High Fidelity Stereo Cassette System with Closed-Loop, Double-Capstan, 3-Motor Drive, Separate Amplifier Unit

RS-9900U MECHANISM SERIES

Specifications (Catalog specifications for sales)

Power requirement: AC: 120 V, 50/60 Hz  
Power consumption: 45 W  

Motor: 4-motor closed-loop double-capstan system;  
1 DC, DC brushless capstan motor  
2 DC coreless motor for reel table drive  

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

Recording system: AC bias (90 kHz), AC erase  

Tape speed: 1-7/8 ips  

Wow and flutter: 0.04% (WRMS)  

Frequency response: CrO2 tape, 25 – 20,000 Hz (±3 dB)  
Normal tape, 25 – 18,000 Hz (±3 dB)  

Signal-to-noise ratio: Dolby NR in: 67 dB (above 5 kHz)  
Dolby NR out: 57 dB  
(signal level = maximum recording level)  

Harmonic distortion: 1.4% (CrO2/normal tape 160 nW/m 333 Hz)  

Input: Mic: sensitivity 0.25 mV/applicable microphone impedance 600Ω – 20 kΩ  
Line: sensitivity 60 mV/input impedance 150 kΩ  
Aux: sensitivity 60 mV/input impedance 150 kΩ  

Output: Line: output level 0.42 V/load impedance 47 kΩ  
Through out: output level 0.42 V/load impedance 47 kΩ over  

Output: Aux: output level 0.42 V/load impedance 47 kΩ  
Headphones: output level 0 – 900 mV/impedance 8Ω – 125Ω  

Fast forward and rewind time: Approx. 70 seconds with C-60 cassette tape  
Tape speed variable range ±5% at playback  

Pitch control: Play cal; playback level variable range ±3 dB at 333 Hz  
Calibration control: Rec cal; recording level variable range ±5 dB at 1,000 Hz  
Bias: bias current variable range –50 – +100% (100% = standard tape)  
EQ: recording equalizer variable range ±5 dB at 10,000 Hz  

Head: 3-head system;  
2-HPF heads for record/playback  
1-double gap ferrite head for erasure  

Dimensions: Transport unit: 19"(W) x 7-5/8"(H) x 14-3/4"(D)  
Amplifier unit: 19"(W) x 6-7/8"(H) x 14-3/4"(D)  

Weight: Transport unit: 33 lbs  
Amplifier unit: 19-7/8 lbs  

Specifications are subject to change without notice.
LOCATION OF CONTROLS AND COMPONENTS

(1) Power indication lamp
(2) Monitor switch
(3) Microphone attenuator switch
(4) Tape selector
(5) Oscillator switch
(6) Dolby noise-reduction switch
(7) Multiplex filter switch
(8) Bias calibration control screws
(9) Equalization calibration control screws
(10) Dolby FM calibration control screws
(11) Oscillation calibration control screws
(12) Peak meters
(13) Record indicator lamp
(14) Preset marks
(15) Line-input level control
(16) Output level control
(17) Microphone/auxiliary input level control
(18) Pitch control
(19) Tape time
(20) Tape counter and reset button
(21) Pause button
(22) Fast forward button
(23) Playback button
(24) Stop button
(25) Rewind button
(26) Record button
(27) Memory switch
(28) Timer switch
(29) Head cover
(30) Microphone jacks
(31) Auxiliary input jack (left), Auxiliary output jack (right)
(32) Power switch
(33) Power indicator lamp
(34) Cassette door
(35) Eject button
(36) Headphones jack
(37) Headphones level control
(38) Record calibration control screws
(39) Playback calibration control screws
(40) Variable/pre-set pushbutton switch
(41) Variable indicator lamp
(42) Line-output jacks
(43) "Through out" jacks
(44) Line-input jacks
(45) 20-pin connection terminals
(46) Ground terminal
(47) Remote control connection socket
(48) 6-pin connection terminals
(49) Power cord

Fig. 1

*Dolby is the trade mark of DOLBY Laboratories*
## DISASSEMBLY INSTRUCTIONS

### Fig. 2

### Fig. 3

### Fig. 4

### Fig. 5

### Fig. 6

### Fig. 7

<table>
<thead>
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<th>Remove</th>
<th>Shown in fig</th>
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<tr>
<td>1</td>
<td>Case cover</td>
<td>7 black screws .................. (A)</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Bottom cover</td>
<td>8 red screws .................... (B)</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Front panel</td>
<td>Pitch control knob ............. (C)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3 lever knobs .................. (D)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>7 red screws ................... (E)</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Cassette cover</td>
<td>2 red screws ................... (F)</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>*1</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Control button unit</td>
<td>4 screws ........................ (G)</td>
<td>7</td>
</tr>
</tbody>
</table>

*1 Temporarily attach the lamp holder as shown in fig. 6 while the cassette cover is removed.
<table>
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<tr>
<td>1</td>
<td>Power circuit board</td>
<td>6 screws ........................ (H)</td>
<td>8</td>
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<tr>
<td></td>
<td></td>
<td>5 connectors .................. F G H I L</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>Plunger operation circuit board</td>
<td>5 screws ........................ (I)</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 connectors .................. J K Z</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>Logic circuit board</td>
<td>3 screws ........................ (J)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 connectors .................. A B C D</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>Motor governor circuit board</td>
<td>2 screws ........................ (K)</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>Switches circuit board</td>
<td>3 screws ........................ (L)</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Operation circuit board</td>
<td>3 screws ........................ (M)</td>
<td>10</td>
</tr>
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**DISASSEMBLY INSTRUCTIONS**

![Fig. 11](image1.png)

![Fig. 12](image2.png)

![Fig. 13](image3.png)

![Fig. 14](image4.png)

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<td>Bottom cover</td>
<td>9 red screws                   (B)</td>
<td>12</td>
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<td>2</td>
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<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 lever knobs                  (D)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 red screws                   (E)</td>
<td></td>
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<td></td>
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<td>*1</td>
<td></td>
</tr>
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*The microphone/auxiliary controls and the line-input level controls are installed as shown in fig. 14, and should be removed in order. Note that an M4 type hexagonal wrench should be used in remove controls.*
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<td>2 screws .......................... (F)</td>
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<td>CAL circuit board</td>
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<td>1</td>
<td>Lever switches circuit board</td>
<td>6 connectors .......... (O) FOR (S)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 screws ........................ (I)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 screws .......................... (J)</td>
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<td>1</td>
<td>Jack circuit board</td>
<td>2 connectors ...................... (N)</td>
<td></td>
</tr>
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ELECTRICAL PARTS LOCATION
MEASUREMENT AND ADJUSTMENT METHOD

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Before measuring and adjusting “Overall frequency response”, “Overall distortion” and “Overall S/N ratio”, confirm that the 5 items below are within specification.

1. Head azimuth adjustment
2. Bias current
3. Playback gain
4. Overall gain
5. Playback frequency response

I. TEST INSTRUMENTS

1. Prepare test instruments which are equivalent in accuracy to those shown below.
2. The test instruments should be inspected and corrected by specialists once every 6 months, to ensure that they are properly calibrated.
3. Warm up the test instruments for 30 minutes and the set to be measured for 10 minutes before taking the measurements. If not, there may arise an error or difference between the initial value and the stabilized value measured after “aging”.
4. Specifications of test instruments.

(1) Audio frequency oscillator
- Oscillation frequency: 5 Hz ~ 500 kHz (5 ranges)
- Frequency tolerance: ± (3% + 1 Hz)
- Sine wave
  - Output voltage (at 25°C): 5 Vrms ± 10% (without load)
  - Output frequency response:
    - Within ± 0.2 dB, 20 Hz ~ 20 kHz
    - Within ± 0.5 dB, 5 kHz ~ 500 kHz
  - Distortion factor:
    - Not more than 0.05%, 200 Hz ~ 20 kHz
    - Not more than 0.5%, 5 kHz ~ 500 kHz
  - Output impedance: 600Ω unbalanced, within ± 15%
  - Output attenuator: 0 dB, 20 dB, error: within ± 0.2 dB
- Temperature in use of set: Temperature = 0 ~ 40°C, humidity = 90% or less

(2) Automatic level distortion meter (with voltmeter)

A. Distortion factor measurement
- Frequency (fundamental wave): 400 Hz, 1 kHz ± 10%
- Measurement: 0.1 ~ 100% (6 ranges)
- Input: 50 mV ~ 50 V
- Fundamental wave attenuation: 60 dB or more

B. Level measurements
- Measurement: 1 mV (~ 60 dB) ~ 30 V (30 dB), 9 ranges
- Frequency response (1 kHz basis): 20 Hz ~ 100 kHz ± 0.3 dB
- Input impedance: 1 MΩ ± 10%, less than 50 pF
- Error in indicated value: Within ± 3% at 1 kHz

C. Output terminal
- Frequency response:
  - 10 Hz ~ 100 kHz ± 1 dB
  - 100 kHz ~ 1 MHz ± 3 dB
- Output voltage: 1 Vrms ± 10% (1 kHz sine wave)

(3) Attenuator
- Input impedance: 600Ω unbalanced
- Maximum attenuation: 121 dB
- Minimum attenuation: 0.1 dB
(4) Oscilloscope
a. Cathode ray tube: Effective ranges 8 × 8 cm
b. Vertical axis
   - Input sensitivity: 30 mV ~ 30 V/cm
   - Frequency band: DC ~ 2 MHz
   - Transient time: 180 ns
   - Input impedance: 1 MΩ, 35 pF
c. Horizontal axis
   - Tuning range: 30 Hz ~ 2 MHz
   - Sweep time: 1 μs ~ 100 ms/cm
   - External sweep: 1 Vp-p/cm or more

(5) Digital electronic counter
a. Number of figures: 4 (decimal system)
b. Input sensitivity: 100 mVrms
c. Input impedance: 1 MΩ, 40 pF
d. Frequency measurement range: 10 Hz ~ 100 kHz
e. Counting time: 0.1 s, 1 s, 10 s

(6) Wow meter
a. Measured center frequency range: 3 kHz ± 4%
b. Input level range: 30 mV ~ 3 V
c. Input impedance: About 50 KΩ unbalanced
d. Measurement: 0.01 ~ 3% (5 ranges)
e. Indicator error: Maximum error in indicated value ±5% in each range
f. Frequency response: Conforming to weighting curve characteristic (WRMS), JIS C5551
   - Flat characteristic (RMS)
   - 0.5 ~ 200 Hz, within ~ 3 dB (4 Hz basis)
g. Meter indication system: Effective value indication, conforming to JIS C5551
h. Meter response characteristic: About 5 ~ 7 sec
i. Oscillation frequency: 3 frequencies (3 kHz, 3 kHz ± 3%)
j. Temperature range: 0 ~ 40°C
II. MEASUREMENT CONDITIONS

1. Standard measurement conditions
   - Ambient temperature: 10～30°C (50～86°F)
   - Ambient humidity: 30～90% RH
   - Power voltage accuracy: ±3%

2. Position of tape recorder
   - When measuring, place the unit under test in a horizontal position.

3. Oscillator output voltage adjustment
   - Connect the equipment as shown and adjust the oscillator output control knob for 1V (f = 1kHz) through the attenuator while keeping the attenuator at 0 dB.
   - When supplying a signal to the tape recorder amplifier, adjust the input level using the attenuator.

III. TEST TAPE

* Test tape life

The more frequently the test tape is used, the more the tape characteristics will deteriorate (e.g. lowering of recorded level, loss of frequency response particularly in high-frequency range, and an increase in wow due to tape elongation) until measured values become unreliable. When a tape is not used, but stored, for a long period of time, tape shows deterioration in performance because of self demagnetization due to storage conditions, etc.

Please refer to the tape life specification and use care not to use a tape longer than its rated life when servicing.

Frequency of use: Not more than 20 times for each tape length.

Storage period: Not more than 6 months.

<table>
<thead>
<tr>
<th>PARTS NO.</th>
<th>PARTS NAME</th>
<th>SPECIFICATIONS</th>
<th>REMARKS</th>
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<tr>
<td>C-FK</td>
<td>Standard recording level and frequency response tape</td>
<td><img src="#" alt="Graph" /></td>
<td>5 times repetitive recording Tape speed: 1-7/8 ips (4.8 cm/s) Full track (10 min)</td>
</tr>
<tr>
<td>C-WAT</td>
<td>Wow and tape speed tape</td>
<td><img src="#" alt="Graph" /></td>
<td>Tape speed: 1-7/8 ips (4.8 cm/s) Full track (45 min)</td>
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<tr>
<td>C-AA</td>
<td>Azimuth tape</td>
<td><img src="#" alt="Graph" /></td>
<td>Tape speed: 1-7/8 ips (4.8 cm/s) Full track (15 min)</td>
</tr>
<tr>
<td>C-RA</td>
<td>Reference blank tape (Normal)</td>
<td></td>
<td>Unrecorded tape (20 min)</td>
</tr>
<tr>
<td>C-RF</td>
<td>Reference blank tape (C0)</td>
<td></td>
<td>Unrecorded tape (20 min)</td>
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</tbody>
</table>
**POWER SUPPLY ADJUSTMENTS**

Power supply adjustments B1 and B2 should be checked and adjusted if necessary, before any other adjustments are made.

### B2 (+5.6V) adjustment

**VTVM or FET-meter**

1. Connect cable to the amplifier.
2. Connect voltmeter to B2 of the power supply and oscillator circuit board and to the E (Ground) test point, adjust VR6 "B2 ADJ" so that the voltmeter indicates 5.6 volt, as shown in fig. 53.

### B1 (+24V) adjustment

**VTVM or FET-meter**

1. Connect cable to the amplifier.
2. Connect voltmeter to B1 of the power supply and oscillator circuit board and to the E (Ground) test point, adjust VR5 "B1 ADJ" so that the voltmeter indicates 24 volt, as shown in fig. 53.

### Tape time meter adjustment

1. Connect to the amplifier unit.
2. Play the portion of the end of tape (C-60).
3. Adjust the "0 (zero), ADJ" VR (VR201) so that the needle of the tape time meter indicates to "0 (zero)" position.
4. Play the portion of the beginning of tape (C-60).
5. Adjust the "FUL ADJ" VR (VR202) so that the needle of the tape time meter indicates to "C-60" position.

(See adjustment parts location on page 43.)

![Fig. 18](image-url)
## IV. MEASUREMENT & ADJUSTMENT METHOD

**NOTE:**
1. Make sure heads are clean.
2. Make sure capstans and pressure rollers are clean.
3. Approximate room temperature: 20°C ± 5°C (68°F ± 9°F)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
</table>
| **Pressure of pressure roller**  
Equipment:  
• Tension gauge (max. 500 gr) | **TRANSPORT SECTION MECHANISM**  
1. Place UNIT into playback mode.  
2. Hook tension gauge to pressure roller shaft top (A), and pull gauge in direction (B) opposite to pressure of pressure roller against capstan (See fig. 19).  
3. Release tension from above condition, and read pressure indicated on gauge immediately when pressure roller rotates with capstan.  

**Standard value:** 350±50 gr |
| **Adjustment method**  
Adjust by bending the (C) part of the pressure roller spring (See fig. 19.)  
**Note:** Confirm that the measured or adjusted value between left and right pressure of pressure rollers are within 50 gr. |
| **Takeup tension**  
Equipment:  
• Cassette torque meter (SRK-CT or RP8063) | 1. Mount cassette torque meter on UNIT.  
2. Place UNIT into playback mode and read takeup torque.  
3. Measure several times and determine the standard value.  

**Standard value:** 60±5 gr-cm |
| **Tape speed**  
Equipment:  
• Digital electronic counter or frequency counter (RP8067)  
• Test tape...C-WAT | **Tape speed accuracy**  
1. Test equipment connection is shown below.  

![Fig. 20](image) |

---

17
2. Play test tape (C-WAT 3,000 Hz), and supply playback signal to frequency counter.
3. Measure this frequency.
4. On the basis of 3,000 Hz, determine value by following formula:
   \[
   \text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100(\%)
   \]
   where, \( f \) = measured value
5. Take measurement at middle section of tape.

**Standard value: ±1.0 %**

**Adjustment method**

(For playback)
1. Set the pitch control to center (clicked) position.
2. Play the test tape (middle section).
3. Adjust the tape speed adjustment VR shown on page 43 so that frequency becomes 3,000 Hz.

(For recording)
1. Stop the bias oscillator.
2. Place UNIT into record/playback mode.
3. Adjust the tape speed adjustment VR (VR4) shown on page 43 so that frequency becomes 3,000 Hz.

**Tape speed fluctuation**

Make measurements in same manner as above (beginning, middle and end of tape), and determine difference between maximum and minimum values and calculate as follows:

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

\( f_1 \) = maximum value
\( f_2 \) = minimum value

**Standard value: 0.5 %**

**Wow and flutter**

Equipment:
- Wow meter
- Test tape ... C-WAT

1. Test equipment connection is shown below.

![Diagram](image)

**Fig. 21**

2. Use wow test tape (3,000 Hz) and measure its playback signal on wow meter.
3. Wow and flutter is expressed in percentage and that measurement can be weighted by JIS network (WRMS).
4. Measure at middle section of test tape.

**Standard value: 0.05% (WRMS)**
1. Head Mounting method

1.1. Erase head

After mounting the erase head holding seat (M42), use the erase head positioning screw (A) to adjust the space between the pressure roller and the erase head to within 0.1 – 0.3 mm in the stop mode.

**Note:** When mounting the erase head in the erase head holding seat (M42), be sure that the pressure roller does not contact the erase head when the stopper pin of the pressure roller contacts the part of the head base plate shown as (a) in the figure below.

![Diagram of Erase Head Mounting](image)

**Fig. 22**

1.2. Record head

After replacement of the record head, mount it so that it is flat. Adjust it by visually estimating a height of about 3.5 mm, as shown in the figure below.

Note that a test tape with a mirror (RT-8133) should be used, when making a visual adjustment, in order to confirm that the skew (forward tilt), tangency, and the tape movement position is correct. See check point in figure below.

![Diagram of Record Head Adjustment](image)

**CHECK POINT**

Check to be sure that tape moves along adjustment line at lower side of record head.

**Fig. 23**
1-3. Playback head

After replacement of the playback head, adjust it so that it has a visually estimated height of about 1 mm, as shown in the figure below.

Note that a test tape with a mirror (RT-8133) should be used, when making a visual adjustment, in order to confirm that the skew (forward tilt), tangency, and the tape movement position is correct. See check point in figure below.

![Check point diagram](image)

**Check point**

Check to be sure that tape moves along adjustment line at lower side of playback head.

---

**Play plunger mounting method**

Manually move the play plunger shaft (iron core) in the direction indicated by the arrow (↑), as shown in fig. 25, and secure it, by using the play plunger mounting screws, in the position where the head base plate holes contact the guide pins.

**Note:** To make the adjustment of the position of the play plunger, be sure to hold the plunger shaft (iron core). If the lever is held in position while making the adjustment, there is the possibility of a mis-adjustment.
### Eject plunger mounting method

While manually moving the eject plunger shaft (iron core) in the direction indicated by the arrow (←), as shown in Fig. 26, secure it by using the eject plunger mounting screws in the position where the eject lever angle contacts the mechanism chassis.

**Note:** To make the adjustment of the position of the eject plunger, be sure to hold the plunger shaft (iron core). If the lever is held in position while making the adjustment, there is the possibility of a mis-adjustment.

![Diagram of Eject plunger mounting method](image)

**Fig. 26**

### Pause plunger mounting method

While moving the pause plunger shaft (iron core) in the direction indicated by the arrow (↓), as shown in Fig. 27, adjust so that the space between the right pressure roller and the capstan is 0.1 ~ 0.5mm or less.

**Note:** To make the adjustment of the position of the pause plunger, be sure to hold the plunger shaft (iron core). If the lever is held in position while making the adjustment, there is the possibility of a mis-adjustment.

![Diagram of Pause plunger mounting method](image)

**Fig. 27**
Cassette base plate adjustment

After insertion of the cassette tape, while moving the micro switch in the direction indicated by the arrow (↑).

Power supply ON/OFF switch

Cassette base plate assembly

Fig. 28

Motor pulley mounting method

Adjust the height of the motor pulley to 1 ± 0.1 mm, using the height of the mechanism base plate as a reference.

Motor pulley

Mechanism chassis

Fig. 29
Micro-switch for eject mounting method

Fast forward, rewind and playback mode
In the fast forward, rewind, playback and pause mode, adjust the micro switch to "OFF" while moving the micro switch in the direction indicated by the arrow (↑).
In the stop mode, adjust the micro switch to "ON" while moving the micro switch in the direction indicated by the arrow (↓).

![Fig. 30](image)

Click lever adjustment

Make the adjustment while moving the "click" lever in the direction indicated by the arrow (←) to the position which is the distance from the end of the cassette base plate to the mechanism base plate (32 mm).
Note that the cassette base plate should not be secured at its "click" point. In addition, the cassette base plate should be reset at the "click" point when the eject plunger operates (Also, when the cassette tape is inserted).

![Fig. 31](image)

Cassette door lock position adjustment

1. See fig. 32.
2. With the steer guide pushed in direction "A", slowly close and lock the cassette door.
3. In the locked condition, and while the steer guide is pulled in direction "B", tighten the lock adjustment screws with the cassette door in a position touching the rubber cushion.
Air damper adjustment

1. See fig. 33.
2. Open the cassette door.
3. Loosen the air damper adjustment screws.
4. Pushing the air damper against the shock absorber lever, move the air damper until it will move no farther.
5. The amount of air of the air damper can be adjusted by using a hexagonal wrench.

**Note:** Make the adjustment carefully, because, depending upon the air pressure, the door will be difficult to open completely.
AMPLIFIER SECTION

1. Recording monitor section

UNIT CONDITIONS (List No. 1)

- S6 Monitor switch: Source monitor
- S1 Mic ATT switch: 0 dB
- S5 Tape select switch: Normal
- S2 OSC selector switch: OFF
- S3 Dolby NR switch: OUT
- S4 MPX filter switch: OUT
- Mic/aux input level control: Minimum
- Output level control: 0 dB position on front panel
- Headphone level control: Minimum
- Variable/pre-set pushbutton switch: Pre-set position
- REC and PLAY CAL: Center clicked position
- Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE IN.

1-1. LINE-IN level

1. Test equipment connections are shown in fig. 34.
2. Place UNIT in the above conditions, see List No. 1.
3. Adjust ATT so that the output level (L-CH) at TP4 (Ground) and M-TP: 6 of ENCODER on VTM becomes 0.42±0.05 V (Then, LINE-IN control VR for R-CH should be set to maximum position as L-CH).
4. Change channel to R-CH in the above same condition.
5. Measure and adjust the LINE-IN level adjustment semi-fixed VR (VR221) so that the output level (R-CH) at TP11 (Ground) and M-TP: 13 of ENCODER on VTM becomes 0.42±0.05 V.

(See adjustment parts location on page 44.)
### 1-2. SOURCE monitor
1. Test equipment connections are shown in fig. 34.
2. Place UNIT in the above conditions, see List No. 1.
3. Adjust ATT as described in step 3 of LINE-IN level adjustment, see page 25.
4. Adjust the monitor level adjustment semi-fixed VR (VR101) so that the output level (L-CH) at TP3 (Ground) and M-TP: 1 of DECODER on VTVM becomes 0.42 ± 0.05 V.
5. Change channel to R-CH in the above same condition.
6. Adjust the monitor level adjustment semi-fixed VR (VR102) so that the output level (R-CH) at TP10 (Ground) and M-TP: 8 of DECODER on VTVM becomes 0.42 ± 0.05 V.
(See adjustment parts location on page 44.)

### 1-3. LINE-OUT level
1. Test equipment connections are shown in fig. 34.
2. Place UNIT in the above conditions, see List No. 1.
3. Adjust ATT as described in step 3 of LINE-IN level adjustment, see page 25.
4. Adjust the source monitor LINE-OUT level adjustment semi-fixed VR (VR207 for L-CH, VR208 for R-CH) so that the output level at LINE-OUT jack (L-CH, R-CH) on VTVM becomes 0.42 ± 0.05 V.
(See adjustment parts location on page 44.)

### 1-4. AUX-IN level
1. Test equipment connections are shown in fig. 34.
2. Place UNIT in the above conditions, see List No. 1.
3. Set the mic/aux input level control from minimum to maximum.
4. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to AUX-IN jack (L-CH).
5. Adjust ATT until 0.42 ± 0.05 V is obtained (The mic/aux input level control for R-CH should now be set to the maximum position).

![Fig. 35](image)
6. Change channel to R-CH in the above same condition.
7. Adjust the AUX level adjustment VR (VR220 for R-CH) at AUX-OUT (R-CH) until 0.42 ± 0.05 V is obtained.
(See adjustment parts location on page 44.)

### 1-5. Dolby FM
1. Test equipment connections are shown in fig. 34.
2. Place UNIT in the above conditions, see List No. 1.
3. Adjust ATT as same manner as step 3 of LINE-IN level adjustment, see page 25.
4. Set the S3 Dolby NR switch to the Dolby FM position.
5. Adjust the FM CAL adjustment VR (VR51 for L-CH) so that the output level at M-TP: 6 (L-CH) of ENCODER on VTVM becomes 0.42 ± 0.05 V.
(See adjustment parts location on page 44.)
6. Change channel to R-CH in the above same condition.
7. Adjust the FM CAL adjustment VR (VR52 for R-CH) so that the output level at M-TP: 13 (R-CH) of ENCODER on VTVM becomes 0.42 ± 0.05 V.
(See adjustment parts location on page 44.)
2. Playback adjustment section

UNIT CONDITIONS (List No. 2)

- S6 Monitor switch: Tape monitor
- S1 Mic ATT switch: 0 dB
- S5 Tape select switch: Normal
- S2 OSC select switch: OFF
- S3 Dolby NR switch: OUT
- S4 MPX filter switch: OUT
- Mic/aux input level control: Minimum
- Line input level control: Minimum
- Output level control: 0 dB position on front panel
- Headphone level control: Minimum
- Variable/pre-set pushbutton switch: Pre-set position
- REC and PLAY CAL: Center clicked position
- Place UNIT into playback mode to release the playback muting function.

2.1. Playback head azimuth

1. Test equipment connections are shown in fig. 36.
2. Place UNIT in the above conditions, see UNIT CONDITION List No. 2.
3. Play azimuth test tape (C-AA, 6.3 kHz — 10 dB).
4. Adjust the playback head azimuth adjustment screw (B), see fig. 37 so that output level at LINE-OUT becomes maximum.
5. Measure both channels, and adjust levels for equal output.
6. After adjustment lock the head adjustment screw with lacquer.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
</table>
| 2-2. Playback equalizer and level | 1. Test equipment connections are shown in fig. 36.  
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 2.  
3. Remove the head lead (6 pin connector) from amplifier unit side.  
4. Supply 333Hz signal (−78.5 dB) from AF oscillator, through ATT. to TP25 and TP24 (Ground) for L-CH, TP21 and TP22 (Ground) for R-CH on the head lead 6 pin connector.  
5. Measure output level at LINE-OUT jack (both channels).  
6. Then, change AF oscillator signal to 10 kHz.  
7. Confirm that the output level at LINE-OUT jack is −12 ± 0.5 dB lower than the step 4 above.  
8. If the measured value is not within the standard value, adjust the playback equalization adjustment VR (VR201 for L-CH, VR202 for R-CH) to obtain the standard value.  
(See adjustment parts location on page 44.)  
9. Change AF oscillator signal to 333Hz (−78.5 dB) in the same manner as the step 4 above  
10. The output level at the LINE-OUT jack should be 0.42 ± 0.05 V.  
11. If the measured value is not within the standard value, adjust the playback gain adjustment VR (VR203 for L-CH, VR204 for R-CH)  
(See adjustment parts location on page 44.)  
12. Set the S5 tape select switch to “CR/O” tape position.  
13. Change AF oscillator signal from 333Hz to 10 kHz in the same manner as step 4, 5 and 6 above.  
14. Confirm that the output level at the LINE-OUT jack is −4.5 ± 0.5 dB lower than the measured value (−12 ± 0.5 dB) in step 7.
3. Dolby NR circuit adjustment

### UNIT CONDITIONS (List No. 3)

- **S6 Monitor switch**: Source monitor
- **S1 Mic ATT switch**: 0 dB
- **S5 Tape select switch**: Normal
- **S2 OSC selector switch**: OFF
- **S3 Dolby NR switch**: OUT
- **S4 MPX filter switch**: OUT
- **Mic/aux input level control**: Minimum
- **Line input level control**: Maximum position
- **Output level control**: 0 dB position on front panel
  
  
  
  (-4 click point from maximum position)
- **Headphone level control**: Minimum
- **Variable/pre-set pushbutton switch**: Pre-set position
- **REC and PLAY CAL**: Center clicked position
- **Playback (see page 27) and record monitor section (see page 25) should be adjusted completely.**

![Diagram of Dolby NR circuit](image)

See fig. 55 on page 45.

Fig. 38

1. Test equipment connections are shown in fig. 38.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 3.
3. Supply 5 kHz signal to LINE-IN jack to obtain 17.5 mV (−34.5 dB) at LINE-OUT jack or M-TP: 6 and TP4 (Ground) for L-CH, M-TP: 13 and TP11 (Ground) for R-CH by adjusting ATT (both L-CH and R-CH).
4. Change the output terminal to REC-OUT/TP7 for L-CH, REC-OUT/TP14 for R-CH from the step 3 condition above.
5. Confirm that the measured value at "IN" position of the S3 Dolby NR switch is to +8 ±0.25 dB greater than the measured value at "OUT" position of the S3 Dolby NR switch.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Confirm that the measured value at REC-OUT/TP7 for L-CH, REC-OUT/TP14 for R-CH is $+2 \pm 0.25$ dB greater than the measured value ($+8 \pm 0.25$ dB) in the above step 5 when between FET GATE and GROUND (TP5 and TP4 (Ground) for L-CH), (TP12 and TP11 (Ground) for R-CH) of ENCODER is shorted.</td>
</tr>
</tbody>
</table>

**Adjustment method**

1. If the Dolby ENCODER circuit doesn't meet the above specifications, adjust the following controls.
2. Set VR501 (L, R-CH) to maximum position (turn to counter-clockwise direction ($\downarrow$)).
3. Adjust VR503 (L, R-CH) to obtain an output level at REC-OUT/TP7 for L-CH, TP14 for R-CH which is $+10$ dB greater than the "OUT" position of S3 Dolby NR switch.
4. Adjust VR501 (L, R-CH) to obtain an output level at REC-OUT/TP7 for L-CH, TP14 for R-CH which is $-2$ dB lower than that obtained in step 3 above.
(See adjustment parts location on page 44.)
3-2. DECODER

Equipment:
- AF oscillator
- Attenuator
- AC meter with dB scale
- Oscilloscope

UNIT CONDITIONS (List No. 4)
- S6 Monitor switch: Tape monitor
- S1 Mic ATT switch: 0 dB
- S5 Tape select switch: Normal
- S2 OSC selector switch: OFF
- S3 Dolby NR switch: OUT
- S4 MPX filter switch: OUT
- Mic/aux input level control: Minimum
- Line input level control: Maximum position
- Output level control: 0 dB position on front panel
  (-4 click point from maximum position)
- Headphone level control: Minimum
- Variable/pre-set pushbutton switch: Pre-set position
- REC and PLAY CAL: Center clicked position
- Playback (see page 27) and record monitor section (see page 25) should be adjusted completely.
- Place transport UNIT into playback mode.

1. Test equipment connections are shown in fig. 39.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 4.
3. Supply 5kHz signal from AF oscillator, through ATT, to TP25 and TP23 (Ground) for L-CH, TP21 and TP23 (Ground) for R-CH on the head lead 6 pin connector to obtain 44 mV at M-TP: 1 and TP3 (Ground) for L-CH, M-TP: 8 and TP10 (Ground) for R-CH by adjusting ATT.
4. Measure the output level at M-TP: 1 for L-CH, M-TP: 8 for R-CH in the above step 3 condition.
5. Confirm that the measured value at "IN" position is $-8 \pm 0.25$ dB lower than the a measured value at "OUT" position of S3 Dolby NR switch.
6. Confirm that the measured value at M-TP: 1 for L-CH, M-TP: 8 for R-CH is $-2 \pm 0.25$ dB lower than the measured value ($-8 \pm 0.25$ dB) in the above step 5 when between FET GATE and GROUND (TP2 and TP3 (Ground) for L-CH, TP9 and TP10 (Ground) for R-CH) of DECODER is shorted.

**Adjustment method**

1. If the Dolby DECODER circuit doesn’t meet the above specifications, adjust the following controls.
2. Set VR401 (L, R-CH) to maximum position (turn to clockwise direction (\(\uparrow\))).
3. Adjust VR403 (L, R-CH) to obtain an output level at M-TP: 1 for L-CH, M-TP: 8 for R-CH is $-10$ dB lower than “OUT” position of S3 Dolby NR switch.
4. Adjust VR401 (L, R-CH) to obtain an output level at M-TP: 1 for L-CH, M-TP: 8 for R-CH which is $+2$ dB greater than that obtained ($-10$ dB) in step 3 above.

(See adjustment parts location on page 44.)
4. Peak meter adjustment

**UNIT CONDITIONS** (List No. 5)
- **S6 Monitor switch**: Source monitor
- **S1 Mic ATT switch**: 0 dB
- **S5 Tape select switch**: Normal
- **S2 OSC selector switch**: OFF
- **S3 Dolby NR switch**: OUT
- **MPX filter switch**: OUT
- **Mic/aux input level control**: Minimum
- **Line input level control**: Maximum position
- **Output level control**: 0 dB position on front panel (−4 click point from maximum position)
- **Headphone level control**: Minimum
- **Variable/pre-set pushbutton switch**: Pre-set position
- **REC and PLAY CAL**: Center clicked position
- Adjust 0 (zero) positions of the peak meter indicators when the power switch is turned "OFF" as shown in Fig. 42.
- Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE·IN.

![Diagram](image.png)

1. Test equipment connections are shown in Fig. 40.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 5.
3. Set the meter adjustment VR (VR213 for L·CH, VR212 for R·CH) to the middle position, as shown in Fig. 41.

![Diagram](image2.png)
<table>
<thead>
<tr>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN jack and adjust ATT so that the output level at LINE-OUT jacks or M-TP: 6 and TP4 (Ground) for L-CH, M-TP: 13 and TP11 (Ground) for R-CH becomes 1.05±0.02 V.</td>
</tr>
<tr>
<td>5. Adjust the meter adjustment VR (VR211 for L-CH, VR210 for R-CH) so that the needle of peak meter indicates &quot;0 (zero)&quot; position.</td>
</tr>
<tr>
<td>6. Adjust ATT so that input level is −20 dB down from the step 4 condition above.</td>
</tr>
<tr>
<td>7. Then, adjust the meter adjustment VR (VR213 for L-CH, VR212 for R-CH) so that the needle of peak meter indicates &quot;−20 dB&quot; position.</td>
</tr>
<tr>
<td>(See adjustment parts location on page 44.)</td>
</tr>
<tr>
<td>8. When step 7 is completed, make sure that the adjusted range of step 5 above is within the specified range, as shown in Fig. 42.</td>
</tr>
<tr>
<td>9. If the adjusted range is not within the specified range, repeat steps 5 and 7 above.</td>
</tr>
<tr>
<td>10. Next, adjust ATT so that the input level is −8 dB down from the step 4 condition above.</td>
</tr>
<tr>
<td>11. Then, confirm that the needle of peak meter indicates &quot;8 ± 1&quot; position.</td>
</tr>
</tbody>
</table>

![Fig. 42](image-url)
5. Built-in oscillator adjustment

UNIT CONDITIONS (List No. 6)
- S6 Monitor switch: Source monitor
- S1 Mic ATT switch: 0 dB
- S5 Tape select switch: Normal
- S2 OSC selector switch: 400 Hz → 8 kHz
- S3 Dolby NR switch: OUT
- S4 MPX filter switch: OUT
- Mic/aux input level control: Minimum
- Line input level control: Minimum
- Output level control: 0 dB position on front panel
  (-4 click point from maximum position)
- Headphone level control: Minimum
- Variable/pre-set pushbutton switch: Pre-set position
- REC and PLAY CAL: Center clicked position

![Distortion meter](image)

**Fig. 43**

1. Test equipment connections are shown in fig. 43.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 6.
3. Set the S2 OSC selector switch to 400 Hz position.
4. Adjust the distortion adjustment VR (VR601) so that the distortion ratio at LINE-OUT jack on the distortion meter becomes 2.5%.
5. Next, adjust the OSC CAL VR (VR219 for L-CH, VR218 for R-CH) so that the peak meter indicates to "-5" position on the meter indication.
6. Change the S2 OSC selector switch to 8 kHz position.
7. Adjust the OSC CAL VR (VR602 for L-CH, VR603 for R-CH) so that the peak meter indicates to "-25" position on the meter.

(See adjustment parts location on page 44.)
**6. Recording adjustment section**

**Equipment:**
- AF oscillator
- Attenuator
- AC meter with dB scale
- Oscilloscope

**UNIT CONDITIONS** (List No. 7)
- **S6 Monitor switch:** Tape monitor
- **S1 Mic ATT switch:** 0 dB
- **S5 Tape select switch:** Set for the kind of tape used
- **S2 OSC selector switch:** OFF
- **S3 Dolby NR switch:** OUT
- **S4 MPX filter switch:** OUT
- **Mic/aux input level control:** Minimum
- **Line input level control:** Maximum
- **Output level control:** 0 dB position on front panel
  
  ($-4$ click point from maximum position)
- **Headphone level control:** Minimum
- **Variable/pre-set pushbutton switch:** Pre-set position
- **REC and PLAY CAL:** Center clicked position
- **Place UNIT into record mode to release the record muting function and confirm that the record indicator lamp illuminates.**

![Diagram of equipment connections](Fig. 44)

**6-1. Record equalizer peaking coil**

A. For Normal tape

1. Test equipment connections are shown in fig. 44.
2. Place UNIT in the above condition, see UNIT CONDITIONS List No. 7.
3. Set the S5 tape select switch to “Normal” position.
4. Supply 18 kHz signal ($-24$ dB) from AF oscillator, through ATT, to LINE IN jacks.
5. Adjust the record equalizer peaking coil for “Normal” tape (L103 for L-CH, L104 for R-CH) so that the output level at TP26 and TP28 (Ground) for L-CH, TP27 and TP28 (Ground) for R-CH becomes maximum.
  (Caution: Confirm that the output wave does not distort.)

(See adjustment parts location on page 44.)
B. For CrO₂ tape

1. Test equipment connections are shown in fig. 44.
2. Place UNIT in the above condition, see UNIT CONDITIONS List No. 7.
3. Set the S5 tape select switch to "CrO₂" position.
4. Supply 20kHz signal (—24 dB) from AF oscillator, through ATT, to LINE-IN jacks.
5. Adjust the record equalizer peaking coil for "CrO₂" tape (L105 for L-CH, L106 for R-CH) so that the output level at TP26 and TP28 (Ground) for L-CH, TP27 and TP28 (Ground) for R-CH becomes maximum.
   (Caution: Confirm that the output wave does not distort.)
   (See adjustment parts location on page 44.)

C. For Fe-Cr tape

1. Test equipment connections are shown in fig. 44.
2. Place UNIT in the above condition, see UNIT CONDITIONS List No. 7.
3. Set the S5 tape select switch to "Fe-Cr" position.
4. Supply 20kHz signal (—24 dB) from AF oscillator, through ATT, to LINE-IN jacks.
5. Adjust the record equalizer peaking coil for "Fe-Cr" tape (L101 for L-CH, L102 for R-CH) so that the output level at TP26 and TP28 (Ground) for L-CH, TP27 and TP28 (Ground) for R-CH becomes maximum.
   (Caution: Confirm that the output wave does not distort.)
   (See adjustment parts location on page 44.)

6-2. Bias trap

1. Test equipment connections are shown in fig. 44.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 7.
3. Place UNIT into record and playback mode.
4. Bias oscillator should be on.
5. Do not supply input signal.
6. Adjust the bias trap coil (L1 for L-CH, L2 for R-CH) so that the output level of bias leakage at REC-OUT/TP18 for L-CH, TP20 for R-CH and TP19 (Ground) becomes minimum.
7. Set the pause function button to "ON" position.
8. Adjust the bias trap coil (L201 for L-CH, L202 for R-CH) so that the output level of bias leakage at between TP15 for L-CH, TP17 for R-CH and TP16 (Ground) becomes minimum. (See adjustment parts location on page 44.)
## 7. Overall adjustment section

### UNIT CONDITIONS (List No. 8)
- **S6 Monitor switch**: Tape monitor
- **S1 Mic ATT switch**: 0 dB
- **S5 Tape select switch**: Set for the kind of tape used
- **S2 OSC selector switch**: OFF
- **S3 Dolby NR switch**: OUT
- **S4 MPX filter switch**: OUT
- **Mic/aux input level control**: Minimum
- **Line input level control**: Maximum position
- **Output level control**: 0 dB position on front panel
  
  \[ \text{Maximum position} \quad \text{Minimum} \quad \text{Pre-set position} \]
- **Headphone level control**: Minimum
- **Variable/pre-set pushbutton switch**: Center clicked position
- **REC and PLAY CAL**: Center clicked position
- **Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN (both L, R channels).**
- **Adjust the line input level control VR so that the output level (L-CH, R-CH) at LINE-OUT on VTVM becomes 0.42 ± 0.05 V in source monitor position.**

![Diagram](image)

### 7-1. Record head height
**For Normal tape**

1. Test equipment connections are shown in Fig. 45.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 8.
3. Set the S5 tape select switch to "Normal" position.
4. Using test tape (C-RA II / Normal blank test tape).
5. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN jack (R-CH).
6. Make recording.
7. Adjust record head height adjustment screws (C), (D) in Fig. 46 so that the output level at LINE-OUT jack (R-CH) becomes maximum.

### 7-2. Record head azimuth
**For Normal tape**

1. Test equipment connections are shown in Fig. 45.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 8.
3. Set the S5 tape select switch to "Normal" position.
4. Using test tape (C-RA II / Normal blank test tape).
5. Supply 10 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN jack (R-CH).
6. Make recording.
7. Adjust record head azimuth adjustment screw (E) in Fig. 46 so that the output level at LINE-OUT (R-CH) becomes maximum.
7-3. Overall frequency response
   For Normal tape

1. Test equipment connections are shown in fig. 45.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 8.
3. Set the S5 tape select switch to "Normal" position.
4. Load "Normal" blank test tape (C-RA11) and place UNIT into record mode.
5. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN jacks and adjust ATT so that the output level (L, R-CH) at LINE-OUT jacks on VTVm becomes 0.42 ± 0.05 V.
6. Next, adjust ATT so that the input level is −25 dB below standard recording level. (Standard recording level = 1 kHz, −24 dB.)
7. Record each frequency: 30 Hz, 50 Hz, 200 Hz, 1 kHz, 4 kHz, 10 kHz, 12 kHz, 15 kHz and 18 kHz at the same level.
8. Playback (or tape monitor) and express in dB the difference between playback (or tape monitor) output level of each frequency based on playback (or tape monitor) output level of 1 kHz.
9. Make sure that the measured value is within the range specified in the overall frequency response chart, as shown in fig. 47.
10. If the overall frequency response doesn't meet specifications, adjust the following controls.

![Overall frequency response for NORMAL tape](image)

**Fig. 47**

Adjustment 1—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. 48, increase the bias current by turning VR1 (L-CH), VR2 (R-CH).
2. When it becomes lower, as shown by dotted line, reduce the bias current by turning in the opposite direction.
(See adjustment parts location on page 53.)

![Bias current adjustment](image)

**Fig. 48**
### Adjustment 2—Adjusting the peaking coil for recording equalization

When the frequency response is flat in the middle-frequency range and makes a sharp rise or drop in the high-frequency range, as shown in fig. 49, adjust by turning the peaking coil L103 (L-CH), L104 (R-CH).

(See adjustment parts location on page 44.)

![Fig. 49](image)

### 7-4. Record head height and azimuth

**For CrO₂ or Fe-Cr tape**

1. Test equipment connections are shown in fig. 45.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 8.
3. Set the S5 tape select switch for the kind of tape used ("CrO₂" or "Fe-Cr" position).
4. Using test tape (C-RF or "CrO₂" or "Fe-Cr" blank tape).
5. Supply 1 kHz signal (−24 dB) for head height adjustment, 10 kHz signal (−24 dB) for head azimuth adjustment, from AF oscillator, through ATT, to LINE-IN jack (R-CH).
6. Make recording.
7. Adjust record head height screws (C), (D) and azimuth screw (E) in fig. 46 so that the output level at LINE-OUT jack (R-CH) becomes maximum.

### 7-5. Overall frequency response

**For CrO₂ or Fe-Cr tape**

1. Test equipment connections are shown in fig. 45.
2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 8.
3. Set the S5 tape select switch for the kind of tape used ("CrO₂" or "Fe-Cr" position).
4. Load C-RF or "CrO₂" or "Fe-Cr" blank test tape and place UNIT into record mode.
5. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN jacks and adjust ATT so that the output level (L, R-CH) at LINE-OUT jacks on VTVM becomes 0.42 ± 0.05 V.
6. Next, adjust ATT so that the input level is −25 dB below standard recording level. (Standard recording level = 1 kHz, −24 dB.)
7. Record each frequency 30 Hz, 50 Hz, 200 Hz, 1 kHz, 4 kHz, 10 kHz, 12 kHz, 15 kHz, 18 kHz and 20 kHz at the same level.
8. Playback (or tape monitor) and express in dB the difference between playback (or tape monitor) output level of each frequency based on playback (or tape monitor) of 1 kHz signal.
9. Make sure that the measured value is within the range specified in the overall frequency response chart as shown in fig. 50.
10. If the overall frequency response doesn’t meet specifications, adjust the following controls.

**Overall frequency response for CrO₂, Fe-Cr tape**

![Fig. 50](image)
### Adjustment 1—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. 51, increase the bias current by turning VR215 for "CrO₂". VR216 for "Fe-Cr" tape.
2. When it becomes lower, as shown by dotted line, reduce the bias current by turning VR215 for "CrO₂", VR216 for "Fe-Cr" tape in the opposite direction.

(See adjustment part location on page 44.)

![Fig. 51](image)

### Adjustment 2—Adjusting the peaking coil for recording equalization

When the frequency response is flat in the middle-frequency range and makes a sharp rise or drop in the high-frequency range, as shown in Fig. 52, adjust by turning the peaking coil for recording equalization.

L105 (L-CH), L106 (R-CH) for "CrO₂" tape
L101 (L-CH), L102 (R-CH) for "Fe-Cr" tape

(See adjustment part location on page 44.)

![Fig. 52](image)

### Note:

1. For adjustment when the bias current is lower than the standard value. Use the procedure indicated in adjustment 2—Adjusting the peaking coil for recording equalization. Reducing the bias current beyond this point may increase the distortion factor.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT &amp; ADJUSTMENT</th>
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| 7-6. **Overall gain**  
  For Normal, CrO₂, Fe-Cr tape | 1. Test equipment connections are shown in fig. 45.  
  2. Place UNIT in the above conditions, see UNIT CONDITIONS List No. 8.  
  3. Set the S5 tape select switch for the kind of tape used ("Normal" or "CrO₂" or "Fe-Cr" position).  
  4. Load C-RA11 or C-RF for "Normal" or "CrO₂" or "Fe-Cr" blank test tape and place UNIT into record mode.  
  5. Supply 1 kHz signal (−24 dB) from AF oscillator, through ATT, to LINE-IN jacks.  
  6. Adjust the overall gain adjustment VR.  
    VR109 (L-CH), VR110 (R-CH) for "Normal" tape  
    VR111 (L-CH), VR112 (R-CH) for "CrO₂" tape  
    VR107 (L-CH), VR108 (R-CH) for "Fe-Cr" tape  
  So that the output level at LINE-OUT jacks (L, R-CH) becomes 0.42 ± 0.05 V.  
  (See adjustment parts location on page 44) |
ADJUSTMENT PARTS LOCATION

Tape speed adjustment VR.

Fig. 53
COMPONENT PACKING

PACKINGS

P1 ...... QPN3509  Inside Packing
P2 ...... QPA0234  Cushion-A
P3 ...... QPA0235  Cushion-B
P4 ...... XZB70X60XA08 Poly Bag