RS-M28 MECHANISM SERIES

Specifications

Track system: 4-track 2-channel stereo recording and playback

Tape speed: 4.8 cm/s
Wow and flutter: \[ \begin{align*}
\text{DB} & \quad \ldots \quad 0.05\% \quad (WRMS), \quad \pm 0.14\% \quad (DIN) \\
\text{FF} & \quad \ldots \quad 0.048\% \quad (WRMS)
\end{align*} \]

Frequency response: Metal tape; \[ \begin{align*}
\text{DF} & \quad \ldots \quad 20-17,000 \ Hz \\
25-16,000 \ Hz \quad (DIN) \\
30-15,000 \ Hz \pm 3dB \\
& \quad \ldots \quad 20-18,000 \ Hz
\end{align*} \]
CrO₂ tape; \[ \begin{align*}
\text{DF} & \quad \ldots \quad 20-16,000 \ Hz \\
25-15,000 \ Hz \quad (DIN) \\
30-14,000 \ Hz \pm 3dB \\
& \quad \ldots \quad 20-18,000 \ Hz
\end{align*} \]
Normal tape; \[ \begin{align*}
\text{DF} & \quad \ldots \quad 20-15,000 \ Hz \\
25-14,000 \ Hz \quad (DIN) \\
30-13,000 \ Hz \pm 3dB \\
& \quad \ldots \quad 20-17,000 \ Hz
\end{align*} \]

Dynamic range: 110 dB (at 1 kHz) with dbx in
Max. input level improvement: 10 dB or more improved with dbx in (at 1 kHz)

Signal-to-noise ratio: dbx in; 92 dB
Dolby B NR in; \[ \text{DF} \quad \ldots \quad 66 \text{dB (CCIR)} \]
FF \ldots \ldots 67 \text{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 0.25mV applicable microphone impedance 400Ω—10kΩ
LINE; sensitivity 60mV input impedance 47kΩ or more

Outputs: LINE; output level 400mV, output impedance 2.3kΩ or less
HEADPHONES; output level 80mV (at 8Ω) applicable headphone impedance 8Ω—600Ω

Bias frequency: 80kHz

Heads: 2-head system
1-MX head for record/playback
1-double-gap ferrite head for erasure

Motor: 1-motor system
(�Electrical governor motor)

Power requirements: \[ \begin{align*}
& \ldots \ldots \quad \text{AC; 220V, 50-60Hz} \\
& \text{B3BM} \quad \ldots \ldots \quad \text{AC; 110/125/220/240V, 50-60Hz} \\
& \quad \ldots \ldots \quad \text{Pre-set power voltage 240V} \\
& \quad \ldots \ldots \quad \text{Pre-set power voltage 125V} \\
& \quad \ldots \ldots \quad \text{Pre-set power voltage 220V}
\end{align*} \]

Power consumption: 12W
Dimensions: 43 cm(W) x 10.9 cm(H) x 23.3 cm(D)
Weight: 4kg

Design and specifications are subject to change without notice.
* The term dbx is a registered trademark of dbx Inc.
** 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.
DISASSEMBLY INSTRUCTIONS

Fig. 1
The head azimuth can be adjusted by removing the cassette lid.

Fig. 2
Serial Number Plate

Fig. 3
(E) How to remove flat cable
Open the lid of socket in the direction of the arrow as shown above, and extract the flat cable to disconnect.

Fig. 4

Fig. 5

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Procedure</th>
<th>To remove —</th>
<th>Remove —</th>
<th>Shown in fig. —</th>
</tr>
</thead>
</table>
| 1       | 1         | Main case   | • 2 ornament screws ... (A)
As shown in fig. 1, slide the case cover in the direction of arrow ①. | 1 |
| 2       | 2         | Bottom cover| • 3 screws ...(B)
Slide the bottom cover in the direction indicated by arrow ②, then raise the bottom cover in the direction indicated by arrow ③. | 2 |
| 3       | 1 → 2 → 3 | Front panel assembly| • 4 screws ... (C)
As shown in fig. 3, push the claw in the direction of arrow ④. | 2, 3 |
| 4       | 1 → 4     | Dolby circuit board| • 1 red screw ... (D)
Pull out the Dolby circuit board. | 3 |
| 5       | 1 → 5     | Power supply circuit board| • Connector ⑤ ...(E)
3 red screws ...(F)
2 screws ...(G)
Cord clamp ... (H)
Pull out the power switch rod ...(I)
As shown in fig. 3, push the claw in the direction of arrow ⑤, lift the power ON/OFF switch in the direction of arrow ⑥. | 3 |
| 6       | 1 → 2 → 3 → 6 | FL meter unit| As shown in fig. 4, pull out the FL meter unit in the direction of arrow ⑦. | 4 |
| 7       | 1 → 2 → 3 → 6 | Mechanism unit| • Reset lever ...(J)
4 red screws ...(K) | 5 |
| 8       | 1 → 2 → 3 → 6 | Main circuit board| • Pull out the switch rod ...(L)
Record/playback connection wire ...(M)
3 red screws ...(N)
As shown in fig. 6, push the claw in the direction of arrow ⑧, then pull out the main circuit board. | 6 |

* Serial No. Indication
* The serial number plate of this product is attached to the bottom cover. (Shown in fig. 2.)

**OPERATING PRECAUTIONS**
* If the Record Button or the Play Button is pressed immediately after the power has gone off, the head section will remain raised. This means that the tape will not be ejected even when the Eject Button is pressed. In cases like this, switch on the power again.
MEASUREMENT AND ADJUSTMENT METHODS

NOTES: Set switches and controls in the following positions, unless otherwise specified.
- Make sure heads are clean
- Make sure capstan and pressure roller are clean
- Setable room temperature 20 ± 5°C (68 ± 9°F)
- Input level controls: Maximum

**Head play tension**
Condition: Playback and pause mode
(The head adjusting plate is provided to adjust the tape touch of the head in cup or review mode.)
1. Press the playback button and pause button.
2. Measure the space between the pressure roller and the capstan.
   Standard value: 0.5 ± 0.3 mm
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.

**Head azimuth adjustment**
Condition: Playback mode, Normal tape mode
Equipment: VTVM, Oscilloscope, Test tape...OZZCFM
1. Make connections as shown in fig. 3.
2. Playback the 8kHz signal from the test tape (OZZCFM).
3. Measure output level at LCH and RCH levels. When the output levels of LCH and RCH are not at the maximum at the same point adjust as follows.
4. Turn screw (B) shown in fig. 4 to find angles A and C (points where peak output levels for left and right channels are obtained). Then, locate angle D between angles A and C, i.e., point where LCH and RCH outputs are balanced.
5. LCH/RCH phase adjustment
   Adjust screw (B) shown in fig. 4 so that pointers of the two VTVMs swing to maximum and a horizontal waveform as illustrated in fig. 7 is obtained on the oscilloscope.

**Tape speed adjustment**
Condition: Playback mode
Equipment: Digital frequency counter, Test tape...OZZCFM
1. Test equipment connection is shown in fig. 8.
2. Playback test tape (OZZCFM) and supply playback signal to the digital frequency counter.
3. Measure this frequency.
4. On the basis of the frequency, determine value by the following formula:
   *Tape speed accuracy* = \[ \frac{f - 3000}{f} \times 100\% \]
   where, \( f \) = measured value
5. Take measurement at middle section of tape.
   Standard value: ±1.5%
6. If measured value is not within the standard value, adjust it by using the 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:
   *Tape speed fluctuation* = \[ \frac{f_1 - f_2}{3000} \] \times 100\%\]
   where, \( f_1 \) = maximum value, \( f_2 \) = minimum value
   Standard value: Less than 1%

**Playback frequency response**
Condition: Playback mode, Normal tape mode
Equipment: VTVM, Oscilloscope, Test tape...OZZCFM
1. Test equipment connection is shown in fig. 3.
2. Playback the frequency response portion of test tape (OZZCFM).
3. Measure output level at 315Hz, 125Hz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz, and compare each output level with the standard frequency 315Hz at LINE OUT.
4. Make measurements for both channels.
5. Make sure that the measured values are within the range specified in the frequency response chart. (Shown in fig. 9).

**Playback gain**
Condition: Playback mode, Normal tape mode
Equipment: VTVM, Oscilloscope, Test tape...OZZCFM
1. Test equipment connection is shown in fig. 3.
2. Playback standard recording level portion on test tape (OZZCFM) at 315Hz and, using VTVM, measure the output level at test points TP7 (LCH), TP6 (RCH).
3. Make measurements for both channels.
   Standard value: 0.42V ± 0.30V ± 1dB at LINE OUT jack

Adjustment
1. If the measured value is not within standard the adjust VR3 (LCH) or VR4 (RCH). (See fig. 1).
2. After adjustment, check "Playback frequency response" again.
1. Erase current
   - Condition: Record mode
   - Metal tape mode
   - Equipment: VTM
   - Oscilloscope

2. Place UNIT into metal tape mode.
3. Press the record and pause buttons.
4. Read voltage on VTM and calculate erase current by following formula:
   \[ \text{Erase current (A)} = \frac{\text{Voltage across resistor R154}}{1 (\Omega)} \]
   Standard value: 155±15mA (Metal)

5. If measured value is not within stand, adjust as follows:
   - Short point (B) and open point (A) on the main circuit board. Refer to the wiring connection diagram on page 15.

   **Adjustment**:
   - Short point (B) and open point (A) on the main circuit board.
   - If the erase current is less than 140mA, short the point (A).
   - If the erase current is more than 170mA, open the point (B).

6. Overall frequency response
   - Condition: Record/playback mode
   - Normal tape mode
   - CH tape mode
   - Metal tape mode
   - Input level control...MAX
   - Equipment: VTM
   - Oscilloscope
   - Test tape: Reference blank tape
   - QZCCSR for Normal
   - QZCCSR for Metal

   **Overall frequency response chart (Normal)**
   - Standard value: around 0.15A (GR position)
   - around 700A (Metal position)

   **Overall frequency response chart (Metal)**
   - Standard value: around 0.15A (GR position)
   - around 700A (Metal position)

   **Overall gain**
   - Condition: Record/playback mode
   - Normal tape mode
   - Input level control...MAX
   - Standard input level
   - Equipment: VTM
   - Oscilloscope
   - Test tape: Reference blank tape
   - QZCCSR for Normal

   Overall frequency response chart (Metal)
   - Standard value: 0.38V±2db (300mV) × 0.38V±2db (400mV)

   **Fluorescent meter**
   - Condition: Record mode
   - Input level controls...MAX
   - Equipment: VTM
   - Oscilloscope
   - Test tape: Reference blank tape
   - QZCCSR for Normal

   **Test equipment connection is shown in fig. 16.**
   1. Connect the wire between TPG and ground (See fig. 18).
   2. Supply a 1kHz signal through ATT to LINE IN, then adjust ATT to LINE OUT to become 0.38V.

   **Adjustment (A):**
   - When the curve exceeds the overall specified frequency response chart (fig. 12) as shown in fig. 13.
   1. Increase bias current by turning VRF (L-CH) and VRF (R-CH).
   2. Repeat steps 5 and 6 for confirmation (Proceed to steps 7, 8 and 9 if the curve is now within the charted specifications as shown fig. 12).
   3. If the curve still exceeds the specifications (fig. 12), increase bias current further and repeat steps 5 and 6.

   **Adjustment (B):**
   - When the curve falls below the overall specified frequency response chart (fig. 12). As shown in fig. 14.
   1. Reduce bias current by tuning VRF (L-CH) and VRF (R-CH).
   2. Repeat steps 5 and 6 for confirmation (Proceed to steps 7, 8 and 9 if the curve is now within the charted specifications as shown fig. 12).
   3. If the curve still falls below the charted specifications (fig. 12), reduce bias current further and repeat steps 5 and 6.

   **Fluorescent meter connection is shown in fig. 16.**
   1. Connect the wire between TPG and ground (See fig. 18).
   2. Supply a 1kHz signal through ATT to LINE IN, then adjust ATT to LINE OUT to become 0.38V.

   **Adjustment (A):**
   - When the output level at LINE OUT becomes 0.38V.
   1. Adjust ATT so that the output level becomes 0.38V.
   2. Adjust ATT so that the output level becomes 0.38V.

   **Adjustment (B):**
   - When the output level at LINE OUT becomes 0.38V.
   1. Adjust ATT so that the output level becomes 0.38V.
   2. Adjust ATT so that the output level becomes 0.38V.