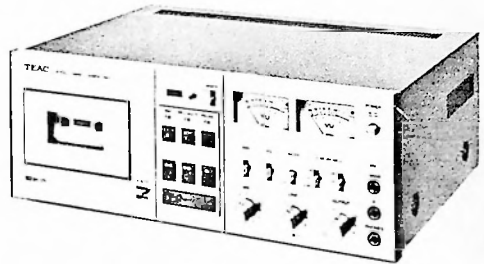


TEAC®

SERVICE MANUAL

A-650

Stereo Cassette Deck with Dolby* System



GENERAL INTRODUCTION

This Service Manual is designed to provide up-to-date information to assist the skilled service technician to properly repair, adjust and maintain the TEAC A-650 Stereo Cassette Tape Deck.

The A-650 is a high quality deck designed to be used as an indispensable part of a superior home stereo system. It contains a 2-motor transport utilizing a DC reel motor and a Phase Locked Loop (PLL) servo motor, push button control panel, Memory Counter with Play feature, Record Mute feature, advanced Dolby NR circuitry, Peak indicators, Limiter, 3-position BIAS and EQ selector Switches, as well as many of the standard TEAC features.

If any of the adjustments or repairs seem too complicated or are difficult for you to accomplish, please contact the nearest TEAC Factory Service Department or write directly to a TEAC office, the addresses of which are printed on the back cover.

NOTE

When ordering replacement parts, please refer to the PARTS LIST which is printed separately from this manual.

* Noise reduction circuit made under license from Dolby Laboratories Inc. The word "Dolby" and the Double-D symbol are trademarks of Dolby Laboratories Inc.

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1. TEST EQUIPMENT REQUIRED

1. Spring scale: For take-up torque check: 0 – 70 g (0 – 2.5 oz.)
For fast forward & rewind torque checks: 0 – 200 g (0 – 7.0 oz.)
2. String: Length: about 50 cm (20")
3. Cassette Reel Adapter: Diameter: 22 mm
* The tools above (1 – 3) are constructed as shown in Fig. 1-1.
4. Cassette Torque Meter: For take-up torque check: 0 – 100 g·cm (0 – 1.4 oz·inch)
For fast forward & rewind torque checks: 0 – 160 g·cm (0 – 2.2 oz·inch)
* Use of the Cassette Torque Meter instead of the spring scale, if you have one, is recommended for easier measuring. (See Fig. 5-3 on page 13.)
* When ordering Cassette Torque Meter, allow for longer delivery time that is required for it.
5. Spring scale: For Pinch Roller pressure check: 0 – 1 kg (2.2 lbs)
6. Wow/flutter meter: MEGURO DENPA SOKKI K.K., Model MK-668A or D & R Co., Model FL-4B.
7. Frequency counter: Digital type, capable of 10 Hz to 100 kHz indication.
8. AF oscillator: 10 Hz – 100 kHz
9. AC VTVM: 0.1 mV – 300 V
10. Attenuator: General Purpose
11. Distortion analyzer: Basic frequency 400 Hz/1 kHz
12. Oscilloscope: General Purpose
13. Band-pass filter: 1 kHz narrow band-pass type
14. Test load resistor: Non inductive type 8 ohm/1 W
15. Plastic alignment tool:
16. Head demagnetizer: TEAC E-3 or equivalent
17. Cleaner: TEAC TZ-261 Tape Recorder Cleaner kit or pure alcohol
18. Oil: TEAC TZ-255 Oil kit or equivalent

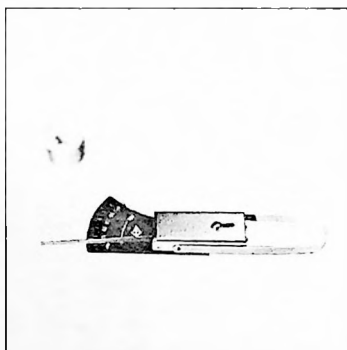


Fig. 1-1 Spring Scale & Cassette Reel Adapter

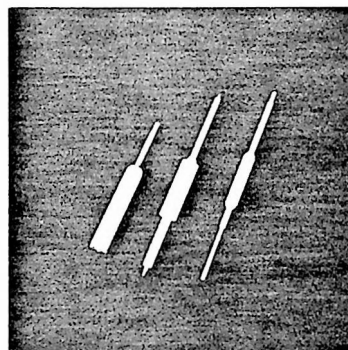


Fig. 1-2 Plastic Alignment Tool

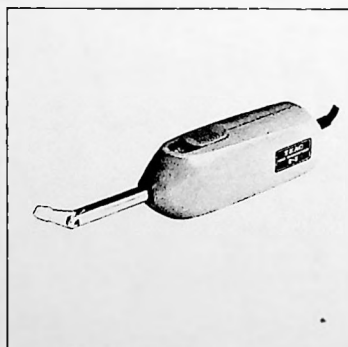


Fig. 1-3 E-3 Head Demagnetizer



Fig. 1-4 TZ-261 Tape Recorder Cleaner Kit

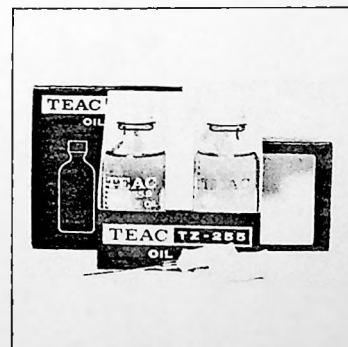


Fig. 1-5 TZ-255 Oil Kit

2. SPECIFICATIONS & SERVICE DATA

SPECIFICATONS

Track System	4-track, 2-channel stereo
2 Heads	Erase and Record/Playback
Type of Tape	Cassette tape, C-60 and C-90 (Philips type)
Tape Speed	4.8 cm/s (1-7/8 ips)
Inputs	Microphones: Min. input level: -67 dB ($345 \mu\text{V}$)/(10 kohms or more)
(level and impedance)	Line: Specified input level: -9 dB (274 mV)/(50 kohms) Min. input level: -19 dB (86 mV)
	DIN*: Min. input level: -35 dB (13.7 mV)
	DOLBY FM/COPY: FM: -17 dB (109 mV) COPY: -9 dB (274 mV)
Outputs	Line out: Max. output level: $+1$ dB (0.869 V)/(into 50 kohms)
(level and impedance)	Specified output level: -5 dB (435 mV)
	Headphones: Specified output level: -15.7 dB (130 mV)/(8 ohms)
Equalization	EQ 1: $3180 \mu\text{s} + 70 \mu\text{s}$ (for CrO ₂ tape) EQ 2: $3180 \mu\text{s} + 70 \mu\text{s}$ (for FeCr tape) EQ 3: $3180 \mu\text{s} + 120 \mu\text{s}$ (for regular Hi-Fi tape)
Head Configuration	1/2-track, 1-channel Erase Head 1/4-track, 2-channel Record/Playback Head
2 Motors	1 Phase Locked Loop Servo Controlled DC Capstan Motor 1 Mechanical Governed DC Reel Motor
Bias Frequency	100 kHz
Operating Position	Horizontal
Power Requirement	100/117/220/240 V AC, 50/60 Hz (General Export Models) 117 V AC, 60 Hz (USA/Canada Models) 220/240 V AC, 50 Hz (Europe Model) 240 V AC, 50 Hz (Australia Model)
Power Consumption	35W
Weight	13 kg (28¾ lbs.) net

* Pursuant to DIN Standards

TEAC TEST TAPE

REMARKS: 0 dB = DIN Reference level (333 Hz)

For tape speed & wow/flutter test

- MTT-111: • For Playback method
• 3.000 Hz/ -10 dB
- MTT-502: • For Record/Playback method (blank tape)

For record performance alignment (blank tape)

- MTT-505B or similar: For BIAS 1/EQ 1 (CrO₂)
- MTT-504 or similar: For BIAS 2/EQ 2 (Fe-Cr)
- MTT-501 or similar: For BIAS 3/EQ 3 (Low Noise, High Output tape)

For playback performance alignment

- MTT-150: • For Dolby level calibration
• Dolby B-type tone (400 Hz tone).
200 nWb/m
- MTT-116K: • For frequency response test for EQ 1 & 2 (CrO₂ & Fe-Cr)
• $3180 \mu\text{s} + 70 \mu\text{s}$
• 315 Hz/ -4 dB, 31.5 Hz \sim 14 kHz/ -24 dB
- MTT-116U: • For frequency response test for EQ 3 (Hi-Fi tape)
• $3180 \mu\text{s} + 120 \mu\text{s}$
• 315 Hz/ -4 dB, 31.5 Hz \sim 14 kHz/ -24 dB

NOTE: The TEAC test tapes require longer delivery time than regular parts.



Fig. 2-1 TEAC Test Tape

SERVICE DATA

Mechanical

Tape Speed Deviation	3,000 Hz \pm 30 Hz
Tape Speed Drift	15 Hz
Wow and Flutter	Playback: 0.07% (WRMS) 0.15% (RMS)
	Record/Playback: 0.18% (WRMS)
Pinch Roller Pressure	400 g \pm 20 g (13.5 ~ 15.0 oz)
Reel Torque	Take Up: 40 ~ 70 g·cm (0.6 ~ 1.0 oz·inch) Fast Forward: 100 ~ 150 g·cm (1.4 ~ 2.1 oz·inch) Rewind: 100 ~ 150 g·cm (1.4 ~ 2.1 oz·inch)
Fast Winding Time	90 seconds for C-60
End-stop Activate Time	1.5 seconds \pm 0.5 seconds

Electrical

Frequency Response	Refer to frequency response limits charts on page 22 and 28
Signal to Noise Ratio	Playback method: CrO ₂ & Fe-Cr tapes: 48 dB (minimum) Hi-Fi tape: 46 dB (minimum) Record/Playback method: CrO ₂ & Fe-Cr tapes: 46 dB (minimum) Hi-Fi tape: 44 dB (minimum) With Dolby Noise Reduction used for recording and playback, S/N ratio is improved by 5 dB at 1 kHz and 10 dB at frequencies over 5 kHz.
Erase Efficiency	65 dB minimum
Channel Separation	30 dB minimum (at 1 kHz)
Crosstalk Between Adjacent Tracks	40 dB minimum (at 125 Hz)
Total Harmonic Distortion	BIAS/EQ 1: 2.5% (maximum) BIAS/EQ 2: 2.5% (maximum) BIAS/EQ 3: 2.5% (maximum)

- NOTE: • Improvements may result in Specifications and Service Data changes.
• Value of "dB" in the Data refers to 0 dB = 0.775V, except where specified. If a Test Set or VTVM calibrated to 0 dB = 1V is to be used, appropriate compensation should be made.

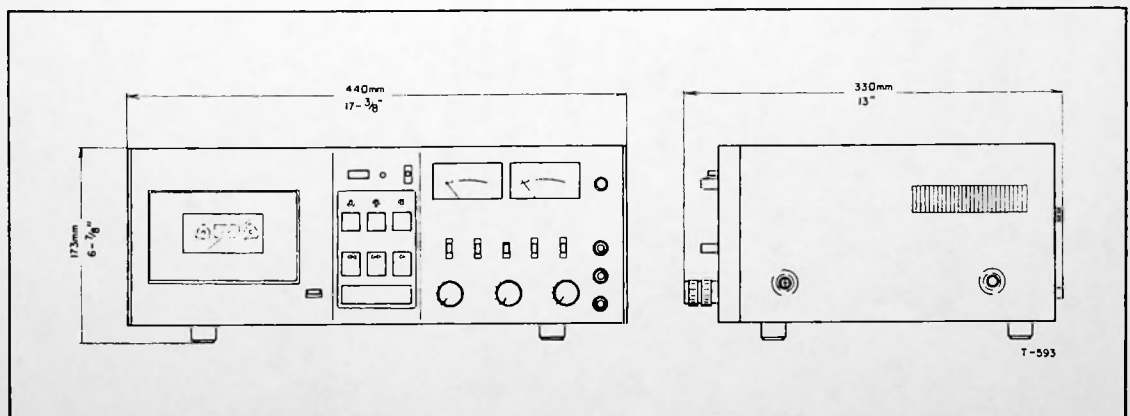


Fig. 2-2 A-650 Dimensions

3. PARTS LOCATION

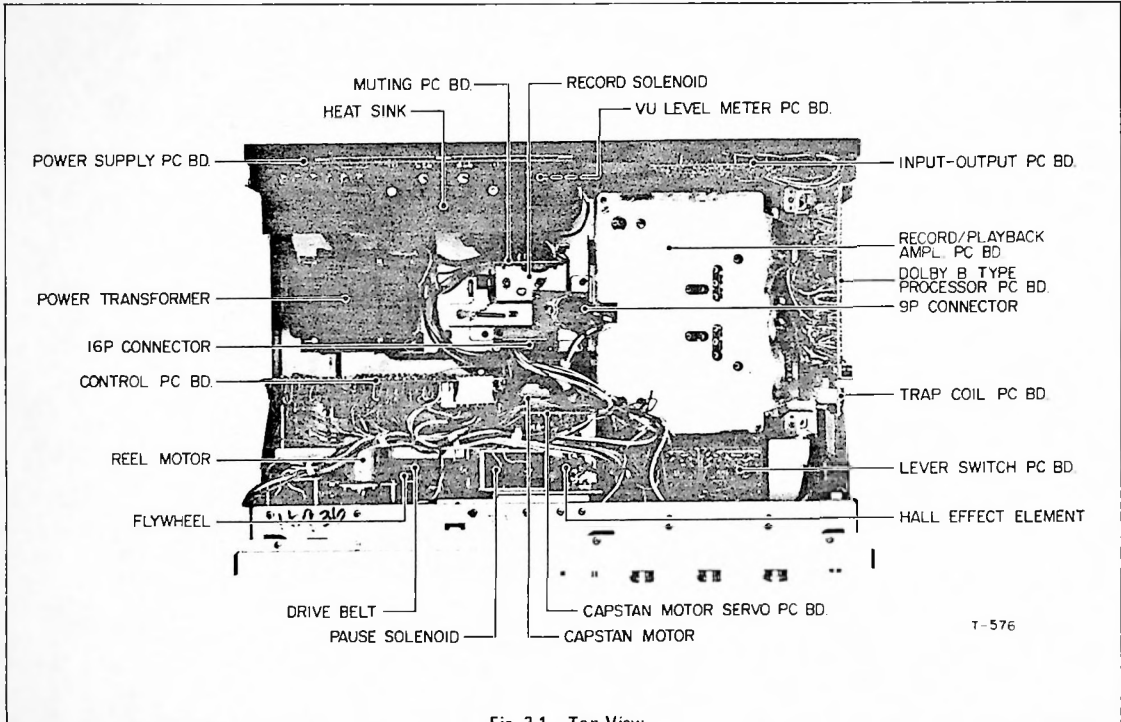


Fig. 3-1 Top View

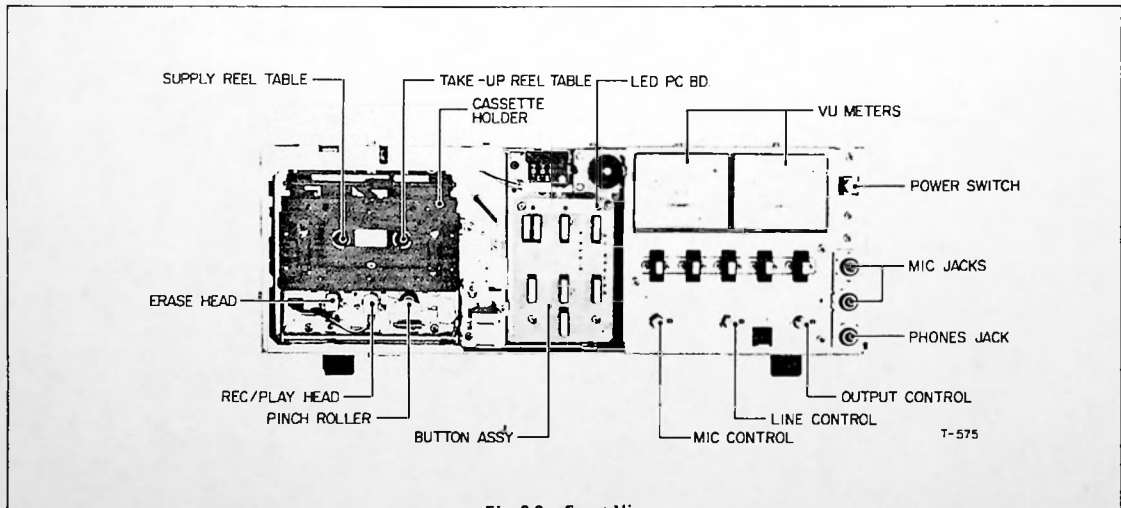


Fig. 3-2 Front View

4. PARTIAL DISASSEMBLY OF MAIN PARTS

NOTE

1. Use the proper tools. Demagnetize the tools before use.
2. When mounting or removing a spring, pay heed to the position (direction) of the anchor or hook. The wrong position may result in a change in the tension.
3. When reassembling, don't forget to reinstall all hardware such as springs and washers, etc.
4. For assembling hardware shape identification, see ASSEMBLING HARDWARE CODING LIST in the Parts List.

4-1. CASE/FRONT PANEL

NOTE

When removing or installing the Front Panel, center the levers of the toggle switches on the Front Panel to make the work easier.

Remove the parts in the following sequence.

1. Top Cabinet Ass'y (D)
2. Cassette Holder Cover Ass'y (A)
To remove the Cassette Holder Cover, do the following:
 - a. Depress EJECT lever.
 - b. Move the latch arm protruding from the top of the Cassette Holder Door to the left to release the Cover.
 - c. Allow the Cover to rotate outward on its hinge; then lift up gently on the Cover to remove it from the Door.
3. Knobs (C)
4. Front Panel Ass'y (B)

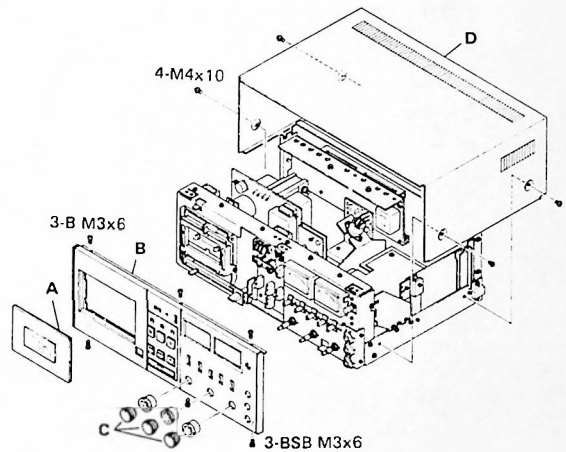


Fig. 4-1 Case/Front Panel Removal

4-2. TAPE TRANSPORT CHASSIS REMOVAL

First do procedure in section 4-1.

1. Disconnect the 16P Plug and the 9P plug. See Fig. 3-1 on page 6.
2. Unscrew the screws (B) (H) (C) (F) in that order and loosen (D) to facilitate next step.
3. Tilt the Front Chassis section (E) forward and away from the main chassis (G).
4. Lift the tape transport chassis (A) from the main chassis.

4-3. PARTIAL ROTATION OF FRONT CHASSIS

First do procedure in section 4-1.

Most removal and replacement can be made with the Front Chassis section (E) tilted in the forward direction, as explained in the preceding section, without removing tape transport chassis (A) which is held in place by screws (F).

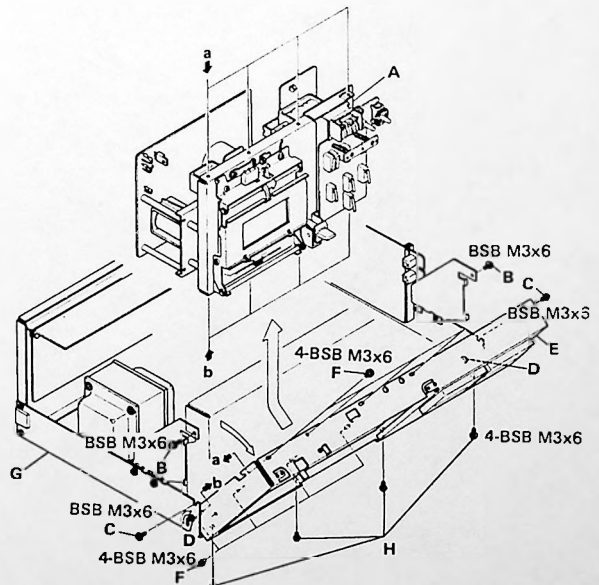


Fig. 4-2 Tape Transport Chassis Removal

4-4. HEAD

First do procedure in section 4-1.

1. Unsolder each lead wire from the terminal pins of the head to facilitate replacement. To re-solder each head wire to the newly replaced head, refer to Fig. 4-4.
2. Lift up the heads after taking off the hardware mounting them.

NOTE

1. After replacing the head, always adjust the head alignment, especially the Record/Playback Head's azimuth (see 6-2-1), and then secure the screws and/or the nut with a drop of locking paint.
2. Connect the wires to the head terminal pins quickly to prevent breaking of internal wires of the head due to overheating.

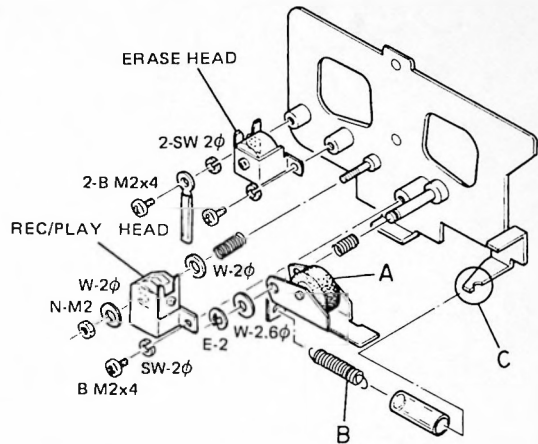


Fig. 4-3 Heads/Pinch Roller Replacement

4-5. PINCH ROLLER

First do procedure in section 4-1.

1. Remove the E-ring retaining the Pinch Roller Ass'y (A) and remove the Spring (B) from the hook (C) of the Head Base Plate and the tab of the Pinch Roller Ass'y.
2. Remove the Pinch Roller Ass'y from the pivot stud pin of the Plate.

NOTE

After replacement, always clean the driving surfaces of the Pinch Roller with the TEAC TZ-261B Rubber Cleaner or with pure alcohol, then proceed directly to the PINCH ROLLER PRESSURE adjustment section. See page 13.

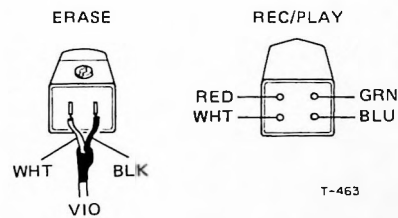


Fig. 4-4 Head Wiring Diagram

4-6. CASSETTE HOLDER

First do procedures in section 4-1 and 4-2.

1. Take off the 2 screws (H) from the transport chassis.
2. Loosen the 2 screw (G) to separate the Cassette Holder Door (F) and the Cassette Holder (E).
3. Detach the Door (F) from the chassis.
4. Remove the Micro Switch Ass'y (B) to simplify the next steps.
5. Take off the E-ring (A) to separate the Cassette Holder (E) from the chassis.
6. Remove the Holder (E).

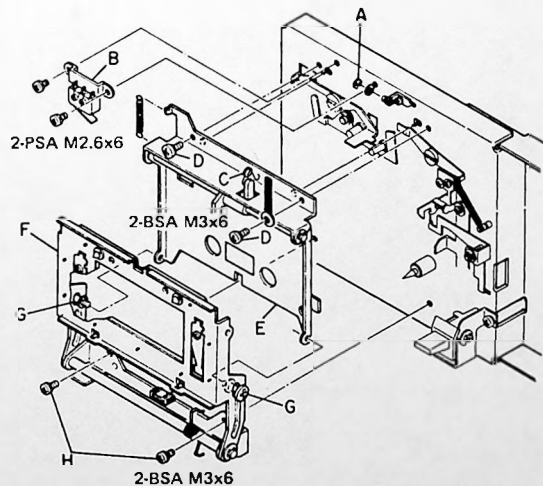


Fig. 4-5 Cassette Holder Removal

4-7. CAPSTAN MOTOR

First remove the Top Cabinet Ass'y (see 4-1), then do section 4-3.

1. Release the Drive Belt from the Motor Pulley.
2. Loosen the two screws holding the P.C. Board insulator, remove the insulator and then unsolder the wires marked with asterisks (*) from the PC Board (part of the Motor Ass'y). Note the color code and the position of each wire prior to unsoldering the leads.
3. Remove the Motor Ass'y together with the PC Board from the chassis by taking off the screws.

NOTE

1. When re-assembling, clean the pulley and the Belt with TEAC TZ-261 Cleaner kit ("A" for the Pulley, "B" for the Belt) or with pure alcohol.
2. Take off or remount the Motor Ass'y taking care not to scratch or otherwise damage the Motor Pulley.
3. When re-attaching the Drive Belt to the Pulley do not twist or stretch the belt.
4. When remounting the PC Board be sure to install the mica insulator between the transistor and the PC Board mounting bracket.

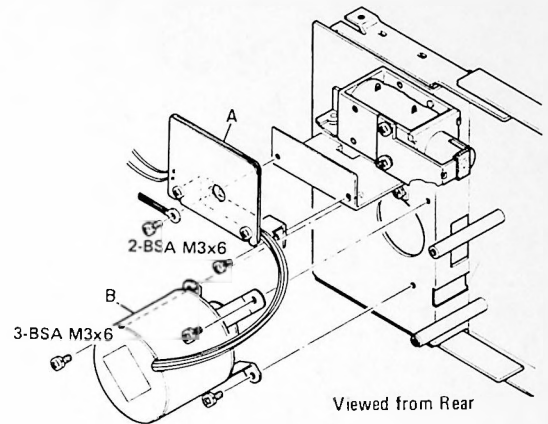


Fig. 4-6 Capstan Motor Replacement

4-8. CAPSTAN DRIVE ASS'Y/DRIVE BELT

First do procedures in section 4-1 and 4-3.

1. Remove the Control PC Board Ass'y (I) by taking off the 4 screws (J).
2. Detach the Flywheel Bearing Plate Ass'y (G) from the mounting studs by unscrewing the 4 screws (H).
3. Take out the Drive Belt (E) from the Motor Pulley (B) and the Flywheel (F).
4. Pull apart the Oil Retaining Washer (A) from the shaft of the Flywheel.
5. Carefully lift out the Flywheel from the Capstan Housing Ass'y (C).
6. Remove the Capstan Housing Ass'y from the chassis by unscrewing the 3 screws (D).

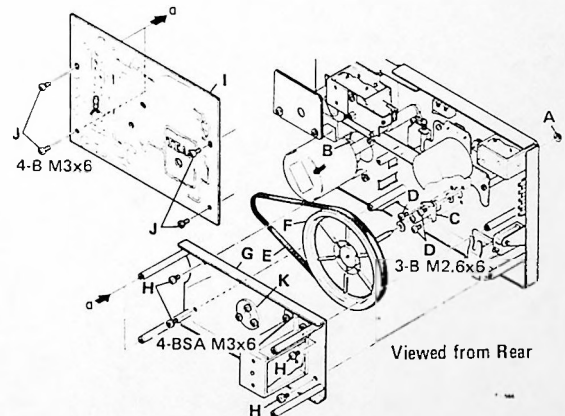


Fig. 4-7 Capstan Drive Ass'y/Drive Belt Replacements

NOTE

1. Since the Capstan Drive Ass'y is a precision part, TEAC specially distributes the Flywheel and the Capstan Housing Ass'y as a whole assembly. Hence, always replace the Flywheel together with the Capstan Housing Ass'y.
2. Clean all driving surfaces of the Flywheel and the Drive Belt with TEAC TZ-261 Cleaner kit ("A" for Flywheel, "B" for Belt) or with pure alcohol.
3. Do not bend the Capstan Shaft as this will increase wow/flutter or speed deviation.
4. During re-assembly re-attach the Drive Belt without twisting or stretching it.

LUBRICATION:

For lubrication of the newly replaced Capstan Drive Ass'y, the following should be observed.

1. Apply a drop of a light machine oil of good quality (e.g.: TEAC TZ-255) with an oil applicator to the shaft of the Flywheel and spread oil evenly over the shaft with a flannel cloth. After installing the Flywheel, be sure to clean the tape moving portion of shaft with TEAC TZ-261A Head Cleaner or with pure alcohol.
2. Apply a drop of the proper oil in the same way as above to the innermost area of capstan shaft (next to the Flywheel).
3. Apply a film of light grease to the well of the Flywheel Bearing Plate (K).

4-9. REEL MOTOR

First do procedures in section 4-1, 4-3 and 4-8.

1. Remove whole Reel Motor Ass'y (J) from the mounting studs by taking off the 3 screws.
2. Detach only the Motor body (I) by unscrewing the 3 screws from the Motor Base Plate Ass'y (H).
3. To further disassemble other parts illustrated in the box area, do the following steps.
4. Take off the screw (A), then separate the Fast Wind Idler Ass'y (B) from the Plate Ass'y (H). Pay special attention not to lose the Steel Ball (C).
5. Remove the Fast Wind Arm Plate (D) from the Plate Ass'y.
6. Disconnect the Spring (G) from the spring hook of the Tension Arm Ass'y (E), remove the 'E' ring (F), then lift off the Tension Arm Ass'y.

NOTE

When remounting the Fast Wind Idler Ass'y (B), clean the driving surface of the Idler with the TEAC TZ-261B Rubber Cleaner or with pure alcohol.

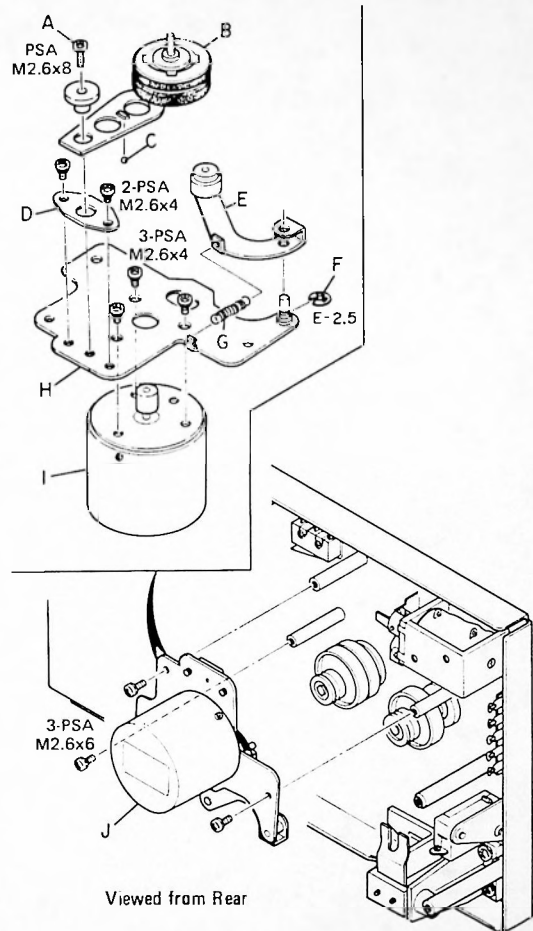


Fig. 4-8 Reel Motor Replacement

4-10. BRAKE PLATE ASS'Y

First do procedures in section 4-1, 4-3, 4-8 and 4-9.

1. Remove the Spring (G) by unhooking each end from the spring fastener on the chassis and the spring hook on the Plate (F) respectively.
2. Detach the Plate (F) by unscrewing the 2 screws.
3. Remove parts (E) (D) (B) (A: Brake Plate Ass'y) illustrated all the way in that sequence.
4. Remove each Brake Shoe (C) from the Brake Plate Ass'y.

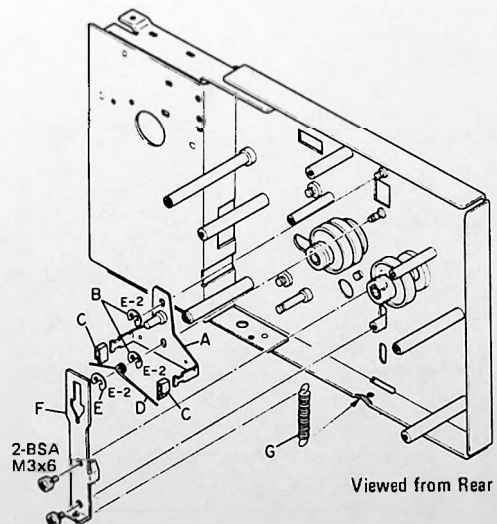


Fig. 4-9 Brake Plate Ass'y Removal

4-11. REEL TABLES

First do procedures in section 4-1, 4-2, 4-6 and 4-8.

Take off the screws mounting the Reel Table which requires replacement.

NOTE

Always replace the complete Reel Table Ass'y as an entire assembly, "Take-up" or "Supply".

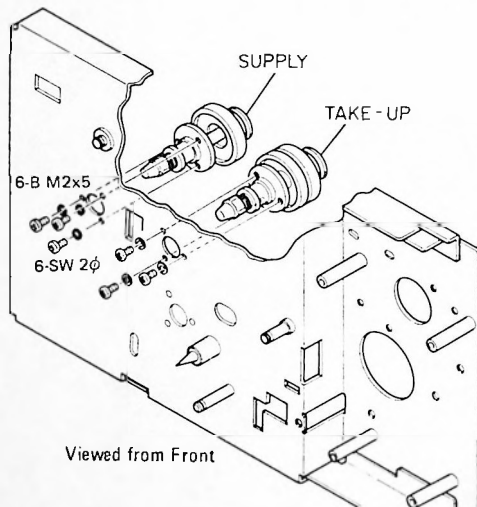


Fig. 4-10 Reel Tables Replacement

4-12. IDLER ASS'Y

First do procedures in section 4-1, 4-3 and 4-8.

1. Remove Spring (C) from the mounting pin (A).
2. Remove E-ring (E) from the pivot pin (B).
3. Lift out the Idler Ass'y (D).

NOTE

When remounting the Idler Ass'y, clean the driving surface of the Idler with the TEAC TZ-261B Rubber Cleaner or with pure alcohol.

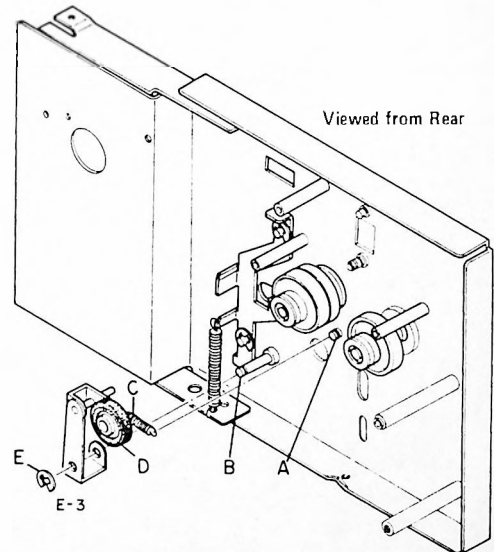


Fig. 4-11 Idler Ass'y Replacement

LUBRICATION

NOTE

1. Lubrication should be generally done at about every 1,000 hours of operating time of the tape deck. Use high quality oil for this purpose.
2. For efficient oiling, it is recommended that lubrication be done after nearly 1 hour of idling of the deck, and while it is still warm.
3. Normally, it is necessary to lubricate only the following two areas:

a. FLYWHEEL ASS'Y

See Section 4-8 for lubrication of the newly replaced Flywheel Assy.

b. CAPSTAN ASS'Y

Apply 1 or 2 drops (approx. 0.2 cc) of a light machine oil with an oil applicator to the shaft bearing portion of the Capstan Assy.

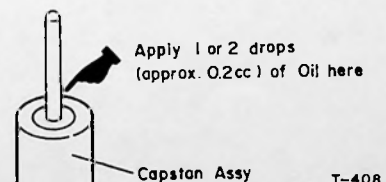


Fig. 4-12 Lubrication of Capstan Ass'y

5. MECHANICAL CHECKS AND ADJUSTMENTS

NOTE

All the mechanical checks and adjustments should be done with the external Cases removed. (See Section 4-1).

5-1. TAKE-UP TORQUE

Specification: 40 ~ 70 g·cm (0.6 ~ 1.0 oz·inch)

1. Remove the Cassette Holder. See 4-6 section on page 8.
2. Switch on POWER.
3. Set the Cassette Reel Adapter (22 mm Dia.), connected to the spring scale (0 ~ 70 g, or 0 ~ 2.5 oz.) by the string as shown in Fig. 5-1 on the Take-up Reel Table.
4. Place the deck in the PLAY mode.
5. Allow the rotation of the Reel Table to pull the scale pointer toward the Adapter with the spring scale moving in the same direction at nearly the same speed as the tape would be moved, and obtain the scale reading. Make reading only when the pointer becomes stable.
6. The scale should indicate Force of 36 ~ 64 g (1.3 ~ 2.2 oz.).
This corresponds to a torque of 40 ~ 70 g·cm (0.6 ~ 1.0 oz·inch). For the torque calculation, refer to Fig. 5-2.
7. If the reading is out of specified range, clean the driving surfaces of the Reel Table Ass'y, and all other driving parts relative to the take up torque function with the TEAC TZ-261B Rubber Cleaner or with pure alcohol.
8. If the above cleaning is ineffective for torque correction, replace the Reel Table Ass'y. (See Section 4-11).

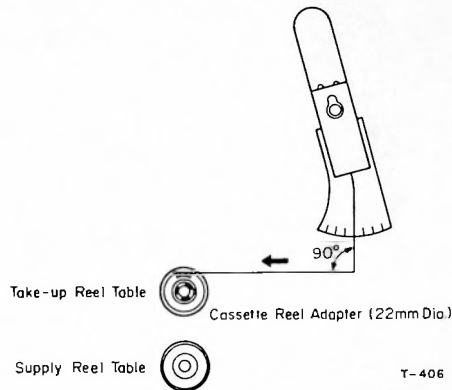
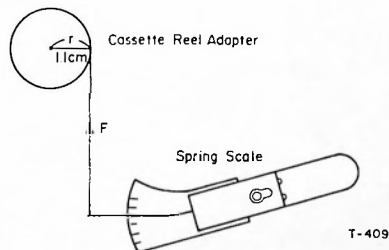


Fig. 5-1 Take-up/Fast Forward Torque Measurement



For example:

$$T = F \times r$$

If $F = 36 \text{ g}$

$$T = \text{torque (g·cm)} = F \times r$$

$$F = \text{force (g)} = 36 \times 1.1$$

$$r = \text{radius (cm)} = 40 \text{ (g·cm)}$$

Consequently the torque is 40 g·cm

Fig. 5-2 Torque Calculation Method

5-2. FAST FORWARD & REWIND TORQUE

Specification: 100 ~ 150 g·cm (1.4 ~ 2.1 oz·inch)

NOTE

Note that the Fast Forward and Rewind torque should be measured before the Auto-End Stop Facility functions.

5-2-1. FAST FORWARD TORQUE

1. Repeat step 1 and 2 in 5-1 section.
2. Set the Cassette Reel Adapter (22 mm Dia.), connected to the spring scale (0 ~ 200 g, or 0 ~ 7.0 oz.) by the string as shown in Fig. 5-1, on the Take-up Reel Table.
3. Place the deck in the Fast Forward mode.
4. Allow the rotation of the Reel Table to pull the scale pointer toward the Adapter, and obtain the scale reading. Do not read until the pointer becomes stable.
5. The scale should indicate 91 ~ 136 g (3.2 ~ 4.8 oz.). This corresponds to a torque of 100 ~ 150 g·cm (1.4 ~ 2.1 oz·inch).

6. If the indication is out of specified range, clean the driving surfaces of the Reel Table Ass'y and all other driving parts relative to the fast forward torque function with the TEAC TZ-261B Rubber Cleaner or with pure alcohol.

5-2-2. REWIND TORQUE

1. Repeat the FAST FORWARD TORQUE procedure, but use the Supply Reel Table and Rewind mode for measuring the rewind torque.
2. The specified value is the same as that of the fast forward torque.

TORQUE MEASUREMENT USING THE CASSETTE TORQUE METER

The torque measurements can be easily done with the Cassette Torque Meter indicated below.

For take-up torque measurement: 0 ~ 100 g·cm
(0 ~ 1.4 oz·inch)

For fast forward and rewind torque measurements: 0 ~ 160 g·cm
(0 ~ 2.2 oz·inch)

By use of a Cassette Torque Meter, it is possible to directly obtain the torque value without calculation, and to do the measurement simply with no removal of any parts. If repairs are necessary, the external Cases must be removed. Load the Meter on the deck and read the pointer indication on the dial scale for each tape movement operation.

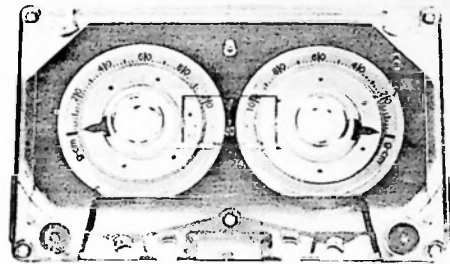


Fig. 5-3 Cassette Torque Meter

5-3. PINCH ROLLER PRESSURE

Specification: 400 g ± 20 g (13.5 ~ 15.0 oz.)

1. Switch on POWER.
2. Press the Switch Arm (A) shown in Fig. 5-5 so that the CASSETTE IN Switch (S509) (see Fig. 5-11) will activate.
3. Place the deck in the PLAY mode with no tape loaded.
4. Attach the spring scale to the hole in the Pinch Roller Ass'y as shown.
5. Gently draw the Pinch Roller away from the Capstan shaft (in a direction parallel to a line that intersects the centers of the capstan shaft and the Pinch Roller) until the Capstan shaft and the Pinch Roller are completely separated.
6. Gradually return the scale back until the Pinch Roller just begins to rotate. The scale should then be reading approximately 400 ± 20 g (13.5 ~ 15.0 oz.).
7. If the reading is out of specified range, adjust the tension of the Pressure Spring by bending the tab of the Pinch Roller Ass'y slightly.

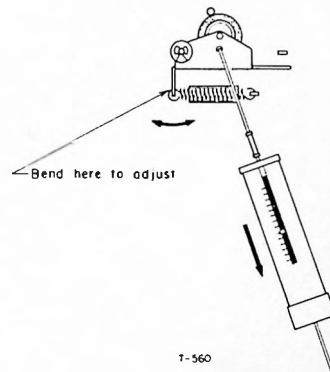


Fig. 5-4 Pinch Roller Pressure Measurement

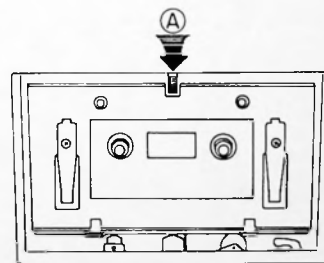


Fig. 5-5 Switch Arm Location

5-4. BRAKE TENSION

1. Switch on POWER.
2. Load a TEAC MTT-501 test tape.
3. Check for excess slack or tightness of the tape when operation is changed from play, fast forward and rewind mode to stop mode, respectively.
4. If brake action is too "tight" or "loose", adjust by bending the arms of the Brake Bracket in or out as shown by the arrows in Fig. 5-6.

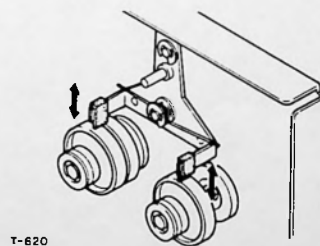


Fig. 5-6 Brake Tension Adjustment

5-5. TAPE SPEED/WOW AND FLUTTER

Specification:

Tape Speed Deviation:	3,000 Hz \pm 30 Hz
Tape Speed Drift:	15 Hz
Wow and Flutter:	Playback: 0.07% (WRMS) 0.15% (RMS) Record/Playback: 0.18% (RMS)

NOTE

1. Before performing this adjustment, clean all parts in the tape path, particularly the Capstan, the Pinch Roller and the Heads with the appropriate liquid from the TEAC TZ-261 Cleaner Kit or with pure alcohol.
2. Wow and flutter should be checked in two ways; Playback only and Record/Playback methods. First correct tape speed and wow and flutter using the playback only method. Then measure wow and flutter using record and playback method.
3. As the measured results may vary with respect to location on tape at which it was taken, three points — at beginning, middle and near the end of the tape — should be measured. The worst case reading must satisfy the specification.

5-5-1. TAPE SPEED

1. Connect test equipment to the deck, except the AF oscillator, as shown in Fig. 5-7.
2. Set the OUTPUT control on the deck to obtain convenient output.
3. Set the EQ switch to the "3" position, and then load and play a TEAC MTT-111 test tape (3,000 Hz signal is recorded).
4. Adjust the semi-fixed resistor as shown in Fig. 5-8 for reading of 3,000 Hz \pm 5 Hz on the frequency counter. (NOTE: This tape speed setting should be done after approx. 30 seconds of operating time of the deck.)
5. Then, verify the reading on the frequency counter as within the specified range of 3,000 Hz \pm 30 Hz, and the Tape Speed Drift is within 15 Hz at any portion of the tape run.
6. If the tape speed is extremely out of the specification, check the Pinch Roller pressure and the tape driving function for correction, and make sure the tape path is clean.

5-5-2. WOW AND FLUTTER

After making the tape speed measurement, perform the wow and flutter test using the Playback Method and the Record/Playback Method successively.

PLAYBACK METHOD

1. Play the MTT-111 test tape.
2. Read the indication on the wow and flutter meter.
3. The wow and flutter value should be 0.07% WRMS, max. or 0.15% RMS, max.
4. If the wow and flutter is out of specification, check the Pinch Roller pressure and the take-up torque, see that the tape path is clean, and that the Capstan Belt is not stretched or oily.
5. If the above checks are ineffective for excessive wow and flutter correction, repair or replace the Pinch Roller, the Capstan Belt and/or any other defective parts.

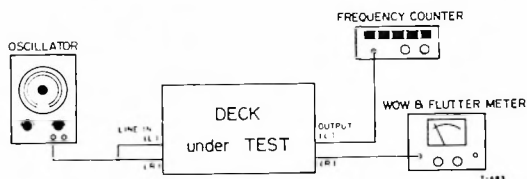
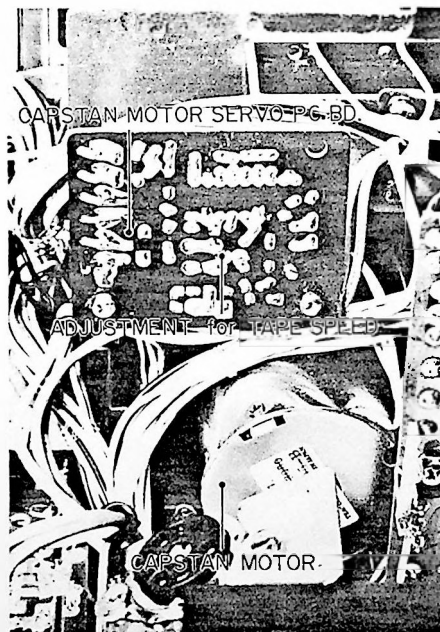


Fig. 5-7 Tape Speed/Wow & Flutter Measurement Setup



T-577

Fig. 5-8 Tape Speed Adjustment Location

RECORD/PLAYBACK METHOD

NOTE

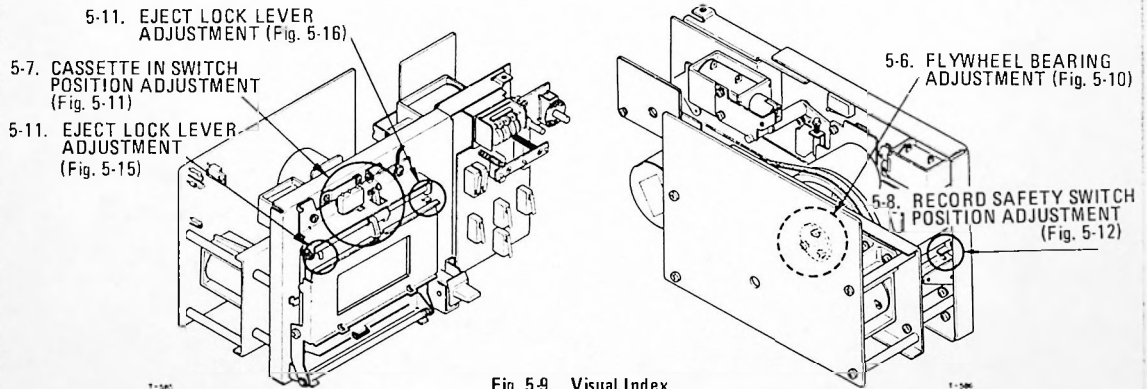
When using this method, adopt the maximum wow and flutter value obtained by repeated play and stop modes of operation. This operation is necessary to make sure wow and flutter content between record and playback will not be in phase to create a false reading.

1. Connect test equipment to the deck as shown in Fig. 5-7.
2. Set LINE and OUTPUT controls on the deck to obtain convenient input and output levels.

3. Load a TEAC MTT-502 test tape (blank) and set the BIAS/EQ switches in the "3" positions.
4. Apply and record a 3,000 Hz signal.
5. Rewind and play this recorded section.
6. Read the indication on the wow and flutter meter.
7. The wow and flutter value should be 0.18% RMS max.
8. If the measured value is out of specification, repair using the same methods as stated in steps 4 - 5 in the Playback Method procedure.

VISUAL INDEX (for 5-6, 7, 8, 11 Sections)

To readily locate the specified checkout areas described in 5-6, 7, 8, 11 Sections, refer to Fig. 5-9.



5-6. FLYWHEEL BEARING ADJUSTMENT

1. Close the Cassette Holder with the Holder empty so that the Switch Arm located on the top of the Cassette Holder is not depressed and the Capstan Motor is not turning.
2. Depress the PAUSE Button to engage the Play Solenoid.
3. By using a slot screwdriver with small blade, adjust the Thrust Screw so that there is a gap of 0.1 to 0.3 mm between the lower end of the Capstan Shaft and the well of the Flywheel Bearing. This adjustment can be made by pushing the Flywheel toward or away from the front of the deck.

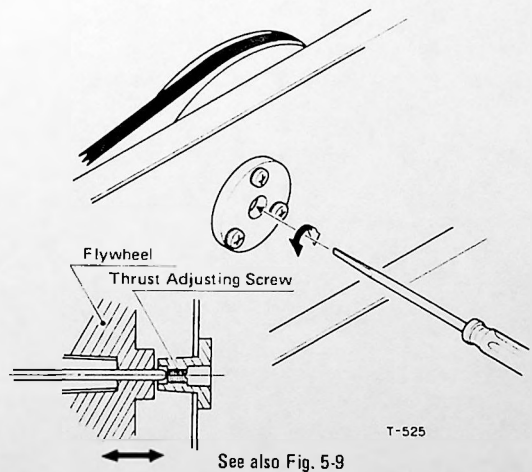
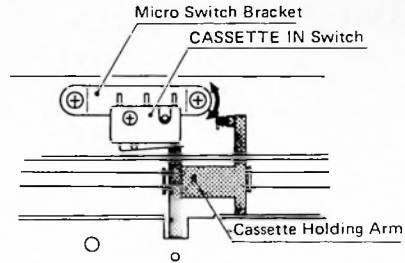


Fig. 5-10 Flywheel Bearing Adjustment

5-7. CASSETTE IN SWITCH POSITION ADJUSTMENT

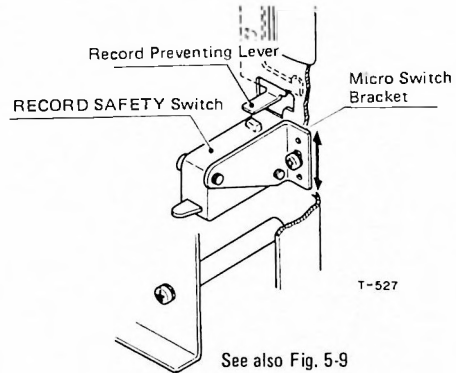
1. Be sure that when inserting any cassette tape in the Cassette Holder and closing it, the Cassette In Switch (S509) is actuated to run the Capstan Motor.
2. If the Capstan Motor does not rotate, loosen the screw on the right end of the Micro Switch Bracket, and then rotate the Bracket so that the Switch is engaged to ON.
3. After adjusting, retighten the loosened screw.



See also Fig. 5-9 T-526
Fig. 5-11 CASSETTE IN Switch Positioning

5-8. RECORD SAFETY SWITCH POSITION ADJUSTMENT

1. Insert any cassette tape with the record protection tab removed in the Cassette Holder and close Cassette Holder.
2. Then, ensure that the Record Preventing Lever moves downward, thus closing the Record Safety Switch (S512).
3. If the Switch does not close, loosen the screw fixing the Micro Switch Bracket and adjust the Switch position by moving the Bracket for proper activation of the Switch.



See also Fig. 5-9
Fig. 5-12 Record Safety Switch Positioning

5-9. CASSETTE HOLDER MOTION CHECKS

1. Load the TEAC MTT-501 test tape or equivalent.
2. Ensure that when depressing the Eject Lever, the Cassette Holder Door is opened smoothly without binding from the closed condition.
3. Close the Cassette Holder with no Cassette in the Holder.
4. Check that the Cassette Holder will open fully when the Eject lever is depressed as above.
5. Load a cassette tape in the opened Cassette Holder Door and check that the cassette shell does not come into contact with the capstan shaft or safety shaft fixed on the chassis.

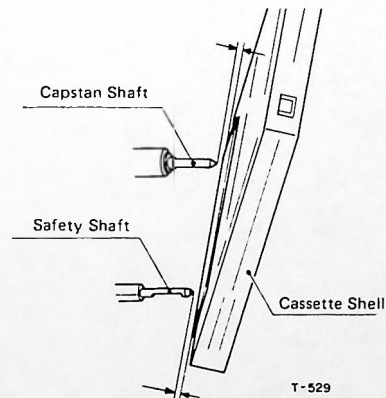


Fig. 5-13 Cassette Holder Motion Checks

5-10. OIL RETAINING WASHER CLEARANCE CHECK

1. Load a standard shape cassette on the deck.
2. Make certain that both surfaces of the Oil Retaining Washer are properly spaced from one side of the Cassette Shell and the top end of the Capstan Housing by rotating the Flywheel manually. See Fig. 5-14.

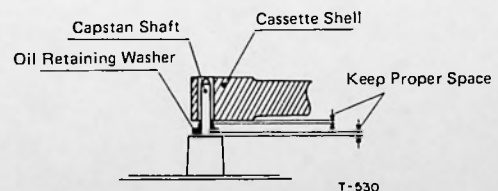


Fig. 5-14 Oil Retaining Washer Clearance Check

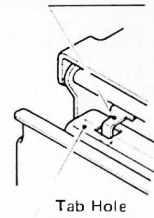
5-11. EJECT LOCK LEVER ADJUSTMENT

1. Insert any cassette tape with the record protection tabs removed, then close Cassette Holder Door.
2. Ascertain that when depressing the Eject Lever, the Cassette Holder Door is released from the Lock Lever after the bent-tip of the Record Preventing Lever is extracted perfectly out of the tab hole of the Cassette.
3. If the bent-tip of the Record Preventing Lever does not fully clear the hole or the Lock Lever does not free the Cassette Holder, make adjustment by bending the tab of the Lock Lever in either direction as shown by the arrows in Fig. 5-16.

Note that the Lock Lever must be allowed to open the Cassette Holder after the Record Preventing Arm is completely pulled out of the record protection tab hole.

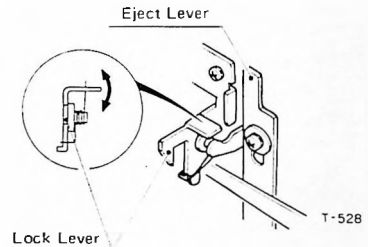
4. The Cassette Holder always should remain locked even when any place on the Cassette Holder Door is pushed toward the inside of the deck.

Bent-tip of Record Preventing Lever



See also Fig. 5-9

Fig. 5-15 Record Protection Tab Location



See also Fig. 5-9

Fig. 5-16 Lock Lever Location

VOLTAGE AND FREQUENCY SETTING

a. VOLTAGE SELECTOR SETTING PROCEDURE (FOR GENERAL EXPORT MODELS)

1. Disconnect the power cord of the deck from the source.
2. Turn the deck over and locate the voltage selector on the bottom of the deck.
3. Loosen the screw on the cut-out end of the metal bar covering the voltage selector and then rotate the bar so the slotted center post of the voltage selector can be adjusted.
4. To increase the selected voltage, turn the slotted center post clockwise using a screwdriver or other suitable tool.
5. To decrease the selected voltage, turn the slotted center post counter-clockwise.
6. The numerals that appear in the cut-out window of the voltage selector indicate the selected voltage.
7. Re-install the metal bar.

b. AC POWER LINE FREQUENCY ADAPTATION

Since the A-650 employs a PLL Servo DC Motor, 50 Hz or 60 Hz operation is possible without power line frequency adaptation.



Fig. 5-17 Voltage Selector Setting

5-12. PUSHBUTTON CONTROL CHECKS

REC BUTTON

1. The deck should go into the Record mode only when a recordable tape is installed.
2. The Record mode should be achieved only when both REC and Play Buttons are depressed at the same moment.
3. While the deck is running in the Play mode, when both Play and Record Buttons are pushed together, the deck should go into the Record mode. . . . Punch-in Recording feature check.
4. When the Fast Forward, Rewind or STOP Buttons are depressed during the Record mode, Record mode should be released.

FAST FORWARD BUTTON

1. The Fast Forward operation should be achieved by pressing the Fast Forward Button only.
2. When the Fast Forward Button is depressed during any other modes, the Fast Forward function should be activated.
3. When either the PAUSE, Play, Rewind or STOP Button is pushed, the Fast Forward mode should cease to function.

REWIND BUTTON

1. The Rewind operation should be achieved by pressing the Rewind Button only.
2. When the Rewind Button is depressed from any other modes, the Rewind action should be achieved.
3. When either the PAUSE, Play, Fast Forward or STOP Button is pushed, the Rewind mode should be released.

PLAY BUTTON

1. Play operation should be achieved by depressing the Play button only.
2. When the Play Button is depressed during Fast Forward or Rewind operation, a delay time of 0.7 ± 0.3 second is required before Play mode is begun.
3. When the Play Button is depressed from any other modes (with the exception of Record, Record Muting and Record Pause), the Play function should be achieved.
4. When either Fast Forward, Rewind, PAUSE or STOP Button is depressed, the Play mode should be disengaged.

STOP BUTTON

When the STOP Button is depressed from any other modes, the selected operation mode should be released to stop tape motion.

PAUSE BUTTON

1. The PAUSE function should be engaged, only when the PAUSE Button is depressed.
2. When the PAUSE Button is depressed from any other modes, the deck should go into the Pause mode. (When the PAUSE Button is depressed from the Record or Record Mute mode, the machine should go into the Record Pause mode.)
3. When either Play, Fast Forward Rewind or STOP Button is depressed with the Pause facility engaged, the Pause mode should be released.

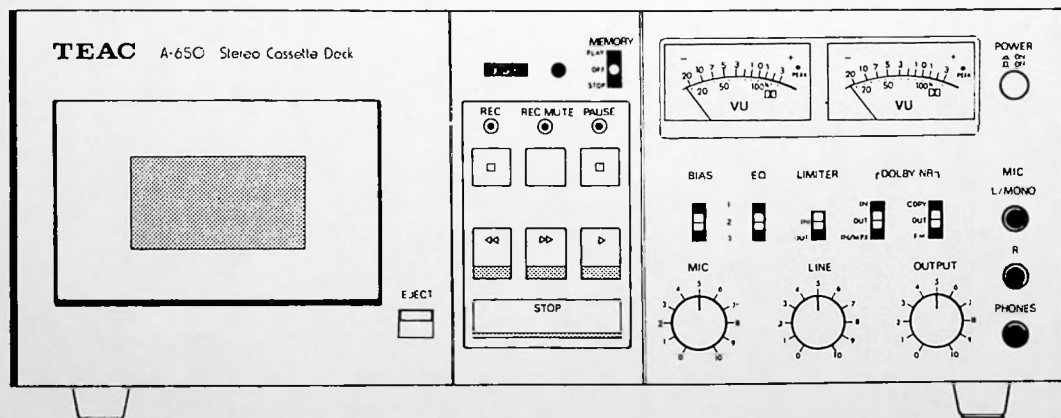


Fig. 5-18 Front Panel View

REC MUTE BUTTON

1. The Record Mute mode should be activated from only the Record mode.
2. If the PAUSE, Play, Fast Forward, Rewind or STOP Button is depressed, the Record Mute mode should be disengaged.

EJECT LEVER

1. During the Play, Record Pause or Record Mute mode, ensure that the EJECT Lever cannot be depressed to open the Cassette Holder.
2. The EJECT Lever can be depressed to open the Cassette Holder from the STOP, Fast Forward or Rewind mode.
3. When the EJECT Lever is depressed, be sure that the Cassette Holder opens far enough, the lamp located at the rear of the Cassette Holder is extinguished, the Drive Motors stop and all control operations are disabled.

5-13. AUTO-END STOP FACILITY CHECK

1. Check that when the cassette reaches the end of tape from each mode with the MEMORY Switch OFF, the Take-up Reel stops rotating and the deck releases the drive mechanism automatically.
2. The End-stop Activate Time (the time between the stopping of the take-up reel table and stop mode of the deck) should be 1.5 ± 0.5 seconds.

5-14. MEMORY DEVICE FUNCTION CHECKS

a. MEMORY PLAY FUNCTION

1. Set the MEMORY Switch to PLAY.
2. Depress the Index Counter reset button, depress Play Button to run the tape forward until the Index Counter indicates 003 or higher (but less than 900) then depress Rewind Button.
3. Check that the tape stops for a short moment when the Counter reaches 999, then the Play mode begins automatically.

b. MEMORY STOP FUNCTION

1. Place the Switch in the STOP position.
2. Set deck in the Rewind mode with the Counter indicating 003 or a larger numeral (but less than 900).
3. Check that the tape halts when the Counter winds back down to 999.

6. ELECTRICAL CHECKS AND ADJUSTMENTS

GENERAL NOTES

1. Before performing adjustments on the amplifier section of this deck, thoroughly clean and demagnetize the entire tape path, particularly erase head, record/playback head, capstan shaft and pinch roller.
 2. Make sure the deck is set for the proper voltage for your locality.
 3. In general, checks and adjustments for other than specified items, are done in the sequence of left channel then right channel. Double designated REF. NO. indicates left channel/right channel (example: VR 101/201).
 4. Value of "dB" in the text refers to 0 dB = 0.775 V, except where specified. If a VTVM calibrated to 0 dB = 1 V is to be used, appropriate compensation should be made.
 5. The VTVM used in the procedures, including the measurement at CAL test points, must have load impedance of $1M\Omega$ or more.
 6. To correctly complete these performance checks, keep the order as explained in this chapter.
 7. All checks and adjustments should be made with Top Cabinet removed. (See Section 4-1).
- * For each procedure, make the initial equipment test set up, connections and switch/control settings as shown in the associated illustrations.
- * Each of the switch settings marked with hyphen (-) in the Switch Setting chart have no effect on the procedures.

6-1. ADJUSTMENT LOCATION

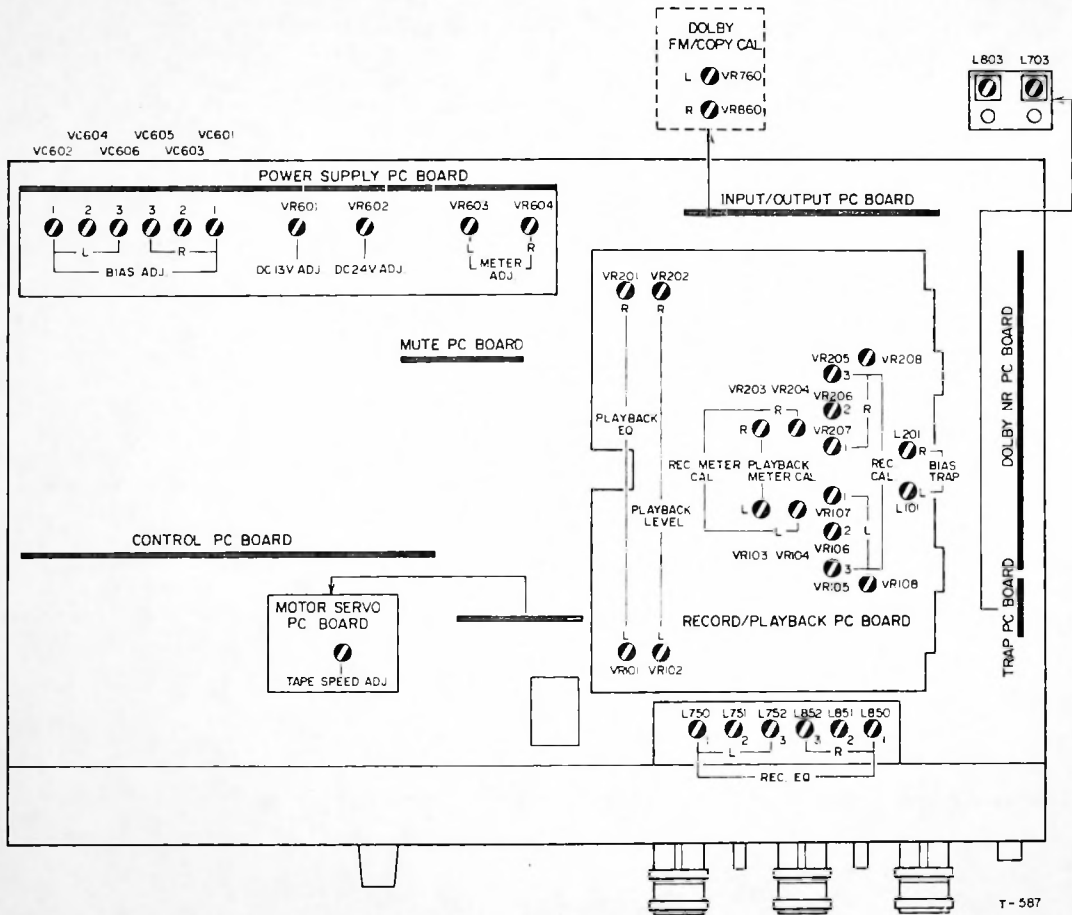


Fig. 6-1 Adjustment Location

VR101/201	Playback EQ	VR760/860	DOLBY FM/COPY calibration
VR102/202	Playback level	VC602/601	Record bias (1)
VR103/203	VU meter calibration (Playback)	VC604/603	Record bias (2)
VR104/204	VU meter calibration (Record)	VC606/605	Record bias (3)
VR105/205	Record level (3)	L101/201	Bias trap
VR106/206	Record level (2)	L703/803	Bias trap
VR107/207	Record level (1)	L750/850	Record EQ (1)
VR108/208	Peak level indicator adjustment	L751/851	Record EQ (2)
VR601	DC 13 V adjustment	L752/852	Record EQ (3)
VR602	DC 24 V adjustment		

DC VOLTAGE ADJUSTMENT

- a. **ADJUSTING FOR +13 V**
 1. Apply AC power to the deck and set the POWER Switch to IN.
 2. Connect the DC Voltmeter between #11 terminal (+) of the 16P Plug and ground.
 3. Adjust VR601 to provide the desired D.C. output voltage of +13 V.
- b. **ADJUSTING FOR +24 V**
 4. Change connecting point of the DC Voltmeter to #10 terminal of the Plug (+) and ground.
 5. Adjust VR602 for +24 V.

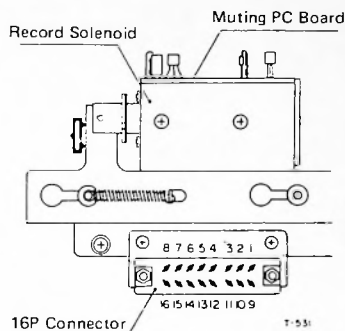


Fig. 6-2 DC Voltage Adjustment

6-2. PLAYBACK PERFORMANCE

NOTE

Except for the Playback Frequency Response checks, all alignments in the PLAYBACK PERFORMANCE have to be done with the EQ switch set to position 3 only unless there is a special reason which requires that other positions also be checked.

6-2-1. RECORD/PLAYBACK HEAD AZIMUTH ADJUSTMENTS

1. Load and play a TEAC MTT-150 test tape.
2. Make sure the phase relationship between the 2 signals (left channel and right channel) is within 45° on the oscilloscope.
3. Load a TEAC MTT-116U test tape.
4. Play the 10 kHz signal section of the tape.
5. Slowly adjust the azimuth adjusting nut for the maximum indication on the VTVM.
6. Secure the nut with a drop of locking paint.

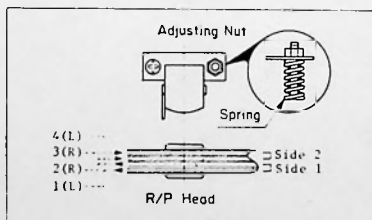


Fig. 6-4 Head Azimuth Adjustments Location

Preparations:

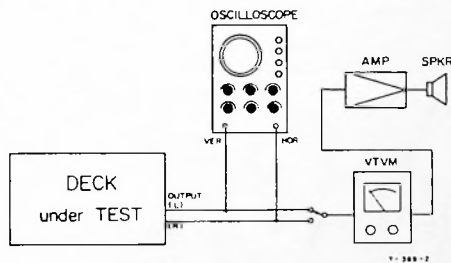


Fig. 6-3 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	3	-	OUT	OUT

Control Setting:

OUTPUT: Set for convenient output level.

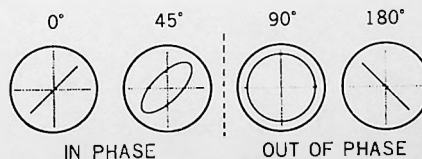


Fig. 6-5 Confirming Phase Relationship

6-2.2. SPECIFIED OUTPUT LEVEL SETTING

Specifications:

- Specified output level: -5 dB (435 mV)
- Maximum output level: $+1 \text{ dB} \pm 1 \text{ dB}$
(0.775 V \sim 0.975 V)

1. Load and play a TEAC MTT-150 test tape.
2. Adjust VR102/202 for 580 mV (-2.5 dB) on VTVM connected to the CAL test points, as shown in (A) of Fig. 6-6.
3. Change the VTVM connection to the OUTPUT jacks as shown in (B) of Diagram.
4. Place the DOLBY NR IN-OUT-IN/MPX switch in the OUT position.
5. Set the OUTPUT controls fully clockwise.
6. Confirm that the output level is $+1 \text{ dB} \pm 1 \text{ dB}$ (0.775 V \sim 0.975 V).
7. Set the OUTPUT controls for a reading of -5 dB (435 mV). This is the specified output level. At this time, the physical position of the OUTPUT controls indicates the Specified Control Setting referred to in subsequent procedures.

IMPORTANT

After this setting is done, do not disturb the Specified Control Setting of the OUTPUT controls until the remaining checks and adjustments are completed.

6-2.3. FREQUENCY RESPONSE —PLAYBACK—

NOTE

In the following procedure, adjust VR101/201 so that the measured values on all settings of the EQ switch are within the specified response limits.

CrO₂ & Fe-Cr TAPES

8. Load a TEAC MTT-116K test tape and play its test signals from 40 Hz up to 14 kHz.
9. Adjust VR101/201 so that the readings of the higher frequency signals on the VTVM are within the response limits.

Hi-Fi TAPE

10. Repeat the above procedure, with the following exceptions.

Test tape. MTT-116U
EQ switch. "3" position

NOTE

If the response does not meet the specified response limits, the head should be checked for accumulated oxide or dirt. Then, if no dirt is found the head azimuth should be readjusted.

Preparations:

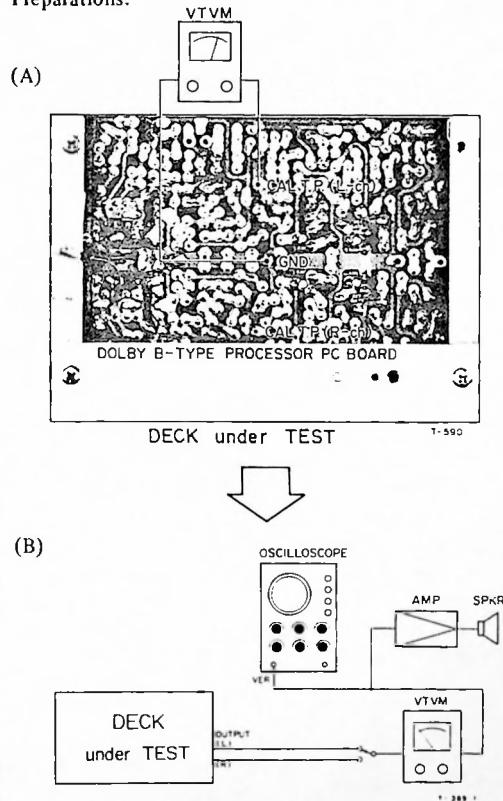


Fig. 6-6 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	3	-	IN	OUT

Control Setting:

OUTPUT: Set for convenient output level.

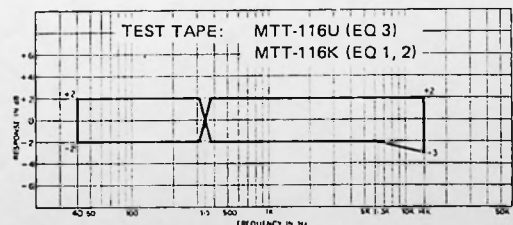


Fig. 6-7 Playback Frequency Response Limits

6-2.4. SIGNAL TO NOISE RATIO –PLAYBACK–

Specifications:

CrO₂ & Fe-Cr tapes. 48 dB (minimum)
 Hi-Fi tape: 46 dB (minimum)

1. Load and play a completely erased or degaussed TEAC MTT-501 test tape.
2. Read the indication on the VTVM.
3. The VTVM should indicate -51 dB minimum (2.18 mV maximum).
4. This corresponds to a signal-to-noise ratio of 46 dB (minimum): difference between residual noise -51 dB and the specified output level -5 dB (435 mV).

NOTE

Since the polarity of the AC plug has some effect on the signal-to-noise ratio, the plug can be reversed in the wall socket when checking the signal-to-noise ratio. The worse case value should be within the indicated value above.

Preparations:

Connection: See Fig. 6-6 (B) on page 22.

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	3	-	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)

6-2.5. VU METER CALIBRATION –PLAYBACK–

Specification. +3 VU ()

IMPORTANT

VU meter calibration must also be conducted after that of MONITOR PERFORMANCE (see 6-3-3 on page 24) is completed.

1. Load and play a TEAC MTT-150 test tape.
2. Adjust VR103/203 for +3 VU () on the VU meter.

Preparations:

Connection: See Fig. 6-6 (B) on page 22.

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	3	-	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)

6-2.6. HEADPHONE OUTPUT LEVEL CHECKS

Specification. -15.7 dB ± 2 dB (103 mV ~ 163 mV)

NOTE

An 8 ohm non-inductive resistor should be used as the test load resistor.

1. Load and play a TEAC MTT-150 test tape.
2. Measure the level across the test load resistor.

Preparations:

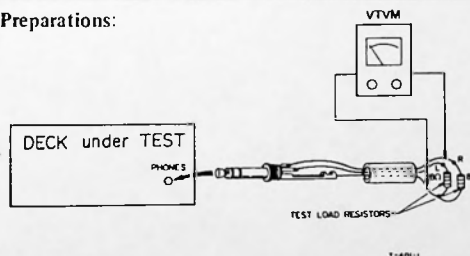


Fig. 5-8 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	3	-	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)

6-3. MONITOR PERFORMANCE

6-3-1. MINIMUM INPUT LEVEL CHECKS

Specifications:

- LINE: $-19 \text{ dB} \pm 2 \text{ dB}$ (69 mV ~ 109 mV)
 MIC: $-67 \text{ dB} \pm 2 \text{ dB}$ (274 μV ~ 435 μV)
 DIN: $-35 \text{ dB} \pm 2 \text{ dB}$ (10.9 mV ~ 17.3 mV)

NOTE

To prevent mis-measurements for the following procedures, any connection cords other than those for the respective input check must be removed.

For example: Do not connect the Microphone and the DIN cords to respective input jacks when checking for the LINE inputs.

1. Load any recordable tape.
2. Place the deck in the RECORD-PAUSE mode.
3. Set the MIC controls to maximum.
4. Apply a 400 Hz signal at $-67 \text{ dB} \pm 2 \text{ dB}$ (274 μV ~ 435 μV) to the MIC jacks and check for 580 mV (-2.5 dB) on the VTVM connected to the CAL test points. (Minimum Input Level checks for the MIC jack).
5. Apply a 400 Hz signal at $-35 \text{ dB} \pm 2 \text{ dB}$ (10.9 mV ~ 17.3 mV) to the input terminals of the DIN connector and check for 580 mV. (Minimum Input Level checks for the DIN inputs).
6. After checking, reduce the MIC controls to minimum to prevent noise insertion during subsequent procedures.
7. Set the LINE controls to maximum.
8. Apply a 400 Hz signal at $-19 \text{ dB} \pm 2 \text{ dB}$ (69 mV ~ 109 mV) to the LINE IN jacks and check for 580 mV. (Minimum Input Level checks for the LINE inputs).

6-3-2. SPECIFIED LINE CONTROL SETTING

Specification:

Specified input level. -9 dB (274 mV)

9. Apply a 400 Hz signal at -9 dB (274 mV) to the LINE IN jacks.
10. Set the LINE controls to obtain a reading of 580 mV (-2.5 dB) on the VTVM. At this time, the physical position of the LINE controls indicates the Specified LINE Control Setting referred to in subsequent procedures.

IMPORTANT

After this setting is done, do not disturb the Specified Control Setting of the LINE controls until the remaining checks and adjustments are completed.

6-3-3. VU METER CALIBRATION —RECORD—

Specification. +3 VU ()

11. Adjust VR104/204 for +3 VU () on the VU meter.

Preparations:

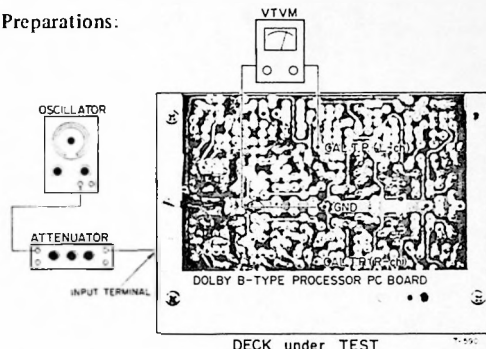


Fig. 6-9 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	-	-	IN	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)
 LINE: Minimum Setting
 MIC: Minimum Setting

6-3-4. LED PEAK LEVEL INDICATOR CALIBRATION

12. Place DOLBY NR IN-OUT-IN/MPX switch to OUT position, adjust VR108 so that the PEAK level indicator lights as shown in Fig. 6-10, when a 400 Hz signal is applied at required level to the left channel LINE IN jack. Keep the right channel LINE IN jack disconnected from the AF oscillator.
13. For the right channel, repeat the above procedure except adjust VR208. Keep the left channel LINE IN jack disconnected from the AF oscillator.
14. After setting both channels, make sure the indicator reacts the same as above when required signal is simultaneously applied to both channels.

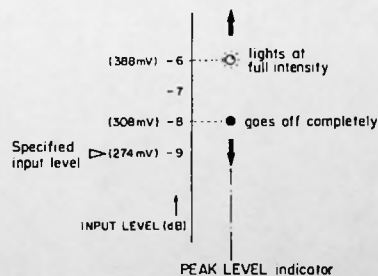


Fig. 6-10 LED Peak Level Indicator Setting

6-3-5. CHECKING OF DOLBY NR COPY-OUT-FM SWITCH FUNCTION

Specification:

When required input level is applied, Output level should be $-5 \text{ dB} \pm 2 \text{ dB}$

1. Load any recordable tape.
2. Place the deck in the RECORD-PAUSE mode.
3. Apply a 400 Hz signal at -9 dB (274 mV).
4. Make sure the VTVM indication is $-5 \text{ dB} \pm 2 \text{ dB}$ (345 mV \sim 548 mV).
5. If the VTVM indication is out of specification, adjust the DOLBY FM/COPY CAL controls (VR760/860) on the A-650 rear panel.
6. Change the input signal to 10 kHz and also check for $-5 \text{ dB} \pm 2 \text{ dB}$ on VTVM.
7. Set the DOLBY NR COPY-OUT-FM switch to FM.
8. Apply a 10 kHz signal at -17 dB (109 mV).
9. Confirm that the output level indicated on the VTVM is $-5 \text{ dB} \pm 2 \text{ dB}$.

NOTE

When the DOLBY NR COPY-OUT-FM switch is in COPY or FM position, the LINE and MIC controls have no control over the input signal and only the

Preparations:

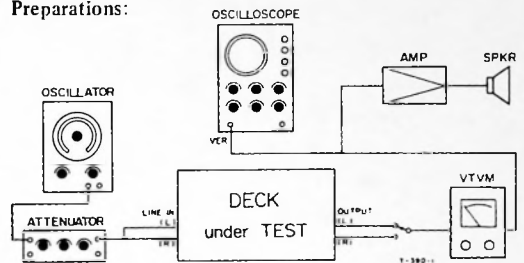


Fig. 6-11 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	-	-	OUT	COPY

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)
 LINE: Specified Setting (See 6-3-2)
 MIC: Minimum Setting

DOLBY FM/COPY CAL controls (on the back panel) can adjust the input level. However, for the convenience of the following procedure, do not disturb the LINE and MIC control settings.

6-4. RECORDING PERFORMANCE

NOTE

1. Before making any adjustments of the recording circuit, be sure that all tests in the PLAYBACK and MONITOR performance sections have been accomplished. The preceding performance should be properly adjusted; otherwise record calibration would be inaccurate.
2. The adjustments and checks for Fe-Cr and Hi-Fi tapes usually may be omitted unless the technician wishes to confirm that they also are within specifications, except for the sections where these tape are designated.

6-4-1. BIAS TRAP ADJUSTMENTS

NOTE

The VTVM used in this procedure must have load impedance of 1M ohm or more.

1. Load any recordable tape.
2. Place the deck in the RECORD-PAUSE mode with no signal applied.
3. Adjust L101/201 for a minimum reading.
4. Change the VTVM connections to the CAL test point and ground. See Fig. 6-12.
5. Adjust L703/803 for minimum reading on the VTVM.

Preparations:

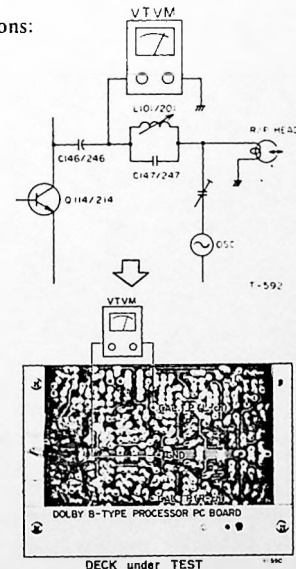


Fig. 6-12 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
-	-	-	-	-

Control Setting: Same as above section.

6-4.2. RECORD BIAS SETTING

CrO₂ TAPE

1. Load a TEAC MTT-505B test tape.
2. Adjust VC602/601 in a counter clockwise direction until the capacitor leaf springs open completely.
3. Apply and record two tone signals in turn; a 1 kHz signal and a 7 kHz signal, both at -42 dB (6.15 mV).
4. Rewind and play this recorded section and note the VTVM indication.
5. Turn VC602/601 clockwise slightly and record another section of tape.
6. Rewind over this section and play the tape again and note the VTVM indication.
7. Repeat this operation of recording, rewinding, playing, and adjusting until no difference in playback level between these two signals is obtained.

Fe-Cr TAPE

8. Set BIAS/EQ switches to position #2.
9. Load MTT-501 test tape.
10. Adjust VC604/603 counter clockwise until capacitor leaf springs open completely.
11. Connect a 1 kHz, -15 dB input signal.
12. Record a ten second section of tape, rewind and play that section and note VTVM indication.
13. Adjust VC604/603 slightly clockwise.
14. Repeat this operation of recording, rewinding, playing, and adjusting until the peak value on the VTVM is obtained.
15. After the preceding adjustment is done, install the MTT-504 tape.
16. Apply and record two tone signals alternately, a 1 kHz signal and a 7 kHz signal, both at -42 dB (6.15 mV).
17. Further adjust VC604/603 slightly until identical readings at both frequencies are found using the process of adjusting, recording, rewinding and playing back the tape.

Hi-Fi TAPE

18. Load a TEAC MTT-501 test tape with the BIAS/EQ switches set to the "3" position and with the DOLBY NR IN-OUT-IN/MPX switch set to IN.
19. Apply and record 2 tone signals, in turn; a 400 Hz tone at -39 dB (8.69 mV) and a 10 kHz tone at -39 dB.
20. Rewind and play this recorded section.
21. Compare the differences between the output level of the 400 Hz signal and that of the 10 kHz signal.
22. The output level of the 10 kHz signal must be 4 dB above the 400 Hz signal level.
23. Adjust VC606/605 to achieve this, continuing the process of recording-rewinding-playing-adjusting.

Preparations:

Connection: See Fig. 6-11 on page 25.

Switch Setting:

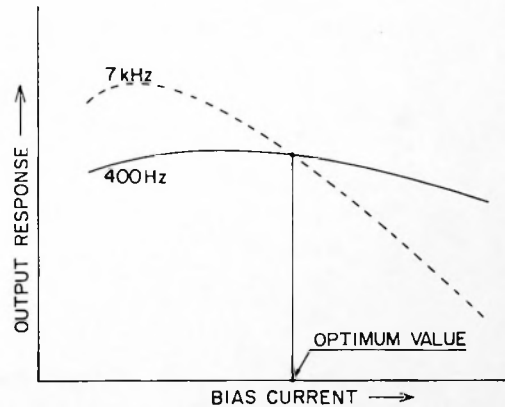
BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)

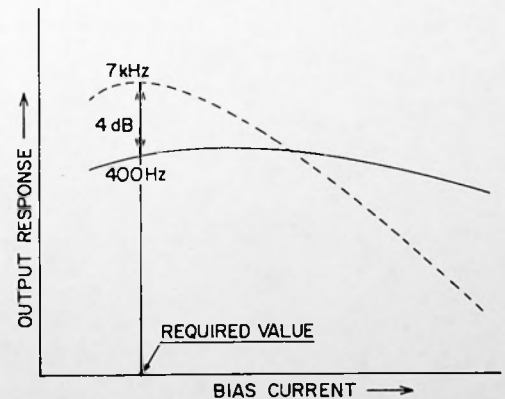
LINE: Specified Setting (See 6-3-2)

MIC: Minimum Setting



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Fig. 6-13 Bias Adjustment (CrO₂ & Fe-Cr tape)



T-589

Fig. 6-14 Bias Adjustment (Hi-Fi tape)

6-4-3. RECORD LEVEL SETTING

CrO₂ TAPE

24. Load a TEAC MTT-505B test tape and set the BIAS/EQ switches to the "1" position.
25. Apply and record a 400 Hz test signal at -9 dB (274 mV).
26. Rewind and play this recorded section.
27. Adjust VR107/207 to obtain -5 dB (435 mV) at deck's output.
28. Continue the process of the recording-rewinding-playing-adjusting until this -5 dB is obtained.

Fe-Cr TAPE

29. Repeat the preceding procedure, with the following exceptions.

BIAS/EQ switches: "2" position
 Test tape: MTT-504
 Adjustments: VR106/206

Hi-Fi TAPE

30. Repeat the preceding procedure, with the following exceptions.

BIAS/EQ switches: "3" position
 Test tape: MTT-501
 Adjustments: VR105/205

6-4-4. DISTORTION CHECKS

Specification:

2.5% or less (w/ 3 types of tape)

CrO₂ TAPE

1. Load a TEAC MTT-505B test tape.
2. Apply and record a 400 Hz test tone at -12 dB (194 mV).
3. Rewind and play this recorded section.
4. Read the indicated value on the distortion analyzer.

Fe-Cr TAPE

5. Repeat the above procedure, with the following exceptions.

BIAS/EQ switches: "2" position
 Test tape: MTT-504

Hi-Fi TAPE

6. Repeat the above "CrO₂ TAPE" procedure, with the following exceptions.

BIAS/EQ switches: "3" position
 Test tape: MTT-501

Preparations:

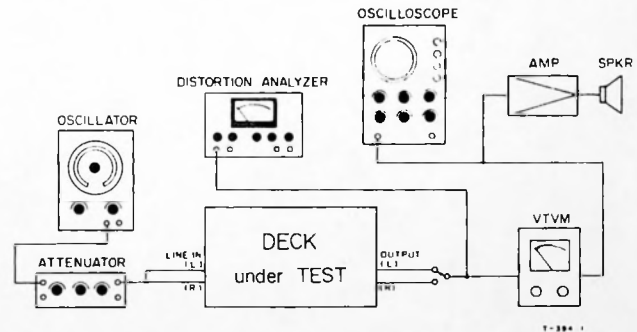


Fig. 6-15 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)
 LINE: Specified Setting (See 6-3-2)
 MIC: Minimum Setting

6-4.5. FREQUENCY RESPONSE –OVERALL–

CrO₂ TAPE

1. Load a TEAC MTT-505B test tape.
2. Apply and record a test signal from 30 Hz to 14 kHz at -42 dB (6.15 mV).
3. Rewind and play this recorded section.
4. Make sure the readings on the VTVM are within the response limits.
5. In case of any deviation in the high frequency range of the response limits, clean the heads and if this cleaning is ineffective adjust L750/850.

Fe-Cr TAPE

6. Repeat the above procedure, with the following exceptions.

BIAS/EQ switches: "2" position
 Test tape: MTT-504
 Adjustments: L751/851

Hi-Fi TAPE

7. Repeat the above procedure, with the following exceptions.

BIAS/EQ switches: "3" position
 Test tape: MTT-501
 Applied frequencies: 30 Hz ~ 12.5 kHz
 Adjustments: L752/852

Preparations:

Connection: See Fig. 6-11 on page 25.

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)
 LINE: Specified Setting (See 6-3-2)
 MIC: Minimum Setting

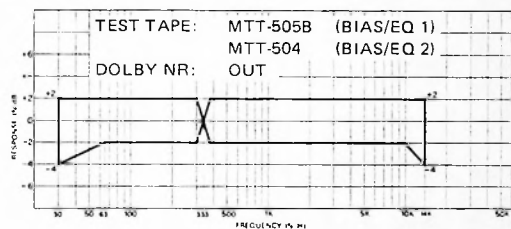


Fig. 6-16 Overall Frequency Response Limits (for BIAS/EQ 1, 2)

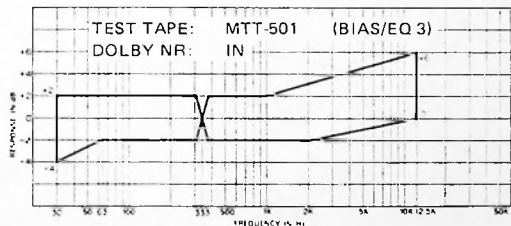


Fig. 6-17 Overall Frequency Response Limits (for BIAS/EQ 3)

6-4.6. SIGNAL TO NOISE RATIO –OVERALL–

Specifications:

CrO₂ & Fe-Cr tapes: 46 dB (minimum)
 Hi-Fi tape: 44 dB (minimum)

CrO₂ TAPE

1. Load a TEAC MTT-505B test tape.
2. Place the deck in the record mode for a few seconds with no signal applied.
3. Rewind and play this recorded (erased) section.
4. Read the indication on the VTVM.
5. The VTVM should indicate -51 dB minimum (2.18 mV maximum).
6. This -51 dB corresponds to the specified signal-to-noise ratio of 46 dB (minimum): the difference between the residual noise of -51 dB and the specified output level -5 dB (435 mV).

Preparations:

Connection: See Fig. 6-6 (B) on page 22.

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)
 LINE: Specified Setting (See 6-3-2)
 MIC: Minimum Setting

Fe-Cr TAPE

7. Repeat the preceding procedure, except use the TEAC MTT-504 test tape and set BIAS/EQ switches to "2" position.
8. Requirement is the same as that for "CrO₂ TAPE".

Hi-Fi TAPE

9. Repeat the preceding "CrO₂ TAPE" procedure, except use the TEAC MTT-501 test tape and set BIAS/EQ switches to "3" position.
10. The VTVM should indicate -49 dB minimum (2.74 mV maximum).
11. This -49 dB corresponds to the specified signal-to-noise ratio of 44 dB (minimum); the difference between the residual noise of -49 dB and the specified output level -5 dB.

6-4-7. DOLBY NR EFFECT MEASUREMENT

Specifications:

- Variation from reference at 1 kHz: 4 dB to 7 dB
- Variation from reference at 10 kHz: 8 dB to 12 dB

CrO₂ TAPE

1. Load a TEAC MTT-505B test tape.
2. Apply and record a 1 kHz signal at -42 dB (6.15 mV).
3. Rewind and play this recorded section.
4. While playing the 1 kHz signal, read the indication of the output level on the VTVM with the DOLBY NR IN-OUT-IN/MPX switch at IN and OUT positions.
5. The output level should vary 4 dB to 7 dB between the IN and OUT positions. (The output level in the IN position should be lower than the OUT position.)
6. Repeat the above procedure changing the applied test signal to 10 kHz at -39 dB (8.69 mV).

Preparations:

Connection: See Fig. 6-11 on page 25.

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

- OUTPUT: Specified Setting (See 6-2-2)
- LINE: Specified Setting (See 6-3-2)
- MIC: Minimum Setting

7. The variation should be 8 dB to 12 dB. (The output level in the IN position should be lower than in the OUT position).

6-4-8. PEAK LIMITER EFFICIENCY CHECKS

Specification: Limiter efficiency: 7 dB ± 2 dB

1. Load a TEAC MTT-501 test tape.
2. Apply and record a 400 Hz signal at -12 dB (194 mV) for several seconds.
3. Set LIMITER switch to IN.
4. Apply and record a 400 Hz signal at -2 dB (615 mV) to next portion of the tape for a while.
5. Rewind the tape to the starting point of the 400 Hz, -12 dB signal recorded portion.
6. Play the tape and compare the output level difference between the -12 dB recorded portion and the -2 dB recorded section.
7. The output level of -2 dB recorded portion should be 3 dB ± 2 dB higher than that of the -12 dB recorded portion.
8. Thus, when a -2 dB input level is applied with LIMITER switch IN, Peak Limiter circuit functions to

Preparations:

Connection: See Fig. 6-11 on page 25.

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
3	3	OUT	OUT	OUT

Control Setting:

- OUTPUT: Specified Setting (See 6-2-2)
- LINE: Specified Setting (See 6-3-2)
- MIC: Minimum Setting

9. This 7 dB ± 2 dB corresponds to Specified Limiter Efficiency.
reduce playback level to 7 dB ± 2 dB compared to the direct record-playback level (unlimited recording level).

6-4-9. ERASE EFFICIENCY

Specification: 65 dB (minimum)

NOTE

To measure erase efficiency, a 1 kHz narrow bandpass filter should be used. The test signal delivered from the AF oscillator should be tuned to the filter used.

Numbers in parentheses correspond to steps in Fig. 6-19.

1. Load a TEAC MTT-505B test tape.
2. Apply and record a 1 kHz signal at +1 dB (0.869 V) for several seconds. (1)
3. Rewind the tape to the mid-point of the recording and remove the signal from the LINE IN jacks. (2)
4. Place the deck in the record mode and record through this previously recorded portion with no input signal applied. (3)
5. Rewind the tape to the starting point of the 1 kHz signal recorded portion. (4)
6. Play the tape and read the indication on the VTVM to obtain the output level of both the unerased portion and the erased portion. (5)
7. Measure the output level differences between the 2 portions.

Preparations:

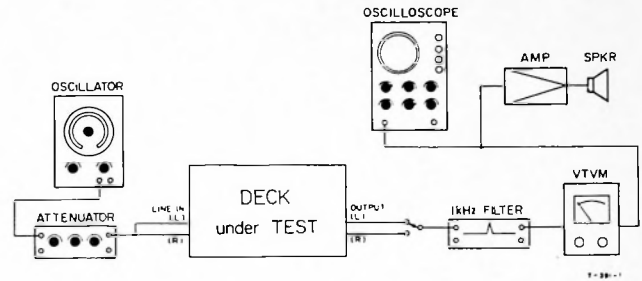


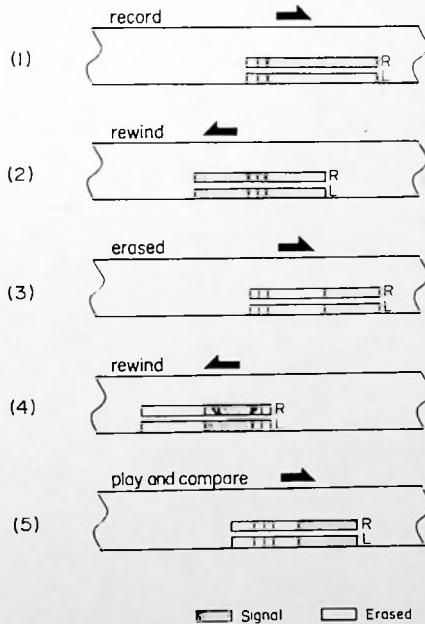
Fig. 6-18 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

- OUTPUT: Specified Setting (See 6-2-2)
- LINE: Specified Setting (See 6-3-2)
- MIC: Minimum Setting



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Fig. 6-19 Erase Efficiency Check Procedure

6-4-10. CHANNEL SEPARATION

Specification: 30 dB (minimum)

NOTE

To check channel separation (cross talk between channels), a 1 kHz narrow bandpass filter should be used. The test signal delivered from an AF oscillator should be tuned to the filter used.

Numbers in parentheses correspond to steps in Fig. 6-21.

1. Load a TEAC MTT-505B test tape.
2. Apply a 1 kHz test-tone at -9 dB (274 mV) into the left channel.
3. Place the deck in the record mode for about 30 seconds. (1)
4. Rewind the tape to the starting point of recording. (2)
5. Play the tape and measure the output level differences between the left and right channels. . . (3)

Preparations:

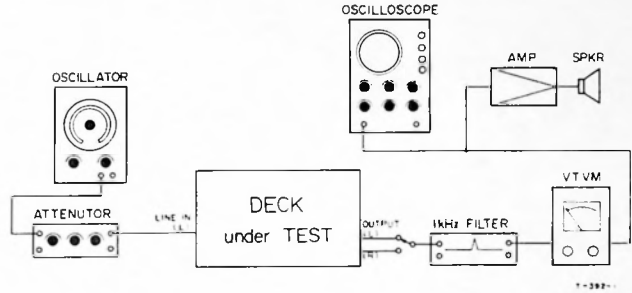


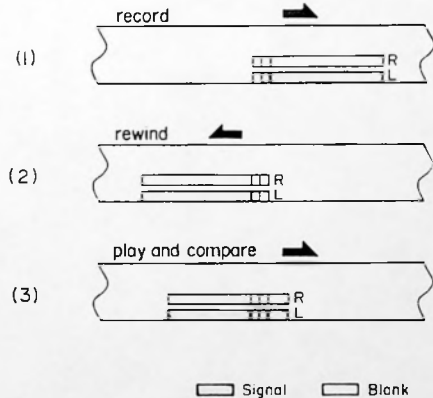
Fig. 6-20 Connection

Switch Setting:

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

OUTPUT: Specified Setting (See 6-2-2)
 LINE: Specified Setting (See 6-3-2)
 MIC: Minimum Setting



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Fig. 6-21 Channel Separation Check Procedure

6-4-11. ADJACENT TRACK CROSSTALK MEASUREMENT

Specification: 40 dB (minimum)

NOTE

The tape must be completely erased prior to this procedure. Preferably use bulk erased tape.

Numbers in parentheses correspond to steps in Fig. 6-23.

1. Load a TEAC MTT-505B test tape.
2. Apply a 100 Hz test signal at -9 dB (274 mV).
3. Place the deck in the record mode for about 30 seconds. (1)
4. Rewind the tape to the starting point of recording. (2)
5. Play the tape and measure the output level of the recorded portion. Note this reading for temporary reference level for the following measurements. (3)
6. Remove the test tape, turn it over and replace it in the deck. (4)
7. Play the tape back and read the output level. (5)
8. Get the differences between this reading and the reading previously measured for the 100 Hz signal.

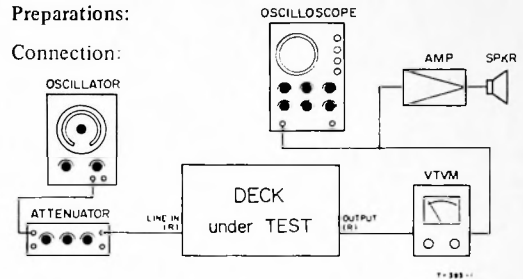


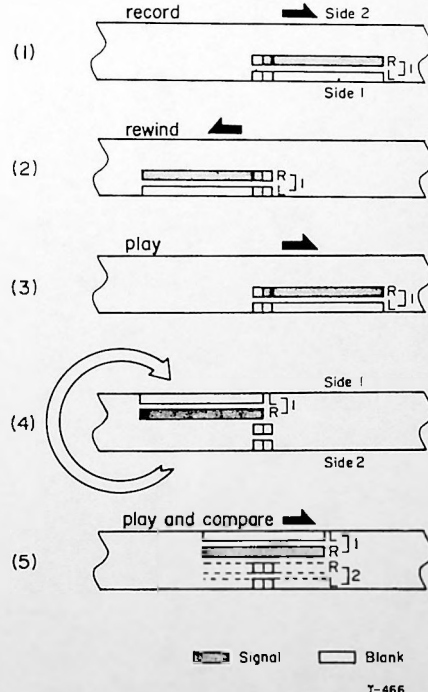
Fig. 6-22 Connection

Switch Setting.

BIAS	EQ	LIMITER	DOLBY NR	
1	1	OUT	OUT	OUT

Control Setting:

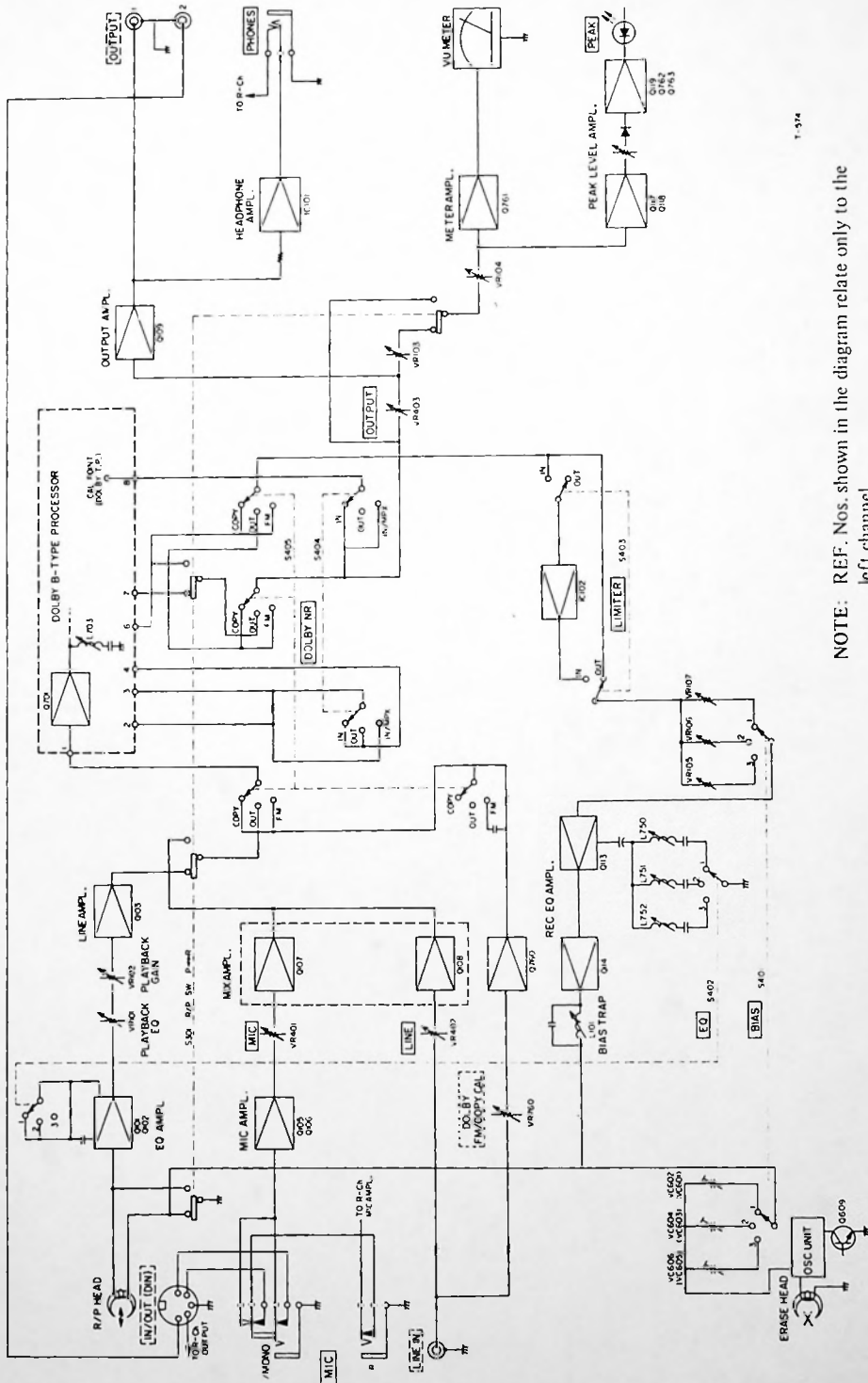
- OUTPUT: Specified Setting (See 6-2-2)
- LINE: Specified Setting (See 6-3-2)
- MIC: Minimum Setting



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Fig. 6-23 Adjacent Track Crosstalk Measurement Procedure

7. BLOCK DIAGRAM

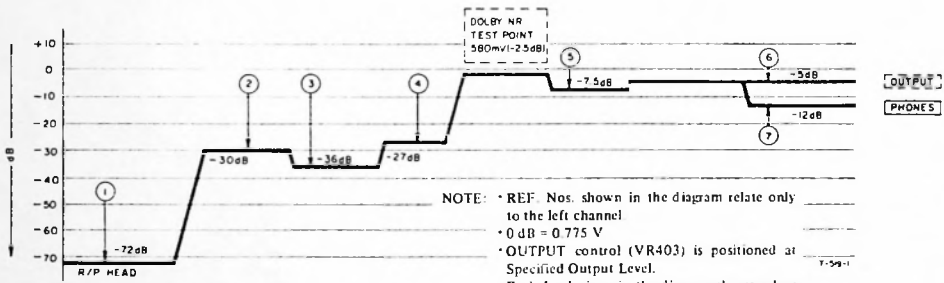
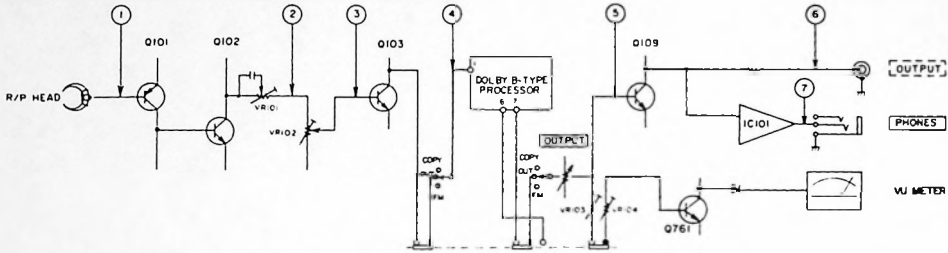


1-314

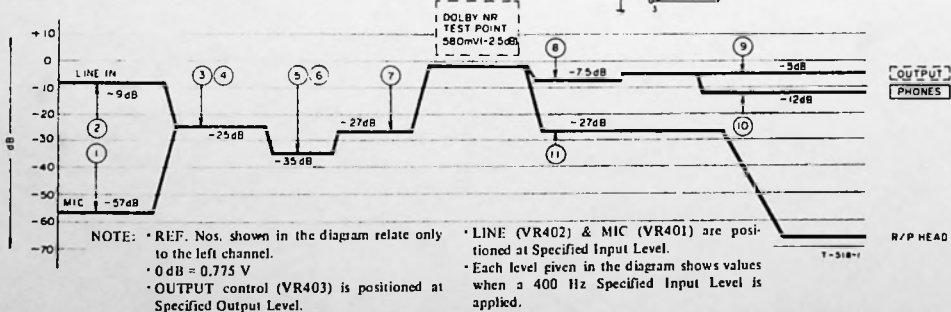
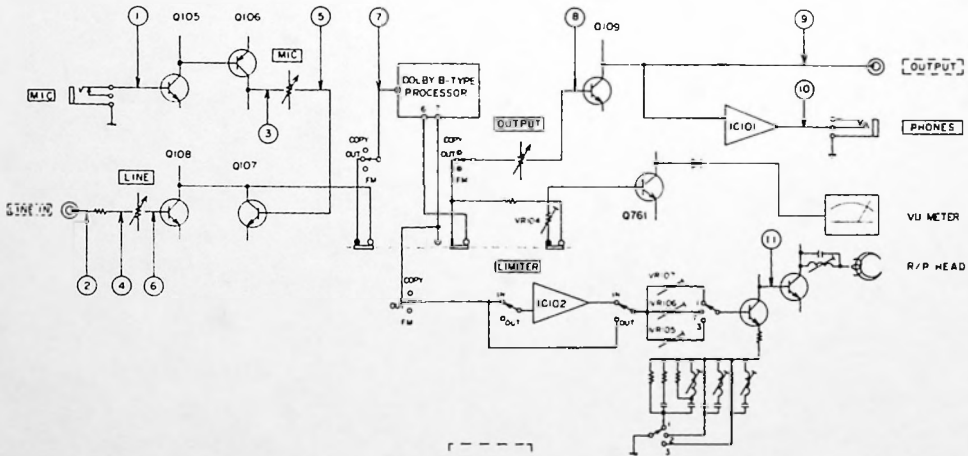
NOTE: REF. Nos. shown in the diagram relate only to the left channel.

8. LEVEL DIAGRAM

PLAYBACK SECTION



RECORDING SECTION



9. TROUBLE-SHOOTING

NOTE

REF. No's indicated in the following table refer to the left channel.
For the right channel REF. No. identification, see schematic
Diagram.

TAPE TRANSPORT SECTION

1. Fuse blows when POWER is switched ON.
 - Defective Power Transformer
2. Auto End-stop will not work in Play and/or Fast Wind.
 - Defective Transistor Q529
 - Defective Diode D533
 - Defective Capacitor C512
 - Defective Resistor R564
 - Defective Parts associated with Hall Effect Element
3. Tape winds onto Capstan Shaft
 - Defective Pinch Roller
 - Defective Take-up Reel Table Ass'y
 - Idler slipping
 - Tape path wrong (improper Tape Guide position, bad Head mounting)
4. Excessive Wow and Flutter
 - Defective Pinch Roller, Pinch Roller pressure incorrect
 - Capstan Belt stretched or oily
5. Capstan does not rotate
 - Capstan Belt off
 - Defective Motor
 - Defective Switch S509
6. Index Counter will not count
 - Counter reset button not fully depressed.
 - Counter Belt off

AMPLIFIER SECTION

1. No sound in playback mode
 - Noise (hum or clicking noise) appear when touching head wires.
 - Poor soldering of head terminations
 - Defective Head
 - Sound can be heard during recording
 - Defective Switch S301
 - Defective Transistor Q101, Q102, Q103
 - Defective Parts associated with parts indicated above
 - Sound cannot be heard during recording
 - Defective Transistor Q101, Q102, Q103, Q109
 - Defective Dolby NR Circuit
 - Defective Parts associated with parts indicated above
2. VU Meter will not indicate in playback mode
 - Defective VU Meter
 - Defective Transistor Q761
 - Defective Semi-fixed Resistor VR103, VR104
 - Defective Parts associated with parts indicated above
3. Loss of high frequencies in playback mode
 - High frequencies too low
 - Defective Transistor Q102
 - Playback equalizer circuit wrong
 - High frequencies are several dB below specified response limits
 - Head dirty or defective
 - Loss of high frequencies including level variation
 - Improper head-to-tape contact
 - Unstable functioning of tape transport mechanism
4. Poor playback signal-to-noise ratio
 - Excessive hum - reduced when changing Power Transformer
 - Defective Power Transformer
 - Excessive white noise (hiss and circuit noise)
 - Defective Head
 - Defective Transistor Q101, Q102
 - Associated circuitry of Transistor Q101, Q102
 - Wave form varies continuously
 - Defective Transistor Q101, Q102
 - Defective Capacitor C102, C108
 - Defective Parts associated with parts indicated above
5. Does not record
 - Can record when changing Bias Switch setting
 - Defective Bias Switch
 - Defective Trimmer Capacitors VC602, VC604, VC606
 - Defective Parts associated with parts indicated above
 - Cannot erase, also
 - Bias Oscillator Ass'y faulty
 - Can erase - sound from record monitor mode is normal
 - Head dirty
 - Defective Switch S301
 - Defective Circuitry of IC102, Q113, Q114

A-650

Stereo Cassette Deck with Dolby System

TEAC.

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