (RH), (UJ): Temperature compensation
(ML): Mylar type
- The indicated voltage in each section is the one measured by Digital Multimeter between such a section and the chassis with no signal given.
- Parts marked with "△" (□ = = = □) are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

REF. NO	DESCRIPTION	POSITION
SW401	EJECT	OFF—ON
SW402	OPEN	OFF—ON
SW901	PROTECT	OFF—ON

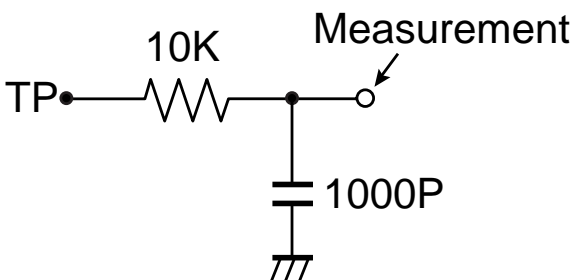
TYPES OF TRANSISTOR AND DIODE



WAVEFORMS OF MD CIRCUIT



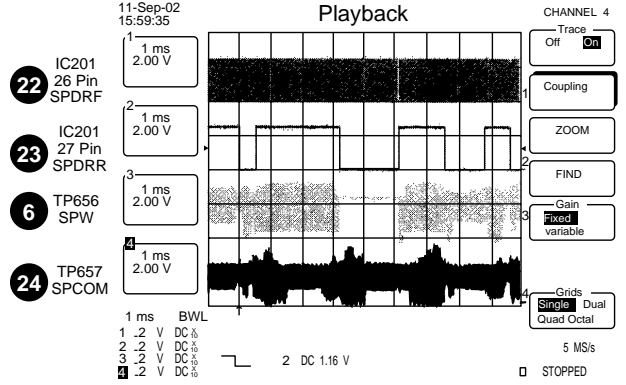
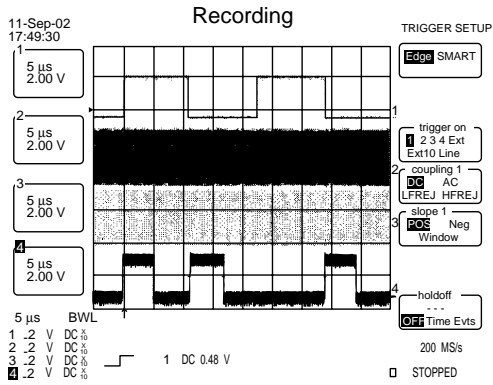
For TP208, TP209, and TP210, use the specific LPF, and observe the waveform.



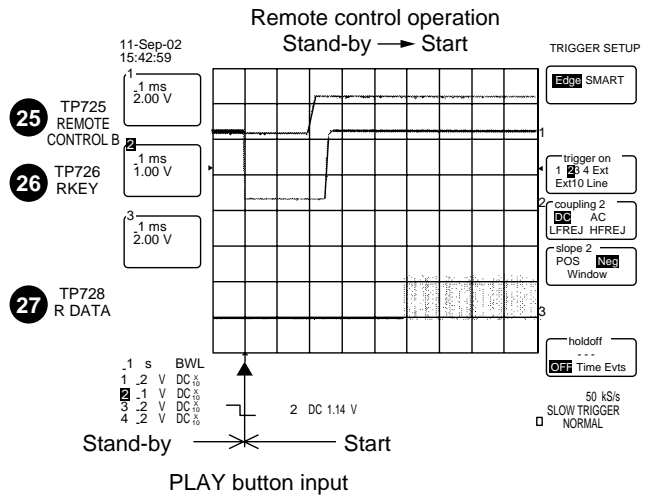
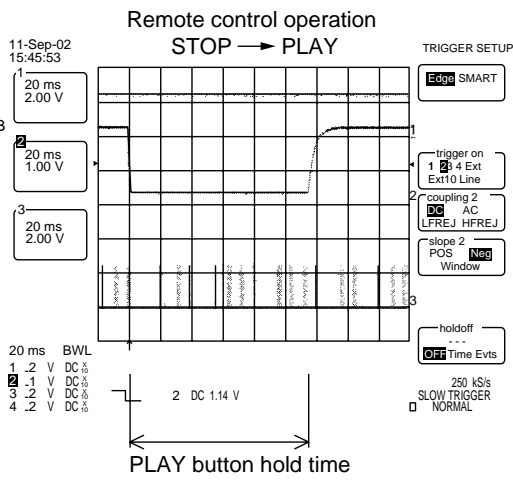
When watching the EEM monitor (TP201)
Set MSL from 00 H to 80 H with EEPROM control setting.
After completion restore 00 H.

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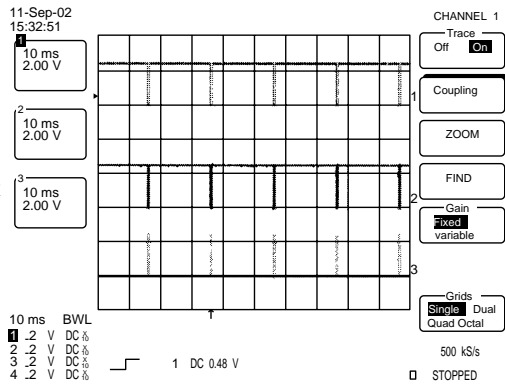
- 18 IC501 10 Pin LRCK
- 19 IC501 11 Pin MCLK
- 20 IC501 12 Pin BLCK
- 21 IC501 9 Pin SDTO



- 25 TP725 REMOTE CONTROL B
- 26 TP726 RKEY
- 27 TP728 R DATA



- 28 TP458 DSPSTB
- 29 TP459 DSPSCK
- 30 TP460 DSPDAT



TROUBLESHOOTING

Use the test mode which indicates trouble causes before repairing the unit. This mode records maximum 10 past error causes as codes. Refer them for repairing.

Preparations

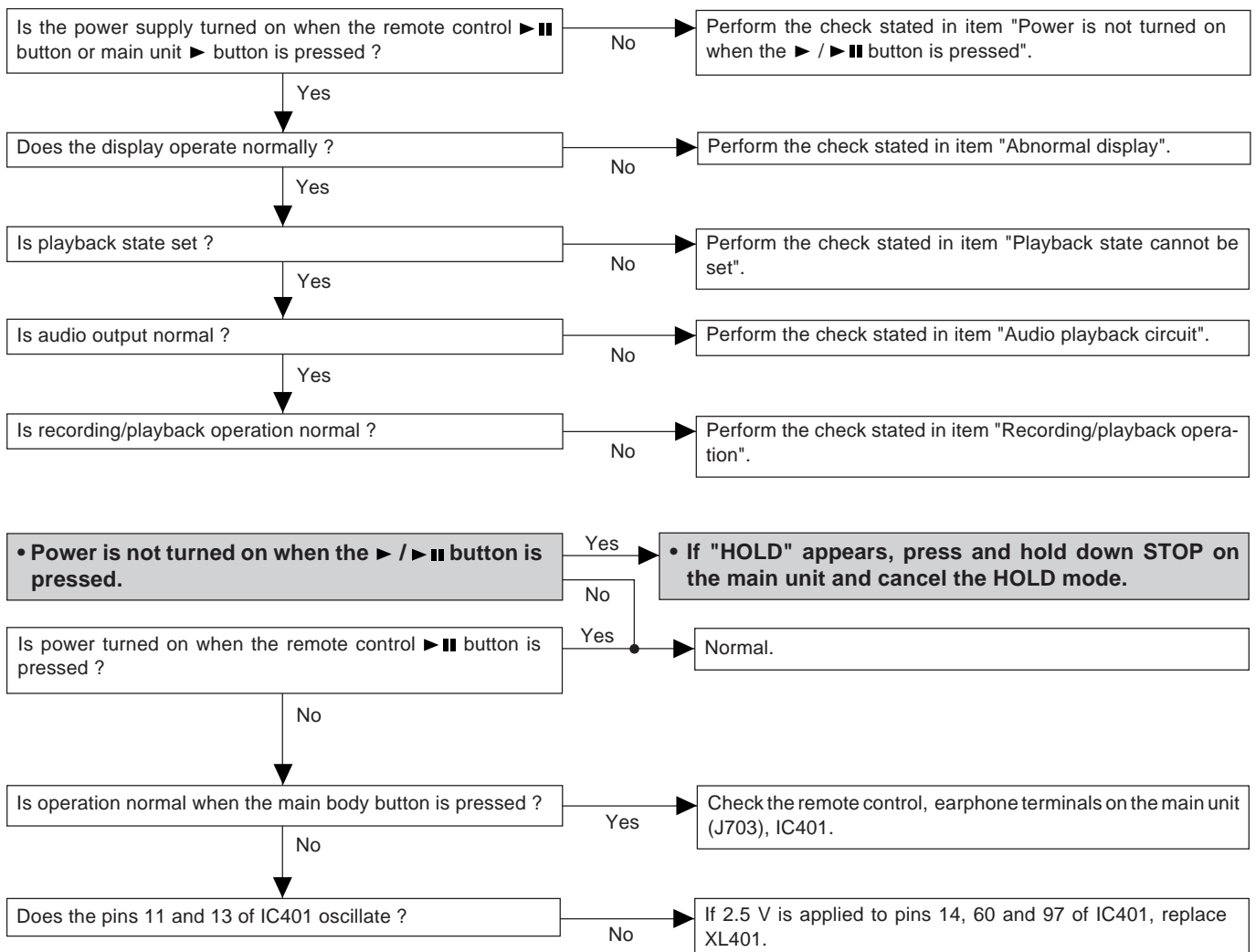
If dusts and foreign materials are accumulated on the pickup lens, playback sounds can be skipped or the TOC (Table of Contents) can't be displayed. Clean the object lens and check the playback. When lens are dirty, do the following.

Turn off the power and wipe lens softly with a cleaning paper and a little marketing so as not to damage them.

Do not touch lens with bare hands.

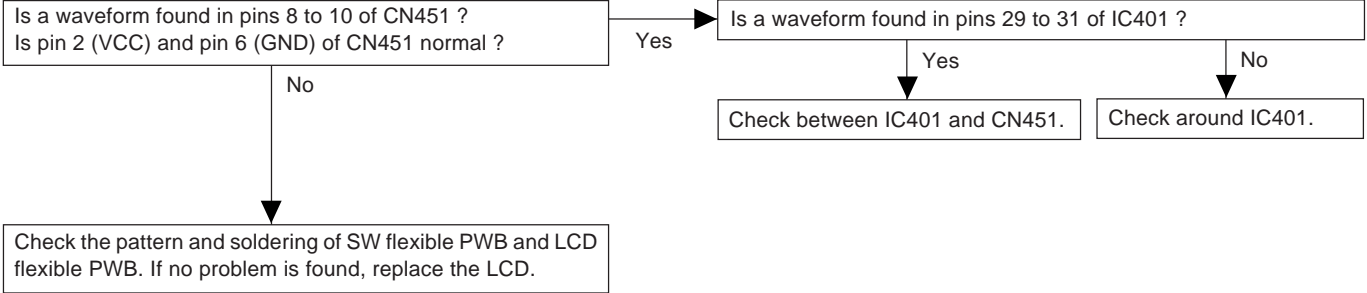
If the unit doesn't work.

If the unit doesn't start after cleaning the pickup objects lens lens, check the unit as follows.



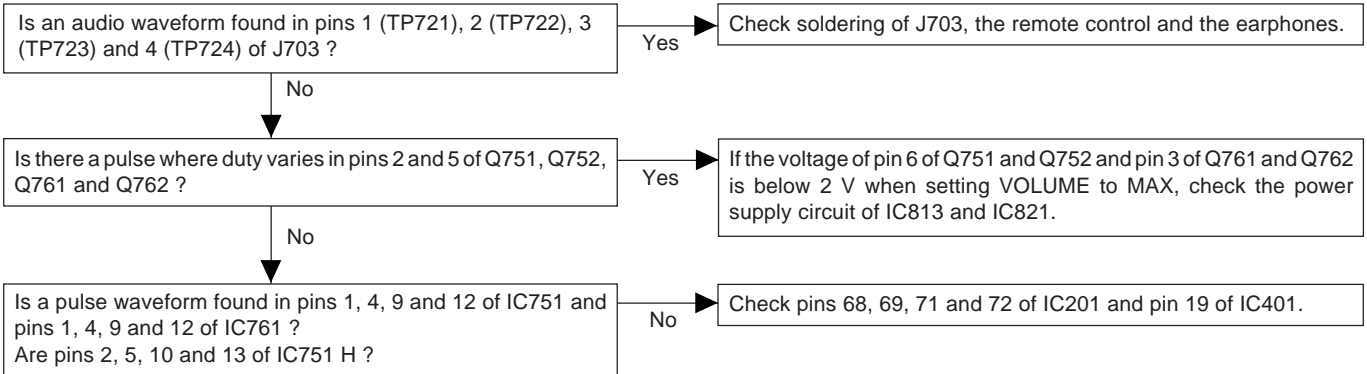
MD-DR470H/MD-DR480H

• Abnormal display

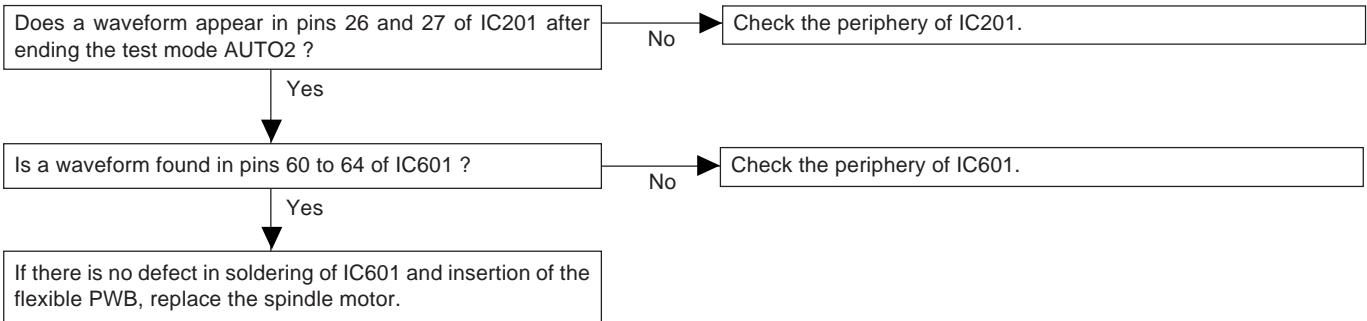


• Audio playback circuit

If playback time is counted but no sound is heard during continuous playback.

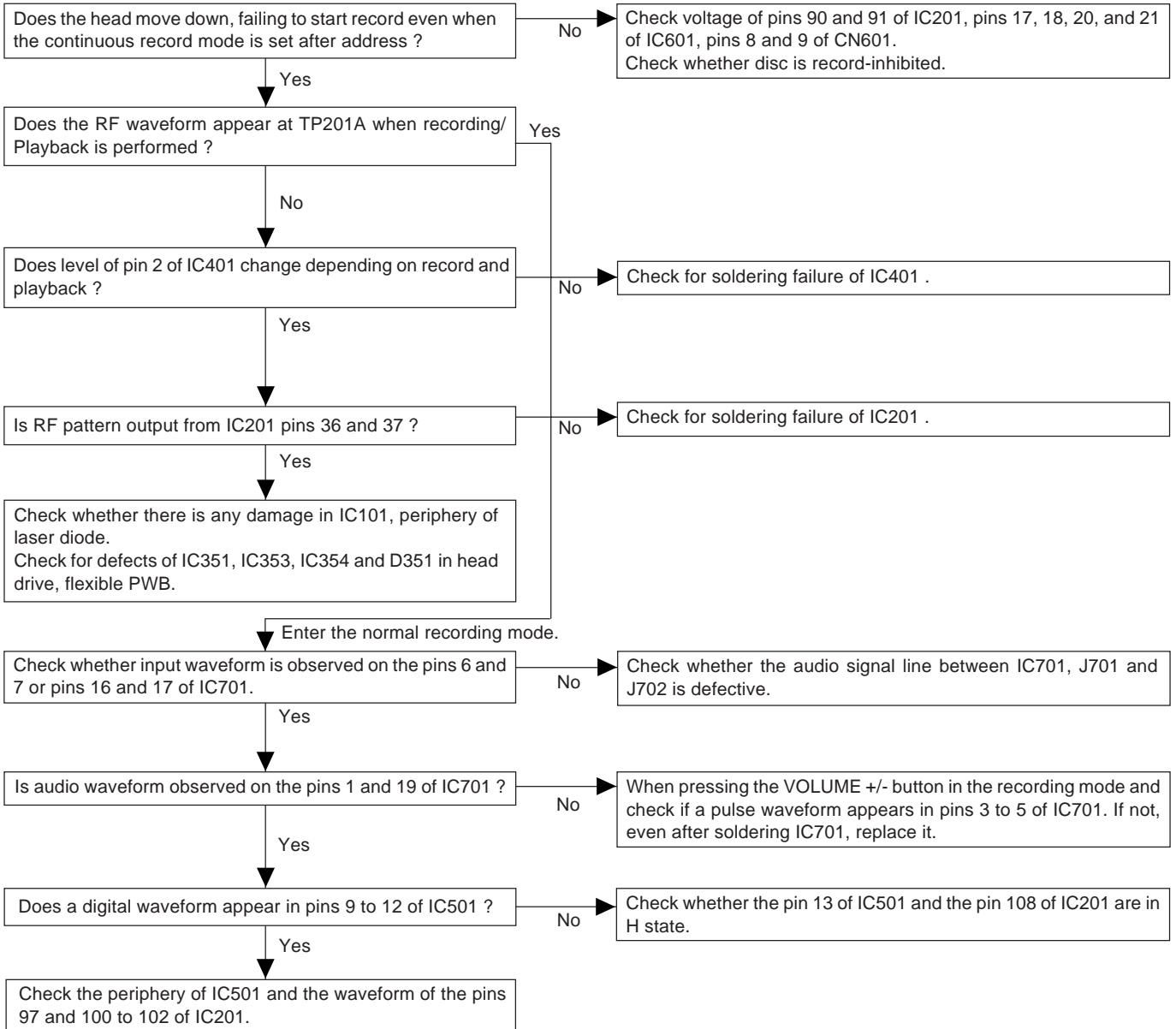


• The spindle motor does not rotate.



• Recording/playback operation

Insert a low reflection disc, and ascertain audio output by normal playback, and then set TEST REC mode. Change MSL from 00 H to 80 H by the control setting of EEPROM. After completing the operation, return in to 00 H.



FUNCTION TABLE OF IC

IC201 VHiLR37820+-1 : Endec/Servo/Atrac (LR37820) (1/3)

Pin No.	Terminal Name	Input/Output	Function
1*	EFMMON	Analog Output	EFM monitor output.
2	AVCC1	Input	Analog power supply. (For EFM system)
3	EFMI	Analog Input	EFM signal input from RF amplifier.
4	AGND1	—	Analog GND.
5	AVCC2	Input	Analog power supply. (For AD)
6	VREF	Analog Input	Reference voltage input of RF amplifier.
7	WBI	Analog Input	ADIP wobble signal.
8	TCG	Analog Input	Track cross signal.
9	AIN	Analog Input	A-signal for focus servo.
10	BIN	Analog Input	B-signal for focus servo.
11	EIN	Analog Input	E-signal for tracking servo.
12	FIN	Analog Input	F-signal for tracking servo.
13	VBAT	Analog Input	Power supply voltage detection signal for constant voltage servo.
14	AGND2	—	Analog GND.
15-17	TEST0-TEST2	Schmidt Input	Input for test. Normally connected to GND.
18	TEST3	Schmidt Input	(For scan circuit)
19*	X176KO	Output	Clock output. $f = 176.4 \text{ kHz}$ (4fs). Servo OFF: L/Always L
20	FODRF	Output	Focus servo forward output.
21	FODRR	Output	Focus servo reverse output.
22	TRDRF	Output	Tracking servo forward output.
23	TRDRR	Output	Tracking servo reverse output.
24	SLDRF	Output	Slide servo forward output.
25*	SLDRR	Output	Slide servo reverse output.
26	SPDRF	Output	Spindle servo forward output.
27	SPDRR	Output	Spindle servo reverse output.
28	VDD2	Input	Power supply for interface.
29	DGND	—	GND for interface.
30*	ACRCER	Output	CRC error flag monitor output of ADIP.
31*	TCRS	Output	Track cross signal.
32*	PLLCK	Three-state Output	EFM PLL clock output on playback.
33*	FEMON	Output	Focus error signal monitor output.
34*	TOTMON	Output	Total signal monitor output. Series resistor 10 - 100 kohm built in.
35*	TEMON	Output	Tracking error signal monitor output.
36	EFMOX	Output	EFM signal output on recording. (Inversion output of 50-pin)
37	EFMO	Output	EFM signal output on recording. (C1F (C1 error flag) monitor on recording)
38	X700KO	Output	Clock output. $f=705.6 \text{ kHz}$
39	VDD5	Input	Power supply for core.
40	DGND	—	GND for core.
41	VDD1	Input	Power supply for interface. (DRAM)
42	RAA3	Output	Address output to external D-RAM. ADR3
43	RAA2	Output	Address output to external D-RAM. ADR2
44	RAA1	Output	Address output to external D-RAM. ADR1
45	RAA0	Output	Address output to external D-RAM. ADR0 (LSB)
46	RAA10	Output	Address output to external D-RAM. ADR10
47	VDD3	Input	Power supply for interface. (DRAM)
48	RAA4	Output	Address output to external D-RAM. ADR4
49	RAA5	Output	Address output to external D-RAM. ADR5
50	RAA6	Output	Address output to external D-RAM. ADR6
51	RAA7	Output	Address output to external D-RAM. ADR7

In this unit, the terminal with asterisk mark (*) is open terminal which is not connected to the outside.

IC201 VHiLR37820+-1 : Endec/Servo/Atrac (LR37820) (2/3)

Pin No.	Terminal Name	Input/Output	Function
52	RAA8	Output	Address output to external D-RAM. ADR8
53	RAOEX	Output	Data output enable signal output to external D-RAM.
54	DGND	—	Digital GND.
55	RACASX	Output	Column address strobe signal output to external D-RAM.
56	RAD2	Input/Three-state Output	Data input/output with external D-RAM. D2
57	RAD3	Input/Three-state Output	Data input/output with external D-RAM. D3 (MSB)
58	RAA9	Output	Address output to external D-RAM. ADR9
59	RARASX	Output	Row address strobe signal output to external D-RAM.
60	RAWEX	Output	Data write enable signal output to external D-RAM.
61	RAD1	Input/Three-state Output	Data input/output with external D-RAM. D1
62	RAD0	Input/Three-state Output	Data input/output with external D-RAM. D0 (LSB)
63*	RAA11	Output	Address output to external D-RAM. (ADR11: used by 64 Mbit)
64	AGND4	—	Analog GND.
65	VOLDAC	—	DAC for volume. Stop by microcomputer setting. Stop: HiZ
66	AVCC4	Input	Analog power supply.
67	AGND4	—	Analog GND.
68*	ROUTX	Output	1 bit PWM Rch (reversed phase)
69	ROUT	Output	1 bit PWM Rch
70	VDD4RX	Input	Analog power supply.
71	MUTE	Output	Mute output.
72	LOUT	Output	1 bit PWM Lch
73*	LOUTX	Output	1 bit PWM Lch (reversed phase)
74	DGND4L	—	Digital GND.
75, 76	FWXVDD	Input	PWM power supply.
77, 78	FWXOUT	—	PWM power supply.
79	FOX	Output	Focus OK detection signal. "0": focus OK
80	DGND	—	Digital GND.
81	VDDX	Input	Internal digital power supply.
82	XI	Input	Oscillation circuit input. 33.8688 MHz
83	XO	Output	Oscillation circuit output. 33.8688 MHz
84	VDD1	Input	Power supply for interface.
85	AGND3	—	Analog GND.
86*	PLLBVC	Analog Output	Terminal of external capacitor for internal PLLB.
87	EXTC	—	Terminal of external capacitor for LPF of PLL VCO.
88	AGND3	—	Analog GND.
89	DIN2	Schmidt Input/ Three-state Output	DIO input signal/Net MD LSI IF (output). Expansion port 4.
90	LDCNTU	Output	Recording head up/down control output. (DOWN)
91*	LDCNTD	Output	Recording head up/down control output. (UP)
92*	CDBCLK	Output	Bit clock input for dubbing.
93	DIN	Schmidt Input	Digital input signal.
94*	DOUT	Output	Digital output signal.
95	DEFECT	Schmidt Input	Defect input.
96*	N.C.	—	Not used.
97	ADDATA	Schmidt Input	Audio data input.
98	DHPIN	—	Stop by microcomputer setting. Stop: L
99	DADATA	Output	Audio data output.
100	LRCK	Output	Lch/Rch switching output of music data.
101	BCLK	Output	Shift clock of music data.
102	DFCK	Output	Clock for AD converter digital filter.
103	VDD2	Input	Power supply for interface.

In this unit, the terminal with asterisk mark (*) is open terminal which is not connected to the outside.

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IC201 VHiLR37820+-1 : Endec/Servo/Atrac (LR37820) (3/3)

Pin No.	Terminal Name	Input/Output	Function
104	DGND	—	Digital GND.
105*	SBCK	Schmidt Input/ Three-state Output	DIN subcode read clock. Expansion port 3.
106	SBO	Output	DIN subcode serial data. Expansion port 2.
107*	SBSY	Output	DIN subcode block sync signal. Expansion port 0.
108	SFSY	Output	DIN subcode frame sync signal. Expansion port 1.
109	VDD5	Input	Power supply for interface.
110	FOK	Output	Focus OK detection signal.
111	SENSE	Output	Servo status detection signal.
112	COUT	Output	Track cross signal output.
113	MCCK	Output	Clock output for microcomputer.
114	DINTX	Output	Terminal of interrupt request output to system control interface.
115	VDD1	Input	Power supply for interface.
116	DGND	—	Digital GND.
117	RSTX	Schmidt Input	Chip reset input. L: reset. (Note)
118	SYD0	Schmidt Input/ Three-state Output	Data bus terminal of system control interface. (LSB)
119-124	SYD1-SYD6	Schmidt Input/ Three-state Output	Data bus terminal of system control interface.
125	SYD7	Schmidt Input/ Three-state Output	Data bus terminal of system control interface. (MSB)
126	SYWRX	Schmidt Input	Register write pulse input of system control interface.
127	SYRDX	Schmidt Input	Register read pulse input of system control interface.
128	SYRS	Schmidt Input	Register selection input of system control interface.

In this unit, the terminal with asterisk mark (*) is open terminal which is not connected to the outside.

List of TEST port settings

TEST1	TEST0	Details
H	H	Normal mode
H	L	No adjustment mode
L	H	Test mode
L	L	(Settings prohibited)

List of LDCNT port settings

LDCNT1	LDCNT0	Details
H	H	Brake
H	L	Drive UP
L	H	Drive DOWN
L	L	Output OFF

IC401 RH-iX0588AWZZ : System Microcomputer (IX0588AW) (1/2)

Pin No.	Port Name	Terminal Name	Input/Output	Function
1*	DA1	MCMON	Output	Internal operation status monitor.
2	DA0	LDVAR	Output	P.U. laser power setting output.
3	P92	EPRT	Output	EEPROM write protect control output.
4	TB1IN	SPIN	Input	Spindle motor FG pulse detection input.
5	TB0IN	CIN	Input	Track cross signal/focus drive detection.
6	BYTE	BYTE	—	External data bus width selection input.
7	CNVSS	CNVSS	—	Processor mode switching input.
8	P87	RCLAT	Output	Recording audio IC data latch output.
9	P86	SYCPW	Output	System LSI core power supply ON/OFF.
10	RESET	_RESET	—	Microcomputer hardware reset input.
11	XOUT	EXTAL	—	Crystal oscillator connection terminal.
12	VSS	VSS	—	Ground potential.
13	XIN	XTAL	—	Crystal oscillator connection terminal.
14	VCC	VCC	Input	Positive power supply.
15	P85/NMI	NMI	—	Reserve
16	P84/INT2	_DINT	Input	System LSI interrupt.
17	P83/INT1	_PLAY	Input	Main unit PLAY button operation detection input.
18	P82/INT0	_REC	Input	Main unit REC button detection input.
19	P81	N.C.	Output	Reserve
20	P80	RCPCNT	Output	Recording circuit power supply control output.
21	P77/TA3IN	_RPLAY	Input	Remote control PLAY button operation detection input.
22	P76	N.C.	Output	Reserve
23*	P75	PBOPON	Output	Audio IC output stage control output.
24	TA2OUT	BUZOUT	Output	Beep tone pulse output. (Reserve)
25	P73	CHGON	Output	Charge ON/OFF control output.
26	P72	N.C.	Output	Reserve
27*	P71	N.C.	Output	Reserve
28*	P70	N.C.	Output	Reserve
29	TXD1	DSPDAT	Output	Main unit display data output.
30	P66	DSPSTB	Output	Main unit display strobe output.
31	CLK1	DSPSCK	Output	Main unit display data clock output.
32*	P64	TEST0	Input	Test mode setting input 0.
33	TXD0	RMDAT	Output	Remote control display data output.
34	P62/RXD0	PCLID	Input	Jig IF data input.
35*	CLK0	SCK0	CLK Output	Serial clock output. (Not used)
36	P60	OPICGA	Output	P.U. detection sensitivity switching output.
37*	P57	N.C.	Output	Reserve
38	P56	SGAIN	Input	RF amplifier gain switching output.
39	P55	DISCP	Input	RF amplifier TE polarity switching output.
40	P54	JPNP	Input	Kana conversion/kana input presence/absence determination.
41	P53	RMTCNT	Input	Remote control power supply ON/OFF control.
42	P52	AUPON	Output	1-bit audio power supply ON/OFF.
43	P51	RACLK	Output	Audio IC data click output.
44*	P50	TEST1	Input	Test mode setting input 1.
45	P47	_MCPGI	Input	Microphone plug insertion detection input.
46	P46	_INPGI	Input	Line/digital plug insertion detection.
47	P45	INPGCK	Input	Line/digital plug type detection.
48	P44	SENSE	Input	System LSI servo sense input.
49	P43	SLCNT1	Output	Stepping motor drive output 1.
50	P42	SLCNT2	Output	Stepping motor drive output 2.
51	P41	SLCNT3	Output	Stepping motor drive output 3.

In this unit, the terminal with asterisk mark (*) is open terminal which is not connected to the outside.

MD-DR470H/MD-DR480H

IC401 RH-iX0588AWZZ : System Microcomputer (IX0588AW) (2/2)

Pin No.	Port Name	Terminal Name	Input/Output	Function
52	A40	DISCPR	Input	Disc recording inhibition switch input.
53*	P37	PBLAT	Output	Audio IC data latch output.
54	P36	RFCNT	Output	RF-LSI power supply ON/OFF control output.
55	P35	RADAT	Output	Audio IC serial data output.
56*	P34	CCRAD	Input	Charge cradle support presence/absence switching input.
57	P33	_FOK	Input	Focus OK signal input.
58*	P32	CKSTP	Output	Microcomputer operation monitor output.
59	P31	DCNT1	Output	Mechanism driver enable output.
60	VCC	VCC	Input	Positive power supply.
61	P30	_EJSW	Input	Eject lever operation detection input.
62	VSS	VSS	—	Ground potential.
63	P27	CHGCNT	Hi-Z	Charge control.
64	P26	JACKIN	Input	DC input plug insertion detection.
65	P25	LSICNT	Input	2.5 V system power supply ON/OFF control.
66	P24	DCNT2	Output	Head up/down motor driver P control.
67	P23	PCNT3	Output	Power supply section reference voltage ON/OFF control.
68	P22	DCON	Selection	DC/BATT selection output.
69	P21	LDON	Output	P.U. laser ON/OFF control output.
70	P20	PCNT2	Output	Power supply selection bypass ON/OFF selection.
71	P17	ARQD	Input	Disc lid open/close detection/rise request.
72	P16	_STOP	Input	Main unit STOP button operation detection input.
73	P15	_DCEXT	Input	DC IN presence/absence detection.
74	P14	_XRST	Output	System LSI hardware reset output.
75	P13	PCNT1	Output	System power supply ON/OFF control output.
76	P12	SYRS	Output	System LSI register selection output.
77	P11	_SYRD	Output	System LSI read enable output.
78	P10	_SYWR	Output	System LSI write enable output.
79-86	P07-P00	SYD7-SYD0	Input	System LSI parallel data bus.
87	P107	N.C.	Output	Reserve
88*	P106	N.C.	Output	Reserve
89	AN5	PLVBAT	Input	Battery voltage detection input.
90	AN4	PLVDCI	Input	DC IN voltage (abnormality) detection input.
91	AN3	RKEY	Input	Remote control button operation detection input.
92	AN2	HKEY	Input	Main unit button operation detection input.
93	AN1	TEMP	Input	Ambient temperature detection input.
94	AVSS	AVSS	—	A/D, D/A converter ground potential.
95*	P100	N.C.	Output	Reserve
96	VREF	VREF	—	A/D, D/A converter reference voltage.
97	AVCC	AVCC	Input	A/D, D/A converter positive power supply.
98	P97	_EPCS	Output	EEPROM chip select output.
99	P96	EEPD	Input	EEPROM serial data input/output.
100	P95	EEPK	Output	EEPROM serial clock output.

In this unit, the terminal with asterisk mark (*) is open terminal which is not connected to the outside.

IC601 VHiLV8221T+-1 : Motor Driver (LV8221T) (1/2)

Pin No.	Port Name	Function
1	SPGND	GND of spindle output section.
2	SPVS	Power terminal spindle drive. A capacitor is connected to the paired GND.
3	FIL	Comparator filter terminal for detecting spindle motor position. A capacitor is connected between this and COMIN terminal (PIN).
4	COMIN	Comparator filter terminal for detecting spindle motor position. A capacitor is connected between this and FIL terminal (PIN).
5, 6	SGND	Small signal system GND terminal.
7	VCO	VCO oscillator terminal. A capacitor is connected to the paired GND. The VCO oscillation frequency varies depending on the motor revolutions (VCOIN terminal voltage).
8	RMAX	VCO maximum frequency setting terminal. If connection resistance is reduced, the VCO oscillation frequency rises.
9	VCOIN	VCO control voltage input terminal. A capacitor is connected to the paired GND. The control output corresponding to the motor revolutions is generated inside the logic, and the capacitor connected to the paired GND is charged. The VCO oscillation frequency is controlled by the voltage of this terminal.
10	MODE1	PWM frequency switching input terminal. "H" is selected when the CLK terminal (PIN) input frequency is 32 times of the spindle PWM frequency; "L" is selected if 64 times.
11	S/S	Start/stop terminal of spindle motor section. "H" level input: start.
12	MUTE3	Half bridge mute terminal. When L is input, each output terminal of the above driver turns to high impedance.
13	IN4	Half bridge control input terminal.
14	BRK	Brake terminal of spindle motor section. "L" level input: counter torque brake.
15	PWM	PWM signal input terminal. The output TR is turned ON by "H" input.
16	CLK	Reference clock input terminal for logic operation. Frequency of 32 or 64 times of the spindle PWM frequency is input.
17, 18	IN3F, IN3R	H bridge 3 logic input terminal.
19	VS3	H bridge 3 power terminal. A capacitor is connected to the paired GND.
20	OUT3F	H bridge 3 forward output terminal.
21	OUT3R	H bridge 3 reverse output terminal.
22	PGND3	H bridge 3 output section GND terminal.
23	PGND2	H bridge 2 output section GND terminal.
24	OUT2F	H bridge 2 forward output terminal.
25	OUT2R	H bridge 2 reverse output terminal.
26	VS2	H bridge 2 power terminal. A capacitor is connected to the paired GND.
27	VS1	H bridge 1 power terminal. A capacitor is connected to the paired GND.
28	OUT1F	H bridge 1 forward output terminal.
29	OUT1R	H bridge 1 reverse output terminal.
30	PGND1	H bridge 1 output section GND terminal.
31, 32	IN1F, IN1R	H bridge 1 logic input terminal.
33, 34	IN2R, IN2F	H bridge 2 logic input terminal.
35	MUTE	H bridge 1, 2 and 3-phase thread mute terminal. When L is input, each output terminal of the above driver turns to high impedance.
36	MUTE2	H bridge 3 mute terminal.
37	CP1	Pulse output terminal for raising charge pump pressure. A capacitor is connected between this and CPC1 terminal (PIN).
38	CP2	Pulse output terminal for raising charge pump pressure. A capacitor is connected between this and CPC2 terminal (PIN).
39	CPC1	Terminal for raising charge pump pressure. A capacitor is connected between this and CP1 terminal (PIN).
40	CPC2	Terminal for raising charge pump pressure. A capacitor is connected between this and CP2 terminal (PIN).
41	VG	Output terminal for raising charge pump pressure. A capacitor is connected to the paired GND.
42, 43	VCC	Small signal system power terminal. A capacitor is connected to the paired GND.
44-46	S1-S3	Logic input terminal for 3-phase thread section. The output is PIN.
47	SLVS	Power terminal for 3-phase thread drive. A capacitor is connected to the paired GND.
48	FG	FG pulse output terminal (MOS output). Pulse corresponding to 3 holes is output.

MD-DR470H/MD-DR480H

IC601 VHiLV8221T+-1 : Motor Driver (LV8221T) (2/2)

Pin No.	Port Name	Function
49	SLGND	GND of 3-phase thread output section.
50*	SUCO	Position detection comparator output terminal of thread driver section.
51	SUO	3-phase thread U-phase output terminal.
52	SVO	3-phase thread V-phase output terminal.
53*	SVCO	Position detection comparator output terminal of thread driver section.
54*	SWCO	Position detection comparator output terminal of thread driver section.
55	SWO	3-phase thread W-phase output terminal.
56	OUT4	Half bridge output terminal.
57	VS4	Half bridge power terminal. A capacitor is connected to the paired GND.
58	PGND4	GND terminal of half bridge output section.
59*	SCOM	Position detection comparator COM input terminal of thread driver section.
60	WOUT	3-phase spindle W-phase output terminal. A motor coil is connected.
61	VOUT	3-phase spindle V-phase output terminal. A motor coil is connected.
62	COM	Position detection comparator COM input terminal of thread driver section.
63	UOUT	3-phase spindle U-phase output terminal. A motor coil is connected.
64	TGND	Small signal system GND terminal.

In this unit, the terminal with asterisk mark (*) is open terminal which is not connected to the outside.

IC701 VHiR3R61U6-1 : Audio Input Amp. (IR3R61U6)

Pin No.	Port Name	Function
1	LOUTL	Lch attenuator circuit output terminal.
2	DGND	Logic input section GND terminal.
3	DATA	Shift register serial data input terminal.
4	CLOCK	Shift register clock input terminal.
5	LATCH	Shift register latch input terminal.
6	LINL	Lch attenuator section line input terminal.
7	LINR	Rch attenuator section line input terminal.
8	AGND	Attenuator section GND terminal.
9	MCINR	Rch attenuator section microphone input terminal.
10	MOUTr	Rch microphone amplifier output terminal.
11	MCINL	Lch attenuator section microphone input terminal.
12	MOUtl	Lch microphone amplifier output terminal.
13	BIAS	Bias input terminal.
14	MINL	Lch Microphone amplifier input terminal.
15	MGND	Microphone amplifier section GND terminal.
16	MINR	Rch Microphone amplifier input terminal.
17	VCC	Positive power supply.
18	VEE	Negative power supply.
19	LOUTr	Rch attenuator circuit output terminal.
20	AGND	Attenuator section GND terminal.

SHARP PARTS GUIDE

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Explanation of capacitors/resistors parts codes

Capacitors

VCC Ceramic type
 VCK Ceramic type
 VCT Semiconductor type
 VC •• MF Cylindrical type (without lead wire)
 VC •• MN Cylindrical type (without lead wire)
 VC •• TV Square type (without lead wire)
 VC •• TQ Square type (without lead wire)
 VC •• CY Square type (without lead wire)
 VC •• CZ Square type (without lead wire)
 VC J .. The 13th character represents capacity difference.
 ("J" ±5%, "K" ±10%, "M" ±20%, "N" ±30%,
 "C" ±0.25 pF, "D" ±0.5 pF, "Z" +80-20%.)


If there are no indications for the electrolytic capacitors, error is ±20%.

Resistors

VRD Carbon-film type
 VRS Carbon-film type
 VRN Metal-film type
 VR •• MF Cylindrical type (without lead wire)
 VR •• MN Cylindrical type (without lead wire)
 VR •• TV Square type (without lead wire)
 VR •• TQ Square type (without lead wire)
 VR •• CY Square type (without lead wire)
 VR •• CZ Square type (without lead wire)
 VR J .. The 13th character represents error.
 ("J" ±5%, "F" ±1%, "D" ±0.5%.)

If there are no indications for other parts, the resistors are ±5% carbon-film type.

NOTE:

Parts marked with “” are important for maintaining the safety of the set.

Be sure to replace parts with specified ones for maintaining the safety and performance of the set.

MD-DR470H/MD-DR480H

NO.	PART CODE	★	PRICE RANK	DESCRIPTION
INTEGRATED CIRCUITS				
IC101	VHIIR3R58M/-1	J	AM	RF Signal Processor,IR3R58M
IC201	VHILR37820+-1	J	BK	Endec/Servo/Atrac,LR37820
IC202	RH-IX2960AFZZ	J	BB	16M Bit D-RAM,IX2960AF
IC203	VHI74LVX74T-1	J	AE	D-Flip Flop,74LVX74T
IC241,242	VHI7MH165FK-1	J	AK	Shift Resister,7MH165FK
IC243-245	VHI7SZ157P6-1	J	AE	MPX.,7SZ157P6
IC254	VHIS89110AC-1	J	AH	OP Amp.,S89110AC
IC271	VHIS89110AC-1	J	AH	OP Amp.,S89110AC
IC351	VHI74ACT08T-1	J	AF	Head Driver,74ACT08T
IC353	VSMCH6616+-1	J	AG	Head Driver,MCH6616
IC354	VHICPH5608/-1	J	AH	Head Driver,CPH5608
IC401	RH-IX0588AWZZ	J		System Microcomputer, IX0588AW
IC402	VHI24WC5UI2-1	J	AG	EEPROM,24WC5UI2
IC431	VHI80820CLN-1	J	AD	Reset,80820CLN
IC501	VHIAK5355VT-1	J	AP	AD Converter,AK5355VT
IC601	VHILV8221T+-1	J	AY	Motor Driver,LV8221T
IC701	VHIIR3R61U6-1	J	AQ	Audio Input Amp.,IR3R61U6
IC751	VHI74LCX00MTC	J	AF	Logic,74LCX00M
IC761	VHI74LCX86T-1	J	AF	Logic,74LCX86T
IC771	VHI6209B23M-1	J	AE	2.3V Regulator,6209B23M
IC803	VHI80819CLN-1	J	AD	2V Regulator,80819CLN
IC813	VHI74LX244T-1	J	AH	Logic,74LX244T
IC821	VHIIR3M17U6-1	J	AQ	1.6V UP Converter/0-2V DOWN Converter,IR3M17U6
IC841	VHI8358B25C-1	J	AH	2.5V DC/DC Converter, 8358B25C
IC842	VHI6209B45M-1	J	AE	4.5V Regulator,6209B45M

TRANSISTORS

Q211	VSXP04501+-1	J	AC	Power Transistor,XP04501
Q212	VS3LN01S++++-1	J	AC	N-ch Power MOS,3LN01S
Q213	VSRT1N441U/-1	J	AB	Digital,NPN,RT1N441 U
Q252	VS2SC4617R/-1	J	AB	Silicon,NPN,2SC4617 R
Q253	VSXP04501+-1	J	AC	Power Transistor,XP04501
Q255	VSXP04313+-1	J	AC	Power Select Charge Drive, XP04313
Q493	VHIFDG312P/-1	J	AD	P-ch Power MOS,FDG312P
Q701,702	VSRT1P441U/-1	J	AB	Digital,NPN,RT1P441 U
Q711	VS2SD2351W/-1	J	AC	Silicon,NPN,2SD2351 W
Q721	VS2SD2351W/-1	J	AC	Silicon,NPN,2SD2351 W
Q751,752	VSMCH6630+-1	J	AH	FET,MCH6630
Q761,762	VSMCH6630+-1	J	AH	FET,MCH6630
Q801	VS2SJ645+-1	J	AG	FET,2SJ645
Q802	VSMCH6405+-1	J	AG	N-ch Power MOS FET,MCH6405
Q803	VSRT1N441U/-1	J	AB	Digital,NPN,RT1N441 U
Q804	VS2SA1774R+-1	J	AB	Silicon,PNP,2SA1774 R
Q805	VS2SC4617R/-1	J	AB	Silicon,NPN,2SC4617 R
Q806	VSXP04501+-1	J	AC	Power Transistor,XP04501
Q809	VSXP04313+-1	J	AC	Power Select Charge Drive, XP04313
Q828	VSECH8601+-1	J	AH	N-ch MOS FET,ECH8601
Q841	VSMCH3409+-1	J	AF	FET,MCH3409
Q843	VHIFDG312P/-1	J	AD	P-ch Power MOS,FDG312P
Q863	VSMCH3409+-1	J	AF	FET,MCH3409
Q865	VS2SC4617R/-1	J	AB	Silicon,NPN,2SC4617 R

DIODES

D351	VHDSBE803/-1	J	AD	Silicon,SBE803
D431	VHDM132WK/-1	J	AB	Silicon,MA132WK
D491	VHE015Z5R1Y-1	J	AD	Zener,5.1V,015Z5.1Y
D493	VHE015Z5R1Y-1	J	AD	Zener,5.1V,015Z5.1Y
D494	VHE15AZ7R5Y-1	J	AC	Zener,7.5V,15AZ7.5Y
D751	VHDM132WK/-1	J	AB	Silicon,MA132WK
D801	VHDDG1M3+-1	J	AC	Silicon,DG1M3
D802	VHEMA8043M/-1	J	AC	Zener,MA8043M
D803	VHDRB521S30-1	J	AC	Silicon,RB521S30
D811	VHDRB521S30-1	J	AC	Silicon,RB521S30
D828	VHDF10J2E/-1	J	AC	Silicon,F10J2E
D841	VHDDG1H3+-1	J	AC	Silicon,DG1H3
D842-844	VHDM1793/-1	J	AC	Silicon,MA1793
D862	VHDDG1H3+-1	J	AC	Silicon,DG1H3

COILS

L100	VPBNN100K0000	J	AC	10 µH
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NO.	PARTS CODE	★	PRICE RANK	DESCRIPTION
L103	RCILZ0060AWZZ	J	AB	100 MHz,Tip Impeder
L171	RCILC0356AFZZ	J	AC	10 µH
L204	RCILC0353AFZZ	J	AB	100 MHz,Tip Impeder
L210	RCILC0358AFZZ	J	AC	47 µH,Choke
L401	VPCBM101K0000	J	AC	100 µH
L455,456	RCILC0353AFZZ	J	AB	100 MHz,Tip Impeder
L457	RCILZ0061AWZZ	J	AB	100 MHz,Tip Impeder
L458	RCILC0290AFZZ	J	AC	100 MHz,Tip Impeder
L491	VRS-TV2AB330J	J	AA	33 ohms,1/10W
L601-604	RCILC0372AFZZ	J	AC	22 µH,Choke
L610	RCILC0372AFZZ	J	AC	22 µH,Choke
L702,703	RCILC0353AFZZ	J	AB	100 MHz,Tip Impeder
L704	RCILZ0061AWZZ	J	AB	100 MHz,Tip Impeder
L711	RCILZ0061AWZZ	J	AB	100 MHz,Tip Impeder
L712-714	RCILC0353AFZZ	J	AB	100 MHz,Tip Impeder
L751,752	RCILC0024AWZZ	J	AD	22 µH,Choke
L761,762	RCILC0024AWZZ	J	AD	22 µH,Choke
L800,801	RCILZ0027AWZZ	J	AD	100 MHz,Tip Impeder
L811	RCILC0025AWZZ	J	AC	47 µH,Choke
L812,813	RCILZ0027AWZZ	J	AD	100 MHz,Tip Impeder
L841	RCILC0027AWZZ	J	AE	47 µH,Choke
L861	VPCBM101K0000	J	AC	100 µH
L862	RCILC0026AWZZ	J	AE	47 µH,Choke

VIBRATORS

XL201	RCRSC0028AFZZ	J	AH	Crystal,33.868 MHz
XL401	RCRM-0050AWZZ	J	AE	Ceramic,4.00 MHz

THERMISTOR

△ PSW1	VHHSMDM110V-1	J	AK	Conductive Restn Switch
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CAPACITORS

C100	VCSAFA0JJ106M	J	AD	10 µF,6.3V,Electrolytic,Tantalum
C102	VCKYCY1CB104K	J	AB	0.1 µF,16V
C103	VCKYCY0JB105K	J	AC	1 µF,6.3V
C106	VCKYCY0JB105K	J	AC	1 µF,6.3V
C107	VCKYCY1CB333K	J	AB	0.033 µF,16V
C108,109	VCKYCY0JB105K	J	AC	1 µF,6.3V
C110	VCKYCY1AB224K	J	AB	0.22 µF,10V
C111	VCKYCY0JB105K	J	AC	1 µF,6.3V
C112	VCKYCY1CB333K	J	AB	0.033 µF,16V
C113	VCKYCY0JB105K	J	AC	1 µF,6.3V
C114	VCCCCZ1HH5R0C	J	AB	5 pF (CH),50V
C130,131	VCKYCY1AB104K	J	AB	0.1 µF,10V
C132,133	VCKYCY1AB224K	J	AB	0.22 µF,10V
C165	VCKYCY1CB333K	J	AB	0.033 µF,16V
C171	VCSAFA0JJ336M	J	AE	33 µF,6.3V,Electrolytic,Tantalum
C203	VCKYCY1AB104K	J	AB	0.1 µF,10V
C205	VCKYCY1AB104K	J	AB	0.1 µF,10V
C207	VCKYCY1AB104K	J	AB	0.1 µF,10V
C208	VCKYCY0JB105K	J	AC	1 µF,6.3V
C209	VCKYCY1AB104K	J	AB	0.1 µF,10V
C211,212	VCCCCZ1HH5R0C	J	AB	5 pF (CH),50V
C213-215	VCKYCY0JB105K	J	AC	1 µF,6.3V
C221	VCCCCY1HH220J	J	AA	22 pF (CH),50V
C222	VCKYCY0JB105K	J	AC	1 µF,6.3V
C232	VCKYCY0JB105K	J	AC	1 µF,6.3V
C233	VCKYCY1HB471K	J	AA	470 pF,50V
C240	VCKYCY1HB153K	J	AA	0.015 µF,50V
C241,242	VCKYCY1AB104K	J	AB	0.1 µF,10V
C250	RC-EZ0109AWZZ	J	AE	220 µF,4V,Electrolytic
C253,254	VCKYCY1AB104K	J	AB	0.1 µF,10V
C270	VCKYCY0JB105K	J	AC	1 µF,6.3V
C272-274	VCKYCY1AB104K	J	AB	0.1 µF,10V
C351	VCCCCY1HH330J	J	AA	33 pF (CH),50V
C353	VCKYCY0JB105K	J	AC	1 µF,6.3V
C357	VCKYCY1AB104K	J	AB	0.1 µF,10V
C361	VCKYTV1HB393K	J	AB	0.039 µF,50V
C401	VCKYCY1AB104K	J	AB	0.1 µF,10V
C402	VCSAFP0JJ106M	J	AE	10 µF,6.3V,Electrolytic,Tantalum
C404	VCKYCY1AB104K	J	AB	0.1 µF,10V
C431	VCKYCY1AB474K	J	AC	0.47 µF,10V
C454	VCKYCY1HB222K	J	AB	0.0022 µF,50V
C491	VCKYCY1AB104K	J	AB	0.1 µF,10V
C493	VCKYCY1AB473K	J	AB	0.047 µF,10V
C500	VCKYCY0JB105K	J	AC	1 µF,6.3V
C503	VCSAPR1AJ335M	J	AD	3.3 µF,10V,Electrolytic,Tantalum
C509,510	VCKYCY0JB105K	J	AC	1 µF,6.3V

NO.	PART CODE	★ PRICE RANK	DESCRIPTION	NO.	PARTS CODE	★ PRICE RANK	DESCRIPTION
C601~604	VCKYCY0JB105K	J AC	1 μF,6.3V	R254	VRS-CZ1JB562J	J AB	5.6 kohms,1/16W
C608	VCKYCY1AB474K	J AC	0.47 μF,10V	R255	VRS-CZ1JB273D	J AA	27 kohms,1/16W
C652	VCKYCY1AB104K	J AB	0.1 μF,10V	R257	VRS-CZ1JB103J	J AA	10 kohms,1/16W
C701,702	VCSATA0JJ106M	J AD	10 μF,6.3V,Electrolytic,Tantalum	R258	VRS-CZ1JB563J	J AA	56 kohms,1/16W
C703	VCKYCY1CB103K	J AB	0.01 μF,16V	R259	VRS-CZ1JB333J	J AB	33 kohms,1/16W
C711,712	VCCCCZ1HH101J	J AB	100 pF (CH),50V	R272	VRS-CZ1JB474D	J AA	470 kohms,1/16W
C713,714	VCKYCY0JB105K	J AC	1 μF,6.3V	R273	VRS-CZ1JB473D	J AA	47 kohms,1/16W
C715	VCKYCY1AB104K	J AB	0.1 μF,10V	R274	VRS-CZ1JB563D	J AA	56 kohms,1/16W
C717	VCKYCY0JB105K	J AC	1 μF,6.3V	R275	VRS-CZ1JB153D	J AA	15 kohms,1/16W
C721,722	VCSAPR1AJ335M	J AD	3.3 μF,10V,Electrolytic,Tantalum	R276	VRS-CZ1JB124D	J AB	120 kohms,1/16W
C723,724	VCKYCY1HB102K	J AB	0.001 μF,50V	R277	VRS-CZ1JB222J	J AB	2.2 kohms,1/16W
C725,726	VCSAPR1AJ335M	J AD	3.3 μF,10V,Electrolytic,Tantalum	R278	VRS-CZ1JB220J	J AB	22 ohms,1/16W
C731	VCKYCY1AB104K	J AB	0.1 μF,10V	R280	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C733,734	VCKYCY1AB474K	J AC	0.47 μF,10V	R282	VRS-CZ1JB564J	J AA	560 kohms,1/16W
C750	VCKYCY0JB105K	J AC	1 μF,6.3V	R284	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C751,752	VCKYCY1AB474K	J AC	0.47 μF,10V	R286	VRS-CZ1JB102J	J AB	1 kohms,1/16W
C760	VCKYCY0JB105K	J AC	1 μF,6.3V	R351	VRS-CZ1JB120J	J AA	12 ohms,1/16W
C767,768	VCKYCY0JB106K	J AE	10 μF,6.3V	R352	VRS-CZ1JB334J	J AA	330 kohms,1/16W
C771,772	VCKYTV1CB474K	J AC	0.47 μF,16V	R361	VRS-TV2AB150J	J AA	15 ohms,1/10W
C773	VCKYCY1AB224K	J AB	0.22 μF,10V	R401	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C774	VCKYCY0JB105K	J AC	1 μF,6.3V	R403	VRS-CZ1JB102J	J AB	1 kohms,1/16W
C783,784	VCKYTV1CB474K	J AC	0.47 μF,16V	R404	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C801	VCKYCY0JB105K	J AC	1 μF,6.3V	R405	VRS-CZ1JB103J	J AB	10 kohms,1/16W
C802	VCKYCY1AB104K	J AB	0.1 μF,10V	R406	VRS-CZ1JB223J	J AB	22 kohms,1/16W
C809	VCKYCY1CB822K	J AA	0.0082 μF,16V	R411	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C811,812	VCKYCY0JB105K	J AC	1 μF,6.3V	R412	VRS-CZ1JB153J	J AA	15 kohms,1/16W
C813	RC-SZ0010AWZZ	J AH	47 μF,6.3V,Electrolytic	R414~417	VRS-CZ1JB102J	J AB	1 kohms,1/16W
C814	VCKYCY0JB105K	J AC	1 μF,6.3V	R422	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C815	RC-SZ0001AWZZ	J AG	22 μF,6.3V,Electrolytic	R423	VRS-CZ1JB223D	J AB	22 kohms,1/16W
C818	VCKYCY1AB104K	J AB	0.1 μF,10V	R425	VRS-CZ1JB223J	J AB	22 kohms,1/16W
C822	VCKYCY0JB105K	J AC	1 μF,6.3V	R431	VRS-CZ1JB334J	J AA	330 kohms,1/16W
C823	VCCCCZ1HH470J	J AB	47 pF (CH),50V	R442	VRS-CZ1JB102J	J AB	1 kohms,1/16W
C824	VCKYCY1AB473K	J AB	0.047 μF,10V	R461	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C825	VCCCCY1HH271J	J AA	270 pF (CH),50V	R462	VRS-CZ1JB223J	J AB	22 kohms,1/16W
C831	VCKYCY1AB104K	J AB	0.1 μF,10V	R463	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C839	VCKYCY1AB334K	J AC	0.33 μF,10V	R464	VRS-CZ1JB224J	J AA	220 kohms,1/16W
C840	VCKYCY0JB105K	J AC	1 μF,6.3V	R495	VRS-CZ1JB334J	J AA	330 kohms,1/16W
C841,842	RC-SZ0010AWZZ	J AH	47 μF,6.3V,Electrolytic	R496	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C843,844	VCKYCY0JB105K	J AC	1 μF,6.3V	R701,702	VRS-CZ1JB101J	J AB	100 ohms,1/16W
C847~849	VCKYCY0JB105K	J AC	1 μF,6.3V	R703	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C850,851	VCKYCY1AB104K	J AB	0.1 μF,10V	R710	VRS-CZ1JB222J	J AB	2.2 kohms,1/16W
C853	VCCCCZ1HH271J	J AB	270 pF (CH),50V	R711,712	VRS-CZ1JB682J	J AB	6.8 kohms,1/16W
C854	VCCCCZ1HH121J	J AB	120 pF (CH),50V	R713,714	VRS-CZ1JB103J	J AA	10 kohms,1/16W
C861	VCKYCY0JB105K	J AC	1 μF,6.3V	R715,716	VRS-CZ1JB104J	J AA	100 kohms,1/16W
C863	RC-SZ0001AWZZ	J AG	22 μF,6.3V,Electrolytic	R719,720	VRS-CZ1JB562J	J AB	5.6 kohms,1/16W
C864~867	VCKYCY1AB104K	J AB	0.1 μF,10V	R723,724	VRS-CZ1JB682J	J AB	6.8 kohms,1/16W
C870	VCKYCY1CB333K	J AB	0.033 μF,16V	R725	VRS-CZ1JB101J	J AB	100 ohms,1/16W
C891	VCKYCY1AB104K	J AB	0.1 μF,10V	R726	VRS-CZ1JB393J	J AB	39 kohms,1/16W
C901	VCKYCY1EB332K	J AA	0.0033 μF,25V	R727	VRS-CZ1JB822J	J AA	8.2 kohms,1/16W
C907	VCKYCY1HB222K	J AB	0.0022 μF,50V	R728	VRS-CZ1JB102J	J AB	1 kohms,1/16W
C908,909	VCKYCY0JB105K	J AC	1 μF,6.3V	R729,730	VRS-CZ1JB472J	J AB	4.7 kohms,1/16W
C911,912	VCKYCY1AB224K	J AB	0.22 μF,10V	R751~754	VRS-CZ1JB105J	J AB	1 Mohms,1/16W
C913,914	VCKYCY0JB105K	J AC	1 μF,6.3V	R773,774	VRS-TV2AB150J	J AA	15 ohms,1/10W
RESISTORS				R781,782	VRS-CZ1JB272J	J AB	2.7 kohms,1/16W
VRS-CY1JB000J	J AA	0 ohms,Jumper,0.8×1.55mm,Green	R801	VRS-CZ1JB102J	J AB	1 kohms,1/16W	
VRS-CZ1JB000J	J AB	0 ohms,Jumper,0.5×1.0mm	R802	VRS-CZ1JB393J	J AB	39 kohms,1/16W	
VRS-TV2AB000J	J AA	0 ohms,Jumper,1.25×2mm,Green	R803	VRS-CZ1JB683J	J AB	68 kohms,1/16W	
R111	VRS-CZ1JB123J	J AB	12 kohms,1/16W	R804,805	VRS-CZ1JB104J	J AA	100 kohms,1/16W
R112	VRS-CZ1JB224J	J AA	220 kohms,1/16W	R806	VRS-CZ1JB123J	J AB	12 kohms,1/16W
R131	VRS-CZ1JB124D	J AB	120 kohms,1/16W	R807	VRS-CZ1JB223J	J AB	22 kohms,1/16W
R132	VRS-CZ1JB105D	J AA	1 Mohms,1/16W	R808	VRS-TV2AB1R0F	J AB	1 ohms,1/10W
R133	VRS-CZ1JB124D	J AB	120 kohms,1/16W	R809	VRS-CZ1JB103J	J AA	10 kohms,1/16W
R134	VRS-CZ1JB105D	J AA	1 Mohms,1/16W	R810	VRS-TV2AB1R0F	J AB	1 ohms,1/10W
R135	VRS-CZ1JB563D	J AA	56 kohms,1/16W	R812,813	VRS-CZ1JB393D	J AA	39 kohms,1/16W
R136	VRS-CZ1JB394D	J AA	390 kohms,1/16W	R814	VRS-CZ1JB123D	J AA	12 kohms,1/16W
R137	VRS-CZ1JB563D	J AA	56 kohms,1/16W	R815	VRS-CZ1JB223D	J AB	22 kohms,1/16W
R138	VRS-CZ1JB394D	J AA	390 kohms,1/16W	R816	VRS-CZ1JB152J	J AB	1.5 kohms,1/16W
R139	VRS-CZ1JB393J	J AB	39 kohms,1/16W	R818	VRS-CZ1JB564J	J AA	560 kohms,1/16W
R140	VRS-CZ1JB684J	J AB	680 kohms,1/16W	R819	VRS-CZ1JB223J	J AB	22 kohms,1/16W
R161	VRS-CZ1JB122J	J AB	1.2 kohms,1/16W	R820	VRS-CZ1JB274J	J AB	270 kohms,1/16W
R204	VRS-CZ1JB102J	J AB	1 kohms,1/16W	R821	VRS-CZ1JB103J	J AA	10 kohms,1/16W
R205	VRS-CZ1JB273D	J AA	27 kohms,1/16W	R822	VRS-CZ1JB125J	J AA	1.2 Mohms,1/16W
R206	VRS-CZ1JB104D	J AA	100 kohms,1/16W	R823	VRS-CZ1JB154D	J AA	150 kohms,1/16W
R207	VRS-CZ1JB681J	J AB	680 ohms,1/16W	R824	VRS-CZ1JB184D	J AB	180 kohms,1/16W
R212	VRS-CZ1JB103J	J AA	10 kohms,1/16W	R825	VRS-CZ1JB562J	J AB	5.6 kohms,1/16W
R214	VRS-CZ1JB104J	J AA	100 kohms,1/16W	R826,827	VRS-CZ1JB273D	J AA	27 kohms,1/16W
R222	VRS-CZ1JB105J	J AB	1 Mohms,1/16W	R828	VRS-CY1JB2R2J	J AA	2.2 ohms,1/16W
R233	VRS-CZ1JB101J	J AB	100 ohms,1/16W	R831	VRS-CZ1JB394D	J AA	390 kohms,1/16W
R243~245	VRS-CZ1JB331J	J AB	330 ohms,1/16W	R832	VRS-CZ1JB684D	J AA	680 kohms,1/16W
R253	VRS-CZ1JB272D	J AA	2.7 kohms,1/16W	R833	VRS-CZ1JB684J	J AB	680 kohms,1/16W
				R841	VRS-CZ1JB104J	J AA	100 kohms,1/16W
				R850,851	VRS-CZ1JB104J	J AA	100 kohms,1/16W

MD-DR470H/MD-DR480H

NO.	PART CODE	★ PRICE RANK	DESCRIPTION	NO.	PARTS CODE	★ PRICE RANK	DESCRIPTION
R852	VRS-CZ1JB103J	J AA	10 kohm,1/16W	203	GCABB3025AWSA	J AT	Bottom Cabinet [For MD-DR470H (S)]
R853	VRS-CZ1JB102J	J AB	1 kohm,1/16W	203	GCABB3025AWSB	J AT	Bottom Cabinet [For MD-DR470H (BL)]
R855,856	VRS-CZ1JB224D	J AA	220 kohms,1/16W	203	GCABB3027AWSA	J	Bottom Cabinet [MD-DR480H (S) Except for Australia/New Zealand/Korea/ Hong Kong]
R862	VRS-CZ1JB474D	J AA	470 kohms,1/16W	203	GCABB3027AWSB	J	Bottom Cabinet [MD-DR480H (BL) Except for Australia/New Zealand/Korea/ Hong Kong]
R865	VRS-CZ1JB104J	J AA	100 kohm,1/16W	204	GCOVH1036AWZZ	J AC	Cover,Terminal
R866	VRS-CZ1JB273J	J AA	27 kohms,1/16W	205	GCOVH1038AWZZ	J AB	Cover,EJECT Frame
R867	VRS-CZ1JB683J	J AB	68 kohms,1/16W	206	GFTAB1048AWSA	J AF	Cover,Battery [For MD-DR470H (S)/ MD-DR480H (S)]
R870	VRS-CZ1JB334J	J AA	330 kohms,1/16W	206	GFTAB1048AWSB	J AF	Cover,Battery [For MD-DR470H (BL)/ MD-DR480H (BL)]
R881,882	VRS-TV2AB1R0J	J AA	1 ohm,1/10W	207	HDECQ0959AWSA	J AF	Decoration Plate
R891	VRS-CZ1JB103J	J AA	10 kohm,1/16W	208	JKNBZ0914AWSA	J AP	Button,Operation
R893	VRS-CZ1JB224J	J AA	220 kohms,1/16W	209	JKNBZ0917AWSA	J AC	Button,Record
R906	VRS-CZ1JB563J	J AA	56 kohms,1/16W	210	JKNBZ0920AWSA	J AE	Knob,EJECT
R907,908	VRS-CZ1JB334J	J AA	330 kohms,1/16W	211	LANGT0149AWFW	J AD	Bracket,Operation Button Flexible PWB
R910	VRS-CZ1JB333J	J AB	33 kohms,1/16W	212	LANGZ0063AWM1	J AG	Battery Terminal,+
OTHER CIRCUITRY PARTS				213	LHLDZ1449AWZZ	J AD	Holder,Battery
CN101	QCNCW046XAWZZ	J AM	Socket,22Pin	214	LHLDZ1450AWZZ	J AC	Holder,Terminal
CN451	QCNCW862LAFZZ	J AF	Socket,11Pin	215	LHLDZ1452AWZZ	J AC	Holder,LCD
CN601	QCNCW862LAFZZ	J AF	Socket,11Pin	216	LHLDZ3031AWM1	J AN	Main Frame Ass'y
△ F800	QFS-L631AAWNZ	J AE	Square Tip Type Fuse,630mA	217	LHLDZ3032AWM1	J AK	EJECT Frame Ass'y
J701	VHLGP1FD202-1	J AT	Jack,Optical/Line	219	MSPRP0066AWFQ	J AG	Battery Terminal,-
J702	QJAKM0018AWZZ	J AG	Jack,Mic In	220	PGUMS0020AWZZ	J AB	Cushion,Battery
J703	QJAKM0015AWZZ	J AL	Jack,Remote Control/Earphones	221	PSHET0119AWZZ	J AB	Sheet,Insulation
J801	QJAKC0007AWZZ	J AF	Jack,DC IN	222	PSHEZ0179AWZZ	J AD	Sheet,Operation Button
M901	RMOTV0044AWZZ	J AW	Motor Ass'y [Spindle]	223	PSHEZ0180AWZZ	J AC	Sheet,Decoration Plate
M902	RMOTS0002AWZZ	J AT	Motor Ass'y [Sled]	225	QTANB9045AWFQ	J AC	Terminal,Battery
M903	RMOTV0053AWZZ	J AR	Motor Ass'y [Lift]	226	RUNTK0024AWZZ	J AV	Operation Button Flexible PWB Ass'y
SW401	QSW-M0010AWZZ	J AE	Switch,Key Type [Eject]	227	RUNTZ0052AWZZ	J BA	LCD Unit
SW402	QSW-M0014AWZZ	J AF	Switch,Push Type [Open]	228	TCAUS0053AWZZ	J AB	Label,Class 3B
SW901	QSW-M0008AWZZ	J AF	Switch,Push Type [Protect]	601	LX-BZ0047AWFC	J AB	Screw,ø1.4×1.5mm
MD MECHANISM PARTS				602	LX-BZ0048AWFN	J AC	Screw,ø1.4×2.5mm
1	LANGK0211AWZZ	J AC	Guide,Shaft	603	LX-CZ0016AWFN	J AB	Screw,ø1.4×2.5mm
2	LCHSM0162AWM1	J AH	Main Chassis Ass'y	ACCESSORIES/PACKING PARTS			
3	LHLDX3017AWM1	J AH	Cartridge Holder Ass'y	1	GCASZ0005AWSA	J AS	Battery Case
4	MLEVF0087AWFW	J AC	Lever,Eject Protect	2	PCOVW1015AWZZ	J AC	Battery Carrying Case
5	MLEVF0110AWFW	J AC	Lever,Lift Link	3	QCNWG0029AWZZ	J AK	Connecting Cord
6	MLEVF0111AWFW	J AC	Lever,Lift Move	4	QCNWG0061AWZZ	J AT	Output Conversion Cable
7	MLEVF0112AWFW	J AC	Lever,Lift	5	QCNWG0422AFZZ	J AQ	Optical Cable
8	MSPRP0060AWFJ	J AB	Spring,Thrust	6	QCNWH0007AWZZ	J AL	PC Link Cord
9	MSPRP0067AWFJ	J AB	Spring,Grip Rack	△ 7	RADPA5050AWZZ	J BG	AC Adaptor
10	MSPRT0058AWFJ	J AB	Spring,Eject Lever	△ 7	RADPA5051AWZZ	J BF	AC Adaptor
11	NBRGC0004AWZZ	J AB	Metal	△ 7	RADPA5063AWZZ	J AX	AC Adaptor
12	NGERH0164AWZZ	J AC	Gear,Drive	△ 7	RADPA6049AWZZ	J BF	AC Adaptor
13	NGERH0165AWZZ	J AB	Wheel,Drive	△ 7	RADPA7057AWZZ	J AX	AC Adaptor
14	NSFTD0011AWZZ	J AG	Drive Screw	△ 7	RADPA8058AWZZ	J AY	AC Adaptor
15	QPWBH0026AWZZ	J AG	Mechanism Flexible PWB	8	RPHOH0021AWZZ	J AU	Earphones
16	RCILH0008AWM1	J AQ	Magnetic Head Ass'y	8	RPHOH0022AWZZ	J BE	Earphones [MD-DR470H Except for U.K. Only]
△ 17	92LHPM280	J BT	Optical Pickup Unit	9	RRMCW0023AWSA	J BH	Remote Control
501	LX-BZ0049AWZZ	J AB	Screw,ø1.4×1.8mm	10	SPAKC1587AWZZ	J AL	Packing Case [For MD-DR480H (S)]
502	LX-BZ0050AWZZ	J AB	Screw,ø1.4×2.5mm	10	SPAKC1588AWZZ	J AL	Packing Case [For MD-DR480H (BL)]
503	LX-BZ0059AWZZ	J AB	Screw,ø1.4×1.8mm	10	SPAKC1596AWZZ	J AL	Packing Case [For MD-DR470H (S)]
504	LX-BZ0072AWZZ	J AB	Screw,ø1.4×3.3mm	10	SPAKC1597AWZZ	J AL	Packing Case [For MD-DR470H (BL)]
505	LX-BZ0079AWZZ	J AB	Screw,ø1.4×1.2mm	11	SPAKZ0490AWZZ	J AC	Spacer,Operation Manual [MD-DR470H for U.K./ MD-DR480H for Australia/New Zealand/Korea Only]
506	LX-BZ0823AFZZ	J AA	Screw,ø1.4×1.2mm	12	TCADS0005AWZZ	J AB	Service Card [MD-DR470H for U.K. Only]
507	LX-WZ9290AFZZ	J AA	Washer,ø0.8×ø2.4×0.25mm	13	TGANE0013AWZZ	J AC	Warranty Card [MD-DR470H for U.K. Only]
M901	RMOTV0044AWZZ	J AW	Motor Ass'y [Spindle]	CABINET PARTS			
M902	RMOTS0002AWZZ	J AT	Motor Ass'y [Sled]	201	GCABA3023AWM1	J AY	Top Cabinet Ass'y [For MD-DR470H (S)/ MD-DR480H (S)]
M903	RMOTV0053AWZZ	J AR	Motor Ass'y [Lift]	201	GCABA3023AWM2	J AZ	Top Cabinet Ass'y [For MD-DR470H (BL)/ MD-DR480H (BL)]
201- 1	—	—	Top Cabinet (Not Replacement Item)	202	GCAB-1225AWSA	J AN	Center Cabinet
201- 2	LANGZ0064AWFC	J	Bracket,Lock	203	GCABB3023AWSA	J AT	Bottom Cabinet [MD-DR480H (S) for Australia/ New Zealand/Korea/Hong Kong]
202	GCAB-1225AWSA	J AN	Center Cabinet	203	GCABB3023AWSB	J AT	Bottom Cabinet [MD-DR480H (BL) for Australia/ New Zealand/Korea/Hong Kong]

NO.	PART CODE	★ PRICE RANK	DESCRIPTION
14	TINSE0513AWZZ	J	Operation Manual [MD-DR470H for U.K.]
14	TINSE0519AWZZ	J	Operation Manual [MD-DR480H for Australia/New Zealand]
14	TINSX0001AWZZ	J	Operation Manual [MD-DR480H Except for Australia/New Zealand/Korea]
14	TINSZ0896AWZZ	J	Operation Manual [MD-DR480H for Korea]
14	TINSZ0901AWZZ	J AV	Operation Manual [MD-DR470H Except for U.K./Sweden]
14	TINSZ0902AWZZ	J AV	Operation Manual [MD-DR470H for Sweden]
15	TINSE0514AWZZ	J	Quick Guide [MD-DR470H for U.K. Only]
16	TLABZ1408AWZZ	J	Label,Feature (for Set)
17	UBAGC0007AWSA	J AG	Carrying Case
18	UBATM0009AWSA	J AY	Rechargeable Battery
19	RUNTZ0053AWM1	J AU	Charging Stand [For MD-DR480H (S)]
19	RUNTZ0053AWM2	J AU	Charging Stand [For MD-DR480H (BL)]
20	TLABG0002AWZZ	J AB	Label,Hong Kong [MD-DR480H for Hong Kong Only]
21	92LBAG1770A	J AB	Polyethylene Bag,Charging Stand [For MD-DR480H Only]
22	TLABG0002AWZZ	J AB	Label,Hong Kong [MD-DR480H for Hong Kong Only]
23	TLABS0294AWZZ	J AB	Label,CPA [For MD-DR480H Only]
24	TLABZ1379AWZZ	J	Label,Feature [MD-DR470H Except for U.K.]

P.W.B. ASSEMBLY (Not Replacement Item)

PWB-A	92LPWB5126MDSS	J	—	Main [For MD-DR470H]
PWB-A	92LPWB5132MDSS	J	—	Main [For MD-DR480H]

OTHER SERVICE PARTS

QCNWN6936AFZZ	J	AU	Performance Test (Extension Cable for Motors)
RUNTK0613AFZZ	J	AV	Performance Test (Extension Relay PWB for Motors)
UDSKM0001AFZZ	J	AZ	Recording Mini Disc
88GMMD-110	J	BV	High Reflection Disc MMD-110 (TEAC Test MD)
88GMMD-213A	J	BT	Low Reflection Disc MMD-213A (TEAC Test MD)

MD-DR470H/MD-DR480H

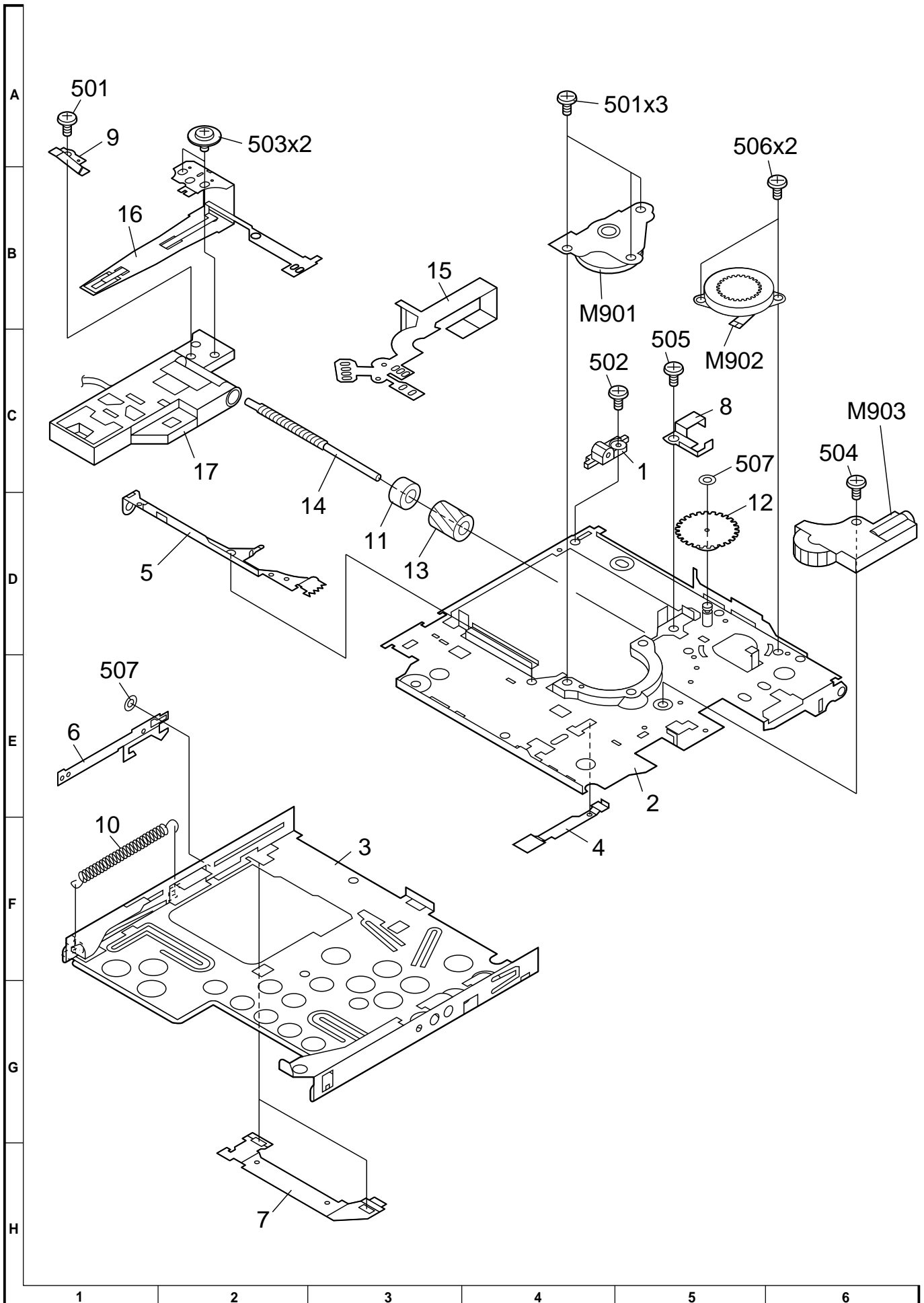


Figure 5 MD MECHANISM EXPLODED VIEW

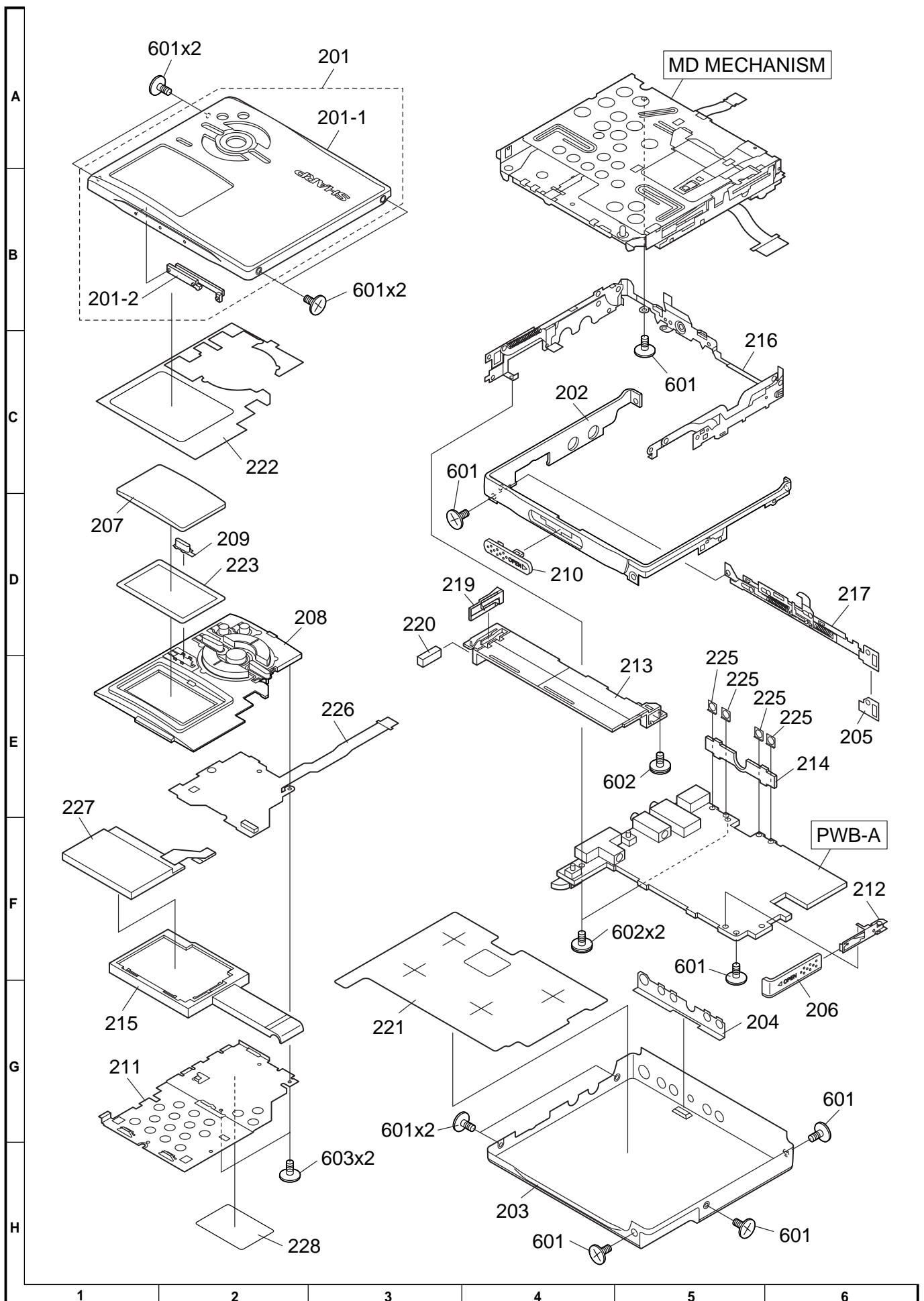


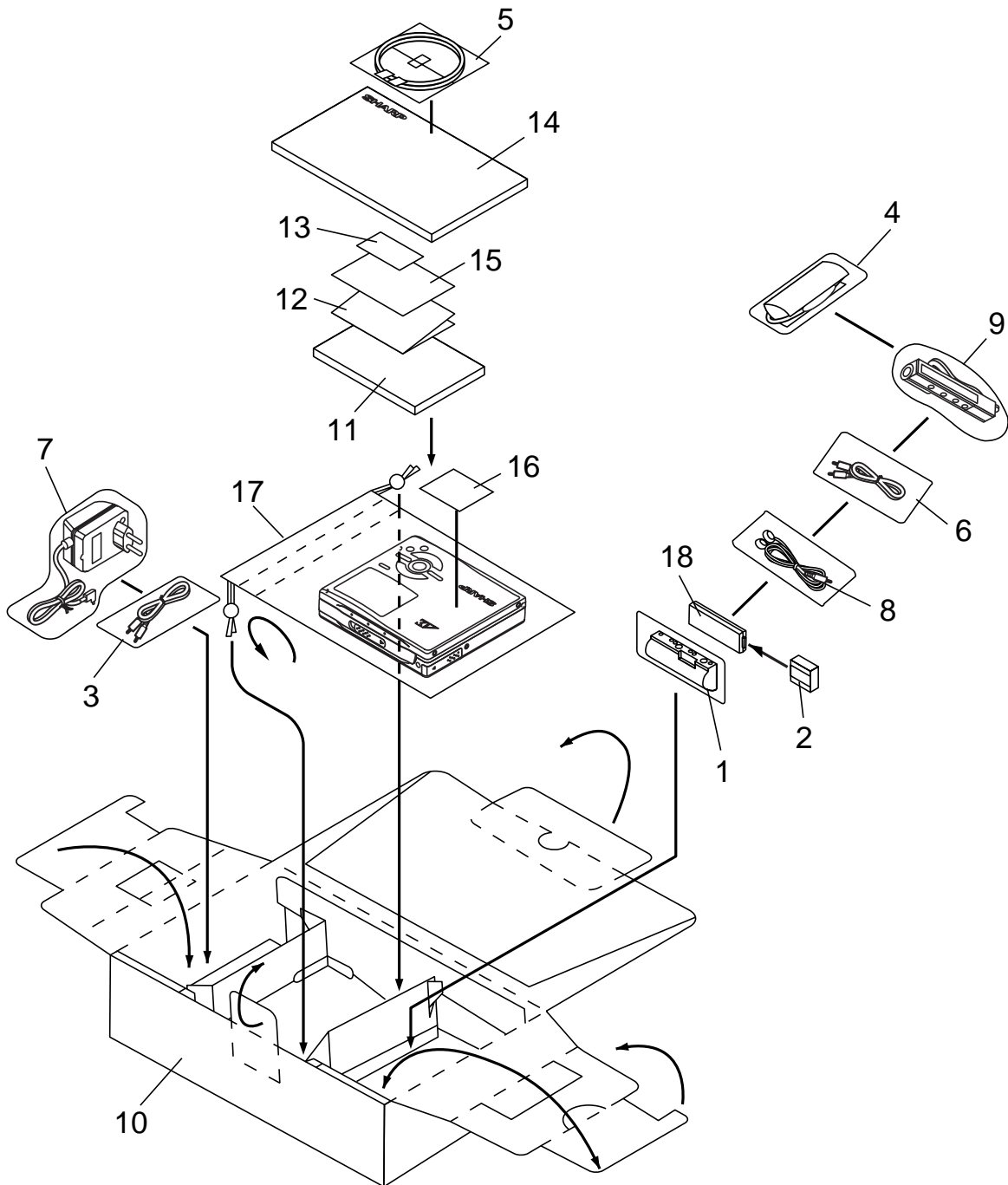
Figure 6 CABINET EXPLODED VIEW

MD-DR470H/MD-DR480H

PACKING METHOD (MD-DR470H FOR U.K. ONLY)

Setting position of switches and knobs		
Remote Control	HOLD	CANCEL

- | | | | |
|---------------------------------|---------------|----------------------------------|---------------|
| 1. Battery Case | GCASZ0005AWSA | 10. Packing Case [MD-DR470H(BL)] | SPAKC1597AWZZ |
| 2. Battery Carrying Case | PCōVW1015AWZZ | 11. Spacer, Operation Manual | SPAKZ0490AWZZ |
| 3. Connecting Cord | QCNWG0029AWZZ | 12. Service Card | TCADS0005AWZZ |
| 4. Output Conversion Cable | QCNWG0061AWZZ | 13. Warranty Card | TGANE0013AWZZ |
| 5. Optical Cable | QCNWG0422AWZZ | 14. Operation Manual | TiNSE0513AWZZ |
| 6. PC Link Cord | QCNWH0007AWZZ | 15. Quick Guide | TiNSE0514AWZZ |
| 7. AC Adaptor | RADPA8058AWZZ | 16. Label, Feature (for Set) | TLABZ1408AWZZ |
| 8. Earphones | RPHōH0021AWZZ | 17. Carrying Case | UBAGC0007AWSA |
| 9. Remote Control | RRMCW0023AWSA | 18. Rechargeable Battery | UBATM0009AWSA |
| 10. Packing Case [MD-DR470H(S)] | SPAKC1596AWZZ | | |



— M E M O —

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