

#### 4.10. Tape Travelling Adjustment

The adjustment shall be made with a modified version of the current type EXII C-90 as shown in Fig. 4.23 (error will be made if a current type Tape Travelling Cassette (DA09011A) should be used for this purpose).

While modifying an EXII C-90, the tape guides in the cassette housing shall be kept protected to avoid tilt. Check shall be made in the following procedures:

- (1) An EXII C-90 Tape thus modified shall be loaded onto the N-680ZX.
- (2) Release the back-tension (rotate the Supply Reel and feed out some length of tape) and set the N-680ZX in play mode.
- (3) In this juncture, check to insure whether the tape is free from waving or slippage from the tape guide.
- (4) When the modified EXII C-90 is played back, check to insure whether the tape is freedom from waving from head surface or at pressure rollers.
- (5) If either of waving or slippage from the tape guide should be noted, adjustments of "4.3. Record Head and Playback Head Tilt Adjustment", "4.4. Head Base Stroke Adjustment", "4.5. Tape Guides Adjustment and Erase Head Stroke Adjustment", "4.6. Erase Head Height and Tilt Adjustment", "4.7. Back Tension Adjustment", "4.8. Playback Head and Record Head Height Adjustment and Azimuth Alignment", "4.9. Record Head Stroke Adjustment", etc. will be required.

As a case may be, the said waving or slippage may have been caused from defective Supply Pressure Roller Ass'y or Take-up Pressure Roller Ass'y without parallel contact with capstans. If such are noted, the Pressure Roller Assemblies will have to be replaced.

Further, excessively weak take-up torque or strong take-up torque may cause defective tape travelling.

The N-680ZX is intended to be an adjustment-free Model, however if the similar matters as above should be noted, please replace the Reel Hub Ass'y to obtain appropriate take-up torque.

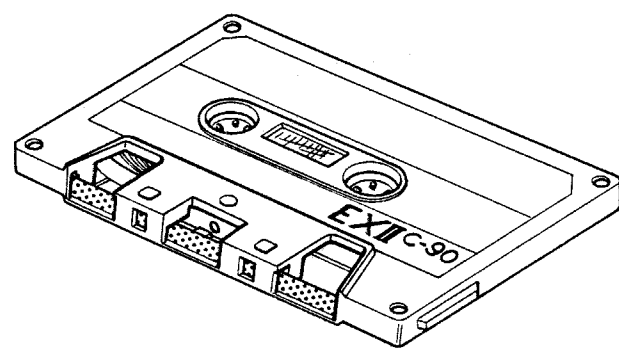


Fig. 4.23

#### 4.11. Flywheel Holder Adjustment

- (1) Refer to Fig. 4.24.

Tighten the Thrust Screws until the gap between the Flywheel Assemblies and Thrust Screws becomes minimized when both of the Capstan Shafts are moved backwardly and forwardly (the Thrust Springs between the Capstan Flanges and Flywheel Thrust Caps are in a flat state).

Excessive tightening of the Thrust Screws however will give damages on the Flywheel Assemblies, to which careful attention is invited.

- (2) Return the Thrust Screws by 1/2 turn.
- (3) Fixing the Thrust Screw with a screwdriver, lock the Lock Nut.
- (4) Apply a quantity of lock tight paint to the Thrust Screws.

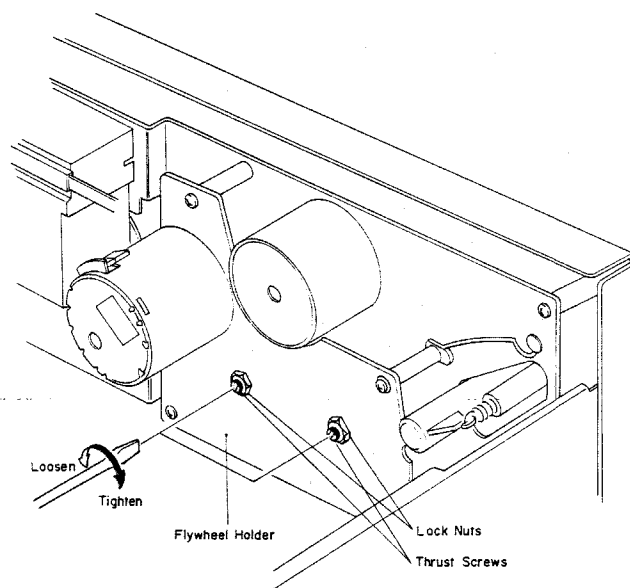


Fig. 4.24

#### 4.12. Lubrication

N-680ZX is a lubrication-free cassette deck except when parts are replaced. Apply the following lubricant for each replaced part:

- (1) LAUNA #100
    - Capstan Shaft
    - Pressure Roller Shaft
    - Thrust Cap
  - (2) FLOIL GB-TS-1
    - Reel Hub Shaft
    - Thrust portion on the Capstan Shaft
- FLOIL GB-TS-1, made by Kanto Chemicals Co., Ltd., in Japan.
- We suggest you use the above or equivalent type. If unavailable please contact Kanto Chemicals Co., Ltd., 2-7 Kanda Suda-cho Chiyoda-ku, Tokyo 101 Japan.
- (3) Silicon Oil #3000CST
    - Air Damper Piston

Note: Excessive lubrication may cause defective damper action as the 0.2φ hole at the end of the cylinder may be filled with oil.

5. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

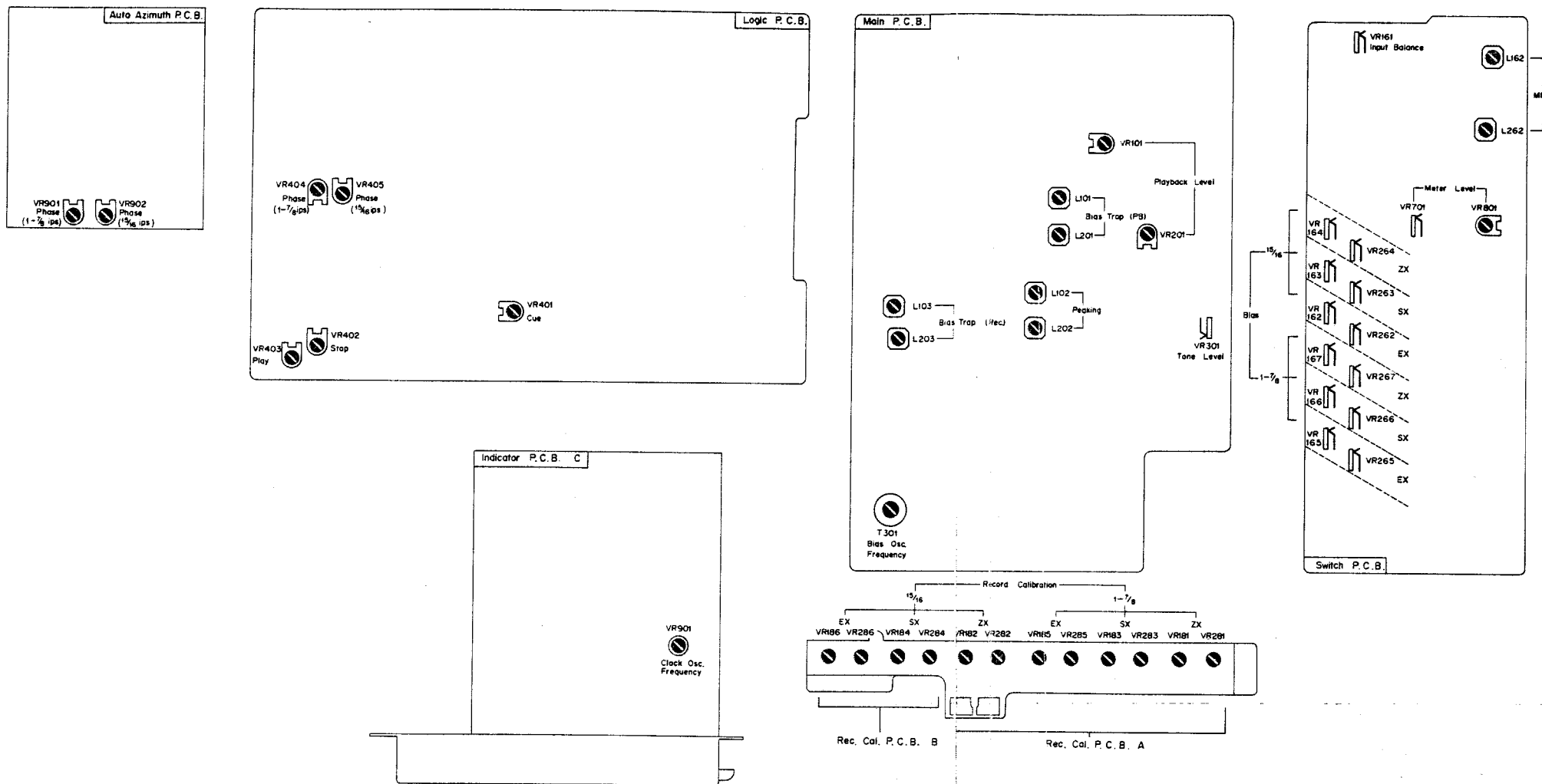


Fig. 5

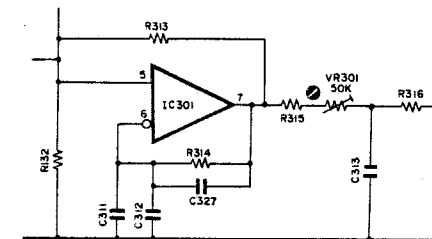


Fig. 6.1 2. Tone Calibration

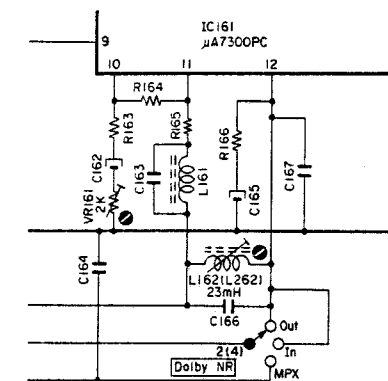


Fig. 6.2 2. Tone Calibration 4. MPX Filter

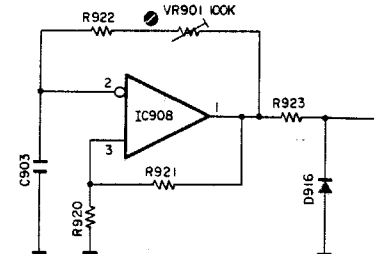


Fig. 6.3 3. FL Indicator Level and Dynamic Range

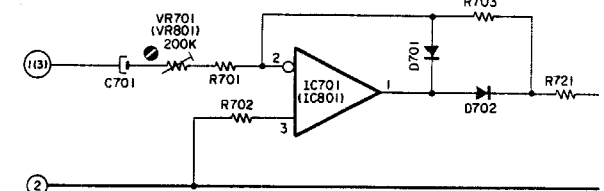


Fig. 6.4 3. FL Indicator Level and Dynamic Range

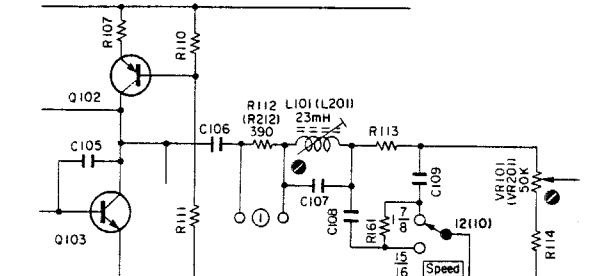


Fig. 6.5 7. Playback Level 8. Playback Frequency Response (1-7/8 ips)

## 6. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

## 6.1. Adjustment and Measurement Instructions

Note: Electrical adjustment should be performed after mechanical adjustment is completed.

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
1	Tape Speed	3 kHz Speed and Wow/Flutter Tapes (DA09006A and DA09049A)	Frequency Counter to OUTPUT Jacks	Playback	Speed Cal. P.C.B. VR407 VR408	<ol style="list-style-type: none"> <li>Standard Speed (1-7/8 ips): Adjust VR407 to obtain 3 kHz <math>\pm</math> 0.5%.</li> <li>Half-Speed (15/16 ips): Adjust VR408 to obtain 3 kHz <math>\pm</math> 0.5%.</li> </ol>
2	Tone Calibration	Test Tone 400 Hz	VTVM to TP101, TP201 on the Main P.C.B.	Monitor SW – Source Display SW – CAL	Main P.C.B. VR301  Switch P.C.B. VR161	<ol style="list-style-type: none"> <li>Set the Display Switch to CAL. Turn output level control fully clockwise (maximum position).</li> <li>Adjust VR301 to obtain 100 mV <math>\pm</math> 0.2 dB on the VTVM at TP201 (output will be 1 V (0 dB)).</li> <li>Adjust VR161 to obtain the same level as Right channel on the VTVM at TP101.</li> </ol>
3	FL Indicator Level and Dynamic Range	400 Hz (0 dB/-20 dB) to INPUT Jacks	Frequency Counter to IC907-10 pin on the Indicator P.C.B. C and VTVM to TP101, TP201 on the Main P.C.B.	Monitor SW – Source Display SW – VU or P. Hold	Indicator P.C.B. C VR901  Switch P.C.B. VR701, VR801	<ol style="list-style-type: none"> <li>Remove the FL Indicator Ass'y from the Front Chassis, then disassemble the FL Indicator Ass'y itself.</li> <li>Adjust VR901 to obtain 25.6 kHz clock oscillation frequency on the Frequency Counter.</li> <li>Assemble the FL Indicator Ass'y, then install it to the Front Chassis.</li> <li>Adjust the input level control to obtain 100 mV at TP101 (TP201) on the VTVM.</li> <li>Adjust VR701 (VR801) so that the FL level indicator displays 0 dB.</li> <li>Decrease input signals by 20 dB to obtain 10 mV at TP101 (TP201) on the VTVM, then adjust VR901 so that the FL level indicator displays -20 dB.</li> <li>Repeat steps 4 through 6 till satisfactory results are obtained.</li> </ol>
4	MPX Filter	19 kHz $\pm$ 100 Hz to INPUT Jacks	VTVM to OUTPUT Jacks	Monitor SW – Source Display SW – VU or P. Hold Dolby NR SW – OUT/MPX	Switch P.C.B. L162, L262	<ol style="list-style-type: none"> <li>Turn output level control fully clockwise (maximum position).</li> <li>Adjust input level control to obtain 1 V on the VTVM.</li> <li>Set the Dolby NR Switch to MPX position, then adjust L162 (L262) to obtain minimum reading on the VTVM (minimum reading will be less than -30 dB).</li> </ol>
5	Playback Head Track Alignment	1 kHz Track Alignment Tape (DA09007A)	VTVM to OUTPUT Jacks	Playback Monitor SW – Tape Display SW – VU or P. Hold Eq. SW – 70 $\mu$ s Dolby NR SW – OUT Tape Speed SW – 1-7/8 ips	Playback Head Height Adj. Screw	Adjust the Playback Head Height Adj. Screw to obtain minimum reading of both L and R channels on the VTVM. See "Playback Head Height Adjustment and Azimuth Alignment" in item 4.8.
6	Playback Head Azimuth Alignment	15 kHz Azimuth Tape (DA09004A)	VTVM to OUTPUT Jacks	Playback Monitor SW – Tape Display SW – VU or P. Hold Eq. SW – 70 $\mu$ s Dolby NR SW – OUT Tape Speed SW – 1-7/8 ips	Playback Head Azimuth Alignment Screw	Adjust the Playback Head Azimuth Alignment Screw to obtain maximum reading of both L and R channels on the VTVM. See "Playback Head Height Adjustment and Azimuth Alignment" in item 4.8. Note: Repeat steps 5 and 6 one or two times to obtain optimum performance.
7	Playback level	400 Hz Level Tape (DA09005A)	VTVM to TP101, TP201 on the Main P.C.B.	Same as above	Main P.C.B. VR101, VR201	Adjust VR101 (VR201) to obtain 100 mV on the VTVM or 0 dB on the FL level indicators.
8	Playback Frequency Response Adjustment at Standard Speed (1-7/8 ips)	400 Hz Level Tape (DA09005A) 10 kHz PB Frequency Response Tape (DA09003A) 15 kHz PB Frequency Response Tape (DA09002A) 20 kHz PB Frequency Response Tape (DA09001A)	VTVM to OUTPUT Jacks	Playback Monitor SW – Tape Display SW – VU or P. Hold Eq. SW – 70 $\mu$ s Dolby NR SW – OUT Tape Speed SW – 1-7/8 ips	Main P.C.B. R112, R212	<ol style="list-style-type: none"> <li>Load the 400 Hz level tape and play it back. Adjust the output level control to a certain level (for example 0 dB).</li> <li>Load the 10 kHz, 15 kHz and 20 kHz PB frequency response tapes and adjust the playback head azimuth to give maximum levels on the VTVM with each tape. Short R112 (R212) to obtain the following levels against 400 Hz level tape. Refer to Fig. 6.5. 10 kHz: -20 dB -1 dB to +2 dB 15 kHz: -20 dB -1 dB to +3 dB 20 kHz: -20 dB -1 dB to +4 dB</li> <li>Conduct step 6 "Playback Head Azimuth Alignment".</li> <li>If above is not sufficient, refer to "Playback Frequency Response Adjustment" in item 6.2.</li> </ol>

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
9	Playback Frequency Response Check at Half-Speed (15/16 ips)	400 Hz Level Tape (DA09005A) 10 kHz PB Frequency Response Tape (DA09003A) 15 kHz PB Frequency Response Tape (DA09002A) 20 kHz PB Frequency Response Tape (DA09001A)	VTVM to OUTPUT Jacks	Playback Monitor SW - Tape Display SW - VU or P. Hold Eq. SW - 120 $\mu$ s Dolby NR SW - OUT Tape Speed SW - 15/16 ips		1. Load the 400 Hz level tape and play it back. Adjust the output level control to a certain level (for example 0 dB). 2. Load the 10 kHz, 15 kHz and 20 kHz PB frequency response tapes and adjust the playback head azimuth to give maximum levels on the VTVM with each tape. Check to insure the following levels against 400 Hz level tape. Output frequency will become half as shown in ( ) as the tape speed is half. 10 kHz: (5 kHz) -22 dB -3 dB to 0 dB 15 kHz: (7.5 kHz) -22 dB -3 dB to +1 dB 20 kHz: (10 kHz) -22 dB -3 dB to +2 dB 3. Conduct step 6 "Playback Head Azimuth Alignment".
10	Bias Oscillation Frequency and Erase Current	Connect an additional 0.1 $\Omega$ resistor in series to the Erase Head	VTVM and Frequency Counter across the additional 0.1 $\Omega$ resistor	Record, Pause Monitor SW - Source Tape SW - ZX Eq. SW - 70 $\mu$ s Dolby NR SW - OUT	Main P.C.B. T301 R331, R330	1. Adjust T301 to obtain 105 kHz on the frequency counter. 2. Check the erase current by the VTVM. Erase current will be in a range of 310 mA to 400 mA (typically approx. 350 mA). If erase current is not sufficient, increase it by shorting R331 or R330. 3. After completion of the erase current adjustment, recheck the bias oscillation frequency.
11	Record Amplifier Equalizer	23 kHz (-20 dB) to INPUT Jacks	VTVM to CN2-1, CN2-3 on the Main P.C.B.	Record, Pause Monitor SW - Source Display SW - VU or P. Hold Tape SW - ZX Eq. SW - 70 $\mu$ s Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips	Main P.C.B. L102, L202	1. Remove the bias-cut-jumper from the dip side of the Main P.C.B. 2. Adjust L102 (L202) to obtain peak reading at 23 kHz on the VTVM. 3. Re-solder the bias-cut-jumper.
12	Bias Trap (Record Amp.)	Remove input signals	Same as above	Same as above	Main P.C.B. L103, L203	Adjust L103 (L203) to obtain maximum reading on the VTVM.
13	Bias Trap (Playback Amp.)	Remove input signals	VTVM to OUTPUT Jacks	Same as above	Main P.C.B. L101, L201	Adjust L101 (L201) to obtain minimum reading on the VTVM.

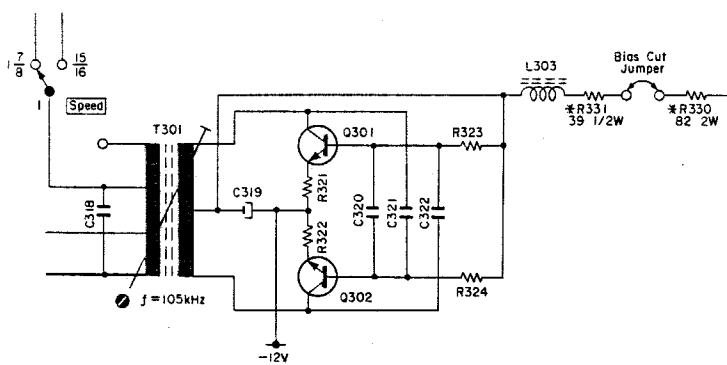


Fig. 6.6 10. Bias Oscillation Frequency and Erase Current

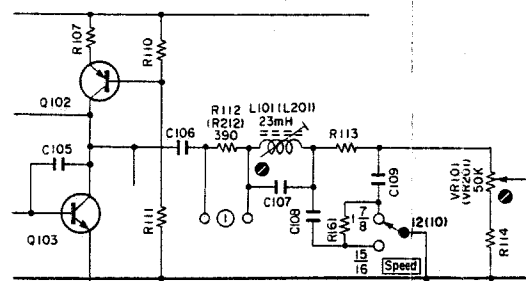


Fig. 6.8 13. Bias Trap (Playback Amp.)

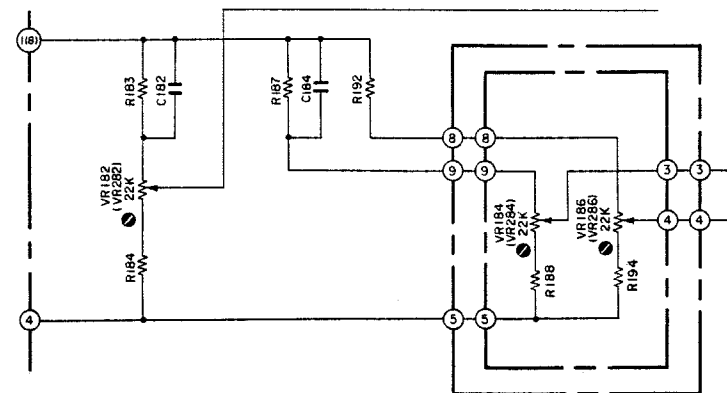


Fig. 6.10 14. Record Head Height and Azimuth

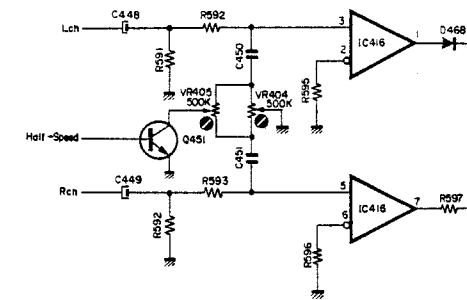


Fig. 6.12 14. Record Head Height and Azimuth

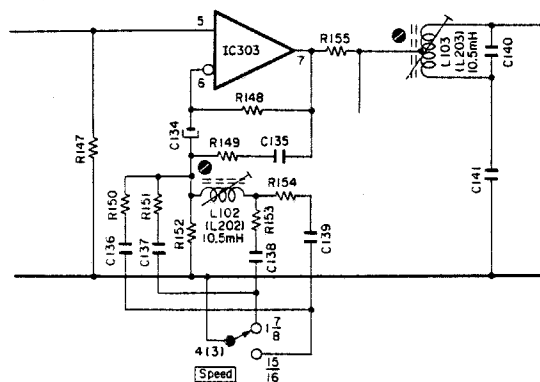


Fig. 6.7 11. Record Amp. Equalizer  
12. Bias Trap (Record Amp.)

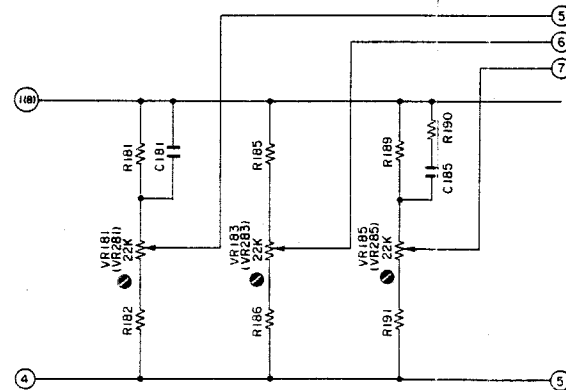


Fig. 6.9 14. Record Head Height and Azimuth

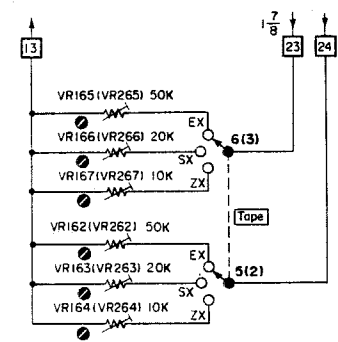


Fig. 6.11 14. Record Head Height and Azimuth

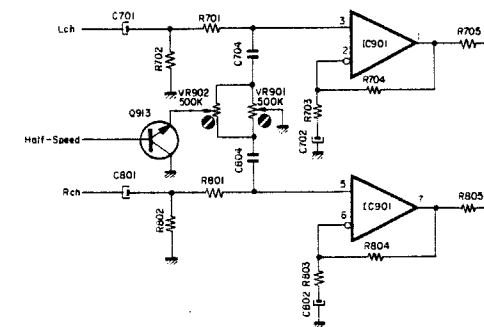


Fig. 6.13 14. Record Head Height and Azimuth

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
14	Record Head Height Adjustment and Azimuth Alignment	Test Tone 400 Hz or 12.5 kHz (-20 dB) to INPUT Jacks	VTVM to OUTPUT Jacks	Record, Playback Monitor SW - Tape Display SW - CAL/VU or P. Hold Tape SW - SX Eq. SW - 70 $\mu$ s Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips/ 15/16 ips	Head Height: Record Head Height Adj. Screw  Azimuth Alignment: Record Head Azimuth Alignment  Standard Speed (1-7/8 ips): Rec. Cal. P.C.B. (Level) VR183, VR283  Switch P.C.B. (Bias) VR166, VR266  Logic P.C.B. VR404  Auto Azimuth P.C.B. VR901  Half-Speed (15/16 ips): Rec. Cal. P.C.B. (Level) VR184, VR284  Switch P.C.B. (Bias) VR163, VR263  Logic P.C.B. VR405  Auto Azimuth P.C.B. VR902	<ol style="list-style-type: none"> <li>In stop mode, turn the Azimuth Motor by hand so that the Alignment Indicator corresponds to the pointer of the Azimuth Alignment Motor Ass'y as shown in Fig. 4.18. Remove the Azimuth Alignment Wire by pulling out from the Azimuth Alignment Motor Ass'y. (In this case, do not move the Slide Lever of the Azimuth Alignment Wire.) Short both leads of capacitor C903 on the Auto Azimuth P.C.B. Ass'y with a jumper wire.</li> <li>Record Head Height Adjustment: <ol style="list-style-type: none"> <li>Set the Display Switch to CAL. Record signals on the reference SX tape (DA09025A), then play it back.</li> <li>Adjust the Record Head Height Adj. Screw to obtain maximum readings of both channels on the VTVM.</li> </ol> </li> <li>Record Head Azimuth Alignment: Perform the following procedures for both standard and half tape speeds. <ol style="list-style-type: none"> <li>Set the Tape Speed Selector to 1-7/8 / 15/16.</li> <li>Set the Display Switch to CAL. Record signals on the reference SX tape (DA09025A), then play it back.</li> <li>Adjust Record Cal. VR183(VR283)/VR184(VR284) to the center position.</li> <li>Adjust Bias VR166(VR266)/VR163(VR263) to obtain maximum reading on the VTVM.</li> <li>Adjust Record Cal. VR183(VR283)/VR184(VR284) to obtain the same reading as the source monitor level on the FL level indicator.</li> <li>Set the Display Switch to VU or P. Hold, then feed in 12.5 kHz (-20 dB). Record signals on the reference SX tape (DA09025A), then play it back.</li> <li>Adjust the Record Head Azimuth Alignment Screw to obtain maximum readings of both channels on the VTVM.</li> <li>Adjust finely VR166(VR266)/VR163(VR263) to obtain the same reading as the source monitor level on the VTVM.</li> <li>Repeat above substeps 2 and 3 one or two times to obtain optimum performance.</li> <li>Set the Display Switch to CAL. Record signals on the reference SX tape (DA09025A), then play it back.</li> <li>Adjust VR404/VR405 so that the cursors are coincident with the rightmost edges of the main displays on the FL level indicators.</li> <li>Adjust VR901/VR902 so that the Azimuth Motor stops its rotation.</li> </ol> </li> <li>After completion of above steps, mount the Azimuth Alignment Wire on the Azimuth Alignment Motor Ass'y. Remove the shorting jumper wire from C903 on the Auto Azimuth P.C.B. Ass'y.</li> <li>Check the Auto Azimuth Alignment function as follows for both standard and half tape speeds: <ol style="list-style-type: none"> <li>Set the Tape Speed Selector to 1-7/8 / 15/16.</li> <li>Set the Display Switch to VU or P. Hold.</li> <li>Load a reference tape, then depress the Record Button and Play Button simultaneously to start recording.</li> <li>Change the Display Switch to the CAL. position and check to insure that the play lamp will keep flashing.</li> <li>Set the Display Switch to VU or P. Hold, then feed in 12.5 kHz (-20 dB). Record signals on the reference SX tape (DA09025A), then play it back.</li> <li>Check to insure that the playback level is the same as the source monitor level for both channels.</li> <li>If above is insured, the Auto Azimuth Alignment function is accurate.</li> </ol> </li> </ol>

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
15	Record Head Azimuth Phase Adjustment	Test Tone 400 Hz and 15 kHz (-20 dB) to INPUT Jacks	VTVM to OUTPUT Jacks	Record, Playback Monitor SW - Tape Display SW - CAL/VU or P. Hold Tape SW - ZX Eq. SW - 70 μs Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips/ 15/16 ips	Standard Speed (1-7/8 ips): Rec. Cal. P.C.B. (Level) VR181, VR281  Switch P.C.B. (Bias) VR167, VR267  Logic P.C.B. VR404  Half-Speed (15/16 ips): Rec. Cal. P.C.B. (Level) VR182, VR282  Switch P.C.B. (Bias) VR164, VR264  Logic P.C.B. VR405	<ol style="list-style-type: none"> <li>Step 14 "Record Head Azimuth Alignment" should be completely performed.</li> <li>Perform the following adjustment procedures first at standard tape speed, then at half tape speed. <ol style="list-style-type: none"> <li>Set VR405 to the center position.</li> <li>Set the Tape Speed Selector to 1-7/8 / 15/16.</li> <li>Set the Display Switch to CAL.</li> <li>Record signals on the reference ZX tape (DA09037A), then play it back.</li> <li>Adjust Record Cal. VR181(VR281)/VR182(VR282) to the center position.</li> <li>Adjust Bias VR167(VR267)/VR164(VR264) to obtain maximum reading on the VTVM.</li> <li>Set the Display Switch to VU or P. Hold, then feed in 15 kHz (-20 dB).</li> <li>Record signals on the reference ZX tape (DA09037A), then play it back.</li> <li>Adjust Record Head Azimuth Alignment Screw to obtain maximum reading on the VTVM, while adjust Bias VR167(VR267)/VR164 (VR264) to obtain -20 dB ± 0 dB on the VTVM.</li> <li>Set the Display Switch to CAL.</li> <li>Adjust VR404/VR405 so that the azimuth cursors are coincident with the rightmost edges of the main displays on the FL level indicators.</li> </ol> </li> </ol>
16	Record Level Calibration and Recording Bias Current Adjustment	Test Tone 400 Hz or 400 Hz (0 dB) and 12.5 kHz/15 kHz (-20 dB) to INPUT Jacks	VTVM and Distortion Meter to OUTPUT Jacks	Standard Speed (1-7/8 ips): Record, Playback Monitor SW - Tape Display SW - CAL/VU or P. Hold Tape SW - ZX/SX/EX Eq. SW - 70 μs (ZX/SX) 120 μs (EX) Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips  Half-Speed (15/16 ips): Record, Playback Monitor SW - Tape Display SW - CAL/VU or P. Hold Tape SW - ZX/SX/EX Eq. SW - 120 μs Dolby NR SW - OUT Tape Speed SW - 15/16 ips	Standard Speed (1-7/8 ips): Rec. Cal. P.C.B. (Level) ZX: VR181, VR281 SX: VR183, VR283 EX: VR185, VR285  Switch P.C.B. (Bias) ZX: VR167, VR267 SX: VR166, VR266 EX: VR165, VR265  Half-Speed (15/16 ips): Rec. Cal. P.C.B. (Level) ZX: VR182, VR282 SX: VR184, VR284 EX: VR186, VR286  Switch P.C.B. (Bias) ZX: VR164, VR264 SX: VR163, VR263 EX: VR162, VR262	<p>For each tape to be used, perform the Auto Azimuth Alignment operation by depressing Record and Play Buttons simultaneously after setting the Display Switch to CAL.</p> <p>To minimize the influence of interference between each VR, adjustment should be made in the order of ZX, SX and EX. In each tape position, adjust first the following steps at tape speed 1-7/8 ips, then perform at tape speed 15/16 ips. After that re-check the performance at tape speeds 1-7/8 ips and 15/16 ips. If satisfactory results are not obtained, re-adjustment at tape speed 1-7/8 ips and 15/16 ips will be required. After completion of adjustment for each tape, re-check the performance.</p> <ol style="list-style-type: none"> <li>Set the Tape Speed Switch to 1-7/8 / 15/16.</li> <li>Set the Display Switch to CAL.</li> <li>Record signals on the reference ZX tape (DA09037A), SX tape (DA09025A), or EXII tape (DA09021A), then play it back.</li> <li>Adjust Record Cal. VR181(VR281)/VR182(VR282) (for ZX), VR183 (VR283)/VR184(VR284) (for SX), or VR185(VR285)/VR186(VR286) (for EXII) to the center position.</li> <li>Adjust Bias VR167(VR267)/VR164(VR264) (for ZX), VR166(VR266)/VR163(VR263) (for SX), or VR165(VR265)/VR162(VR262) (for EXII) to obtain maximum reading on the VTVM.</li> <li>Set the Display Switch to VU or P. Hold, then feed in 15 kHz (-20 dB) (for ZX), or 12.5 kHz (-20 dB) (for SX and EXII).</li> <li>Adjust finely VR167(VR267)/VR164(VR264) (for ZX), VR166(VR266)/VR163(VR263) (for SX), or VR165(VR265)/VR162(VR262) (for EXII) to obtain the same reading as source monitor level on the VTVM.</li> <li>Set the Display Switch to CAL.</li> <li>Adjust Record Cal. VR181(VR281)/VR182(VR282) (for ZX), VR183 (VR283)/VR184(VR284) (for SX), or VR185(VR285)/VR186(VR286) (for EXII) to obtain 0 dB on the FL level indicators.</li> <li>Repeat 6 through 9 as above two or three times to obtain optimum performance.</li> <li>Check whether the total harmonic distortion (T.H.D.) is less than 0.8%/1.5% (for ZX), or 1.0%/2.0% (for SX and EXII).</li> </ol> <p>Note: Typical bias current  ZX: approx. 3.4 mA  SX: approx. 1.5 mA  EXII: approx. 0.9 mA</p>

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
17	Overall Frequency Response at Tape Speed 1-7/8 ips	400 Hz (0 dB) and 10 Hz to 22 kHz (-20 dB) to INPUT Jacks	VTVM and Distortion Meter to OUTPUT Jacks	Record, Playback Monitor SW - Source/Tape Display SW - VU or P. Hold Tape SW - EX/SX/ZX Eq. SW - 120 μs (EX) 70 μs (SX/ZX) Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips	Main P.C.B. L102, L202	For each tape to be used, perform the Auto Azimuth Alignment operation by depressing Record and Play Buttons simultaneously after setting the Display Switch to CAL.  1. Set the Monitor Switch to Source. 2. Feed in 400 Hz (0 dB) and adjust input level controls to obtain 0 dB on the FL level indicators. 3. Switch the Generator output level to -20 dB. 4. Set the Monitor Switch to Tape, then record and play it back. 5. Feed in 10 Hz to 22 kHz (-20 dB), and check to insure if the output levels are within -20 dB ± 3 dB. 6. If above is not sufficient, adjust L102 (L202) to obtain approx. -20 dB on the VTVM. 7. Conduct step 16 "Record Level Calibration and Recording Bias Current Adjustment". 8. If above is not sufficient, precise re-adjustment of step 8 "Playback Frequency Response", replacement of Playback Head or Record Head, or check on item 4.10 "Tape Travelling Adjustment" will be required.
18	Overall Frequency Response at Tape Speed 15/16 ips	400 Hz (0 dB) and 10 Hz to 15 kHz (-20 dB) to INPUT Jacks	Same as above	Record, Playback Monitor SW - Source/Tape Display SW - VU or P. Hold Tape SW - EX/SX/ZX Eq. SW - 120 μs (EX) 70 μs (SX/ZX) Dolby NR SW - OUT Tape Speed SW - 15/16 ips	Main P.C.B. L102, L202	For each tape to be used, perform the Auto Azimuth Alignment operation by depressing Record and Play Buttons simultaneously after setting the Display Switch to CAL.  1. Set the Monitor Switch to Source. 2. Feed in 400 Hz (0 dB) and adjust input level controls to obtain 0 dB on the FL level indicators. 3. Switch the Generator output level to -20 dB. 4. Set the Monitor Switch to Tape, then record and play it back. 5. Feed in 10 Hz to 15 kHz (-20 dB), and check to insure if the output levels are within -20 dB ± 3 dB. 6. If above is not sufficient, adjust L102 (L202) to obtain approx. -20 dB on the VTVM. 7. Conduct step 16 "Record Level Calibration and Recording Bias Current Adjustment". 8. If above is not sufficient, precise re-adjustment of step 8 "Playback Frequency Response", replacement of Playback Head or Record Head, or check on item 4.10 "Tape Travelling Adjustment" will be required.

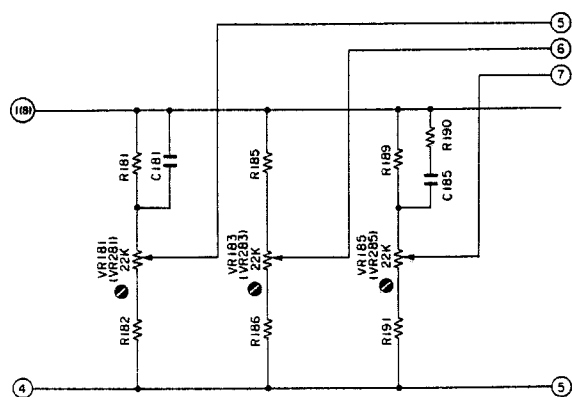


Fig. 6.14 15. Record Head Azimuth Phase  
16. Record Level and Bias

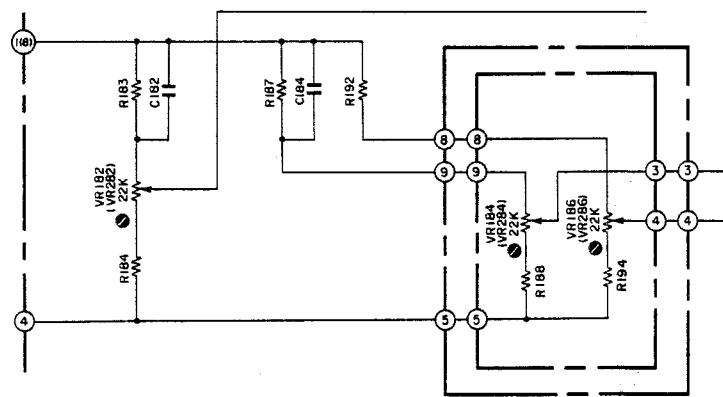


Fig. 6.15 15. Record Head Azimuth Phase  
16. Record Level and Bias

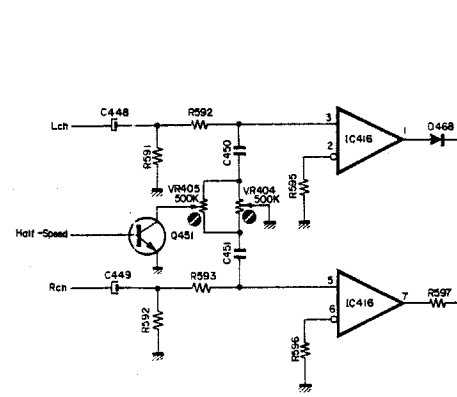


Fig. 6.16 15. Record Head Azimuth Phase

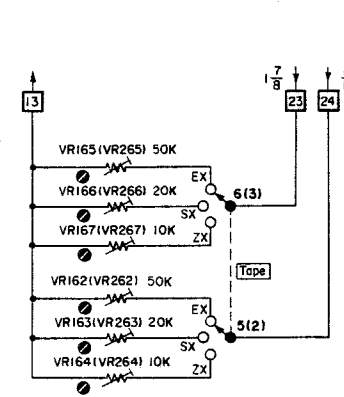


Fig. 6.17 15. Record Head Azimuth Phase  
16. Record Level and Bias

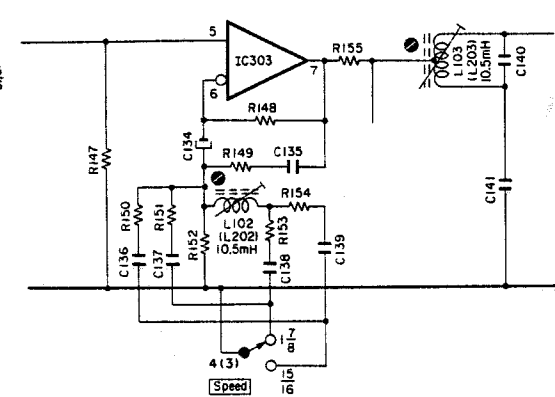


Fig. 6.18 17,18. Overall Frequency Response

STEP	ITEM	SIGNAL SOURCE	OUTPUT CONNECTION	MODE	ADJUSTMENT	REMARKS
19	Crosstalk	1 kHz to INPUT Jacks	1 kHz Band Pass Filter, VTVM to OUTPUT Jacks	Record and Playback Monitor SW - Tape Display SW - VU or P. Hold Tape SW - ZX Eq. SW - 70 μs Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips		<ol style="list-style-type: none"> <li>Erase the tape with bulk eraser.</li> <li>Adjust input level controls to obtain 0 dB on the FL level indicators, and record the signals on the reference tape.</li> <li>Turn the cassette tape the other way round and play it back.</li> <li>Measure the difference between 2 and 3.</li> </ol>
20	Channel Separation	1 kHz to INPUT Jacks	Same as above	Same as above		<ol style="list-style-type: none"> <li>Erase the tape with bulk eraser.</li> <li>Adjust Lch (Rch) input level control to obtain 0 dB on the FL level indicators, and close Rch (Lch) input level control.</li> <li>Record and play it back, then measure the Rch (Lch) level.</li> </ol>
21	Erasure	1 kHz to INPUT Jacks	1 kHz Band Pass Filter, VTVM to OUTPUT Jacks	Same as above		<ol style="list-style-type: none"> <li>Erase the tape with bulk eraser.</li> <li>Adjust input level controls to obtain 0 dB on the FL level indicators, and record the signals on the reference tape.</li> <li>Rewind the tape then close input level controls.</li> <li>Record and play it back, then measure the difference between 2 and 3.</li> </ol>
22	Signal to Noise Ratio	400 Hz to INPUT Jacks	VTVM and Distortion Meter to OUTPUT Jacks	Record and Playback Monitor SW - Tape Display SW - VU or P. Hold Tape SW - ZX Eq. SW - 70 μs Dolby NR SW - MPX		<ol style="list-style-type: none"> <li>Feed in 400 Hz and record, and play it back.</li> <li>Adjust the input level controls to obtain 3% total harmonic distortion in playback mode.</li> <li>Close the input level controls then record.</li> <li>After rewind, play back and check the output level difference between 2 and 3.</li> </ol> <p>Note: The filter of IHF-A curve shall be used in the measurements.</p>
23	Total Harmonic Distortion	400 Hz to INPUT Jacks	Distortion Meter to OUTPUT Jacks	Record and Playback Monitor SW - Tape Display SW - VU or P. Hold Tape SW - EX/SX/ZX Eq. SW - 120 μs (EX) 70 μs (SX/ZX) Dolby NR SW - OUT Tape Speed SW - 1-7/8 ips/ 15/16 ips		<p>Tape Speed 1-7/8 ips:</p> <ol style="list-style-type: none"> <li>Adjust input level controls to obtain 0 dB on the FL level indicators.</li> <li>Record and play it back.</li> <li>Read the distortion meter and check to insure that the distortion is less than 0.8% for ZX tape and 1.0% for SX and EXII tapes.</li> </ol> <p>Tape Speed 15/16 ips:</p> <ol style="list-style-type: none"> <li>Adjust input level controls to obtain 0 dB on the FL level indicators.</li> <li>Record and play it back.</li> <li>Read the distortion meter and check to insure that the distortion is less than 1.5% for ZX tape and 2.0% for SX and EXII tapes.</li> </ol>
24	Wow/Flutter	3 kHz Speed and Wow/Flutter Tapes (DA09006A and DA09049A)	Wow/Flutter Meter to OUTPUT Jacks	Playback Monitor SW - Tape Display SW - VU or P. Hold Eq. SW - 70 μs Tape Speed SW - 1-7/8 / 15/16 ips		Play back and read the wow/flutter meter.

**6.2. Frequency Response Adjustment at Standard Speed (1-7/8 ips)**

**(1) Playback Frequency Response Adjustment at Standard Speed (1-7/8 ips)**

Refer to Figs. 6.19 - 6.21.

**(a) Level Adjustment (for middle frequency response)**

This adjustment will be required when playback level is not sufficient at 10 kHz PB Frequency Response Tape (refer to step 8 in "6.1. Adjustment and Measurement Instructions").

Playback equalization level can be varied by the modification of R108 (R208) and R109 (R209).

Following are the details for level modification:

Approx. +1 dB	R109 (R209): 3.0K
	R108 (R208): 4.3K
0 dB	R109 (R209): 3.3K
	R108 (R208): 4.7K
Approx. -1 dB	R109 (R209): 3.6K
	R108 (R208): 5.1K

**(b) Peaking Adjustment (for high frequency response)**

This adjustment will be required when playback level is not sufficient at 20 kHz PB Frequency Response Tape (refer to step 8 in "6.1. Adjustment and Measurement Instructions").

Peaking portion compensates the gap loss of the playback head.

Peaking level is varied by the short circuit of R112 (R212) as illustrated in Fig. 6.20.

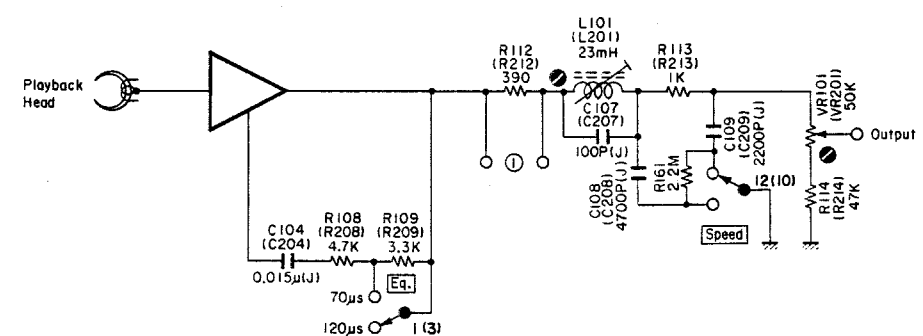


Fig. 6.19 Playback Amp.



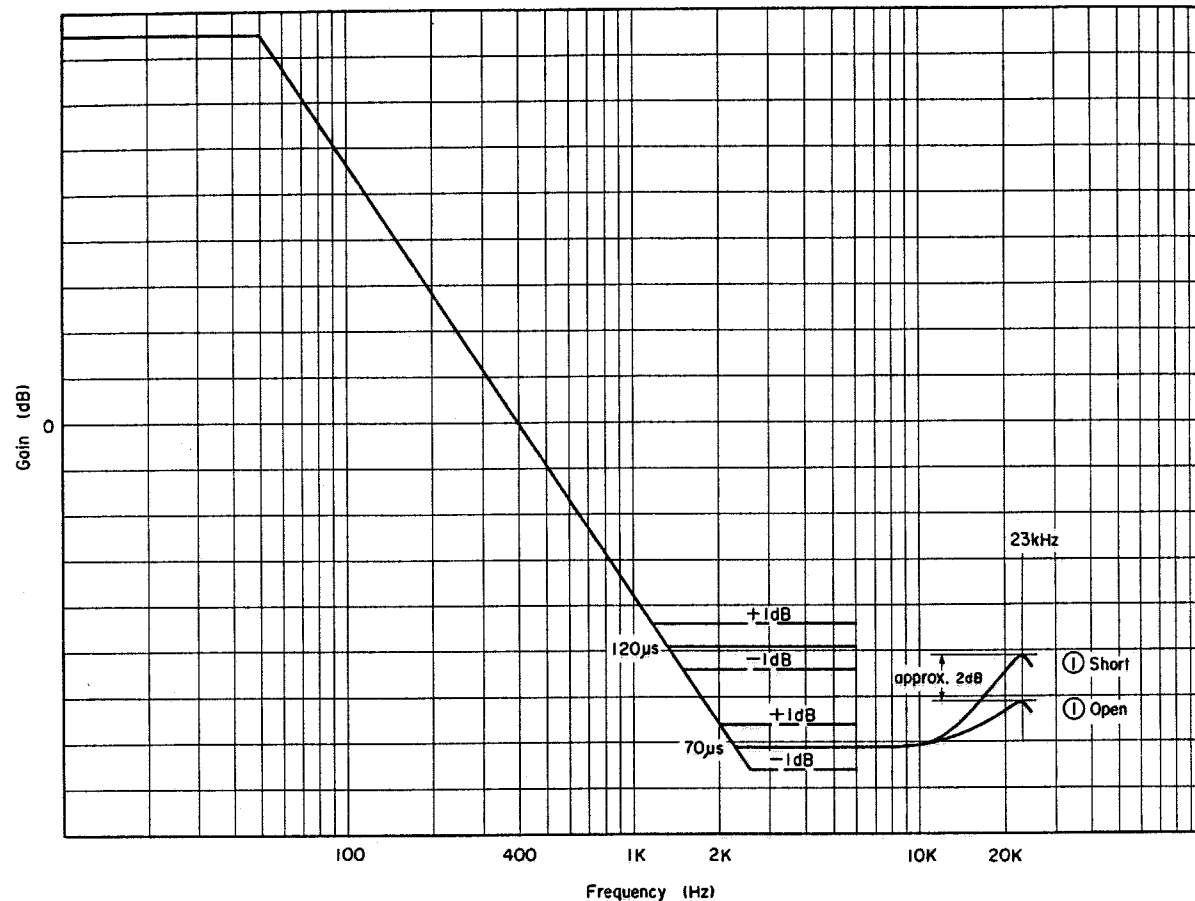


Fig. 6.20 Playback Equalization Curve (1-7/8 ips)

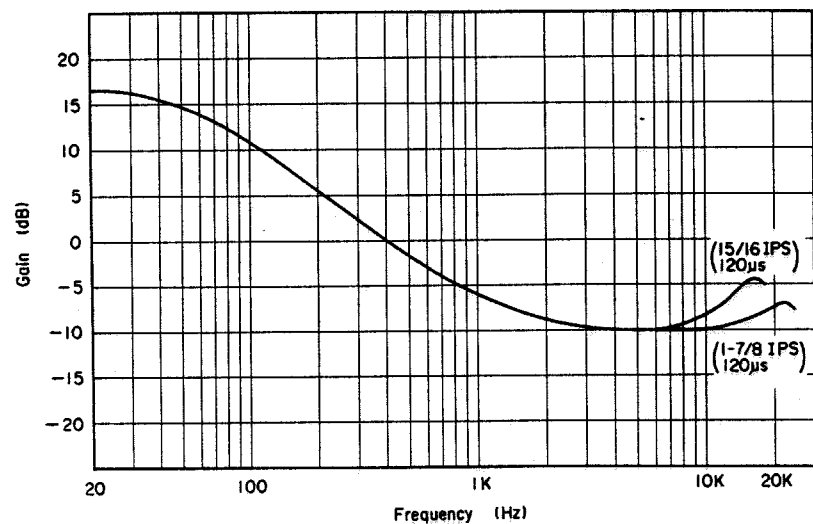


Fig. 6.21 Typical Playback Equalization Curve (1-7/8 / 15/16 ips)

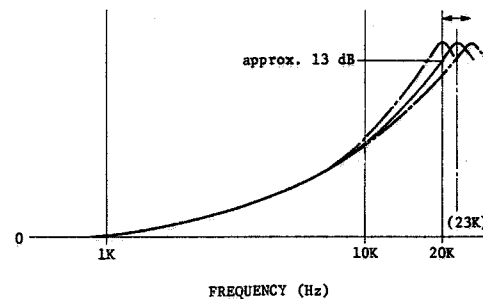


Fig. 6.22 Record Peaking Curve (1-7/8 ips)

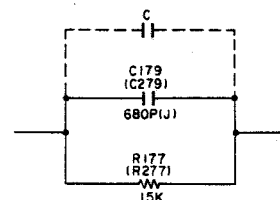


Fig. 6.23

**(2) Record Current Frequency Response Adjustment at Standard Speed (1-7/8 ips)**

Record eq. peaking is adjusted for compensating the overall frequency response when playback frequency response is completed.

Normally however, peaking frequency is pre-adjusted to approx. 23 kHz in record mode. See Fig. 6.22.

**(a) For ZX Tape**

1) Feed in 400 Hz (0 dB), then record and play it back. Adjust bias current by VR167 (VR267) on the Switch P.C.B. to obtain a 0.8% distortion.

2) Feed in 10 kHz and 400 Hz (-20 dB) then record and play it back.

Check the difference of the levels between 10 kHz and 400 Hz, and mount an additional capacitor in parallel with the C179 (C279) on the Switch P.C.B. from the dip side of the printed circuit board depending upon the difference of the levels against 400 Hz. See Fig. 6.23.

	Add	Total
0 dB	0	680 pF
-1 dB	330 pF	1010 pF
-2 dB	680 pF	1360 pF

3) Feed in 22 kHz (-20 dB) then record and play it back.

Adjust record peaking coil L102 (L202) to obtain flat overall frequency response.

**(b) For SX Tape**

1) Feed in 15 kHz and 400 Hz (-20 dB), then record and play it back.

Adjust bias current by VR166 (VR266) on the Switch P.C.B. to obtain flat overall frequency response.

2) Feed in 22 kHz and 400 Hz (-20 dB), then record and play it back.

And check to insure that the overall frequency response is flat.

**(c) For EX Tape**

1) Feed in 15 kHz and 400 Hz (-20 dB), then record and play it back.

Adjust bias current by VR165 (VR265) on the Switch P.C.B. to obtain flat overall frequency response.

2) Feed in 22 kHz and 400 Hz (-20 dB), then record and play it back.

And check to insure that the overall frequency response is flat.

**6.3. Dolby NR Circuit Check**

Dolby NR circuit incorporates a Dolby B-Type NR IC ( $\mu$ A7300PC) which has no adjustment point.

Perform the following checks and make sure that the IC operates accurately i.e. accuracy of frequency response through IC.

**(1) Playback Dolby NR Circuit (IC101 (IC201) on the Main P.C.B.)**

Signal Source: 5 kHz to No. 9 pin of IC101 and IC201

Output Connection: VTVM to the test points TP101 and TP201 on the Main P.C.B.

Mode: Stop  
Monitor SW - Tape  
Dolby NR SW - OUT/IN

**(a) Connect a VTVM to TP101 (TP201) on the Main P.C.B.**

Feed in 5 kHz to No. 9 of IC101 (IC201) and adjust the generator output control so that the VTVM may read 7.6 mV at each test point.

**(b) Set the Dolby NR Switch to IN. Check to insure that the level at TP101 (TP201) is 3 mV  $\pm$  1.5 dB.**

**(2) Record Dolby NR Circuit (IC161 (IC261) on the Switch P.C.B.)**

Signal Source: 5 kHz to INPUT Jacks

Output Connection: VTVM to the output side of C178 (C278) on the Switch P.C.B.

Mode: Stop  
Monitor SW - Source

**(a) Connect a VTVM to TP101 (TP201) on the Main P.C.B.**

Feed in 5 kHz and adjust the input level so that the VTVM may read 100 mV (0 dB) at each test point. FL level indicators will indicate 0 dB.

**(b) Remove the VTVM from TP101 (TP201) and re-connect it to the output side of C178 (C278). Check to insure that the VTVM indicates approx. 560 mV.**

**(c) Decrease the input level (0 dB) by 20 dB or 30 dB. Check to insure that the level at output side of C178 (C278) corresponds to the following with Dolby NR Switch IN and OUT.**

Input Level	Capacitor Output Level		
	Dolby NR OUT	Dolby NR IN	Difference between IN and OUT
(f=5 kHz)			
-20 dB	-20 dB	-16.8 dB $\pm$ 1.5 dB	3.2 dB $\pm$ 1.5 dB
-30 dB	-30 dB	-21.8 dB $\pm$ 1.5 dB	8.2 dB $\pm$ 1.5 dB

7. MOUNTING DIAGRAMS

Note: Mounting diagram shows a dip side view of the printed circuit board.

7.1. Main P.C.B. Ass'y

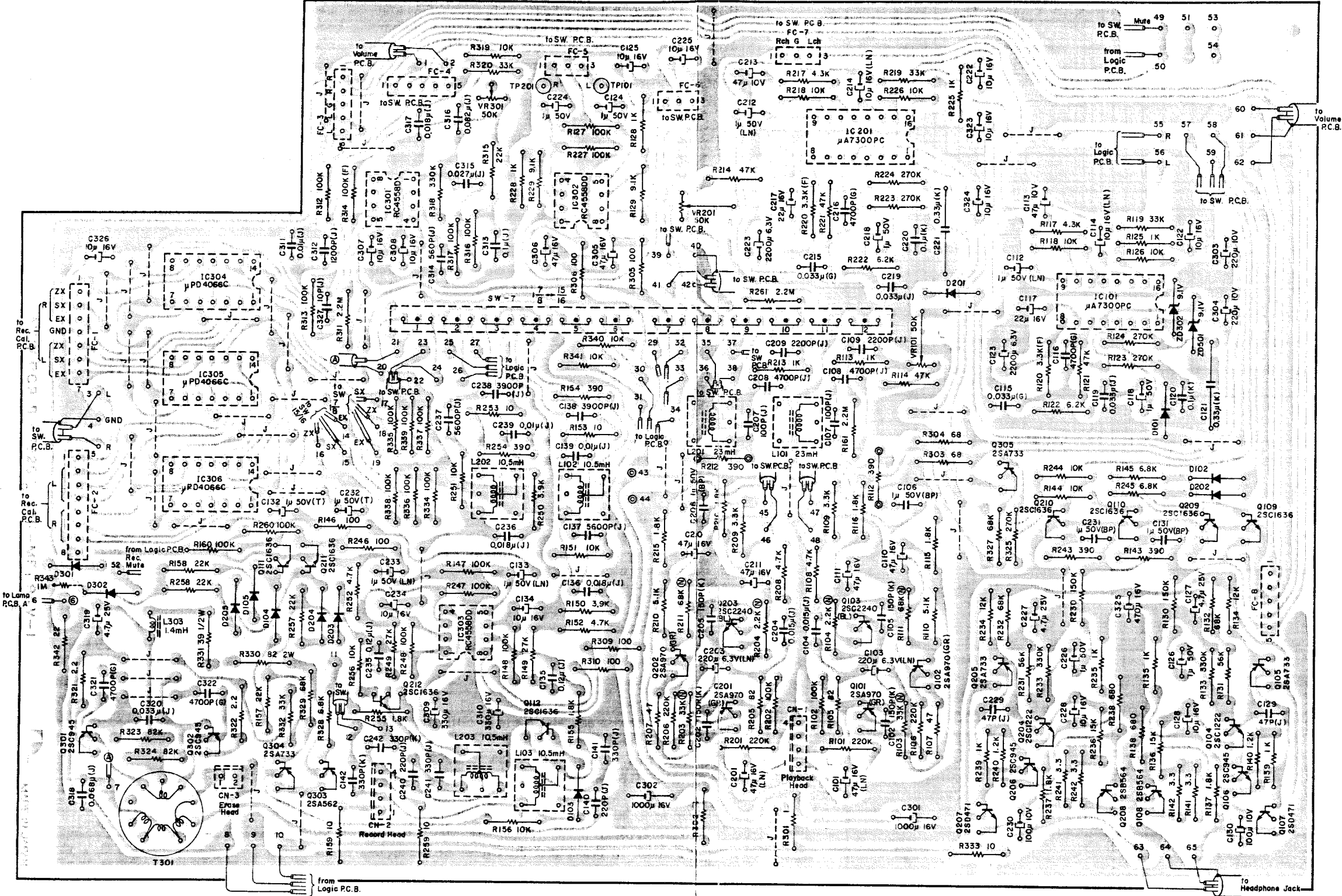


Fig. 7.1

Note: Diode is 1SS53 unless otherwise specified.