RS-M24 MECHANISM SERIES

Specifications

Track system: 4-track, 2-channel stereo recording and playback
Tape speed: 4.8 cm/s (1-7/8 ips.)
Wow and flutter: 0.05% (WRMS)
Frequency response:
- Metal tape: 20 - 17,000 Hz, 30 - 15,000 Hz (DIN)
- CrO₂ tape: 20 - 16,000 Hz, 30 - 15,000 Hz (DIN)
- Normal tape: 20 - 15,000 Hz, 30 - 13,000 Hz (DIN)
Signal-to-noise ratio:
- Dolby NR in: 66 dB (above 5kHz)
- Dolby NR out: 56 dB
  (signal level = max. recording level, CrO₂ type tape)
Fast forward and rewind time: Approx. 90 seconds with C-60 cassette tape
Inputs:
- MIC: sensitivity 0.25 mV, input impedance 60 kΩ
- Applicable microphone impedance 400Ω - 10 kΩ
- LINE: sensitivity 60 mV, input impedance 47 kΩ

Outputs:
- LINE: output level 400 mV, output impedance 1.5 kΩ or less, load impedance 22 kΩ over
- HEADPHONES: output level 80 mV, load impedance 8 Ω
Rec/pb connection: 5P DIN type; input sensitivity 0.25 mV, impedance 5.6 kΩ
  output level 400 mV, impedance 1.5 kΩ
Bias frequency: 80 kHz
Motor: Electrical DC governor motor
Heads: 2-head system;
  1-MX head for record/playback
  1-double-gap ferrite head for erase
Power requirements:
  - AC: 110/220 V, 50-60 Hz
  - AC: 110/125/220/240 V, 50-60 Hz
  - AC: 240 V
Power consumption: 10 W
Dimensions: 43.0 cm (W) x 12.2 cm (H) x 20.6 cm (D)
Weight: 3.9 kg

Specifications are subject to change without notice.
* ‘Dolby’ and the double-D symbol are trademarks of Dolby Laboratories.

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan
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LOCATION OF CONTROLS AND COMPONENTS

1. Power switch (power (push on))
2. Cassette holder
3. Tape counter and Reset button (tape counter)
4. Recording indication lamp (rec)
5. VU meters (left-level-right)
6. Eject button (△ eject)
7. Record button (○ rec ○)
8. Rewind/Review button (← rew/rev)
9. Fast forward/Cue button (► ff/cue)
10. Play button (► play ▶)
11. Stop button (■ stop)
12. Pause button (II pause)
13. Headphones jack (phones)
14. Tape selector (tape select (Metal-CrO₂: Normal))
15. Dolby noise-reduction switch (Dolby NR (in-out))
16. Input selector (input select (line-mic (DIN))
17. Input level controls (input level (left-right))
18. Microphone jacks (mic (left-right))
19. Record/Playback connection socket (REC/PLAY)
20. Voltage selector (VOLTAGE SELECTOR)
   + For all European areas except United Kingdom
   + For Asia, Latin America, Middle East and Africa areas
21. Line output cord (LINE OUT)
22. Line input cord (LINE IN)
DISASSEMBLY INSTRUCTIONS

Fig. 1

* The head azimuth can be adjusted by removing the cassette lid.

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8
<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Procedure</th>
<th>To remove</th>
<th>Remove</th>
<th>Shown in fig.</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Case cover</td>
<td>• 2 screws (A)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Bottom cover</td>
<td>• 5 screws (B)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1 → 2 → 3</td>
<td>Front panel</td>
<td>• 2 control knobs (C)</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Cassette lid (D)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 5 screws (E)</td>
<td>3, 4, 5, 6, 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Binder (F)</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>1 → 2 → 4</td>
<td>Back chassis</td>
<td>• 4 screws (G)</td>
<td>3, 4</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• 3 binders (H)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recording wire (I)</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>1 → 2 → 3 → 5</td>
<td>Mechanism unit</td>
<td>• 4 screws (J)</td>
<td>8</td>
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<tr>
<td>6</td>
<td>1 → 2 → 3 → 6</td>
<td>Level meter</td>
<td>• 2 screws (K)</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>1 → 2 → 3 → 5 → 7</td>
<td>Operation button unit</td>
<td>• Cassette holder (L)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 2 screws (M)</td>
<td>10</td>
</tr>
</tbody>
</table>
MEASUREMENT AND ADJUSTMENT METHODS

ADJUSTMENT PARTS LOCATION

Tape speed adjustment VR
Motor

Screwdriver

Please use non metal type screwdriver when you adjust tape speed on this unit.

Fig. 1

VR101  VR102  VR5  VR6  TP2  TP1

TP4  TP3  VR2  VR1  R46  TP6  R45  TP5

Fig. 2
### Item: Head position adjustment

**Condition:**
- Playback and pause mode

**Measurement & Adjustment:**

1. Press the playback button and pause button.
2. Measure the space between the pressure roller and the capstan.

   **Standard value:** 0.5±0.3mm

3. If the measured value is not within the standard value, untighten screw (A), and slide the head adjusting plate in the direction of arrow (B) for adjustment.

### Item: Head azimuth adjustment

**Condition:**
- Playback mode

**Equipment:**
- VTVM, Oscilloscope
- Test tape (azimuth) QZ2CFM

**Measurement & Adjustment:**

1. Make connections as shown in fig. 4.

2. Playback the 8kHz signal from the test tape (QZ2CFM). Adjust screw (B) in fig. 5 for maximum output L-ch and R-ch levels.

   When the output levels of L-ch and R-ch are not at maximum at the same time, readjust as follows:

3. Turn the screw shown in fig. 5 to find angles A and C (points where peak output levels for left and right channels are obtained). Then, locate the angle B between angles A and C, i.e., a point where L-ch and R-ch output levels come together at maximum. (Refer to figs. 5 and 6)

### Item: L-ch/R-ch output balance adjustment

**Measurement & Adjustment:**

1. Make connections as shown in fig. 7.

2. Playback the 8kHz signal from the test tape (QZ2CFM). Adjust screw (B) shown in fig. 5 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 8 is obtained on the oscilloscope.

### Item: Tape speed

**Condition:**
- Playback mode

**Equipment:**
- Digital electronic counter or frequency counter
- Test tape... QZ2CWAT

**Measurement & Adjustment:**

1. Test equipment connection is shown in fig. 9.

2. Playback test tape (QZ2CWAT 3,000Hz) at middle section and supply playback signal to frequency counter.

3. Measure this frequency.

4. On the basis of 3,000Hz, determine value by following formula:

   
   \[
   \text{Tape speed accuracy} = \frac{|t - 3,000|}{3,000} \times 100\% \quad \text{where,} \ t = \text{measured value}
   \]

   **Standard value:** ±1.5%

**Adjustment method:**

1. Playback the test tape (middle)

2. Adjust so that frequency becomes 3,000Hz

3. Tape speed adjustment VR shown in fig. 1.
Tape speed fluctuation
Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows:

\[
\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3.000} \times 100\% \quad f_1 = \text{maximum value}, f_2 = \text{minimum value}
\]

**Standard value:** Less than 1%

**Note:** Please use non metal type screwdriver when you adjust tape speed accuracy on this unit.

### Playback frequency response

1. Test equipment connection is shown in fig. 4.
2. Place UNIT into playback mode.
3. Playback the frequency response test tape (QZZCFM).
4. Measure output level at 315Hz, 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz, and compare each output level with the standard frequency 315Hz at LINE OUT.
5. Make measurement for both channels.
6. Make sure that the measured value is within the range specified in the frequency response chart (shown in fig. 10).

### Playback gain

1. Test equipment connection is shown in fig. 4.
2. Playback standard recording level portion on test tape (QZZCFM 315Hz), and using VTVM measure the output level at LINE OUT.
3. Make measurement for both channels.

**Standard value:** 0.4V ± 1dB [around 0.42V: at test points TP5 (L-CH) and TP6 (R-CH)]

**Adjustment**
1. If measured value is not within standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. 2 on page 3).
2. After adjustment, check "Playback frequency response" again.

### Erase current

1. Test equipment connection is shown in fig. 11.
2. Press the record and pause buttons.
3. Set the tape selector to metal position.
4. Read voltage on VTVM and calculate erase current by following formula:

\[
\text{Erase current (A)} = \frac{\text{voltage across both ends of R101}}{1 (\Omega)}
\]

**Standard value:** 160 ± 10 mA (Metal position)

5. If measured value is not within standard, adjust as follows.

**Adjustment**
1. Open the point (A) and short the point (B) on the main circuit board in the wiring connection diagram (See page 8).
2. Make measurement for erase current.
3. Make sure that the measured value is within the erase current of 140mA to 170mA.
4. If it is beyond the value, carry out the following adjustments:
   - If the erase current is less than 140mA, short the point (A).
   - If the erase current is more than 170mA, open the points (A) and (B).

### Overall frequency response

1. Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).

**Note 2:**
Test tape QZZCRA to be supplied after July 1980 has higher recording sensitivity in the middle and high frequency range.
### MEASUREMENT & ADJUSTMENT

| ITEM | 
|------|---|
| **Equipment:** | • VTVM  
|  | • AF oscillator  
|  | • ATT  
|  | • Oscilloscope  
|  | • Resistor (600Ω)  
|  | • Test tape (reference blank tape)  
|  | --- QZZCRA for Normal  
|  | --- QZZCRRX for CrO₂  
|  | --- QZZCRZ for Metal  

- This chart indicates the standard values for the new type of QZZCRA when in use.  
- This chart indicates the standard values for the former type of QZZCRA when in use.  

The new type of QZZCRA is marked as shown in fig. 13.  

![Fig. 13](image)

**Former type**  
**New type**  

**Marking**

**Overall frequency response adjustment by recording bias current**

**Note 1:**  
On RS-M205, overall frequency response is adjusted with tape selector set at Normal.  

**Note 2:**  
Recording equalizer is fixed.  

1. Make connections as shown in fig. 14.  
2. Input a 1 kHz, -24 dB signal through LINE IN. Place the set in record mode.  
3. Fine adjust the attenuator to obtain 0.4 V LINE OUT output.  
   - Make sure that the input signal level is -24 ± 4 dB with 0.4 V output voltage.  
4. Set the tape selector to Normal, and load the test tape (QZZCRA).  
5. Adjust the attenuator to reduce the input signal level by 20 dB.  
6. Adjust the AF oscillator to generate 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz and 10 kHz signals, and record these signals on the test tape.  
7. Playback the signals recorded in step 6, and check if the frequency response curve is within the limits shown in the overall frequency response chart for normal tapes (fig. 12).  
   - If the curve is within the charted specifications, proceed to steps 8, 9 and 10.  
   - If the curve is not within the charted specifications, adjust as follows:  

**Adjustment A:**  
When the curve exceeds the overall frequency response chart specifications (fig. 12) as shown in fig. 15.  

![Fig. 15](image)

1) Increase bias current by turning VR101 (L-CH) and VR102 (R-CH).  
   - (See fig. 2 on page 3.)  
2) Repeat steps 6 and 7 to confirm.  
   - (Proceed to steps 8, 9 and 10 if the curve is now within the charted specifications in fig. 12.)  
3) If the curve still exceeds the specifications (fig. 12), increase bias current further and repeat steps 6 and 7.

**Adjustment B:**  
When the curve falls below the overall frequency response chart specifications (fig. 12) as shown in fig. 16.  

![Fig. 16](image)

1) Reduce bias current by turning VR101 (L-CH) and VR102 (R-CH).  
2) Repeat steps 6 and 7 to confirm.  
   - (Proceed to steps 8, 9 and 10 if the curve is now within the charted specifications in fig. 12.)  
3) If the curve still falls below the charted specifications (fig. 12), reduce bias current further and repeat steps 6 and 7.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
</table>

8. Switch the tape selector to CrO₂, change test tape to QZZCRX, and record 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz and 12.5kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO₂ tapes (fig. 17).

9. Switch the tape selector to Metal, change test tape to QZZCRZ, and record 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz and 12.5kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for metal tapes (fig. 17).

10. Confirm that bias currents are approximately as follows when the tape selector is set at different positions.

- Read voltage on VTVM and calculate bias current by following formula:
  \[ \text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (Ω)} \]

  - around 410μA (Normal position)
  - around 545μA (CrO₂ position)
  - around 800μA (Metal position)

**Overall gain**

**Condition:**
- Record/playback mode
- Input level controls...MAX
- Standard input level:
  - MIC: 72 ± 4 dB
  - LINE: 24 ± 4 dB

**Equipment:**
- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)
- Test tape (reference blank tape)

1. Test equipment connection is shown in fig. 18.
2. Place UNIT into record mode, and tape selector to normal position.
3. Supply 1kHz signal (−24 dB) from AF oscillator, through ATT to LINE IN.
4. Adjust ATT until monitor level at LINE OUT becomes 0.4V.
5. Using test tape, make recording.
6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.4V.
7. If measured value is not 0.4V, adjust VR5 (L-CH), VR6 (R-CH) (See fig. 2 on page 3).
8. Repeat from step (2).

**Level meter**

**Condition:**
- Record mode
- Input level control...MAX

**Equipment:**
- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)

1. Test equipment connection is shown in fig. 19.
2. Supply 1kHz signal (−24 dB) to the LINE IN then press the record button.
3. Adjust the ATT so that the output level at LINE OUT becomes 0.4V. (The input level at this condition is termed the standard input level.)
4. At this time, confirm that the level meter reading is within a range of −1.5 dB to +1.5 dB (shown in fig. 20). (Confirm this for both L and R channels.)

**Dolby NR circuit**

**Condition:**
- Record mode
- Dolby NR switch...IN/OUT
- Input level controls...MAX

**Equipment:**
- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)

1. Test equipment connection is shown in fig. 21.
2. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −34.5dB at TP5 (L-CH), TP6 (R-CH) (frequency 5kHz).
3. Confirm that the value at IN position is 8 (±2.5) dB greater than the value at OUT position of Dolby NR switch.
### ELECTRICAL PARTS LOCATION

**NOTES:**
- For all European areas except United Kingdom.
- For Asia, Latin America, Middle East and Africa areas.
- For Australia.

**REPLACEMENT PARTS LIST**

**Important safety notice:** Components identified by a mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Part Name &amp; Description</th>
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<tbody>
<tr>
<td>E1</td>
<td>QWY1222</td>
<td>Record/Playback Head</td>
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<tr>
<td>E2</td>
<td>QWY2338</td>
<td>Erase Head</td>
</tr>
<tr>
<td>E3</td>
<td>QMA4061</td>
<td>Center Angle</td>
</tr>
<tr>
<td>E4</td>
<td>QQ0179B</td>
<td>Push Button (for Power ON/OFF)</td>
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<td>E5</td>
<td>QQ0437</td>
<td>&quot;Silver Type&quot;</td>
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<td>E6</td>
<td>QQ0437K</td>
<td>&quot;Black Type&quot;</td>
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<td>E8</td>
<td>A2 SA88</td>
<td>AC Power Cord</td>
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<td>E9</td>
<td>A2 QQ01208M</td>
<td>For Australia</td>
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<tr>
<td>E10</td>
<td>QQ01106</td>
<td>Cord Clamp</td>
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**ELECTRICAL PARTS**

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<tbody>
<tr>
<td>E8</td>
<td>QT5151</td>
<td>Shield Plate (for AC Power Transformer)</td>
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<tr>
<td>E9</td>
<td>XTN3+106</td>
<td>Tapping Screw 3x10</td>
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<tr>
<td>E10</td>
<td>QT5015</td>
<td>Log Terminal</td>
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<tr>
<td>E11</td>
<td>XW36</td>
<td>Washer 3/8</td>
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<td>E12</td>
<td>XW38</td>
<td>Washer 3/8</td>
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<td>XW38</td>
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<td>E14</td>
<td>QML21711</td>
<td>Recording Lever</td>
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<td>E15</td>
<td>QBS5132</td>
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<td>E16</td>
<td>QBE23136</td>
<td>Pin Cord</td>
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<td>E17</td>
<td>QSL1115RMN</td>
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<td>E20</td>
<td>QMA4060</td>
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<td>E21</td>
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<td>QJ1041</td>
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<td>E24</td>
<td>QJ1079</td>
<td>Nylon Coupler</td>
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<td>E25</td>
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<td>XTN3+168</td>
<td>Tapping Screw 3x16</td>
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**Replacement Parts List**

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<td>QT5054</td>
<td>Fuse Holder</td>
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<tr>
<td>E28</td>
<td>QT5153</td>
<td>Shield Plate (for L1 and L2)</td>
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<tr>
<td>E29</td>
<td>QC9011</td>
<td>Spark Killer</td>
</tr>
<tr>
<td>E30</td>
<td>QTW1195</td>
<td>Spark Killer Cover</td>
</tr>
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**For all European areas except United Kingdom:**
- E27 QT5054
- E28 QT5153
- E29 QC9011
- E30 QTW1195
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<th>Component</th>
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<td>Q2</td>
<td>2SB745(T,U) [2SB745T]</td>
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<tr>
<td>Q1</td>
<td>2SB745(T,U) [2SB745T]</td>
</tr>
<tr>
<td>Q3</td>
<td>2SD661(T,U) [2SD661T]</td>
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</table>

*For Asia, Latin America, Middle East, Africa areas and Australia.*
MECHANISM PARTS LOCATION

SPECIFICATIONS

Pressure of pressure roller
350±50 g

Takeup tension
• Use cassette torque meter
  45 ± 15 N•m

Wow and flutter (JIS)
• Use test tape
  Less than 0.06% (WRMS)

When servicing this mechanism unit, refer to the disassembly notes and assembly instructions described in the service manuals of RS-M51, RS-M13, RS-M14 and RS-M04 (RS-M24 mechanism series).

REPLACEMENT PARTS LIST

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<th>Part Name &amp; Description</th>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Part Name &amp; Description</th>
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</thead>
<tbody>
<tr>
<td>M1</td>
<td>QBP1674</td>
<td>Cassette Pressure Spring</td>
<td>M14</td>
<td>QML3605</td>
<td>Auto-Stop Detection Lever</td>
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<tr>
<td>M2</td>
<td>QDG1201</td>
<td>Main Gear</td>
<td>M15</td>
<td>QML3592</td>
<td>Change Lever</td>
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<tr>
<td>M3</td>
<td>QDG1207</td>
<td>Sub Gear</td>
<td>M16</td>
<td>QMR1820</td>
<td>Record Rod</td>
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<td>M4</td>
<td>QMB1336</td>
<td>Supply Reel Table Hub</td>
<td>M17</td>
<td>QMR1821</td>
<td>Auto-Stop Connection Rod</td>
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<td>M5</td>
<td>QDR1139</td>
<td>Supply Reel Table</td>
<td>M18</td>
<td>QMR1822</td>
<td>Eject Rod</td>
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<tr>
<td>M6</td>
<td>QMF2118</td>
<td>Fast Forward Arm Bracket</td>
<td>M19</td>
<td>QMR1826</td>
<td>Control Rod</td>
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<td>M7</td>
<td>QML5851</td>
<td>Sub Control Lever</td>
<td>M20</td>
<td>QMR2139</td>
<td>Flywheel Thrust Retainer</td>
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<td>M8</td>
<td>QML3583</td>
<td>Main Control Lever</td>
<td>M21</td>
<td>QRC1357</td>
<td>Lock Pin Pressure Spring</td>
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<td>M9</td>
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<td>Pressure Roller Release Spring</td>
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CABINET PARTS LOCATION

Replacing Parts List

Important safety notice

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

When replacing any of these components, use only manufacturer's specified parts.

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Part Name &amp; Description</th>
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<td>QOM1442</td>
<td>Operation Button Angle</td>
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<td>G29</td>
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Accessories

A1 | QQT027 | Instruction Book for all European areas except United Kingdom. |
A2 | QQT030 | Instruction Book for Asia, Latin America, Middle East and Africa areas. |
A3 | QQT031 | Instruction Book for Australia. |

Packings

P1 | QPTN456 | Inside Carton for all European areas and Australia except United Kingdom. |
P2 | QPTN457 | Inside Carton for Asia, Latin America, Middle East and Africa areas. |
P3 | QPTN458 | Cushion-A for all European areas. |
P4 | QPTN459 | Cushion-B for all European areas. |
P5 | QPTN460 | Poly Bag for all European areas. |
P6 | QPTN461 | Sheer for all European areas. |
P7 | QPTN462 | Pad for all European areas. |

Printed in Japan
# Service Manual

## Supplement-1

Metal Tape Compatible Stereo
Cassette Deck with Soft-Touch Controls
and Rewind Auto-Play Convenience

### RS-M24 MECHANISM SERIES

* DOLBY SYSTEM

Please use this manual together with the service manual for model No. RS-M205 (Original) order No. ARD81030032C8-10 and RS-M205 (For United Kingdom) order No. ARD81070069A2-01.

## PARTS COMPARISON TABLE:

Please revise the original parts list in the Service Manual (RS-M205) to conform to the changes shown herein.

If new part numbers are shown, be sure to use them when ordering parts.

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<th>Ref. No.</th>
<th>Part Name &amp; Description</th>
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<td>Takeup Gear Assembly</td>
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<td>QZK0241 (M70)</td>
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<td>R171, 118</td>
<td>Resistors</td>
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<td>ECK1H2232F (22000pf)</td>
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<td>EQ0V301043J (0.1μF)</td>
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<td>IC1, 2</td>
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* 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.
SCHEMATIC DIAGRAM
(ADDITION)

* For all European areas except United Kingdom, Australia, Asia, Latin America, Middle East and Africa areas.

CIRCUIT BOARD
(ADDITION)

* For all European areas except United Kingdom, Australia, Asia, Latin America, Middle East and Africa areas.