Service Manual
Portable MD Recorder

SJ-MR100
MD unit: RAE1620Z Mechanism Series
Colour
(S)................Silver Type
Areas
EB................Great Britain.
EG..............Europe.
GH...........Hong Kong.

Specifications

Audio
System:
Laser: MiniDisc digital audio system
Semiconductor laser (=780 nm)
Sampling frequency: 44.1 kHz
Coding: Adaptive Transform Acoustic Coding (ATRAC)
No. of channels: 2 (left and right, stereo)
1 (monaural)
Frequency response: 20 Hz-20 kHz (+0 dB, -8dB)
Wow and flutter: Below measurable limit

General
Input terminal
OPT/LINE IN jack
Impedance: 47kΩ
Input level: SENS H: 178mV
SENS L: 500mV
MIC jack
Impedance: 600Ω
Input level: 0.4mV
Output terminal
Output Jack: Phones, 14Ω
Power output: 5 mW+5 mW

Power supply
Rechargeable battery: DC 1.2V
(included rechargeable battery)
Battery: DC 1.5V (One LR6, AA, UM-3 battery)
AC adaptor: DC 1.8V (included AC adaptor)
Dimensions (WxHxD):
Cabinet dimensions: 84x77x18.9 mm
incl.projecting parts: 84.9x78.3x20.5 mm
Weight: 161 g (with battery)
136 g (without battery)

Play time
(When used in hold mode, at 25°C, on a flat, stable surface)
Battery type:
Rechargeable: About 8.5 hours
Panasonic alkaline: About 10.5 hours
Both together: About 20 hours

Charger
Input: AC 220 V (GH) / AC230 V (EG) / AC 240V (EB), 50/60 Hz 8W
Recharging time: About 3 hours

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Notes:
- The play time may be less depending on the operating conditions.
- Specifications are subject to change without notice. Weight and dimensions are approximate.

WARNING
This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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1 Precaution of Laser Diode

CAUTION:
This product utilizes a laser diode with the unit turned “on”, invisible laser radiation is emitted from the pickup lens.
Wave length: 780 nm
Maximum output radiation power from pickup: 100 μW/VDE
Laser radiation from the pickup lens is safety level, but be sure the following:
1. Do not disassemble the optical pickup unit, since radiation from exposed laser diode is dangerous.
2. Do not adjust the variable resistor on the pickup unit. It was already adjusted.
3. Do not look at the focus lens using optical instruments.
4. Recommend no to look at pickup lens for a long time.

ACHTUNG:
Dieses Produkt enthält eine Laserdiode. Im eingeschalteten Zustand wird unsichtbare Laserstrahlung von der Laserinheit abgestrahlt.
Wellenlänge: 780 nm
Maximale Strahlungsleistung der Laserinheit: 100 μW/VDE
Die Strahlung der Laserinheit ungefährlich, wenn folgende Punkte beachtet werden:
1. Die Laserinheit nicht zieren, da die Strahlung an der freigelegten Laserdiode gefährlich ist.
2. Den werkseitig justierten Einstellregler der Laserinheit nicht verstellen.
3. Nicht mit optischen Instrumenten in die Fokussierlines blicken.
4. Nicht über längere Zeit in die Fokussierlines blicken.
2 Accessories

- Rechargeable battery with carrying case ............1pc.
  (RKF8BP140HSY)
- Battery case .................................................1pc.
  (RFA1320-S)
- Carrying case ..............................................1pc.
  (RFC0056-K)
- Wired remote control...............................1pc.
  (RFEV023P-SM)
- Stereo earphones .................................1pc.
  (RFEV319P-SA)
- Line cable ......................................................1pc.
  (RJL2P07X08)

For EB area
- AC adaptor .................................................1pc.
  (RFEA0035B-S)

For EG area
- AC adaptor .................................................1pc.
  (RFEA0036A-S)

For GH area
- AC adaptor .................................................1pc.
  (RFEA0040A-S)

3 Operating Instructions

Location of controls

Main unit

A. Stop/power/record button  
B. Play/record/pause/power on/character type button  
C. Display  
D. Volume/cursor buttons  
E. Changing edit mode, changing track mark mode, completing edit button  
F. Jog dial  
G. Tone/recording sensitivity/pace button  
H. Open switch  
I. Play and record mode/character delete button  
J. Hold switch  
K. Recording/pause/power on switch  
L. Microphone jack  
M. Headphone jack  
N. Optical digital line-in jack  
O. Connection terminal for battery case  

Stereo earphones

A. Plug  
B. Slider  

Wired remote control

A. Earphone jack  
B. Display  
C. Play/record/stop button  
D. Function select/hold switch  
E. Volume control/tone control/track mark button  
F. Volume/play mode/recording pause button  
G. Skip/search button  

Display information

- Synchronized recording display  
- Recording display  
- Manual play/recording display  
- Battery indication  
- Play mode  
- Remaining recording time  
- Text  
- Sound quality  
- Disc mark  
- Level meter

A. Stereo earphones  
B. Line cable  
C. Wired remote control  
D. Main unit
Power source

The rechargeable battery (included)

1. Put the battery into the unit.
   The unit cannot recharge batteries other than the one supplied or recommended replacements.
2. Connect the AC adapter.
   (1) DC IN Jack (DC IN 1.8 V - - )
   (2) Back panel of the unit
   (3) AC adapter (included)
   (4) Household mains socket.
   Recharging begins.
   "CHARGE" appears on the display while recharging.
   (5) Batteries
   "CHARGE" disappears when the battery is fully charged. It takes approximately 3 hours to recharge the supplied battery.
3. Disconnect the AC adapter from the DC IN 1.8 V - - terminal and the household mains socket.
   Note
   • The unit can only be recharged while it is off.
   • The AC adapter and battery may become warm during recharging but this is normal.
   • Recharging time and duration.
   (When using the included rechargeable battery.)
   Charging: Approx. 3 hours
   Playing: Approx. 6 hours
   Recording: Approx. 4.5 hours
   (2) Operation may be reduced under some conditions.
   • If the unit is to be used for long periods, such as during recording, use the AC adapter to power it.
   • Rechargeable number of times
   About 300
   This battery has reached the end of its useful life if play time dramatically reduces after recharging.
   • Replacement
   Nickel-metal hydride rechargeable battery (RP-HPRP140ESV).
   Please inquire at a Panasonic dealer for a replacement.

Dry cell battery (not included)

Use one LR6 alkaline battery. Use long-life Panasonic alkaline batteries.
1. Put the battery into the battery case.
   (1) External battery case (included)
   (2) LR6/UM-3 battery (not included)
2. Attach the case to the unit.
   (3) Bottom of the unit

Note
Insert the rechargeable battery when recording on dry cell batteries.

The battery indicator
The illustration shows how the indicator on the remote control display appears as battery power runs down.
(1) Full
(2) Empty
When the indicator starts flashing
The battery is almost flat and should be replaced or recharged.

For longer use
• You will be able to playback for 20 hours and record for 6.5 hours if the two types of batteries are used together.
• We recommend using long-life Panasonic alkaline batteries.

Using the AC adapter (included)

Connect the AC adapter.
Refer to the step 2 of "The rechargeable battery" for connection instructions.

Note
• The unit is in the standby condition when the AC adapter is connected. The primary circuit is always "live" as long as the AC adapter is connected to an electrical outlet.
• Use only the supplied AC adapter. Use of other adapters can damage the unit. If the unit is not to be used for a long time disconnect the AC adapter from the household mains socket and turn the unit off to save power.
The HOLD function

This function stops the player and remote control from responding when a button is pressed.

- Hold mode
- Release

- Guards against the following
  - The unit is powered on accidentally when not in use, causing the batteries to run down.
  - A button is accidentally pressed during play or recording, interrupting the operation.

Note

There is a HOLD switch on both the player and remote control, each of which works independently of the other.

- The "HOLD" display
  - This is displayed for about 2 seconds on the main unit and the remote control display when the following occurs:
    - The main unit is on hold and a button is pressed. (If off, display appears only if [CHAR] or [REC REPLAY] is operated.)
    - The remote control's switch is set to hold. The display also lights for about 5 seconds at this time.

Before recording

The two methods of recording

Digital

This method records the digital signals from CDs. Compared to analogue recording, this method makes it possible to make recordings of higher quality. Purchase an optical fiber cable (RP-CAD210 or RP-CAD3000, sold separately) to record digitally.

Analogue

Use this method to make analogue recordings of digital material, CDs and MDs, and to record analogue sources such as the radio. Use the included line cord to make analogue recordings.

The recording modes

Normal

This method allows you to start and stop recording manually.

Synchronized

This method starts and stops recording at the same time as the source being recorded. Available with both digital and analogue recording.

One track synchronized

The first track on a CD is recorded and then the unit goes to recording standby. Recording starts again automatically when the first track on another CD is played. Available only when recording CDs digitally.

Note

This function only works with tracks numbered "1".

Monsural

This mode allows you to record approximately double the amount of material normally possible. (For example, it is possible to record about 140 minutes worth of material onto a 74 minute MD.) Available only when analogue recording.

Track marks

- Track marks and track numbers
  - Use CDs, it is possible to select and play a track on an MD by selecting its track number. There are marks at the beginning of each track, called track marks, that make this possible. The period between each track mark is called a track.

- Putting track marks on an MD
  - The unit automatically decides where track marks are to be put.
  - Manual mark mode
    - You can manually put the track marks where you want them to go.

Time mark mode

(3 MIN, 5 MIN, 10 MIN)

Track marks are put at a preselected distance from each other.
**Recording**

1. **Connect the unit to a unit that has a digital output terminal.**
   - Digital output terminal (portable → portable)
   - Purchase an optical fiber cable (RPM-C2020, sold separately).
   - Digital output terminal (portable → portable)
   - Purchase an optical fiber cable (RPM-C2120, sold separately).

2. **Connect the unit to a unit that has stereo LINE OUT terminals.**
   - LINE OUT terminal

   **Note:**
   - Disconnect other cables from the [OPT/ LINE IN] terminal.
   - Stereo microphone (not included)
   - Purchase a stereo microphone (RPM-V2000, sold separately).

3. **Release hold.**
   - Remote control
   - Insert a recordable MD.
     1. Slide [OPEN] to the right.
     2. Open the lid.
     3. Insert disc with label facing upward.
        Push the disc in the center until it locks in place.
     4. Close the lid.

   **After an MD has been inserted the player turns on, reads the information from it, then, after a minute, the power goes off again.**

4. **Slide [REC PAUSE] to the right.**
   - The unit enters the recording mode.
   - If you have inserted an MD with recordings already on it, the unit prepares to record from the first available space.

5. **Press [PLAY, CHARA] (main unit) or the main button (remote control) to start recording.**
   - Main unit
   - Remote control
   - Rec: Begin

6. **Start playback on the source to be recorded or point the microphone at the source of the sound.**

   **Note:**
   - Recording level is automatically set.
   - Changes to volume will have no effect on recording.

   **To select the recording mode**
   - Press [MODE, DELETE] while in recording standby mode.

   **Each time the button is pressed the mode changes and an indicator is shown in the following order:**

   - [Normal (No display)] ➔ [SYNC] ➔ [SYNC 1]
   - [Normal (No display)] ➔ [MONO] ➔ [SYNC]
   - [Normal (No display)] ➔ [MONO] ➔ [SYNC]

   **Recording with microphone**

   - [SYNC]: Synchronized recording
   - [SYNC 1]: One track synchronized recording
   - [MONO]: Manual recording

   **If you have selected**
   - Synchronized recording (SYNC) or One track synchronized recording (SYNC 1)
     Recording begins automatically when you begin playback of the source.
   - Manual recording (MONO)
     Perform steps 5 to 6 to start recording.

   **Note:**
   - If you set the recording mode to "SYNC", recording begins immediately if the source is already playing.
**Recording**

**To pause recording**
- If you have selected Synchronized recording (SYNC)
  - Recording pauses if the source stops or if 2 seconds of silence is detected. (Track number increases by one.)
- Recording restarts when the source starts again.
- One track recording (SYNC)
  - The unit automatically pauses after track 1 finishes. (Track number increases by one.)
  - Recording restarts when another track numbered 1 is played.
- Normal recording (No display) or Manual recording

Press [1/1, CHARA] (main unit) or VOL, PLAY MODE, REC PAUSE (remote control) while recording.

<table>
<thead>
<tr>
<th>1</th>
<th>Main unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Remote control</td>
</tr>
<tr>
<td>3</td>
<td>Microphone</td>
</tr>
<tr>
<td>4</td>
<td>Base</td>
</tr>
</tbody>
</table>

To restart recording:
Press [1/1, CHARA] (main unit) or the main button (remote control).

**To stop recording**
Press [1, POWER OFF] (main unit) or main button (remote control) while recording.

**To turn the unit off**
Press [1, POWER OFF] while stopped.

---

**Adding track marks**

- When recording from CD
  - The track marks are put onto the MD as they are found on the CD. Each time a new track starts on the CD, the number of track marks on the MD increases by one.
  - Track marks may not be inserted accurately in some cases.
- When recording from digital sources other than CDs
  - 2 seconds of silence is determined as the division between tracks and a track mark is added.
To add track marks manually

**Analog recording**

2 seconds of silence is determined as the division between tracks and a track mark is added.
To add track marks manually

**Note**
- Track marks will not be added if the space between tracks is short or if there is noise in the space. Track marks may be added in error if there is a silent or especially quiet portion in a track. Use the editing functions after recording to add and remove track marks.

**Recording in advance**
- Add track marks manually or have the unit add the marks at selected intervals.

**Making good recordings**
- Power the unit with the AC adapter while recording. If you intend to use batteries, recharge the rechangeable battery fully and use a new dry cell battery.
- If the unit is turned off while recording, or when "UTOC Writing" is on the display, the recording will not be correctly recorded onto the disc.
- "REC ERROR" may appear on the display if the unit turns off while "UTOC Writing" is on the display.

---

**Do not open the lid or shake the unit while recording.**

An especially soft voice when "UTOC Writing" is on the display (WRITE) on the remote control. If the unit is moved at this time, the recording may not be correctly recorded onto the disc. You can damage the unit or disc if you try to force open the lid.

**Note**
- This unit has a sampling rate converter so recording from equipment (DHT deck, G5 tuner, etc) with a different sampling frequency is possible.
- When recording on dry cell batteries.

(For United Kingdom)
Your attention is drawn to the fact that recording pre-recorded tapes on discs or video published or broadcast material may infringe copyright laws.

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**Recording**

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Other recording functions

Ways of adding track marks

1. Press [EDIT, MARK MODE] while the unit is in the recording standby mode to select the required marking mode.

AUTO
Track marks are added automatically when the track changes.

MANUAL
Track marks can be added manually when required.

3 MIN
Track marks inserted at 3 minute intervals.

5 MIN
Track marks inserted at 5 minute intervals.

10 MIN
Track marks inserted at 10 minute intervals.

2. Press [MARK, CHARA] (main unit) or the main button (remote control) to start recording.

To add track marks manually:

Press the jog dial (main unit) or [VOL +, EQ, T.MARK] (remote control) when a track mark is required.

Track marks are added over if "MANUAL" has not been selected.

Checking the remaining time on the MD

This function allows you to check the time available for recording before you start recording or while recording is in progress.

Press [DISPLAY, CAPS LOCK] (main unit) or press and hold [ ], +LIGHT x DISP] (remote control) while in recording standby mode or during recording.

1. Main unit
2. Remote control
3. Sleep

The display changes each time this is done to show elapsed recording time and the remaining recording time.

Adjusting recording sensitivity

You can adjust the sensitivity of the unit for analogue recording.

Press [EQ/REC SENS, SPACE] while in recording standby mode.

The mode changes each time the button is pressed.

REC SENS L: REC SENS H

REC SENS L:
To record from stereo and radio cassette players

REC SENS H:
To record from portable equipment
Playback (Basic play)

1. Release the hold function.
   - Main unit
   - Remote control

2. Connect the earphones to the remote control then insert the remote control's plug into the headphone jack (C) on the player. (Plug in firmly.)

3. Open the player and insert an MD.
   - Slide (OPEN) to the right.
   - Open the lid
   - Insert disc with label facing upward. Push the disc in to the center until it locks in place.
   - Close the lid.

   After an MD has been inserted, the player turns on, reads the information from it, then, after a minute, the power goes off again. The name of the disc or song is shown on the display. The information scrolls from right to left across the display if it cannot be displayed all at once.

4. Press [CHARA] (main unit) or the main button (remote control) to start play.
   - Main unit
   - Remote control
   - Sleep

   The player stops automatically when all the tracks on the disc have been played.

5. Adjust the volume.
   - Main unit
   - Remote control
   - Sleep
   - To increase the volume level
   - To decrease the volume level

   Volume range is 0~25.

Playback (Basic play)

- To pause play
  Press [CHARA] (main unit) during play.
  Playback restarts when pressed again.

- To stop the disc
  Press [POWER OFF] (main unit) or the main button (remote control) during play.

- To turn the unit off
  Press [POWER OFF] (main unit) while stopped.

- Resume function
  The player stores the point at which play was stopped and if [CHARA] (main unit) or the main button (remote control) is pressed again, play begins from that point.
  This does not work if the player is opened or if the battery is removed. The player starts play from the first track in these cases.

- Monaural playback
  If a disc was recorded monaurally, the unit automatically switches to monaural playback mode.
  "MONO" appears on the main unit's display.

- Error
  If the display on the remote control disappears or seems unusual, disconnect the remote control then plug it in again firmly.
  This unit is vibration resistant but sound may skip if the vibration is constant.
Other playback functions

Skip
This function skips tracks and play begins from the beginning of the selected track.

Main unit
Operation is the same as for "Title search"

Remote control
Press during play.
1: Backward
2: Skip Skip Skip
3: Forward
3: Skip Skip Skip

For your reference:
You can skip more than one track by repeating this operation. The first skip backwards takes you to the beginning of the current track. Pressing the button in quick succession takes you back to previous tracks.

Search
This function allows you to fast-forward or rewind through tracks.

Main unit
During play, press and turn the jog dial.
1: Backward
2: Forward
Playback resumes when you release the dial.

Remote control
Hold down during play.
1: Backward
2: Forward

For your reference:
1. You can not fast-forward past the end of the last track. If you release the button at this point, the player stops.
2. You cannot rewind beyond the beginning of the first track. The player starts playing the first track if the button is released at this point.

Title search
This function allows you to begin listening from a selected track.

Main unit
1. Turn the jog dial to select the track while stopped or during play.
2. Backward
3. Forward
Track name and track number appear on the display.
After about 5 seconds (or when the title finishes scrolling if it takes more than 5 seconds) the previous display is restored.

Remote control
1. Press the jog dial to play the specified track.
2. Press the main button.
3: Skip

For your reference:
1. You can hold the button of the remote control in place to go through tracks.
2. No track on the remote control is pressed or the jog dial on the main unit is turned left while the first track is selected then the last track is selected.
3. No track on the remote control is pressed or the jog dial on the main unit is turned right while the last track is selected then the first track is selected.
Other playback functions

Repeat and Random play
Press [MODE, DELETE] (main unit) or [VOL - , PLAY MODE, REC PAUSE] (remote control) when the player is stopped or playing.

A Main unit
B Remote control
C: Sleep

Every time the button is pressed the mode changes and an indicator is shown on the display in the following order.

1 track repeat (1) (2)
One track is played over and over.

All track repeat ( )
All tracks on the disc are repeated.

Random (RANDOM, RND)
All tracks are played randomly.

Normal (no indicator is shown)

Note
If you have selected the mode while stopped, press [ - , CH/PA] (main unit) or the main button (remote control) to start playback.

For your reference:
- When the player is in the all-track repeat mode, you can skip (on the remote control) and search beyond the first and last track.
- You cannot skip or search back to a track that has already been played when in random mode.
- If you specify a track with the main unit during random play, random play begins again from that track.
- The modes are cleared after changing discs.

Sound quality
Press [EQ/RECS, SPACE] (main unit) or [VOL +, EQ, T.MARK] when the player is stopped or playing.

A Main unit
B Remote control
C: Sleep

Every time the button is pressed the mode changes in the following order.

Normal (no indicator is shown)

TRAIN
Increases the power of the bass sounds.

Note
If you selected the mode when stopped, press [ - , CH/PA] (main unit) or the main button (remote control) to start playback.
### Other playback functions

**Change the display**

Press [DISPLAY, CAPS LOCK] (main unit) or press and hold [FAST FORWARD, LIGHT, +DISP] (remote control) when the player is stopped or playing.

- **Main unit**
- **Remote control**
- **Track number**
- **Track name**
- **Elapsed playing time**
- **Remaining playing time**
- **Remaining recording time**
- **Title**
- **Total number of tracks**
- **Total playing time**
- **While stopped**
- **While playing**

- Changes each time this button is pressed.
- Changes automatically after a few seconds. "NO TITLE" (main unit) or "- - - -" (remote control) is displayed when the disc contains no track or disc titles.

### Other useful functions

**About the display**

- **To light the remote control’s display**
  The display lights for about 5 seconds when an operation is done on the remote control. It remains lit for up to 30 seconds while a track or disc title is scrolling on the screen.

- **Checking the display of the remote control**
  Press [FAST FORWARD, LIGHT, +DISP]. The display lights for 5 seconds.

- **Adjusting the display’s contrast**
  1. Turn the unit on and put it in hold.
  2. Press and hold [HI, CHARA] on the main unit and...
  3. Press [- - - - - - - VOL/CURSOR] (main unit) or [VOL +, EQ, T.MARK] or [VOL - PLAY MODE, REC PAUSE] (remote control).

**The operation tone of the remote control**

A tone sounds when a button on the remote control is pressed.

The tone can be turned on and off.

Press and hold the main button until the following display appears.

- **To turn on**
- **To turn off**

**Note**
If the above is done during play, play stops and power automatically goes off in about 1 minute.
**Editing MDs**

**MOVE (Moving tracks)**
Rearranges the order of the tracks. The new order is recorded onto the MD so the tracks are always played in the order.
1. Press [EDIT, MARK MODE] while stopped.
2. ① Turn the jog dial to select "MOVE".
   ② Press it.
   Now the display is in the mode to select track to be moved.
3. ① Turn the jog dial to select the track to be moved.
   ② Track number decreases
   ③ Track number increases
   ④ Press it.
   ⑤ Track being moved
   ⑥ New position
   Now the display is in the mode to select the new position.
4. ① Turn the jog dial again to select the new position.
   ② Track number decreases
   ③ Track number increases
   ④ Press it.
   The display asks you to confirm your selection.
5. Press [EDIT, MARK MODE].
   When "UTOC Writing" goes out editing is complete and the unit stops.

To stop part way through an editing operation
Press [POWER OFF] before confirming the operation in step 5.

**ERASE (Erasing tracks)**
Erases one track at a time with TRACK ERASE, or erase all of the tracks on the MD with ALL ERASE. When tracks are erased with TRACK ERASE, the tracks following move back to fill in the space and the number of tracks counts by one each time the operation is performed.

**ALL ERASE**
1. Press [EDIT, MARK MODE] while stopped.
2. ① Turn the jog dial to select "ALL ERASE".
   ② Press it.
   The display asks you to confirm your selection.
3. Press [EDIT, MARK MODE].
   When "UTOC Writing" goes out editing is complete and the unit stops.
   ("BLANK DISC" appears on the display)

To stop part way through an editing operation
Press [POWER OFF] before confirming the operation in step 3.

**NOTE**
ALL ERASE cannot be used while the disc is playing or paused.
**Editing MDs**

**TRACK ERASE**

1. Press [EDIT, MARK MODE] while stopped.
2. ① Turn the jog dial to select "TRACK ERASE?". Press it. Now the display is in the track selection mode.
3. ② Turn the jog dial to select the track to erase.
   ① Track number decreases
   ② Track number increases
4. ③ Press it. The display asks you to confirm your selection.
5. Press [EDIT, MARK MODE]. When "DELETE Track" goes out editing is complete and the unit stops.
7. When performed while playing or paused
   1. Press [EDIT, MARK MODE] while the track you want to erase is playing or paused.
   2. ① Turn the jog dial to select "TRACK ERASE?". Press it. The display asks you to confirm your selection.
   3. Press [EDIT, MARK MODE]. When "DELETE Track" goes out editing is complete and the unit stops.

**COMBINE**

Combining 2 tracks)

Remove a track mark from between two tracks, effectively making them one track. (If you combine tracks 2 and 3, for example, the track will take the number 2 and also retain the title for track 2.)

1. Press [EDIT, MARK MODE] while playing the letter of the two tracks you want to combine (or while paused).
2. ① Turn the jog dial to select "COMBINE?". Press it. The display asks you to confirm your selection.
3. Press [EDIT, MARK MODE]. When "DELETE Track" goes out editing is complete and the unit stops.
4. To stop part way through an editing operation: Press [POWER OFF] before confirming the operation in step 3.
5. When performed while stopped
   1. Press [EDIT, MARK MODE] while the disc is stopped.
   2. ① Turn the jog dial to select "COMBINE?". Press it. The display is in the mode where the tracks are combined.
   3. ① Turn the jog dial to select the two tracks to combine.
   4. Press the jog dial.
5. Press [EDIT, MARK MODE]. When "DELETE Track" goes out editing is complete and the unit stops.

**NOTE**

- COMBINE does not work while playing track 1.
- You cannot combine a track recorded normally and a track recorded monaurally.
Editing MDs

DIVIDE (Dividing a track into two)

This allows you to add track marks, making it easy to divide a classic piece into its separate movements, for example.

1. Press [EDIT, MARK MODE] while playing the track you want to divide.
2. ① Turn the jog dial to select "DIVIDE".
   ② Press it at the point you want to divide the track.
   A 4-second segment (8 seconds if track is monaural) of the track is played repeatedly, beginning at the point selected.
3. To adjust the point
   Turn the jog dial to adjust the point. Adjustments can be made approximately 8 seconds (16 seconds if track is monaural) either side of the original point. (-128 to +127)
4. Press the jog dial.
   The display asks you to confirm your selection.
5. Press [EDIT, MARK MODE].
   When "OTOC Writing" goes out editing is complete and the unit stops.

To stop part way through an editing operation

Note
① If you divide a track with a title, the latter track becomes unidentified.
② DIVIDE cannot be used while the unit is stopped.

Titling MDs

Titling discs and tracks

Tracks and discs can have a title up to 100 characters long.

1. Press [EDIT, MARK MODE] while stopped.
   "TITLE" appears on the display.
2. ① When titling a disc
   ② Press the jog dial.
   "DISC TITLE:" appears on the display.
   ③ Press it again.
   The text editing mode is entered.
3. When titling a track
   ① Press the jog dial.
   "DISC TITLE:" appears on the display.
   ② Turn it to select the track you want to title.
   ③ Press the jog dial.
   The text editing mode is entered.
4. Enter the title. (See page 62.)
4. Press [EDIT, MARK MODE].
   When "OTOC Writing" goes out editing is complete.

After titling a disc
The display automatically shows the track titling display. Follow the steps for titling tracks.

To stop part way through an editing operation
Press [POWER OFF].
The normal display is restored.
Copying a title from one MD to another (TITLE STATION)

This unit temporarily records the titles from one MD so they can then be copied onto another MD.

Before proceeding:
- You cannot copy titles from prerecorded MDs.
- You can copy the title only if both MDs have the same number of tracks.
- Any titles on the second MD are replaced when this function is used.

1. Insert the MD with the title.
2. Press [EDIT], [MARK MODE] while stopped.
3. Turn the jog dial to select "TITLE COPY".
4. Press it.
5. "TAKEOUT DISC" is displayed when the unit has recorded the title.
6. Eject the MD.
7. "CHANGE DISC" is displayed when the MD is opened.
8. Insert the other MD.
9. After "TOC Reading" is displayed, the display asks you to confirm the operation.

Press [EDIT, MARK MODE]. When "TITLE WRITING" passes out editing is complete and the unit stops.

Entering text

1. Press [CHARA] to select the type of character. The type changes each time the button is pressed.
2. Press it to enter the character.
3. Press it to exit the character.
4. Press it to enter the character.
5. Press it to enter the character.
6. Press it to enter the character.
7. To move the cursor:
   - Press [-], [+], [VOL/CURSOR].
   - Left
8. To erase a character:
   - Press [MODE, DELETE].
   - The characters after the erased character move back to take its place.
**Tilting MDs**

- **Correcting titles**
  1. Press [-, +, -, VOL/CURSOR] to move the cursor over the character you want to correct.
  2. (i) Turn the jog dial to move the cursor over the character you want to enter.
  (ii) Press it to enter the character. The new character replaces the old one.

- **To insert an extra character**
  1. Press [-, +, -, VOL/CURSOR] to move the cursor over the place you want the character to go.
  2. Press [EQ/REC SENS, SPACE].
  3. (i) Turn the jog dial to select the character to enter.
  (ii) Press it to enter the character. The character is inserted.

- **Changing capitals into lower case or lower case into capitals**
  1. Press [-, +, -, VOL/CURSOR] to move the cursor over the character you want to change.
  2. Press [DISPLAY, CAPS LOCK].

- **To exit the text editing mode**
  Press [M, POWER OFF]. The normal display is restored.
Using the unit with optional accessories

- Read the operating instructions of the items to be used.
- Use the recommended accessories to ensure correct operation.

Connection to a stereo system
You can listen to or record the sound from this unit on other audio equipment. Disconnect the headphones from the remote control and connect the stereo equipment with one of the following line cords.

- Line connection
  - Use the included line cord.
  - A mini-phone jack.
  - Obtain the optional line cord.
  - Headphone jack
  - Line cord
  - Amplifier
  - White (white)
  - Red (red)

- Turn off the power to all units before making connections.
- Either turn the remote controller's operation mode off or perform the operations on the unit itself.

Some useful information about MDs

- Types of MDs
  - Pre-recorded MDs
    - These discs are for playback only.
  - Recording MDs
    - Apart from the time limitations, it is possible to record up to 254 tracks on an MD.

- Care and storage
  - Label MDs only as recommended. Extra labels and exposed adhesive can cause malfunctions.
  - Do not open the shutter. Close it immediately if it accidentally opens. Never touch the disc inside the MD cartridge.

- Protecting your recordings
  - Move the switch to open the write-protect hole. Close the hole when you want to record or edit the MD signals.

- Recording MDs
  - MDs are different to tapes
    - MDs give you control over how tracks are recorded and editing functions allow you to change the contents of an MD after recording. Unlike cassettes, it is not necessary to load an empty portion to record onto. All recordings start from the first available space. The MD fills up and when the disc is full, either because the time limit has been reached or 204 tracks have been recorded, recording is no longer possible. You can use the editing functions to erase and move your recordings around within the MD.

- Limitations on digital recording
  - The serial copy management system (SCMS) prevents unlimited recording of digital material. Digital recordings are of high quality, but to protect the rights of the producer of the original material, it is only possible to make one digital recording of a digital recording. This also applies if you record audio material digitally. That digital recording can be recorded digitally once more, but is locked after that. analogue recordings are otherwise unaffected.

- Glossary of terms
  - TOC: Table of contents. Information stored on the MD about the tracks and times.
  - UtOc: User table of contents. This is information the user can edit, such as text and track positions.
  - The message "UtOc Writing" appears on the display during editing.
Troubleshooting guide

Before requesting service for this unit, check the chart below for possible causes of the problem you are experiencing. Some simple checks or a minor adjustment on your part may eliminate the problem and restore proper operation.

If you are in doubt about some of the check points, or if the remedies indicated in the chart do not solve the problem, refer to the directory of Authorized Service Centers (enclosed with this unit) to locate a convenient service center, or consult your dealer for instructions.

![Troubleshooting guide chart]

Displays

A blank disc has been inserted.
The reason is shown on the lower line of the display.
The limitations of the system sometimes mean tracks cannot be combined.
The limitations of the system sometimes mean tracks cannot be divided.
The reason is shown on the lower line of the display.
Check the digital optical fiber cable connections and try again.
There is a problem with the disc and it needs to be replaced.
The maximum time or number of tracks has reached. Either erase some tracks or record with another disc.
The write protect hole is open. Close it to enable recording and editing.
A problem occurred during recording. Either the MD, or the MD and record from the beginning again.
There is a problem with the MD. The MD is open and recording is not possible.
The problem did not resolve itself.
The disc is not inserted.
The disc cannot be played back. It cannot be recorded.
You are trying to make a second copy of a digital recording.
You are trying to record on the last beyond 100 characters.
The display appears for one of the following reasons:
- The maximum number of tracks (254) has been reached; erase unwanted tracks to make room.
- Due to limitations of the recording system, UTGC may become full before the maximum number of tracks or time capacity is reached. Replace the MD.
- The section reserved for track information is full; erase unwanted tracks in main menu.

Maintenance

If the surfaces are dirty
To clean this unit, wipe with a soft, dry cloth.
If the surfaces are extremely dirty, use a soft cloth dipped in a soap-and-water solution or a weak detergent solution.
- Never use alcohol, paint thinner or benzine to clean this unit.
- Before using chemically impregnated cloth, read the instructions that come with the cloth carefully.
4 Handling Precautions for Traverse Deck (Mechanism Unit)

The laser diode in the mechanism unit (optical pickup) may break down due to potential difference caused by static electricity of clothes or human body. So, be careful of electrostatic breakdown during repair of the mechanism unit (optical pickup).

4.1. Mechanism Unit (optical pickup)

1. Do not subject the mechanism unit (optical pickup) to static electricity as it is extremely sensitive to electrical shock.
2. Before you take off MD mechanism unit (optical pickup), short the short-land of the flexible P.C.B. by using a solder. (refer to Fig. 1)
3. Take care not to apply excessive stress to the flexible board (FFC).
4. Do not turn the variable resistor (laser power adjustment). It has already been adjusted.

4.2. Caution for repairing of MD mechanism (optical pickup)

The short-land of MD mechanism (optical pickup) as solder after you insert the flexible P.C.B. into the connector. replacement part is shorted with a solder build-up. Remove the

4.3. Grounding for electrostatic breakdown prevention

1. Human body grounding
   Use the anti-static wrist strap to discharge the static electricity from your body. (As shown in Fig. 2.)
2. Work table grounding
   Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet.

Caution:

The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the traverse deck (optical pickup).
5 Operation Checks and Main Component Replacement Procedures

**NOTE**
1. This section describes procedures for checking the operation of the major printed circuit boards and replacing the main components.
2. For reassembly after operation checks or replacement, reverse the respective procedures. Special reassembly procedures are described only when required.
3. Select item from the following index when checks or replacement are required.

- **Contents**
  - Checking Procedures for each P.C.B.
    1. Checking for the main P.C.B.
    2. Checking for the rec head P.C.B.
  - Main Component Replacement Procedures
    1. Replacement for the LCD.
    2. Replacement for the intermediate cabinet ass'y.
    3. Replacement for the spindle motor ass'y.
    4. Replacement for the traverse motor and lift motor.
    5. Replacement for the magnetic head and optical pickup ass'y.

- **Checking Procedures for each P.C.B.**
  1. Checking for the main P.C.B.
     (Checking for the main P.C.B. (A side))

    - **Step 1**
      - Open the battery cover.
    - **Step 2**
      - Remove the cabinet ass'y.
    - **Step 3**
      - Store the rechargeable battery, and then close the battery cover.
      - Check the main P.C.B. (A side) as shown below.

- **Checking for the main P.C.B. (B side)**
  - Each part on main P.C.B. (B side) can not be checked directly, however, for the checking of main component parts on P.C.B., refer to the "Checking procedures of main components parts on the main P.C.B. (B side)."
2. Checking for the rec head P.C.B.

- Follow the Step 1 ~ Step 4 of the Item 1 in checking procedures for each P.C.B.

**Step 1**
Push the open knob, and then open the disc cover ass'y.

**Step 2**
Release the claw.

**Step 3**
Release the hooks of both sides, and then place the disc cover ass'y backward.

- Check the rec head P.C.B. as shown below.

---

Main Component Replacement Procedures

1. Replacement for the LCD

- Follow the Step 1 ~ Step 4 of the Item 1 in checking procedures for each P.C.B.
- Follow the Step 1 ~ Step 3 of the Item 2 in checking procedures for each P.C.B.

**Step 1**
Remove the FFC from the connector (CN701).

**Step 2**
Remove the disc cover ass'y.

**Step 3**

**Step 4**
Remove the operation P.C.B. angle.
Notice for Installation of operation P.C.B. angle ass'y

- When installing the operation P.C.B. angle ass'y to the disc cover ass'y, locate the rec knob in the direction of arrow fully, and then align it with notch of rec lever.

2. Replacement for the Intermediate cabinet ass'y

- Follow the Step 1 ~ Step 3 of the item 1 in checking procedures for each P.C.B..

Step 1
Push the open knob, and then open the disc cover ass'y.

Step 2
Release the claws (A) at both sides of intermediate cabinet ass'y.

Step 3
Release the claw (B), and then remove the Intermediate cabinet ass'y with spreading those both sides.

NOTE
When installing the LCD, align it with hooks, and then lock it with claw.
Notice for installation of intermediate cabinet ass'y

1. Align the claw of hold with the slot of hold lever.

2. Align the claw of open with the slot of open lever.

3. Replacement for the spindle motor
   - Follow the Step 1 ~ Step 3 of the item 1 in checking procedures for each P.C.B.
   - Follow the Step 1 ~ Step 3 of the item 2 in main component replacement procedures.

   **NOTE**
   Insert a short pin into the traverse unit FFC board.
   (Refer to "Handling Precautions for Traverse deck".)

Step 3
Release the claw, and lift up the main P.C.B.

**Notice of installing the main P.C.B.**
- Align the boss of hold switch with the notch of hold lever.

Step 4
Release the jack from the hole of chassis, and then remove the main P.C.B.

**Step 5**
Remove the spindle motor.

**NOTE**
Never touch the set screws for magnetic head.

**NOTE**
Remove the FFC through the slot of main P.C.B. gradually to prevent damage to the surface of FFC.
4. Replacement for the traverse motor and lift motor ass'y

- Follow the Step 1 ~ Step 3 of the item 1 in checking procedures for each P.C.B.
- Follow the Step 1 ~ Step 3 of the item 2 in main component replacement procedures.
- Follow the Step 1 ~ Step 4 of the item 3 in main component replacement procedures.

**Step 1**
Remove the washer, and then pull out the intermediate gear.

**Step 2**
Release the 2 claws in the direction of the arrow, and then remove the drive gear (L).

**Step 3**
Remove the washer, and then pull out the down gear and relay gear.

**Step 4**
Remove the traverse motor and lift motor ass'y.

**Step 5**
Remove the traverse motor and lift motor ass'y.

**Step 6**
Peel the FFC.

**Step 7**
Unsolder the lift motor terminal.

---

**Notice for installation motor gear**

- The spring should be interfered with the end of motor gear.
Notice for installation of drive gear (L)

1. Slide the drive rod in the direction of arrow fully.

2. Rotate the drive gear (L) slightly to recognize the engagement of drive rod and relay gear, and then push to install them.

5. Replacement for the magnetic head and optical pickup ass'y

- Follow the Step 1 ~ Step 3 of the item 1 in checking procedures for each P.C.B..
- Follow the Step 1 ~ Step 3 of the item 2 in checking procedures for each P.C.B..
- Follow the Step 1, Step 2 of the item 1 in main component replacement procedures.
- Follow the Step 1 ~ Step 3 of the item 2 in main component replacement procedures.
- Follow the Step 1 ~ Step 4 of the item 3 in main component replacement procedures.

Step 4
Remove the washer, and then pull out the intermediate gear.

Step 5
Release the 2 claws, and then remove the spring.

Step 6
Remove the FFC from the connector.

Step 7
Raise the magnetic head in the direction of arrow, fix it with wire such as paper clip.

NOTE
Handle with care to the magnetic head.

Step 8
Lift up the optical pickup, and then remove the drive shaft from the slot of mechanism.

Remove the chassis.
Step 9
Remove the magnetic head and optical pickup.

NOTE
1. Use care to prevent damage the optical pickup, due to the precision construction.
2. Do not touch the lens of the optical pickup.
3. Never touch the set screws for magnetic head.
6 Operating Procedures

6.1. Operating Procedures

Play
1. To read the signals recorded on the disc, the laser beam emitted by the laser diode (LD) strikes the disc and is reflected back and detected by the photodetector (PD).
   - For a pre-mastered disc, similar to a CD, the signals are recorded as pits on the surface of the disc, and the signals are detected by the amount of light reflected when the laser beams strikes the pits.
   - For a recordable disc, the signals are recorded by magnetizing the magnetic film on the surface of the disc and there is no variation in the amount of light that is reflected, so the signals are detected using the shifting of the polarization of the reflected light due to the Kerr effect (*1).
2. The detected signals are input to pins 38 and 39 of the RF IC (IC1), where they are amplified and then output from pin 32.
   - By observing the input signals (between pins 38 and 39) and the output signals (pin 32) on an oscilloscope, it is possible to check the eye pattern.
   - This unit SJ-MR100 makes the disc rotate double velocity, reading the signal from disc at double velocity. It has blank about 40 seconds till next reading after reading the signal once.
3. Error correction of the amplified signals is performed by the MD LSI (IC101:MN66616) using EFM demodulation and ACIRC (*2) and the signals are stored in the 16M DRAM (IC102:MNA7400CWAIT). At this time, the cycle of the signals is adjusted by the LSI’s clock in order to eliminate any jitter that might result from irregular revolution of the disc.
4. The signals are sequentially taken from 16M DRAM (IC102) and send back to MD LSI (IC101), where they are ATRAC (*3)-decoded.
   The above-mentioned items 1-4’s signals are all digital.
5. Digital audio signals that are outputted from MD LSI, inputted to 15pin of AD/DA converter (IC631:AK4518), converted to analog signal and outputted from 19 (left channel) and 18 (right channel) pins.
   - The exchange of signals between the DRAM and the MD LSI is performed using four data lines (pin 1, 2, 24 and 25 of the DRAM and pin 43, 44, 45 and 46 of the MD LSI).

Record
1. Analog signal that is inputted from MIC IN or LINE IN, is amplified at LINE/MIC AMP, inputs to 6 (left channel) and 3 (right channel) pins of AD/DA converter (IC601).
2. The analog signals input to the A/D-D/A converter (IC601) are converted to digital signals with a sampling frequency of fs=44.1kHz and then output from pin 12 to pin 65 of the MD LSI (IC3).
3. The signals input from OPTICAL IN are input to pin 70 of the MD LSI (IC3).
4. The signals input to pin 70 of the MD LSI (IC101) are converted to a sampling frequency of fs=44.1kHz by an fs converter inside the LSI. If the signals are already fs=44.1kHz, they bypass the fs converter.
5. The signals converted to fs=44.1kHz or the signals input to pin 65 are ATRAC-encoded and stored in the 16M DRAM (IC102).
6. The signals are sequentially taken from the 16M DRAM (IC102) and sent back to the MD LSI (IC101), where they are ACIRC-processed and EFM-modulated and then output from pin 73 and pin 73 to the magnetic head.
7. The magnetic disc records the signals onto the disc by magnetizing the magnetic film on the surface of the disc. During recording the laser diode emits its laser beam in order to raise the temperature to the Curie temperature (*4) that is required to magnetize the magnetic film. For this reason, the optical power of the laser diode is higher during recording than during playback.
   In the case of this unit SJ-MR100, it is performed to write to the disc with double velocity (disc rotation is also double velocity). TOC writing is continuous movement (recording signal to magnetic head is sent with continuously).

Control
1. Performs the necessary controls for each operation during playback and recording and for writing of the UTOC (*5) at the end of recording.
   - The information written in the UTOC includes the recorded track numbers and their addresses, text data, etc.
2. Performs the necessary displays of the text data recorded on the disc and for each operation.
   The system is designed for integrated operation, so that the system control IC (IC101) on the MD servo PCB.

Clock
- The controls of the playback signal, recording signals, 4-channel driver IC, and of the RF IC (IC1) all function using the clock on the MD LSI as the master clock.
- A/D-D/A converter (IC601) is using FS384 signal of MD LSI as clock.
1. Kerr effect
   A phenomenon in which the polarization plane of laser light reflected from a material shifts in one of two directions depending upon its "plus" or "minus" magnetic polarization.

2. ADD on Interleave CIRC
   The aim of Add-on Interleave is to improve the resistivity in CD-ROM decoder from the burst error on the disc.

3. ATRAC........ Adaptive Transform Acoustic Cording
   The digital data compressing system developed for MiniDisc in which audio signals can be reproduced with only about 1/5th of the data normally required for high fidelity reproduction.

4. Curie temperature
   The temperature at which magnetism of a specific material dissipates. This temperature varies according to the material.

5. UTOC........ User Table Of Contents
   Found only on recordable MiniDiscs, this area contains subdata (track number, etc.) which can be rewritten by the user.

6.2. Block Diagram
7 Measurements and Adjustments

Note:

If you exchange mechanism unit “RAE1620Z” when you repair, you must perform the automatic adjustment and checking of “playback-only disc” “magneto-optical disc” at the “adjustment mode”.

Instruments to prepare

1. Test disc (Playback-only disc)
2. Commercially available recordable disc (fully recorded with music) (magneto-optical disc)
3. Laser power meter (Advantest TQ8210 or compatible meter)
4. Insulated driver for adjustment such as a ceramic driver
5. Remote controller

Laser power adjustment, Playback-only disc/magneto-optical disc automatic adjustment

How to enter adjustment mode

1. Check the PC board. (Refer to the item of “Checking for the P.C.B.” in “Operation Checks and Main Component Replacement Procedures”).
2. Set the battery and connect the remote controller.
3. Make the optical pickup move to the center of the moving range.
   - How to make it move.
     a. Play the track No.4 or 5 of Playback-only disc.
     b. Remove the battery on the playing (switch off the power).
     c. Remove the disc. Confirm that the optical pickup’s position is about in the center, and close the disc cover.
     d. Switch on the power.

Note

If the optical pickup does not move to the center by this method, you don’t have to adjust. You must repair with referring to “Troubleshooting Guide”.

4. Turn off the power, and switch main unit’s HOLD switch off.
5. Turn off the power. Then, with the main unit’s HOLD switch at OFF, press the VOL+, VOL-, ►►, and ◄◄ buttons on the remote controller within two seconds without pressing the OFF button.
   a. Using your thumb, while pressing the VOL+ button, also press the VOL- button.
   b. Then, while still pressing the VOL- button, release your thumb from the VOL+ and press the ►► button.
   c. While still pressing the ►► button, release your thumb from the VOL- button and press the ◄◄ button. Then, while still pressing the ◄◄ button, release your thumb from the ◄◄ button and then from the ►► button.
   (a-c are shown in Fig.3)

6. When the adjustment mode is activated, “TA” will be displayed on the LCD of remote controller. After “TA” is displayed, select the desired adjustment item with the ►► button or ◄◄ button of the remote controller.

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### Adjustment mode

<table>
<thead>
<tr>
<th>Adjustment mode</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playback-only disc automatic adjustment</td>
<td>T1</td>
</tr>
<tr>
<td>Magneto-optical disc automatic adjustment</td>
<td>T2</td>
</tr>
<tr>
<td>Playback-only disc automatic adjustment value check</td>
<td>T3</td>
</tr>
<tr>
<td>Magneto-optical disc automatic adjustment value check</td>
<td>T4</td>
</tr>
<tr>
<td>Laser power check</td>
<td>T5</td>
</tr>
<tr>
<td>ADIP/EFM jitter measurement (double velocity)</td>
<td>T6</td>
</tr>
<tr>
<td>ADIP error rate measurement (double velocity)</td>
<td>T7</td>
</tr>
<tr>
<td>Error rate measurement (double velocity)</td>
<td>T8</td>
</tr>
<tr>
<td>Tilt measurement (disc middle speed)</td>
<td>T9</td>
</tr>
<tr>
<td>PWB inspection (audio test)</td>
<td>TA</td>
</tr>
<tr>
<td>PLAY/REC erase mode</td>
<td>TB</td>
</tr>
<tr>
<td>No blank disk play mode</td>
<td>TC</td>
</tr>
<tr>
<td>Asing mode</td>
<td>TD</td>
</tr>
<tr>
<td>(Spare)</td>
<td>TE</td>
</tr>
</tbody>
</table>

*In the display of T1 ~ TA shown above, you must adjust T1, T2 and T5. You must perform the adjustment by observing the order T5→T2→T1.

### 7.1. Laser Power Adjustment

Adjust each laser power: read power for reading (play) and write power for writing (record).

#### 7.1.1. Set the Unit to the Adjustment Mode

**Cautions**

1. **About handling the MD unit**
   - The magnetic head is a precision unit and is very fragile. Do not deform it.
   - Laser diode in the optical pickup may be destroyed by the static electricity generated in your clothes or body. Be especially careful with the static electricity.
   - The optical pickup is structured extremely precisely. Do not subject to the strong impact or shock. Do not touch the lens.

2. **About the driver for adjusting laser power**
   Use only insulated driver such as a ceramic driver. With the metal driver, it is not possible to adjust properly because of the induction noise. Also, if it short-circuits with the chassis, it may destroy or damage the laser diode.

   Recommended driver: VESSEL 9000 1.8 -30 (Ceramic driver)

3. **Cautions on optical pickup:**
   - The optical pickup and the magnetic head are structured precisely; therefore, they are very fragile. Be careful not to touch them with the edge of the laser power meter.
   - The sensor of the laser power meter is a very fine part. Be careful not to touch it to the optical pickup lens.
   - Do not loosen or remove the magnetic head installing screw.
   - The focus point of the laser reaches to 356°F. Therefore, avoid adjusting using laser power for a long time because the sensor of the laser power meter may be burned.
   - Do not allow the write power to even momentarily reach or exceed 5 mW. Doing so will result in damage to the optical pickup.

   - Do not set the unit to the laser power adjustment mode with the MD loaded. Doing so may result in damage to the MD.

4. **Adjustment Procedure**

   1. Show "T5" on the LCD by pressing the ▶️ or ◀️ button of the remote controller.
   2. Make the sensor cover of the laser power meter slide. (refer to Fig.4)

   ![Fig.4](image_url)

   3. Set the laser power meter. (refer to Fig.5)

   ![Fig.5](image_url)

   4. Press the PLAY key of the remote controller ("T5" changes to "LP" of the LCD).
   5. Performe the read power adjustment. Turn VR1 and set to 600uW±10%. (refer to Fig.6)

   ![Fig.6](image_url)

   6. Press the ▶️ key of the remote controller ("LP" changes to "BLDA" in the LCD).

   Specified range (read power): 600 uW±10% or lower

   **Caution:**

   - Proceeding on to the subsequent adjustment procedure with the read power exceeding 600uW±10% will result in damage to the optical pickup.

   7. Performe the light power adjustment. Set the light power at 4.5mW by using VOL+ and VOL- key of the remote controller. Then, if the voltage between TP405 and TP406 deviided by 1Ω is more than power supply indication of
8. Press the \[\text{\textgreater\textgreater}\] key of the remote controller ("BLDA" changes to "LP" on the LCD. At this time, the data is written to EEPROM.).

Specified range (light power): 4.5mW

**Caution:**

- Do not allow the write power to even momentarily reach or exceed 5 mW. Doing so will result in damage to the optical pickup.

9. Press the PLAY key on the remote controller ("LP" changes to "T5" on the LCD.).

10. Remove the laser power meter. Laser power adjustment is finished.

**Magneto-optical disc automatically adjustment**

1. Show "T2" on the LCD by pressing the \[\text{\textgreater\textgreater}\] or \[\text{\textless\textless}\] button of the remote controller.

2. Set the full-recorded magneto-optical disc with the prevention erase situation.

3. Press the PLAY key of the remote controller ("T2" changes to "OAADJ" on the LCD, adjustment is started.).

4. If it has been finished normally, "OAADJ" changes to "OAOK" on LCD. If it is abnormally, it changes to "OANG".

5. Press the PLAY key ("OAOK" or "OANG" changes to "T2", magneto-optical disc adjustment is finished.).

**Note**

If it is displayed "OANG", check the "Troubleshooting Procedures" in the order.

**Playback-only disc automatically adjustment**

1. Show "T1" on the LCD by pressing the \[\text{\textgreater\textgreater}\] or \[\text{\textless\textless}\] button of the remote controller.

2. Set the playback-only discs.

3. Press the PLAY key of the remote controller ("T1" changes to "OOADJ" on the LCD, adjustment is started.).

4. If it has been finished normally, "OOADJ" changes to "OOOK" on LCD. If it is abnormally, it changes to "OONG".

5. Press the PLAY key ("OOOK" or "OONG" changes to "T1", playback-only disc adjustment is finished.

**Note**

If it is displayed "OONG", check the "Troubleshooting Procedures" in the order.

After the 1.2.3. adjustment written above, remove the battery when you finish the adjustment mode.

**Checking the main unit's keys**

1. Check the PC board. (Refer to the item of "Check for the P.C.B." in "Operation Checks and Main Component Replacement Procedures").

2. Set the battery and connect the remote controller.

3. Turn off the power. Then, with the main unit's HOLD switch at OFF, press the VOL+, VOL-, \[\text{\textgreater\textgreater}\], and \[\text{\textless\textless}\] buttons on the remote controller within two seconds without pressing the OFF button.

   a. Using your thumb, while pressing the VOL+ button, also press the VOL- button.

   b. Then, while still pressing the VOL- button, release your thumb from the VOL+ and press the \[\text{\textgreater\textgreater}\] button.

   c. While still pressing the \[\text{\textgreater\textgreater}\] button, release your thumb from the VOL- button and press the \[\text{\textless\textless}\] button. Then, while still pressing the \[\text{\textless\textless}\] button, release your thumb from the \[\text{\textgreater\textgreater}\] button and then from the \[\text{\textless\textless}\] button. (a-c are shown in Fig.7)

**Fig.7**

4. When entering the main unit's key check mode, "KEY.JF" will be displayed on the LCD of main unit and remote controller.

   If it is not displayed, perform the procedures written above again.

5. Confirm the display of LCD by pressing any keys on the main unit. There is no order to press the keys.
### Main unit’s keys LCD display positions and letters

<table>
<thead>
<tr>
<th>Main unit’s keys</th>
<th>LCD display positions and letters</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOLD OFF</td>
<td>1st. letter is A</td>
</tr>
<tr>
<td>ENTER</td>
<td>2nd. letter is B</td>
</tr>
<tr>
<td>SPACE</td>
<td>3rd. letter is C</td>
</tr>
<tr>
<td>POWER OFF</td>
<td>4th. letter is D</td>
</tr>
<tr>
<td>VOL+</td>
<td>5th. letter is E</td>
</tr>
<tr>
<td>VOL-</td>
<td>6th. letter is F</td>
</tr>
<tr>
<td>DELETE</td>
<td>7th. letter is G</td>
</tr>
<tr>
<td>EDIT</td>
<td>8th. letter is H</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>9th. letter is I</td>
</tr>
<tr>
<td>CHARA</td>
<td>10th. letter is J</td>
</tr>
<tr>
<td>PAUSE</td>
<td>11th. letter is K</td>
</tr>
<tr>
<td>JOG rotation</td>
<td>12th. letter is L</td>
</tr>
</tbody>
</table>

6. Remote controller’s LCD lights "KEY OK" and main unit’s LCD lights all when you can detect all keys.

7. Perform below voltage check about the keys come under if you cannot detect the key.

<table>
<thead>
<tr>
<th>Main unit’s keys</th>
<th>Measurement points</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOLD</td>
<td>TP428</td>
<td>0V</td>
<td>2.6V</td>
</tr>
<tr>
<td>ENTER</td>
<td>TP420</td>
<td>2.0V</td>
<td>2.6V</td>
</tr>
<tr>
<td>SPACE</td>
<td>TP420</td>
<td>1.3V</td>
<td>2.6V</td>
</tr>
<tr>
<td>POWER OFF</td>
<td>TP420</td>
<td>0.6V</td>
<td>2.6V</td>
</tr>
<tr>
<td>VOL+</td>
<td>TP420</td>
<td>0V</td>
<td>2.6V</td>
</tr>
<tr>
<td>VOL-</td>
<td>TP419</td>
<td>2.0V</td>
<td>2.6V</td>
</tr>
<tr>
<td>DELETE</td>
<td>TP419</td>
<td>1.3V</td>
<td>2.6V</td>
</tr>
<tr>
<td>EDIT</td>
<td>TP419</td>
<td>0.6V</td>
<td>2.6V</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>TP419</td>
<td>0V</td>
<td>2.6V</td>
</tr>
<tr>
<td>CHARA</td>
<td>IC501 48pin</td>
<td>0V</td>
<td>2.5V</td>
</tr>
<tr>
<td>PAUSE</td>
<td>IC501 49pin</td>
<td>0V</td>
<td>2.5V</td>
</tr>
<tr>
<td>JOG rotation</td>
<td>IC501 59,60pin</td>
<td>0V</td>
<td>2.6V</td>
</tr>
</tbody>
</table>

Confirm the waveform for JOG rotation.

8. Remove the battery when you exit from this mode.

**Note:**

Refer to "Printed Circuit Board and Wiring Connection Diagram" for the test points.
8 Troubleshooting Guide

Confirm the movement

Set the battery and connect the remote cont..

Insert the disc and close the disc cover.

Does "T-READ" display on remote cont.'s LCD?

NO

Does "TOC Reading" display on main unit LCD?

NO

Confirmation of the remote cont.(display).

Confirmation of the detection of disc cover closing.

YES

Is TOC read OK?

NO

Confirm the spindle.

Confirm the focus.

Confirm the traverse.

YES

Press the PLAY key.

Does it play the track No.1?

NO

Are there any sounds?

NO

Confirm the audio circuit.

YES

Is analog recording OK?

NO

Confirm the magnetic head.

Confirm the AD/DA section.

YES

Is mic recording OK?

NO

Confirm the MIC/LINE AMP.

YES

Continuing to next page.

Note: We mentioned "※Filter" beside the waveform about the points for necessary the filter when you check the waveforms. Check it with setting the band width of the meter about 5~10kHz, or connecting the filter shown below.

\[
\begin{align*}
\text{10kΩ} & \quad \text{10kΩ} \\
\text{0.01μF} & \\
\end{align*}
\]
Continuing from previous page.

Is digital recording OK?

NO

Confirm the optical input line.

YES

Are all keys operations of remote cont. OK?

NO

Confirm the remote cont.(key).

YES

Can it recharge the power with connecting the AC adaptor?

NO

Confirm the recharging circuit.

YES

OK

TP448

100ms, 0.5V/DIV.

2.6Vp-p

Confirmation of the remote cont.(display)

Start

Is waveform of display power supply/data at TP448 OK?

NO

Remote cont. is broken.

YES

TP441

2.6V?

NO

Confirm the power supply circuit.

YES

Is IC501-18pin's data waveform OK?

NO

Confirm the remote cont. circuit.

YES

Confirm the power supply and oscillation of IC501.

OK

IC501-18pin

100ms, 0.5V/DIV.

2.6Vp-p
Confirmation of the detection of the disc cover closing.

Start

Is TP427 "L"?

NO

YES

Confirmation of IC501's power supply and oscillation.

Confirmation S501.

OK

Confirmation of spindle.

Start

Is spindle rotating?

NO

IC402 Battery voltage

2.6V

YES

Is waveform of IC402-4pin OK?

NO

IC101 is broken.

Are voltages of IC402-41, 80 pins OK?

NO

Confirm the power supply line.

YES

Is waveform of TP418 OK?

NO

Are waveforms of IC402-12, 15 and 19 pins OK?

NO

Spindle motor is broken.

YES

IC402 is broken.
Confirmation of the focus.

Start

Enter the read power adjustment mode.

Does the laser emit?

YES

Is 600μW±10%?

YES

Could it adjust by VR1?

YES

Press the PLAY key and exit from read power adjustment mode.

If it cannot be read power adjustment perform the next item.

Remove the battery. (exit from test mode)

Press S501 (OPEN/CLOSE SW).

Continuing to next page.

NO

NO

Is the voltage between TP405 and 406 more than 25mV?

NO

Is waveform of IC101-2pin OK?

YES

Is IC1-2pin approximately 1.6V?

YES

Is the voltage between TP405 and TP406 0V?

YES

IC1 is broken.

NO

NO

Is voltage of TP411 2.6V?

YES

Confirm the power supply circuit.

2.6V±p

Is voltage of TP407 approximately 1.8V?

YES

NO

NO

NO

NO

IC101 is broken.
Continuing from previous page.

Does the lens move up and down? Between TP401 and 404, waveform is OK?

YES

Between TP401 and 404 (ROM) filter

NO

Insert the disc and press S501.

Are FOPD and THDM waveforms of IC101-20 and 21 pins OK?

YES

Are voltages of IC402-38 and 41 pins OK?

NO

Battery voltage

2.6V

Optical pickup or IC402 is broken.

IC402

Are voltages of IC1-40, 41, 44, 45, 46 and 47 pins OK?

NO

Confirm the power supply line.

Are FOPD and THDM waveforms of IC101-20 and 21 pins OK?

NO

Confirm IC101's power supply and oscillation.

Are waves at TP410 and TP411 OK?

TP412 (RAM) (TP407 reference)

TP410 (TP407 reference)

0.5Vp-p

0.2V/div.

10μs. 0.1V/div.

Is ADIP waveform of TP412 OK?

YES

NO

Are waves of IC1-38 and 39 pins OK?

NO

IC1 is broken.

Are waves of IC1-38 and 39 pins OK?

NO

IC1-36 pin (TP407 reference)

IC1-38 pin (TP407 reference)

0.03Vp-p

5ns. 0.02V/div.

50μs. 0.2V/div.

*) When you confirm RF waveform, perform "EFM jitter measurement" in "Adjustment mode" (refer to "7. Measurements and Adjustments"). And you'll be able to observe the continuous waveforms.
Confirmation of audio circuit.

Start

Are there output signals at TP444 and 445?

NO

Remote cont. or insidophone is broken.

YES

Are there input signals at IC201-21 and 22 pins?

NO

Confirm the power supply of IC501.

YES

Is IC501-65pin "L"?

NO

IC501 is broken.

NO

Is IC501-66pin "L"?

YES

Confirm the power supply of IC201.

Confirmation of the magnetic head.

Start

Is magnetic heads up and down motor movement OK?

NO

Between CN403-1 and 2pins

REC ON

REC OFF

3.0Vp-p

500mS, 0.5V/DIV.

YES

Is drive waveform of between CN403-1 and 2pins OK?

NO

Up and down motor is broken.

YES

Are waveforms of IC501-62 and 63pins OK?

NO

Confirm the power supply and oscillation of IC501.

YES

Up and down motor drive circuit is broken.

Is it normally for the figure of magnetic head?

NO

Is there output signal between CN402-1 and 4 pins?

YES

Magnetic head is broken.

NO

Are outputs at CN901-4 and 6pins OK?

YES

IC101 is broken.

Magnetic head circuit is broken.
Confirmation of the recharging circuit.

Start

Is Q301 corrector “L”?

YES

Is Q302 gate “H”?

NO

Is voltages at both sides of R317 approximately 50mV?

YES

Confirm IC301 or Q303.

NO

JK301 or AC adaptor is broken.

Confirm IC501-42pin CHARGE1 “H”?

YES

TP441 2.6V?

NO

JK301 is broken.

NO

Confirm the power supply and oscillation of IC501.

YES

OK

---

Confirmation of remote cont. (key)

Confirm the waveform at TP449 and the voltage when the keys are pressed.

<table>
<thead>
<tr>
<th>MAIN</th>
<th>SUB</th>
<th>HOLD</th>
<th>VOLTAGE</th>
<th>BOUNDARY VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAY</td>
<td>0.1</td>
<td></td>
<td>0.2445</td>
<td>1.66</td>
</tr>
<tr>
<td>VOL+</td>
<td>0.442</td>
<td></td>
<td>9.8495</td>
<td>1.60</td>
</tr>
<tr>
<td>VOL-</td>
<td>0.941</td>
<td></td>
<td>9.9043</td>
<td>2.19</td>
</tr>
<tr>
<td>EQ MODE</td>
<td>1.11</td>
<td></td>
<td>1.1966</td>
<td>2.41</td>
</tr>
<tr>
<td>PLAY MODE</td>
<td>1.91</td>
<td></td>
<td>1.4192</td>
<td>2.5965</td>
</tr>
<tr>
<td>F-Skip</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAIN</th>
<th>SUB</th>
<th>HOLD</th>
<th>VOLTAGE</th>
<th>BOUNDARY VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY</td>
<td></td>
<td></td>
<td>1.66</td>
<td>1.8096</td>
</tr>
<tr>
<td>REV-OFF</td>
<td></td>
<td></td>
<td>2.3092</td>
<td>2.5965</td>
</tr>
<tr>
<td>WITHOUT REMOTE CONT</td>
<td></td>
<td></td>
<td>2.8</td>
<td></td>
</tr>
</tbody>
</table>

---
9 Checking Procedures of Main Components Parts on the Main P.C.B. (B side)

As it cannot measure the mechanism side of MAIN P.C.B. directly, refer to the table shown below for the criterion in the time of repairing or checking.

<table>
<thead>
<tr>
<th>Circuit No.</th>
<th>Part No.</th>
<th>Function</th>
<th>Symptom</th>
<th>Check point</th>
<th>Result and measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC301</td>
<td>NJU7015RTE1</td>
<td>Op amp for control of recharging circuit</td>
<td>Impossible to recharge</td>
<td>Perform &quot;Confirmation of the recharging circuit&quot; in &quot;Troubleshooting Guide&quot;.</td>
<td>If it comes under in &quot;Troubleshooting Guide&quot;, check the coil around IC301 or Q304. If there are no abnormal things, change the parts that is coming under.</td>
</tr>
<tr>
<td>IC302</td>
<td>XC6368A261MR</td>
<td>DC-DC converter</td>
<td>No power.</td>
<td>1. Confirm the voltage of TP411 (1.3V). 2. Confirm the gate waveform of Q305 (oscillating or not, oscillation frequency is approx. 100kHz)</td>
<td>Check the coil around IC302 when the voltage of TP441 is low (about 1.2V) and there is no gate waveform oscillation. If there are no abnormal things, change IC302.</td>
</tr>
<tr>
<td>IC303</td>
<td>XC6367A151MR</td>
<td>DC-DC converter</td>
<td>Impossible to play and record.</td>
<td>1. Confirm the voltage of TP442 (1.5V). 2. Confirm the voltage of TP441 (2.8V).</td>
<td>Check the coil around IC303 when the voltage of TP441 is normal but TP442 is low (about 1.2V). If there are no abnormal things, change IC302.</td>
</tr>
<tr>
<td>IC304</td>
<td>XC6372C501PR</td>
<td>DC-DC converter</td>
<td>Impossible to record.</td>
<td>1. Confirm the voltage of TP443 (5V). 2. Confirm that IC501-74pin is &quot;L&quot;.</td>
<td>Check the coil around IC304 when the voltage of TP443 is low (about 1.2V) and IC501-74pin is &quot;L&quot;. If there are no abnormal things, change IC304.</td>
</tr>
<tr>
<td>IC601</td>
<td>AK4518VF-E2</td>
<td>AD/DA converter</td>
<td>No sounds, impossible to record by analog input.</td>
<td>1. Digital (optical) input confirmation: Send the signals to IC201 (power amp) -21.22pins, confirm that if the sounds are heard or not. 2. Perform &quot;Confirmation of AD/DA section&quot; in &quot;Troubleshooting Guide&quot;</td>
<td>Check the coil around IC601 if the confirmation items are OK. If there are no abnormal things, change IC601.</td>
</tr>
<tr>
<td>IC701</td>
<td>AN7635SH-E1</td>
<td>LINE/MIC AMP.</td>
<td>Impossible to record by analog input.</td>
<td>Confirm that it can record by digital (optical), if it is OK, perform &quot;Confirmation of MIC/LINE AMP section&quot; in &quot;Troubleshooting Guide&quot;. *The voltage confirmation of IC701: Confirm that the leading between IC701-13pin and Q704 drain.</td>
<td>Check the coil around IC701 if the confirmation items are OK. If there are no abnormal things, change IC701.</td>
</tr>
</tbody>
</table>
10 Schematic Diagram Notes

10.1. Schematic Diagram Notes

This schematic diagram may be modified at any time with the development of new technology.

Notes:

• S501 : COVER OPEN det. switch.
• S502 : Hold (HOLD) switch (in "OFF" position).
• S802 : Play / record / pause / power on / character type (► / II , CHARA) switch.
• S803 : Recording pause / power on (REC PAUSE→) switch.
• S804 : Display, capital / lower case (DISPLAY, CAPS LOCK) switch.
• S805 : Changing edit mode, changing track mark mode, completing edit (EDIT, MARK MODE) switch.
• S806 : Play and record mode / character delete (MODE, DELETE) switch.
• S807, 808 : Volume / cursor (+ - , + →, VOL / CURSOR) switches.
• S809 : Stop / power off / edit cancel (■ , POWER OFF) switch.
• S810 : Tone / recording sensitivity / space (EQ / REC SENS, SPACE) switch.
• S901 : Magnetic head up (M. HEAD UP) switch.
• S1101 : PROTECT det. switch.
• VR1 : Laser power adj., V.R..

Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.

No mark: MD STOP
( ): MD play [1kHz, L+R, 0dB]

Important safety notice:

Components identified by △ mark have special characteristics important for safety.

Furthermore, special parts which have purpose of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used. When replacing any of components, be sure to use only manufacture’s specified parts shown in the parts list.

Caution

IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.
Cover the parts boxes made of plastics with aluminum foil.
Ground the soldering iron.
Put a conductive mat on the work table.
Do not touch the legs of IC or LSI with the fingers directly.
### Type Illustration of IC’s, Transistors and Diodes

<table>
<thead>
<tr>
<th>TC74ACT04FSEB</th>
<th>AK93C4FBH-L</th>
<th>MNA74000CAW1T</th>
<th>MN66168RJB1</th>
</tr>
</thead>
<tbody>
<tr>
<td>14PIN</td>
<td>24PIN</td>
<td>4PIN</td>
<td>100PIN</td>
</tr>
<tr>
<td>AK4519VF-E2</td>
<td>AN7635SE1-E</td>
<td>NJU7015RT-E1</td>
<td>MN101CF233CA</td>
</tr>
<tr>
<td>24PIN</td>
<td>24PIN</td>
<td>8PIN</td>
<td>8PIN</td>
</tr>
<tr>
<td>AN7635SE1-E</td>
<td>NJU7015RT-E</td>
<td>AN8772FKEB1</td>
<td>BD6004KVT</td>
</tr>
<tr>
<td>24PIN</td>
<td>8PIN</td>
<td>48PIN</td>
<td>80PIN</td>
</tr>
<tr>
<td>NJU7015RT-E1</td>
<td>AN8772FKEB1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TA2131FL</th>
<th>XC61FC2012MR</th>
<th>XC6372C501PR</th>
<th>2SK1764KYTR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>XP151A12A2MR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>XP152A12A2MR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2SB1462STX</th>
<th>2SB1296-6-TB</th>
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<th>F1J2ETP</th>
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Cathode-----Ca-----Anode

Anode-----Ca-----Cathode
11 Schematic Diagram

NOTE:
Each part on main p.c.b. (Side B) cannot be checked directly, however, for the checking of main component parts on p.c.b. refer to the "Checking procedures of main component parts on the main p.c.b. (Side B)."

A MAIN CIRCUIT

A. MD OPTICAL PICKUP

B. SWITCH CIRCUIT

C. REC HEAD CIRCUIT

IC901 TC/4ACT04FSE INTERFACE

Q901-904 2SB1764 KYTR HEAD DRIVE

POSITIVE VOLTAGE LINE
PLAYBACK SIGNAL LINE
RECORDING SIGNAL "DIGITAL" LINE

LASER POWER ADJ.
A MAIN P.C.B. "SIDE : B"

- DC IN 1.6V
- BATTERY CASE
- ONE LR6 / AAUM-3
- BATTERY 1.6V

56
14 Wiring Connection Diagram

15 Terminal Function of IC's
15.1. IC1 (AN8772FHKEBV) : RF AMP

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<th>Mark</th>
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<td>D signal det. capacitor input terminal</td>
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<tr>
<td>2</td>
<td>LDO</td>
<td>O</td>
<td>Laser amp output terminal</td>
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<tr>
<td>3</td>
<td>APCPD</td>
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<td>Photo diode light quantity dist. input terminal</td>
</tr>
<tr>
<td>4</td>
<td>LD IN</td>
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<td>Laser amp reverse input terminal</td>
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<td>APC amp reference voltage input terminal</td>
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<td>TEMP IN</td>
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<td>Temperature sensor amp input terminal</td>
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15.2. IC101 (M6616RB1) : ATRAC ENCODER/DECODER, SERVO SIGNAL PROCESSOR

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<td>Drive voltage monitor input terminal</td>
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<td>Battery power supply terminal</td>
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<td>Servo analog signal output terminal (Not used, open)</td>
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<td>MSP/MDA/I/F address select input terminal (&quot;H Address)</td>
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<td>Leader synchronous signal output</td>
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## 15.3. IC301 (BD6604KVT): FOCUS/TRACKING COIL, TRAVERSE MOTOR DRIVE, SPINDLE MOTOR DRIVE, ROTARY DETECTOR

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<tr>
<td>59</td>
<td>IVDD1</td>
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<td>Power supply terminal for I/O pad</td>
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<tr>
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<td>GND terminal</td>
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<td>XI</td>
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<td>XO</td>
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<td>RF serial data output terminal</td>
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<td>RCCK</td>
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<td>RF serial clock output terminal</td>
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<td>NRPLD</td>
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<td>RF serial load output terminal</td>
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<td>Track cross input terminal</td>
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<td>92</td>
<td>APCD</td>
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<td>Laser power PWM output terminal</td>
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<tr>
<td>93</td>
<td>EXEFMCK</td>
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<td>External EFCM clock input terminal (Not used, connected to GND through register)</td>
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<tr>
<td>94</td>
<td>PEFM1</td>
<td>O</td>
<td>EFM loop filter output terminal</td>
</tr>
<tr>
<td>95</td>
<td>EFMREF</td>
<td>I</td>
<td>EFM PLL reference current input terminal</td>
</tr>
<tr>
<td>96</td>
<td>EFMPLLF</td>
<td>O</td>
<td>EFM PLL filter output terminal</td>
</tr>
<tr>
<td>97</td>
<td>EFMFS</td>
<td>I</td>
<td>EFM signal input terminal</td>
</tr>
<tr>
<td>98</td>
<td>AV1c0</td>
<td>I</td>
<td>Power supply terminal</td>
</tr>
<tr>
<td>99</td>
<td>AVss0</td>
<td>—</td>
<td>GND terminal</td>
</tr>
<tr>
<td>100</td>
<td>TESSEL</td>
<td>—</td>
<td>Tracking error signal output terminal</td>
</tr>
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</table>

### Pin No. Table

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Mark</th>
<th>I/O Division</th>
<th>Function</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>S GND</td>
<td>—</td>
<td>GND terminal</td>
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<tr>
<td>2</td>
<td>AS GND</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>PW IN 1</td>
<td>—</td>
<td>Not used, connected to GND</td>
</tr>
<tr>
<td>4</td>
<td>PW IN 2</td>
<td>I</td>
<td>Half bridge input terminal</td>
</tr>
<tr>
<td>5</td>
<td>FG</td>
<td>O</td>
<td>Speed pulse output terminal</td>
</tr>
<tr>
<td>6</td>
<td>BRK-</td>
<td>I</td>
<td>Brake comparator- input terminal</td>
</tr>
<tr>
<td>7</td>
<td>BRK+</td>
<td>I</td>
<td>Brake comparator+ input terminal (Connected to GND and power supply through resistor)</td>
</tr>
<tr>
<td>8</td>
<td>CSL2</td>
<td>I</td>
<td>Slope capacitor connect terminal (Connected to GND through capacitor)</td>
</tr>
<tr>
<td>9</td>
<td>CSL1</td>
<td>I</td>
<td>Connected to GND through capacitor</td>
</tr>
<tr>
<td>10</td>
<td>CST</td>
<td>I</td>
<td>Connected to GND through capacitor</td>
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<tr>
<td>11</td>
<td>SP PG2</td>
<td>—</td>
<td>GND terminal</td>
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<tr>
<td>12</td>
<td>SP W OUT</td>
<td>O</td>
<td>Spindle motor coil (W) output terminal</td>
</tr>
<tr>
<td>13</td>
<td>SP VM2</td>
<td>I</td>
<td>Power supply terminal for part of spindle power</td>
</tr>
<tr>
<td>14</td>
<td>NC</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>SP V OUT</td>
<td>O</td>
<td>Spindle motor coil (V) output terminal</td>
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<td>16</td>
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<td>—</td>
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<tr>
<td>19</td>
<td>SP U OUT</td>
<td>O</td>
<td>Spindle motor coil (U) output terminal</td>
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<tr>
<td>20</td>
<td>SP VM</td>
<td>I</td>
<td>Power supply terminal for part of spindle power</td>
</tr>
<tr>
<td>21</td>
<td>SP COM</td>
<td>I</td>
<td>Spindle motor coil center input terminal</td>
</tr>
<tr>
<td>22</td>
<td>SP W IN</td>
<td>I</td>
<td>Rotor position detect comparator (W) input terminal</td>
</tr>
<tr>
<td>23</td>
<td>SP V IN</td>
<td>I</td>
<td>Rotor position detect comparator (V) input terminal</td>
</tr>
<tr>
<td>24</td>
<td>SP U IN</td>
<td>I</td>
<td>Rotor position detect comparator (U) input terminal</td>
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<tr>
<td>25</td>
<td>H2 PG2</td>
<td>—</td>
<td>GND terminal</td>
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<tr>
<td>26</td>
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<td>27</td>
<td>H2 R OUT</td>
<td>H</td>
<td>H bridge 2 reverse output terminal</td>
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<td>28</td>
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<td>—</td>
<td>—</td>
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<td>H2 VM</td>
<td>I</td>
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<td>—</td>
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<td>H2 F OUT</td>
<td>O</td>
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<td>32</td>
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<td>—</td>
<td>—</td>
</tr>
<tr>
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<td>H2 PG1</td>
<td>I</td>
<td>GND terminal</td>
</tr>
<tr>
<td>34</td>
<td>H1 PG2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>35</td>
<td>NC</td>
<td>—</td>
<td>—</td>
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<tr>
<td>36</td>
<td>H1 R OUT</td>
<td>O</td>
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<tr>
<td>37</td>
<td>NC</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>38</td>
<td>H1 VM</td>
<td>I</td>
<td>Power supply terminal</td>
</tr>
<tr>
<td>39</td>
<td>H1 F OUT</td>
<td>O</td>
<td>H bridge 1 forward output terminal</td>
</tr>
<tr>
<td>40</td>
<td>H1 PG1</td>
<td>—</td>
<td>GND terminal</td>
</tr>
<tr>
<td>41</td>
<td>VCC1</td>
<td>I</td>
<td>Power supply terminal</td>
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<tr>
<td>42</td>
<td>VCC2</td>
<td>I</td>
<td>Power supply terminal</td>
</tr>
<tr>
<td>43</td>
<td>IN 1F</td>
<td>I</td>
<td>H bridge 1 forward input terminal</td>
</tr>
<tr>
<td>44</td>
<td>IN 1R</td>
<td>I</td>
<td>H bridge 1 reverse input terminal</td>
</tr>
<tr>
<td>45</td>
<td>IN 2F</td>
<td>I</td>
<td>H bridge 2 forward input terminal</td>
</tr>
<tr>
<td>46</td>
<td>IN 2R</td>
<td>I</td>
<td>H bridge 2 reverse input terminal</td>
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<tr>
<td>47</td>
<td>EXT CLK</td>
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*Image and table content for IC301 (BD6604KVT) focusing on its various functions and pin configurations.*
15.4. IC501 (MN101CF32GCA) : SYSTEM CONTROL

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Mark</th>
<th>I/O Division</th>
<th>Function</th>
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<tbody>
<tr>
<td>1</td>
<td>VREF-</td>
<td>I</td>
<td>Reference voltage input terminal</td>
</tr>
<tr>
<td>2</td>
<td>REM KEY</td>
<td>I</td>
<td>Remote cont. key input terminal</td>
</tr>
<tr>
<td>3</td>
<td>KEY IN1</td>
<td>I</td>
<td>Unit key 1 input terminal</td>
</tr>
<tr>
<td>4</td>
<td>KEY IN2</td>
<td>I</td>
<td>Unit key 2 input terminal</td>
</tr>
<tr>
<td>5</td>
<td>BATT1</td>
<td>I</td>
<td>Battery voltage det. input terminal</td>
</tr>
<tr>
<td>6</td>
<td>AN4</td>
<td>I</td>
<td>Connected to reference voltage</td>
</tr>
<tr>
<td>7</td>
<td>TEMP</td>
<td>I</td>
<td>Temperature sensor input terminal</td>
</tr>
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<td>8</td>
<td>DOCTOR</td>
<td>I</td>
<td>Doctor mode input terminal</td>
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<tr>
<td>9</td>
<td>AN7</td>
<td>I</td>
<td>Connected to power supply</td>
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<tr>
<td>10</td>
<td>VREF+</td>
<td>I</td>
<td>Reference voltage input terminal</td>
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<tr>
<td>11</td>
<td>VDD</td>
<td>I</td>
<td>Power supply terminal</td>
</tr>
<tr>
<td>12</td>
<td>OSC2</td>
<td>I</td>
<td>System clock input terminal (fs=10.02MHz)</td>
</tr>
<tr>
<td>13</td>
<td>OSC1</td>
<td>O</td>
<td>System clock output terminal (fs=10.02MHz)</td>
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<td>14</td>
<td>VSS</td>
<td>O</td>
<td>GND terminal</td>
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<tr>
<td>15</td>
<td>XI</td>
<td>I</td>
<td>Sub clock input terminal (Not used, connected to GND)</td>
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<tr>
<td>16</td>
<td>XO</td>
<td>O</td>
<td>Sub clock output terminal (Not used, open)</td>
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<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Mark</th>
<th>I/O Division</th>
<th>Function</th>
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<tbody>
<tr>
<td>17</td>
<td>MMOD</td>
<td>O</td>
<td>Memory mode select input terminal (Connected to GND)</td>
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<tr>
<td>18</td>
<td>REM DATA</td>
<td>O</td>
<td>LCD driver data output terminal</td>
</tr>
<tr>
<td>19</td>
<td>RXD</td>
<td>I</td>
<td>Connected to GND through capacitor</td>
</tr>
<tr>
<td>20</td>
<td>NC</td>
<td>O</td>
<td>Not used</td>
</tr>
<tr>
<td>21</td>
<td>SSDW</td>
<td>O</td>
<td>MSP/MODA interface writing data output terminal</td>
</tr>
<tr>
<td>22</td>
<td>SSDR</td>
<td>I</td>
<td>MSP/MODA interface reading data input terminal</td>
</tr>
<tr>
<td>23</td>
<td>SSOCK</td>
<td>O</td>
<td>MSP/MODA interface data forward clock output terminal</td>
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<td>24</td>
<td>BUZZER</td>
<td>I</td>
<td>Buzzer output terminal</td>
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<tr>
<td>25</td>
<td>RST</td>
<td>I</td>
<td>Reset signal input terminal</td>
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<td>26</td>
<td>SELAD</td>
<td>O</td>
<td>MSP/MODA interface address signal output terminal</td>
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<td>Not used, open</td>
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<td>LCD STB</td>
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<td>LCD driver strobe signal output terminal</td>
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<td>REC SENSE</td>
<td>O</td>
<td>REC sensitivity select output terminal</td>
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<td>MONO/ST</td>
<td>O</td>
<td>REC amp monaural/stereo select terminal</td>
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<tr>
<td>31</td>
<td>WAKEUP</td>
<td>I</td>
<td>Micro computer wake up signal input terminal</td>
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<td>32</td>
<td>MDISY</td>
<td>I</td>
<td>Leader synchronize signal from IC101 input terminal</td>
</tr>
<tr>
<td>33</td>
<td>SCSY</td>
<td>I</td>
<td>ADP/sub A synchronize signal from IC101 input terminal</td>
</tr>
<tr>
<td>34</td>
<td>CSRFNC</td>
<td>I</td>
<td>MDA synchronize signal from IC101 input terminal (1.0ms pulse)</td>
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<tr>
<td>35</td>
<td>CPGNRC</td>
<td>I</td>
<td>Disc cover open/close switch det. input terminal (&quot;*&quot;:open, &quot;L&quot;:close)</td>
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<tr>
<td>36</td>
<td>LCD DATA</td>
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<td>LCD driver data output terminal</td>
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<tr>
<td>37</td>
<td></td>
<td>O</td>
<td>Connected to GND</td>
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<td>38</td>
<td>LCD CK</td>
<td>I</td>
<td>LCD driver clock input terminal</td>
</tr>
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<td>39</td>
<td>NC</td>
<td>O</td>
<td>Not used, open</td>
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<td>40</td>
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<td>O</td>
<td>Charged control output terminal</td>
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<td>41</td>
<td>NRECP</td>
<td>O</td>
<td>Track jump det. output terminal</td>
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<td>42</td>
<td>EEPDCS</td>
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<td>EEPROM chip select output terminal</td>
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<td>43</td>
<td>EEPCK</td>
<td>O</td>
<td>EEPROM clock output terminal</td>
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<td>44</td>
<td>EEPDATA0</td>
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<td>EEPDATA1</td>
<td>O</td>
<td>EEPROM data input terminal</td>
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<tr>
<td>46</td>
<td>PLAY Story</td>
<td>I</td>
<td>PLAY/PAUSE KEY input terminal</td>
</tr>
<tr>
<td>47</td>
<td>STORY</td>
<td>I</td>
<td>REC/PAUSE KEY input terminal</td>
</tr>
<tr>
<td>48</td>
<td>DC IN WAKEUP</td>
<td>I</td>
<td>DC IN wake up input terminal</td>
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<tr>
<td>49</td>
<td>REG</td>
<td>I</td>
<td>Area selection input terminal</td>
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<td>50</td>
<td>MHEAD UP</td>
<td>I</td>
<td>Magnetic head down input terminal</td>
</tr>
<tr>
<td>51</td>
<td>PROTECT</td>
<td>I</td>
<td>Erase prevention switch input terminal</td>
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<td>52</td>
<td>JITTER OK</td>
<td>I</td>
<td>Connected to power supply through resistor</td>
</tr>
<tr>
<td>53</td>
<td>HOLD SW</td>
<td>I</td>
<td>HOLD switch input terminal (&quot;*&quot;:OFF, &quot;L&quot;:ON)</td>
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<td>54</td>
<td>DCNDT</td>
<td>I</td>
<td>DC IN det. input terminal</td>
</tr>
<tr>
<td>55</td>
<td>MIC DET</td>
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<td>Mic det. input terminal</td>
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<td>56</td>
<td>INSEL</td>
<td>I</td>
<td>INPUT select det. input terminal</td>
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<td>57</td>
<td>JOGA</td>
<td>I</td>
<td>JOG pulse A input terminal</td>
</tr>
<tr>
<td>58</td>
<td>JOGB</td>
<td>I</td>
<td>JOG pulse B input terminal</td>
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<tr>
<td>59</td>
<td>MOC/LINE</td>
<td>O</td>
<td>MOC/LINE select output terminal</td>
</tr>
<tr>
<td>60</td>
<td>LOAD0</td>
<td>O</td>
<td>Magnetic head movement control 0 output terminal</td>
</tr>
<tr>
<td>61</td>
<td>LOAD1</td>
<td>O</td>
<td>Magnetic head movement control 1 output terminal</td>
</tr>
<tr>
<td>62</td>
<td>HFO1</td>
<td>I</td>
<td>HF module ON 1 input terminal</td>
</tr>
<tr>
<td>63</td>
<td>MUTEA</td>
<td>O</td>
<td>Analog mute A output terminal</td>
</tr>
<tr>
<td>64</td>
<td>MUTEB</td>
<td>O</td>
<td>Analog mute B output terminal</td>
</tr>
<tr>
<td>65</td>
<td>NRFSTBY</td>
<td>O</td>
<td>RF amp standby output terminal</td>
</tr>
</tbody>
</table>
16 Caution in Use of Rechargeable Battery Ass'y

- Take Rechargeable Battery Ass'y out of Battery Carrying Case and use it.
- Be sure to carry Rechargeable Battery Carrying Case. If not, it may either heat or ignite by shorting with a metal. (as shown in Fig.9)

17 Supply of Rechargeable Battery Ass'y as Replacement Parts

Please take note of the following points relating to Battery Carrying Case to be used for protection of Rechargeable Battery Ass'y from shorting. Replacement Parts:

- Rechargeable Battery Ass'y (RFKFBP140HSY) supplied will be provided with Battery Carrying Case (RFA0475-Q).
- No replacement parts will be supplied for Rechargeable Battery Ass'y without Battery Carrying Case.
- Replacement parts will be supplied for Battery Carrying Case (RFA0475-Q) without Rechargeable Battery Ass'y.
- To your customers, delivery Rechargeable Battery Ass'y together with Battery Carrying Case to prevent shorting accidents that may occur when Rechargeable Battery Ass'y is carried about Battery Carrying Case. (as shown in Fig.8)

18 Resolution Procedure and Parts Format of Remote Controller's Clip Unit

- Remove two screws with precision driver.
- Lift up the clip and remove the clip unit.

Note)
As removed screws are not supplied as replacement parts, be careful not to lose it.
## 19 Replacement Parts List

**Notes:**

- **Important safety notice:** Components identified by △ mark have special characteristics important for safety.
- Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used.
- When replacing any of components, be sure to use only manufacturer's specified parts shown in the parts list.
- **Warning:** This product uses a laser diode. Refer to caution statements.
- **ACHTUNG:** Die laser-Einheit nicht zerlegen. Die Laser-Einheit darf nur gegen ein vom hersteller spezifizierte einheit ausgetauscht werden.
- **Capacity values are in microfarads (μF) unless specified otherwise, P=Picofarads (pF) F=Farads (F).**
- **Resistance values are in ohms, unless specified otherwise, 1K=1,000 (Ω), 1M=1,000K (Ω).**
- The marking <RT> indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.

**<A>**  "<B>" marks in Remarks indicate language of instruction manuals.

**<A>=English/Spanish/French/German/Netherlands/Swedish/Italian/Danish, <B>=English/Chinese**

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Part Name &amp; Description</th>
<th>Pos</th>
<th>Remarks</th>
</tr>
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<td>18-9</td>
<td>RM0216</td>
<td>REJECT ROD</td>
<td>1</td>
<td></td>
</tr>
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<td>18-10</td>
<td>R0G0430</td>
<td>MOTOR GEAR</td>
<td>1</td>
<td></td>
</tr>
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<td>18-11</td>
<td>RFX1351AC</td>
<td>SPINDLE MOTOR</td>
<td>1</td>
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</tr>
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<td>RDG0431</td>
<td>RELAY GEAR</td>
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<td>RDG0432-1</td>
<td>DRIVE GEAR</td>
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<td>RDX0452-1</td>
<td>DOWN GEAR</td>
<td>1</td>
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<td>RGX141CWH</td>
<td>EXTRUDE RUBBER</td>
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<td>18-17</td>
<td>RHD14072</td>
<td>SCREW</td>
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<td>18-18</td>
<td>RHD14073</td>
<td>SCREW</td>
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<td>ZQNX14+118F</td>
<td>SCREW</td>
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<td>RNM09001</td>
<td>WASHER</td>
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<td>RNM0525-K</td>
<td>STOPPER RUBBER</td>
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<td>18-22</td>
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21 Packaging