Service Manual
Cassette Deck
RS-M226
(Black Face)
(Silver Face)

This is the Service Manual for the following areas.

For all European areas except United Kingdom.

For United Kingdom.

Please use this service manual for the RS-M226. (Discard the service manual prepared for the order No. ARD82050142C8-11.)

RS-M24 MECHANISM SERIES

Specifications

Track system: 4-track 2-channel stereo recording and playback
Tape speed: 4.8 cm/s
Wow and flutter: 0.048% (WRMS), ±0.14% (DIN)
Frequency response: Metal tape: 20 — 18,000 Hz
CrO2 tape: 20 — 18,000 Hz
Normal tape: 20 — 17,000 Hz
30 — 16,000 Hz (DIN)
30 — 15,000 Hz (DIN)
Signal-to-noise ratio: Dolby C NR in: 75 dB (CCIR)
Dolby B NR in: 67 dB (CCIR)
NR out: 57 dB
(signal level = max. input level A weighted, CrO2 type tape)
Fast forward and rewind time: Approx. 90 seconds with C-60 cassette tape

Inputs:
MIC: sensitivity 0.25 mV, applicable microphone impedance 400 Ω — 10 kΩ
LINE: sensitivity 60 mV, input impedance more than 47 kΩ

Outputs:
LINE: output level 400 mV, output impedance less than 2.3 kΩ
HEADPHONES: output level 80 mV (8Ω) applicable headphone impedance 8Ω — 600Ω
Bias frequency: 80 kHz
Motor: Electrical DC governor motor
Heads: 2-head system
1 MX head for rec/playback
1 double-gap ferrite head for erasure
Power requirements: D 220 V, 50-60 Hz
D 240 V, 50 Hz

Power consumption: 12 W
Dimensions: 43.0 cm (W) × 10.9 cm (H) × 23.3 cm (D)
Weight: 4.0 kg

Specifications are subject to change without notice.

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Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan
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</table>

**LOCATION OF CONTROLS AND COMPONENTS**

- Headphones Jack (phones)
- Power Switch (power push on)
- Eject Button (eject)
- Cassette Holder
- Counter Reset Button (counter reset)
- Fast Forward/Cut Button (ff/ cut (>>))
- Rewind/Review Button (rew/rev (<<))
- Play Button (play (>)
- Stop Button (stop (X))
- Record Button (rec (C))
- Tape Counter (tape counter)
- Recording Indicator (rec)
- Input Level Controls (input level (L, M, R))
- Input Select Button (input select (L, M, R, mic))
- FL (fluorescent level) Meter
- Dolby Noise Reduction Select Switch (Dolby NR (L, M, R, X))
- Microphone Jacks (L, M, R)
- Dolby Noise Reduction Switch (Dolby NR (L, M, R, X))
- AC Power Voltage Select Switch
- Line Output Jacks (LINE OUT (L+R))
- Line Input Jacks (LINE IN (L+R))

**DISASSEMBLY INSTRUCTIONS**

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

![Fig. 1](image1)

![Fig. 2](image2)

![Fig. 3](image3)

![Fig. 4](image4)

![Fig. 5](image5)
MEASUREMENT AND ADJUSTMENT METHODS

NOTES: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- Make sure heads are clean
- Make sure capstan and pressure roller are clean
- Judgeable room temperature: 20 ± 5°C (68 ± 9°F)
- Dolby NR switch: OUT
- Tape selector: Normal position
- Input selector: Line in
- Input level controls: Maximum

---

![Diagram of internal components](image-url)
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
</table>
| **Head position adjustment** | (The head adjusting plate is provided to adjust the tape touch of the head in cue or review mode.)  
1. Press the playback button and pause button  
2. Measure the space between the pressure roller and the capstan  
3. If the measured value is not within the standard value, unlighten screw (A), and slide the head adjusting plate in the direction of arrow (B) for adjustment  

*Standard value: 0.5 ± 0.3mm* |

| **Head azimuth adjustment** | L-ch/R-ch output balance adjustment  
1. Make connections as shown in fig. 3.  
2. Playback the 8kHz signal from the test tape (QZZCFM)  
Adjust screw (B) in fig. 4 so that maximum output of L-ch and R-ch levels are not at maximum at the same time.  
When the output levels of L-ch and R-ch are not at maximum at the same time, adjust as follows:  
3. Turn the screw shown in fig. 4 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. 4 and 5.)  

**L-ch/R-ch phase adjustment**  
4. Make connections as shown in fig. 6.  
5. Playback the 8kHz signal from the test tape (QZZCFM)  
Adjust screw (B) shown in fig. 4 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 7 is obtained on the oscilloscope. |

| **Tape speed** | Tape speed accuracy  
1. Test equipment connection is shown in fig. 8.  
2. Playback test tape (QZZCWAT 3.000Hz) at middle section and supply playback signal to frequency counter.  
3. Measure the frequency.  
4. On the basis of 3.000Hz, determine value by following formula:  

\[
\text{Tape speed accuracy} = \frac{1 - 3.000}{3.000} \times 100 \% \quad \text{where} \quad t = \text{measured value}
\]

*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:  

\[
\text{Tape speed fluctuation} = \frac{t_1 - t_2}{3.000} \times 100 \% \quad t_1 = \text{maximum value}, \quad t_2 = \text{minimum value}
\]

*Standard value: Less than 1%* |

| **Note:**  
Please use non metal type screwdriver when you adjust tape speed accuracy on this unit. |
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
</table>
| ① Playback frequency response | 1. Test equipment connection is shown in fig. 3  
2. Place UNIT into playback mode  
3. Playback the frequency response test tape (QZZCFM)  
4. Measure output level at 315 Hz, 1 2 5 kHz  
8 kHz, 4 kHz, 1 kHz, 250 Hz, 125 Hz, and 63 Hz, and compare each output level with the standard frequency 315 Hz, 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. 9). |
| **Playback gain** | 1. Test equipment connection is shown in fig. 3  
2. Playback standard recording level portion on test tape (QZZCFM 315 Hz), and using VTVM measure the output level at LINE OUT.  
3. Make measurement for both channels.  
**Standard value: 455 mV ± 1 dB [around 280 mV: at test points TP3 (L-CH) and TP4 (R-CH)]**  
**Adjustment**  
1. If measured value is not within standard, adjust VR3 (L-CH), VR4 (R-CH) (See fig. 1 on page 3).  
2. After adjustment, check 'Playback frequency response' again |
| **Erase current** | 1. Test equipment connection is shown in fig. 10.  
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:  
\[
\text{Erase current (A)} = \frac{\text{Voltage across both ends of R124}}{1 (\Omega)}
\]  
**Standard value: 155 ± 15 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 15).  
2. Make measurement for erase current  
3. Make sure that the measured value is within the erase current of 140 mA to 170 mA  
4. If it is beyond the value, carry out the following adjustments:  
   - If the erase current is less than 140 mA, short the points (A)  
   - If the erase current is more than 170 mA, open the points (A) and (B) |
| **Overall frequency response** | **Note:**  
Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).  
**Overall frequency response adjustment by recording bias current**  
**Note 1:**  
On RS-M226, overall frequency response is adjusted with tape selector set at Normal  
**Note 2:**  
Recording equalizer is fixed  
1. Make connections as shown in fig. 12.  
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.  
4. Make sure that the input signal level is 24 ± 4 dB with 0.45 V output voltage  
**Fig. 11**  
**Fig. 12**
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Set the tape selector to Normal, and load the test tape (QZCRA).</td>
</tr>
<tr>
<td>5.</td>
<td>Adjust the attenuator to reduce the input signal level by 20 dB.</td>
</tr>
<tr>
<td>6.</td>
<td>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.</td>
</tr>
<tr>
<td>7.</td>
<td>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. 11). If the curve is still within the charted specifications, proceed to steps 8 and 10. If the curve is not within the charted specifications, adjust as follows.</td>
</tr>
<tr>
<td>Adjustment A:</td>
<td>When the curve exceeds the overall frequency response chart specifications (fig. 11) as shown in fig. 13.</td>
</tr>
</tbody>
</table>

**Fig. 13**

1) Increase bias current by turning VR9 (L-CH) and VR10 (R-CH). (See fig. 1 on page 3.)
2) Repeat steps 6 and 7 to confirm. (Proceed to steps 8 and 10 if the curve is now within the charted specifications in fig. 11.)
3) If the curve still exceeds the specifications (fig. 11), increase bias current further and repeat steps 6 and 7.

8. Switch the tape selector to CrO₂ change test tape to QZCXRX, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz, and 12.5 kHz signals. Then, playback the signals and check if the curve is still within the limits shown in the overall frequency response chart for CrO₂ tapes (fig. 15).

9. Switch the tape selector to Metal change test tape to QZCR2, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz, and 12.5 kHz signals. Then, playback the signals and check if the curve is still within the limits shown in the overall frequency response chart for metal tapes (fig. 15).

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:
  Bias current (A) = \( \frac{\text{Value read on VTVM (V)}}{10 (\Omega)} \)

<table>
<thead>
<tr>
<th>Overall gain</th>
<th>Condition:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Record/playback mode</td>
</tr>
<tr>
<td></td>
<td>• Tape selector: Normal position</td>
</tr>
<tr>
<td></td>
<td>• Input level controls: MAX</td>
</tr>
<tr>
<td></td>
<td>• Standard input level:</td>
</tr>
<tr>
<td></td>
<td>MIC: −72 ± 4 dB</td>
</tr>
<tr>
<td></td>
<td>LINE IN: −24 ± 4 dB</td>
</tr>
</tbody>
</table>

: | around 350 µA (Normal position) |
| around 450 µA (CrO₂ position) |
| around 700 µA (Metal position) |

: measured at TP1 (L-CH) and TP2 (R-CH)
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluorescent meter</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Condition:</strong></td>
<td></td>
</tr>
<tr>
<td>Record mode</td>
<td></td>
</tr>
<tr>
<td>Tape selector</td>
<td></td>
</tr>
<tr>
<td>Input level controls → MAX</td>
<td></td>
</tr>
<tr>
<td>Equipment:</td>
<td></td>
</tr>
<tr>
<td>VTVM + AF oscillator</td>
<td></td>
</tr>
<tr>
<td>ATT</td>
<td></td>
</tr>
<tr>
<td>7. If measured value is not 0.45 V, adjust VR5 (L-CH), VR6 (R-CH) (See fig. 1 on).</td>
<td></td>
</tr>
<tr>
<td>8. Repeat from step (2).</td>
<td></td>
</tr>
<tr>
<td>1. Test equipment connection is shown in fig. 16.</td>
<td></td>
</tr>
<tr>
<td>2. As shown in fig. 17, connect the collector of Q8 and peak reset terminal.</td>
<td></td>
</tr>
<tr>
<td>3. Supply 1kHz signal (−24 dB) to the LINE IN jack, then press the record button.</td>
<td></td>
</tr>
<tr>
<td>4. Adjust the ATT so that the output level at LINE OUT jack becomes 0.45 V (The input level at the condition is termed the standard input level).</td>
<td></td>
</tr>
<tr>
<td>5. Adjustment at ±20 dB:</td>
<td></td>
</tr>
<tr>
<td>A. Adjust the ATT so that the input level is ±20 dB below standard recording level.</td>
<td></td>
</tr>
<tr>
<td>B. Adjust VR7 so that the ±20 dB segment lights up in the −20 ±1 dB range (L-CH ONLY) (See fig. 18).</td>
<td></td>
</tr>
<tr>
<td>6. Adjustment at 0 dB:</td>
<td></td>
</tr>
<tr>
<td>A. Adjust the ATT so that the output level at LINE OUT jack becomes 0.45 V. (The input level at this condition is termed the standard input level.)</td>
<td></td>
</tr>
<tr>
<td>B. Adjust VR8 so that the ±1 dB segment lights up in the 0 ±0.2 dB range of the standard input level (See fig. 19).</td>
<td></td>
</tr>
<tr>
<td>7. Repeat twice between steps 5 and 6 above.</td>
<td></td>
</tr>
<tr>
<td>8. Adjust ATT and check that all segments light up when an input signal level is increased by 10 dB higher than the standard input level (See fig. 20).</td>
<td></td>
</tr>
</tbody>
</table>

**Dolby NR circuit**

| Condition: |
| Record mode |
| Dolby NR switch → IN/OUT |
| Dolby NR select switch → B/C |
| Input level controls → MAX |
| Equipment: |
| VTVM + AF oscillator |
| ATT + Oscilloscope |
| Resistor (600Ω) |

**Dolby circuit frequency response check:**

- Check of the Dolby-B type encoder characteristics:
  1. Make connections as shown in fig. 21.
  2. Set the unit to the record mode (NR select switch is OUT.)
  3. Apply a 1kHz signal to LINE IN.
  4. Adjust the ATT so that the output level at TP3 (L-CH) and TP4 (R-CH) is 12.3 mV.
  5. The output level at pin 14 should be 0 dB.
  6. Set the NR select switch to B, and make sure that the output signal level at pin 14 of IC3 (L-CH) and IC4 (R-CH) is ±6 dB ±2.5 dB.
  7. Set the NR select switch to OUT, and adjust the frequency to 5kHz. The output signal level at pin 14 should be 0 dB.
  8. Set the NR select switch to B and make sure that the output signal level at pin 14 of IC3 (L-CH) and IC4 (R-CH) is ±8 dB ±2.5 dB. (Check of Dolby-C type encoder characteristics)
  9. Repeat steps 1-5 above.
  10. Set the NR select switch to C and make sure that the output signal level at pin 14 of IC3 (L-CH) and IC4 (R-CH) is 11.5 dB ±2.5 dB.
  11. Set the NR select switch to OUT and adjust the frequency to 5kHz. The output signal at pin 14 should be 0 dB.
  12. Set the NR select switch to C and make sure that the output signal level at pin 14 of IC3 (L-CH) and IC4 (R-CH) is 8.5 dB ±2.5 dB.
ELECTRICAL PARTS LOCATION

REPLACEMENT PARTS LIST

Important safety notice
Components identified by △ 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>
<th>Ref No.</th>
<th>Part No.</th>
<th>Part Name &amp; Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 1</td>
<td>QWY4122Z</td>
<td>Record/Playback Head</td>
<td>E 7</td>
<td>QJS198615</td>
<td>Flat Cable Connector</td>
</tr>
<tr>
<td>E 2</td>
<td>QWY2138Z</td>
<td>Erase Head</td>
<td>E 8</td>
<td>QT1090</td>
<td>Pin Terminal A (Test Point)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[For all European areas except United Kingdom.]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E 4</td>
<td>GSF19006</td>
<td>FL Meter</td>
<td>E 10</td>
<td>NO39</td>
<td>Heat Sink</td>
</tr>
<tr>
<td>E 5</td>
<td>QJP1921TN</td>
<td>3 Pin Post</td>
<td>E 11</td>
<td>QJS1923TN</td>
<td>9 Pin Socket</td>
</tr>
<tr>
<td>E 6</td>
<td>QJP1923TN</td>
<td>9 Pin Post</td>
<td>E 12</td>
<td>QT1054</td>
<td>Contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E 13</td>
<td>QJS1921TN</td>
<td>3 Pin Socket</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E 14</td>
<td>△ QTF1054</td>
<td>Fuse Holder</td>
</tr>
</tbody>
</table>

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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).

SPECIFICATIONS

- Pressure of pressure roller: 350 ± 50 g
- Takeup tension: 45 ± 15 cm
- Wow and flutter (JIS): Less than 0.08% (WRMS)
Motor Unit Disassembly

1. Remove screw (A) and connection plate retainer (M107). The remove fast forward connection plate (M104), rewind connection plate (M105) and record connection plate (M106) (see Fig. 1).
2. Remove three screws (B) and remove operation button unit (see Fig. 2).
3. Remove two screws (C) and hook at section (D) to dismount flywheel retainer (M44) (see Fig. 2).
4. Remove hook at section (E) and cord clamp (M48) (see Fig. 2), and then remove two screws (F) (see Fig. 3) to dismount motor unit.

Precautions for Mechanism Unit Assembly

Before installing the operation button unit in the mechanism unit, pull the play changing lever (M102) of the mechanism unit in the direction of the arrow until it is locked, and set the pause, F.F. and rewind buttons of the operation button unit to OFF. At this time, check that all parts are installed at their proper positions at sections (G), (H) and (I) (see Fig. 2).
RS-M24 MECHANISM SERIES

Please use this manual together with the service manual for model No. RS-M226 (Original) order No. ARD82060161C8-11 and RS-M226 (Supplement-1) order No. ARD82100161S2-01.

PARTS COMPARISON TABLE:
Please revise the original parts list in the Service Manual (RS-M226) to conform to the changes shown herein. If new part numbers are shown, be sure to use them when ordering parts.

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part Name &amp; Description</th>
<th>Part Numbers</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>G3</td>
<td>Rubber Foot</td>
<td>QKA1081</td>
<td></td>
</tr>
<tr>
<td>G6</td>
<td>Eject Spring</td>
<td>QBN1893</td>
<td></td>
</tr>
<tr>
<td>G37</td>
<td>Main Name Plate</td>
<td>QBS3094</td>
<td>Added</td>
</tr>
</tbody>
</table>

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

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Technics

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