Specifications

Power requirement: AC: 110/220V, 50-60Hz
- For All European areas except United Kingdom
- AC: 110/125/220/240V, 50-60Hz
  for Asia, Latin America, Middle East and Africa areas
- AC: 240V, 50-60Hz
  for Australia

Power consumption: 9W

Motor: Electronic control DC motor

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

Tape speed: 4.8cm/s

Wow and flutter: 0.08% (WRMS), ±0.20% (DIN)

Frequency response:
- CrO2/Fe-Cr tape: 30 – 15,000 Hz
  30 – 14,000 Hz (DIN)
- Normal tape: 30 – 14,000 Hz
  30 – 13,000 Hz (DIN)

Signal-to-noise ratio:
- Dolby NR in: 66dB (above 5kHz)
- Dolby NR out: 56dB (signal level = max. recording level, Fe-Cr/CrO2 type tape)

Fast forward and rewind time: Approx. 86 seconds with C-60 cassette tape

Inputs:
- MIC: sensitivity 0.25mV, input impedance 33kΩ
  over applicable microphone impedance 600Ω – 10kΩ

Outputs:
- LINE: sensitivity 60mV, input impedance 47kΩ
  - Headphone: output level 420mV, output impedance 1.5kΩ or less, load impedance 22kΩ over
  - 8Ω

Rec/pc connection: 5P DIN type;
- input sensitivity 0.25mV, impedance 8.2kΩ
  - output level 420mV, impedance 5.0kΩ

Bias frequency: 83kHz

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

Dimensions: 410cm(W) x 142cm(H) x 20.5cm(D)

Weight: 3.8kg

Specifications are subject to change without notice.

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

① Power switch (power)
② Cassette holder
③ Tape counter and Reset button (tape counter)
④ VU meters (left-level-right)
⑤ Recording indication lamp (rec)
⑥ Pause button (pause) (I)
⑦ Record button (record) (O)
⑧ Play button (play) (△)
⑨ Rewind button (rew) (◄◄)
⑩ Fast forward button (ff) (►►)
⑪ Stop button (stop) (■)
⑫ Eject button (eject) (△)
⑬ Microphone jacks (mic) (left/right)
⑭ Input selector (input select)
⑮ Dolby noise-reduction switch (Dolby NR)
⑯ Tape selector (tape select)
⑰ Input level controls (left/input level/right)
⑱ Headphones jack (phones)
⑲ Line input cord (LINE IN)
⑳ Line output cord (LINE OUT)
㉑ Record/playback connection socket (REC/PLAY)
㉒ Voltage selector (VOLTAGE SELECTOR)

DISASSEMBLY INSTRUCTIONS

Fig. 2

Fig. 3

Fig. 4

Fig. 5
### MEASUREMENT AND ADJUSTMENT METHODS

**NOTE:** Set lever 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

#### ITEM | MEASUREMENT & ADJUSTMENT
---|---
**A** Head azimut adjustment  
Condition:  
- Playback mode  
Equipment:  
- VTVM  
- Oscilloscope  
- Test tape (azimuth) --- QZZCFM  
1. Test equipment connection is shown in fig. 7.  
2. Playback azimuth tape (QZZCFM & 8kHz)  
3. Adjust record/playback head angle adjustment screw (B) in fig. 8 so that output level at LINE OUT becomes maximum  
4. Measure both channels, and adjust levels for equal output  
5. After adjustment lock head adjustment screw with lacquer  
**B** Tape speed  
Condition:  
- Playback mode  
Equipment:  
- Digital electronic counter or frequency counter  
- Test tape --- QZZCWAT  
1. Test equipment connection is shown in fig. 9.  
2. Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to frequency counter  
3. Measure this frequency.  
4. On the basis of 3,000Hz, determine value by following formula:  
   \[
   \text{Tape speed accuracy} = \left(\frac{f - 3,000}{3,000}\right) \times 100 \%
   \]
   where, \( f \) = measured value
5. Take measurement at middle section of tape.

**Standard value:** ± 1.5%

**Adjustment method**
1. Playback the test tape (middle).
2. Adjust so that frequency becomes 3,000 Hz.
3. Tape speed adjustment VR shown in CAUTION on page 2.

**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:

\[
\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 100 \%
\]

Where:
- \( f_1 \) = maximum value
- \( f_2 \) = minimum value

**Standard value:** 1%

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**Playback gain**

**Condition:**
- Playback mode

**Equipment:**
- VTVM
- Oscilloscope
- Test tape... QZCFM

**Adjustment**
1. Test equipment connection is shown in fig. 7.
2. Playback standard recording level portion on test tape (QZCFM 315 Hz), and using VTVM measure the output level at LINE OUT jack.
3. Make measurement for both channels.

**Standard value:** 0.39V

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**Bias current**

**Condition:**
- Record mode
- When bias current is adjusted on one channel, only note that bias current on the other channel may vary.
- When L5 or L6 is the replaced preset core, position to bottom side of coil and then readjust optimum bias current.

**Equipment:**
- VTVM
- Oscilloscope

**Adjustment**
1. Test equipment connection is shown in fig. 10.
2. Place UNIT into record mode, and tape selector to normal position.
3. Read voltage on VTVM and calculate bias current by following formula:

\[
\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{300 \, \Omega}
\]

**Standard value:** around 315μA (Normal, Fe-Cr position),
around 380μA (Cr02 position)

4. Adjust L5 (L1-C) and L6 (R1-C) (See fig. 20 on page 5).

**Note:**
1. Adjusting L5 and L6 causes bias current to vary as shown in fig. 11.
2. Bias current is adjusted by portion A (fig. 11).

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**Erase current**

**Condition:**
- Record mode

**Equipment:**
- VTVM
- Oscilloscope
- Resistor (1Ω)

**Adjustment**
1. Connect 1Ω resistor between the ground side terminal of erase head and ground lead wire removed (See fig. 13).
2. Connect VTVM to both ends of 1Ω resistor (See fig. 12).
3. Place UNIT into record mode, and measure voltage across the 1Ω resistor.
4. Determine erase current with the following formula:

\[
\text{Erase current (A)} = \frac{\text{Voltage across both ends of 1Ω resistor}}{1 \, \Omega}
\]

**Standard value:** More than 40mA (Normal position), More than 40mA (Fe-Cr position), More than 55mA (Cr02 position)
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
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| **Overall gain** | 1. Test equipment connection is shown in fig. 14.  
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 0.39 V.  
5. Using test tape, make recording.  
6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.39 V (—7 dB).  
7. If measured value is not 0.39 V, adjust VR5 (L-CH), VR6 (R-CH) (See pg. 20).  
8. Repeat from step 2. |
| **Level meter** | 1. Test equipment connection is shown in fig. 15.  
2. Supply 1kHz signal from the AF oscillator, through the ATT, to the LINE IN jack.  
3. Adjust ATT so that the monitor level at LINE OUT becomes 0.39 V.  
4. Check to see that the level meter stays within the range of —1 dB to +1 dB.  
5. If it is beyond the range, carry out the following adjustments:  
   1. Open soldered portions a (L-CH) and c (R-CH) indicated as "DOWN" where level more than +1 dB.  
   2. Open soldered portions b (L-CH) and d (R-CH) indicated as "UP" where level less than —1 dB. (See wiring connection diagram on page 8.) |
| **Overall frequency response** | 1. Test equipment connection is shown in fig. 14.  
2. Load reference blank test tape and place UNIT into record mode.  
3. Supply 1kHz signal from AF oscillator through ATT to LINE IN.  
4. Adjust ATT so that input level is —20 dB below standard recording level (standard recording level —24 dB).  
5. Record each frequency 50Hz, 100Hz, 200Hz, 1kHz, 2kHz, 4kHz, 6kHz and 10kHz (12kHz for CrO₃, and Fe-Cr tape) at the same level.  
6. Playback and express in dB the difference between playback output level of each frequency based on playback output level of 1kHz.  
7. Make sure that the measured value is within the range specified in the Overall frequency response chart.  
8. Set the tape selector to CrO₃, Fe-Cr position.  
9. Measure as same as manner above.  
10. Make sure that the measured value is within the range specified in the overall frequency response chart for CrO₃ and Fe-Cr tape shown in fig. 17 and 18. |
### ADJUSTMENT PARTS LOCATION

- **Tape speed adjustment VR.**
- **VR6**
- **VR5**
- **VR3**
- **VR4**
- **L6**
- **L5**

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**Item 1:** Overall frequency adjustment response
(As a standard for adjustment)

Adjustment — Using bias current:

1. When the frequency response between the middle and high-frequency range becomes higher than the standard value, as shown by the solid line in Fig. 19, increase the bias current by tuning L5 (L-CH), L6 (R-CH).
2. When it becomes lower, as shown by dotted line, reduce the bias current by tuning L5 (L-CH), L6 (R-CH).

**Note:**

For the method of bias current measurement, refer to "Bias current adjustment" on page 3.

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**Item 2:** Dolby NR circuit

Condition:
- Record mode
- Input level control — MAX

Equipment:
- VTVM
- AF oscillator
- ATT
- Oscilloscope

1. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain —34.5 dB at TP4 (L-CH), TP5 (R-CH) (frequency 5 kHz).
2. Confirm that the value at IN position is 8 (±2.5) dB greater than the value at OUT position of Dolby NR switch.

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**Fig. 19**

**Fig. 20**