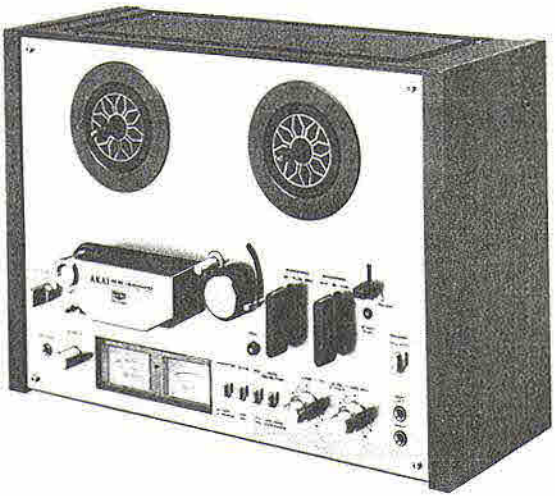

AKAI STEREO TAPE DECK

MODEL GX-4000D/DB

ALSO APPLICABLE TO BLACK PANEL MODEL

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SECTION 1

SERVICE MANUAL

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For basic adjustments, measuring methods, and operating principles, refer to GENERAL TECHNICAL MANUAL.

I. TECHNICAL DATA

1. MODEL GX-4000D

TRACK SYSTEM	4 track, 2 channel stereo/monaural system
REEL CAPACITY	Up to 7" reel
TAPE SPEED	7-1/2 and 3-3/4 ips
WOW & FLUTTER	Less than 0.08% WRMS
FREQUENCY RESPONSE	30 to 24,000 Hz ±3 dB at 7-1/2 ips 30 to 16,000 Hz ±3 dB at 3-3/4 ips
DISTORTION (1,000 Hz "0" VU)	Less than 1.0% at 7-1/2 ips
SIGNAL TO NOISE RATIO	Better than 60 dB (measured via tape with peak recording level)
ERASE RATIO	Better than 70 dB
BIAS FREQUENCY	100 kHz
HEADS	(3): One GX Recording head, one GX Playback head, one Erase head
MOTOR	(1): 4-pole induction motor
FF & REWIND TIME	200 sec using 1,200 ft. tape
OUTPUT JACKS	Line (2): 0.775V ("0" VU) Required load impedance: more than 50 kohms Phone (1): 100 mV/8 ohms
INPUT JACKS	Microphone (2): 0.25 mV Required microphone impedance: 600 ohms Line (2): 70 mV
DIN JACK	Input: 2 mV/10 kohms, Output: 0.3V
SEMICONDUCTORS	Transistors: 24, Diodes: 13, FETs: 2, IC: 1
DIMENSIONS	440(W) x 315(H) x 230(D) mm (17.3 x 12.4 x 9.1")
WEIGHT	13.2 kg (29.1 lbs)
POWER REQUIREMENTS	100V, 50/60 Hz for Japan 120V, 60 Hz for Canada & U.S.A. 220/240V, 50 Hz for European Countries & Australia 110/120/220/240V (Switchable), 50/60 Hz for the other Countries

* For improvement purposes, specifications and design are subject to change without notice.

2. MODEL GX-4000DB

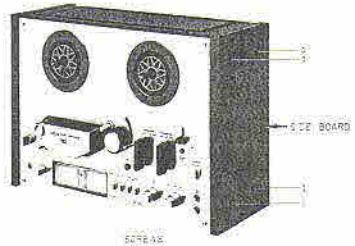
TRACK SYSTEM	4 track, 2 channel stereo/monaural system
REEL CAPACITY	Up to 7" reel
TAPE SPEED	7-1/2 and 3-3/4 ips
WOW & FLUTTER	Less than 0.08% WRMS
FREQUENCY RESPONSE	30 to 24,000 Hz ±3 dB at 7-1/2 ips 30 to 16,000 Hz ±3 dB at 3-3/4 ips
DISTORTION (1,000 Hz "0" VU)	Less than 1.0% at 7-1/2 ips
SIGNAL TO NOISE RATIO	Better than 60 dB (measured via tape with peak recording level) Dolby Switch ON: Improves up to 10 dB above 5 kHz
ERASE RATIO	Better than 70 dB
BIAS FREQUENCY	100 kHz
HEADS	(3): One GX Recording head, one GX Playback head one Erase head
MOTOR	(1): 4-pole induction motor
FF & REWIND TIME	200 sec using 1,200 ft tape
OUTPUT JACKS	Line (2): 580 mV ("0" VU) Required load impedance: more than 100 kohms Phone (1): 100 mV/8 ohms
INPUT JACKS	Microphone (2): 0.25 mV Required microphone impedance: 600 ohms Line (2): 70 mV
DIN JACKS	Input: 2 mV/10 kohms Output: 0.3V
SEMICONDUCTORS	Transistors: 21, Diodes: 21, FETs: 2, ICs: 5
DIMENSION	440(W) x 315(H) x 230(D) mm (17.3 x 12.4 x 9.1")
WEIGHT	13.2 kg (29.1 lbs)
POWER REQUIREMENT	120V, 60 Hz for Canada & U.S.A. 220/240V, 50 Hz for European Countries & Australia 110/120/220/240V (Switchable), 50/60 Hz for the other Countries

* For improvement purposes, specifications and design are subject to change without notice.
* "Dolby" and the Double D symbol are trademarks of Dolby Laboratories.
(Manufactured under license from Dolby Laboratories.)

II. DISMANTLING OF UNIT

In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs.
Reassemble in reverse order.

1



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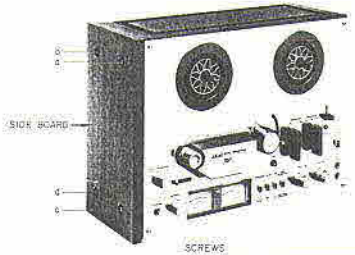

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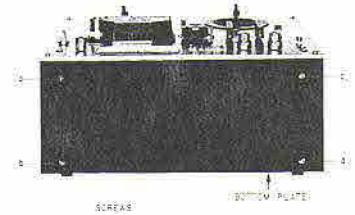

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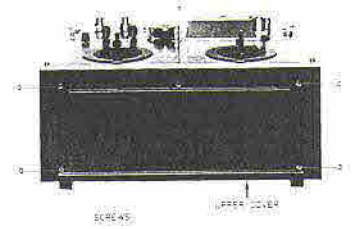

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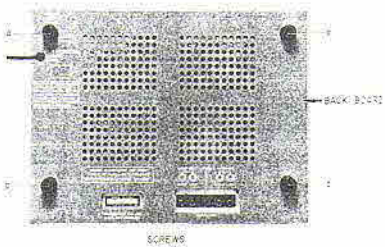

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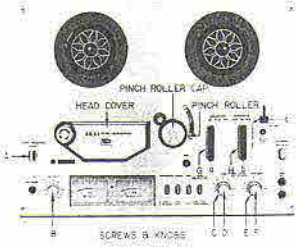

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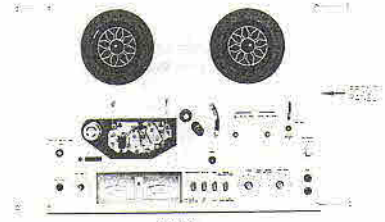

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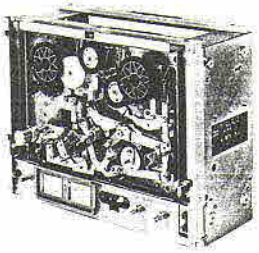
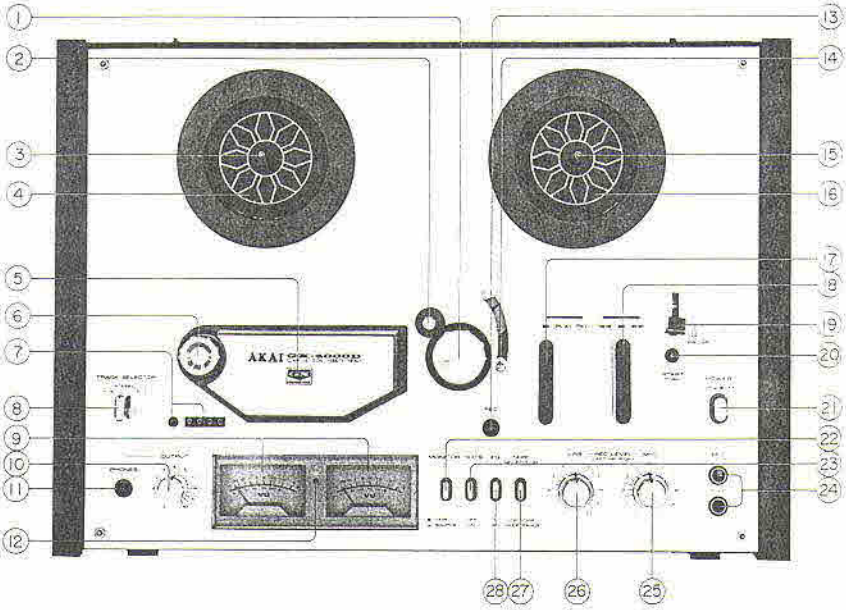
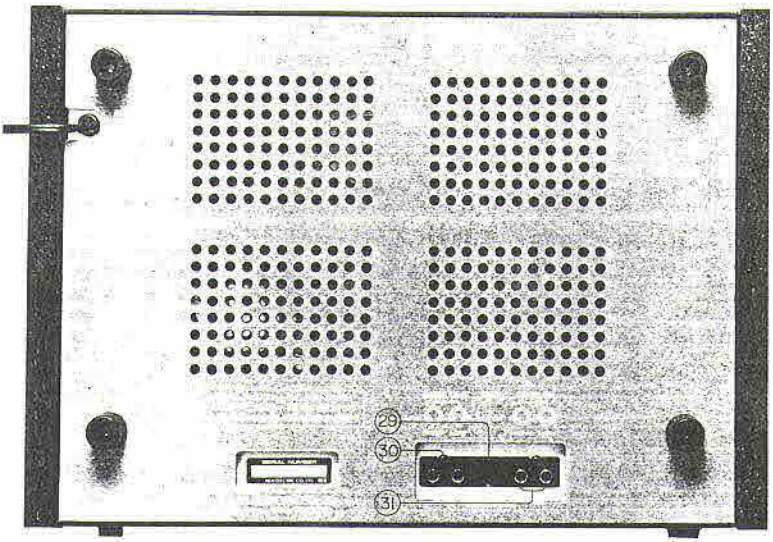


III. CONTROLS





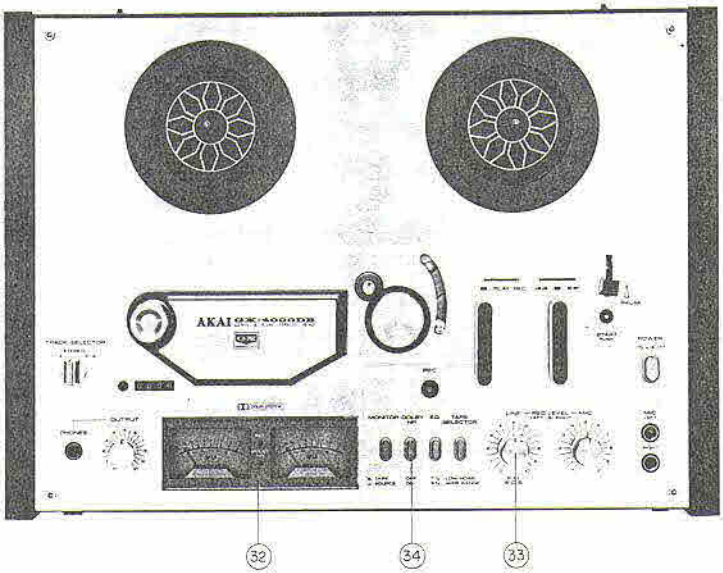


Fig. 1 Controls

1. PINCH ROLLER
2. CAPSTAN
3. REEL RETAINER (Left)
4. SUPPLY REEL TABLE
5. HEAD COVER
6. TAPE GUIDE
7. INDEX COUNTER & RESET BUTTON
8. TRACK SELECTOR
9. VU METERS (Left & Right)
10. OUTPUT VOLUME
11. HEADPHONE JACK
12. RECORDING INDICATOR LAMP
13. RECORDING SAFETY BUTTON
14. AUTOMATIC STOP LEVER
15. REEL RETAINER (Right)
16. TAKE-UP REEL TABLE
17. RECORDING/PLAYBACK LEVER
18. FAST FORWARD/REWIND LEVER
19. PAUSE LEVER
20. START BUTTON
21. POWER
22. MONITOR SELECTOR SWITCH (Tape & Source)
23. S.O.S. (Sound-On-Sound) BUTTON
24. MICROPHONE JACKS (Left & Right)
25. MICROPHONE RECORDING LEVEL CONTROLS
26. LINE RECORDING LEVEL CONTROLS
27. TAPE SELECTOR SWITCH
28. EQUALIZER SWITCH
29. DIN JACK
30. LINE OUTPUT JACKS (Left & Right)
31. LINE INPUT JACKS (Left & Right)
32. DOLBY N.R. INDICATOR LAMP
33. S.O.S. SWITCH/LINE RECORDING LEVEL CONTROLS
34. DOLBY N.R. SWITCH

IV. PRINCIPAL PARTS LOCATION

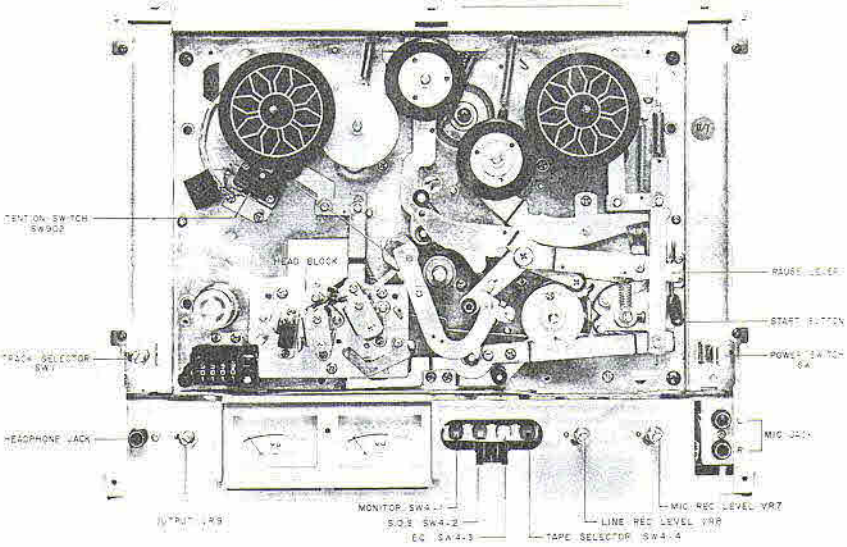


Fig. 2 Front View (GX-4000D)

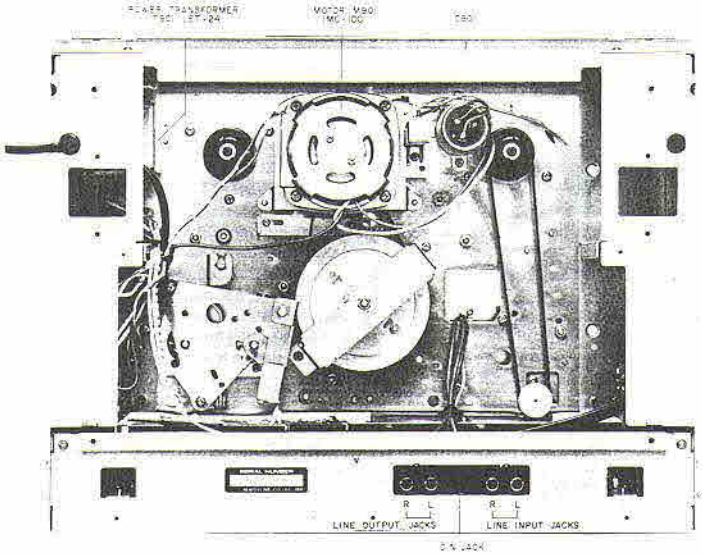


Fig. 3 Rear View (GX-4000D)

V. MECHANISM ADJUSTMENT

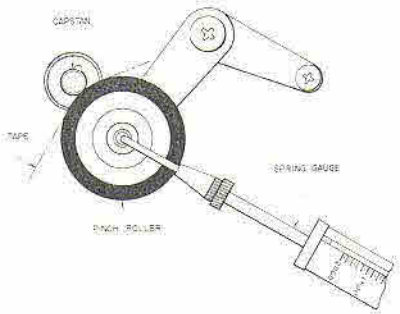


Fig. 4 Pinch Roller Pressure Measurement

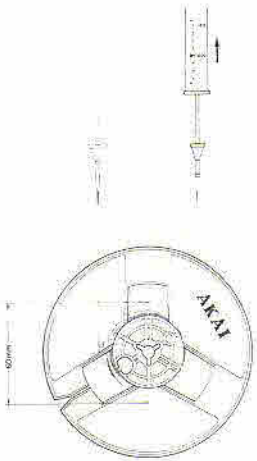


Fig. 5

1. PINCH ROLLER PRESSURE MEASUREMENT (Refer to Fig. 4)

Set the recorder in the PLAY Mode. Pull the pinch roller 1~2 mm away from the capstan with the spring gauge as shown in Fig. 4. Slowly release and take the spring gauge reading when the pinch roller touches the capstan and begins to rotate. The specified pinch roller pressure is 1150~1200g. (Tape speed: 7-1/2 ips)

2. REEL TABLE BLOCK ADJUSTMENT (Refer to Figs. 5, 6)

* Necessary points when measuring the tension

Wind the tape onto a 5" empty reel until there is a diameter of 60 mm of tape. (See Fig. 5). Make the end of the tape into a loop and put onto the spring gauge.

A. SUPPLY REEL TABLE BLOCK ADJUSTMENT

1) RWD Tension Adjustment
   A spring gauge reading of 400~500g in the RWD Mode.
   To adjust, increase or decrease the number of (1) washers.
2) PLAY Mode Back Tension Adjustment
   A spring gauge reading of 100~120g in PLAY Mode.
   To adjust, increase or decrease the number of (2) washers.
3) FF Free Tension Adjustment
   A spring gauge reading of 15~20g in the FF Mode.
   To adjust, move the position of pulley (3) backwards and forwards.

B. TAKE-UP REEL TABLE BLOCK ADJUSTMENT

1) FF Tension Adjustment
   A spring gauge reading of 400~500g in the FF Mode.
   To adjust, increase or decrease the number of (1) washers.
2) PLAY Tension Adjustment
   A spring gauge reading of 150~180g in the PLAY Mode.
   To adjust, increase or decrease the number of (2) washers.
3) RWD Free Tension Adjustment
   A spring gauge reading of 15~20g in the RWD Mode.
   To adjust, move the position of pulley (3) backwards and forwards.

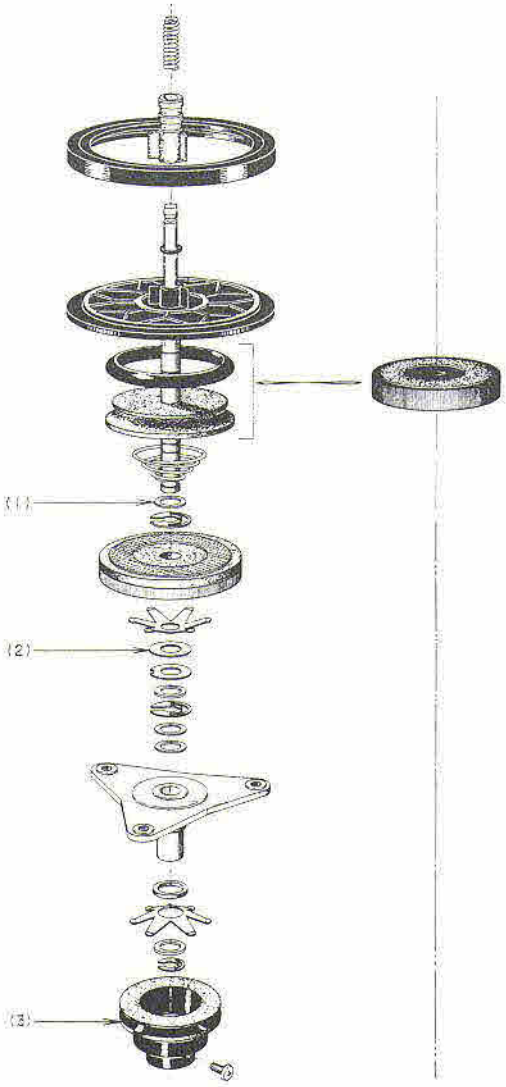


Fig. 6

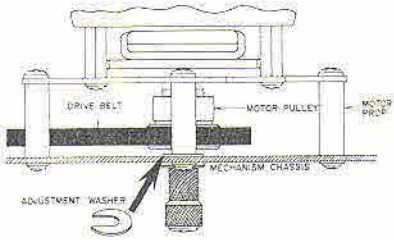


Fig. 7

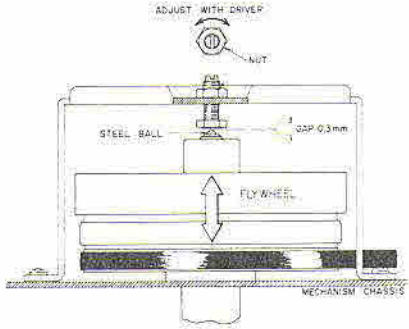


Fig. 8

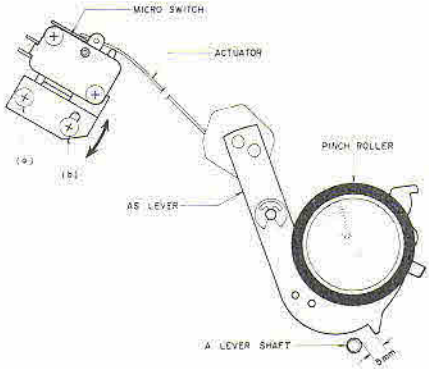


Fig. 9

3. DRIVE BELT POSITION ADJUSTMENT (Refer to Fig. 7)

Adjust position of drive belt so that it comes to the center of the motor pulley by inserting a washer (or washers) between the motor prop and mechanism chassis as shown in Fig. 12.

4. FLYWHEEL LOOSE PLAY ADJUSTMENT (Refer to Fig. 8)

With a minus screw driver, turn bearing to left and right and adjust so that when the flywheel is moved as indicated by the arrow mark in the figure, the gap between the steel ball and flywheel supporting plate is 0.3 mm as shown in Fig. 8. Fix at this position with nut.

5. AUTOMATIC SHUT-OFF OPERATING POINT ADJUSTMENT (Refer to Fig. 9)

Loosen screws (a) and (b) and adjust installed position of Micro Switch so that when AS Lever is lowered as a result of the Power Switch being set to SHUT-OFF position, the gap between AS Lever is about 5 mm.

VI. HEAD ADJUSTMENT

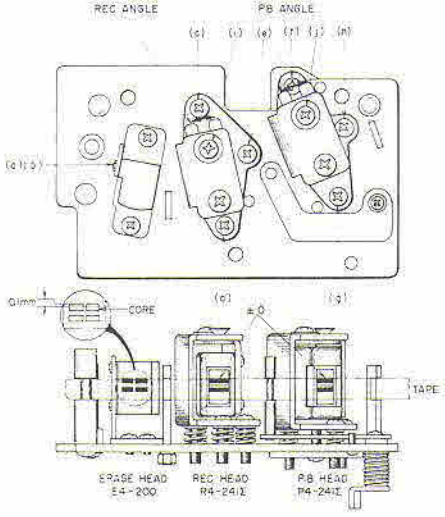


Fig. 10

1. HEAD HEIGHT ADJUSTMENT (Refer to Fig. 10)

1) Erase Head

Loosen screws (a) and (b) shown in Fig. 10 and adjust erase head height. Tighten screws at position at which the upper edge of the tape is 0.1 mm lower than the upper edge of the left channel head core of the erase head.

2) Recording Head

Adjust head height adjustment screws (c) and (d) shown in Fig. 10 so that the upper edge of the tape and the upper edge of left channel head core of the recording head are the same height.

3) Playback Head

Adjust head height adjustment screws (f) and (g) shown in Fig. 10 so that the upper edge of the tape and the upper edge of left channel head core of the playback head are the same height.

2. HEAD AZIMUTH ALIGNMENT ADJUSTMENT (Refer to Fig. 10)

1) Playback Head

a. Connect a High Sensitivity AC Voltmeter to the left and right channel Output Terminals of the tape deck.
b. Set the Track Selector to STEREO and set the machine to 7-1/2 ips tape speed.
c. Playback an 8,000 Hz 3-3/4 ips alignment adjustment test tape.
d. Adjust adjustment screw (h) to obtain maximum High Sensitivity AC Voltmeter indication on both channels.

2) Recording Head

a. Connect an Audio Frequency Oscillator to the line input through an Attenuator, and connect a High Sensitivity AC Voltmeter to the line output. Then load a blank test tape.
b. Set the Monitor Switch to SOURCE and supply a 16,000 Hz sine wave signal. Adjust the Attenuator or the Line Recording Level Controls to obtain a −20 dBm High Sensitivity AC Voltmeter indication.
c. Reset Monitor Switch to TAPE and set deck to recording mode.
d. Adjust adjustment screw (e) to obtain maximum High Sensitivity AC Voltmeter indication on both channels.

3. HEAD ANGLE ALIGNMENT ADJUSTMENT (Refer to Fig. 10)

1) Playback Head

a. Connect a High Sensitivity AC Voltmeter to the left and right channel Output Terminals of the tape deck.

b. Set the Track Selector to STEREO and set the machine to 7-1/2 ips tape speed.

c. Playback an 8,000 Hz 3-3/4 ips alignment adjustment test tape.

d. Loosen screw (j). Adjust PB angle in the direction of the arrow and change the angle of the head-to-tape contact.
Fix the PB head at a position where the output level is not effected by an additional tension to the supply reel.
(e.g. slightly touching the supply reel).

2) Recording Head

a. Connect an Audio Frequency Oscillator to the line input through an Attenuator, and connect a High Sensitivity AC Voltmeter to the line output. Then load a blank test tape.

b. Set the Monitor Switch to SOURCE and supply a 16,000 Hz sine wave signal. Adjust the Attenuator or the Line Recording Level Controls to obtain a −20 dBm High Sensitivity AC Voltmeter indication.

c. Reset Monitor Switch to TAPE and set deck to recording mode.

d. Loosen screw (i). Adjust REC angle in the direction of the arrow and change the angle of the head-to tape contact.
Fix the REC head at a position where the output level is not effected an additional tension to the supply reel.
(e.g. slightly touching the supply reel).

NOTES: 1. As head adjustment greatly affects tape deck performance, be sure that these adjustments are carried out properly.
2. Be careful not to use magnetized tools near the heads.
3. As the level of old tape varies greatly, use new tape.
4. Demagnetize heads before and after head adjustment.

VII. AMPLIFIER ADJUSTMENT

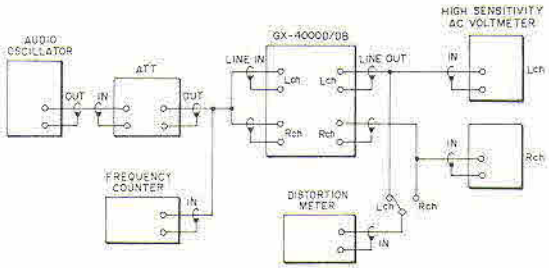


Fig. 11 Instruments Connection

1. MODEL GX-4000D

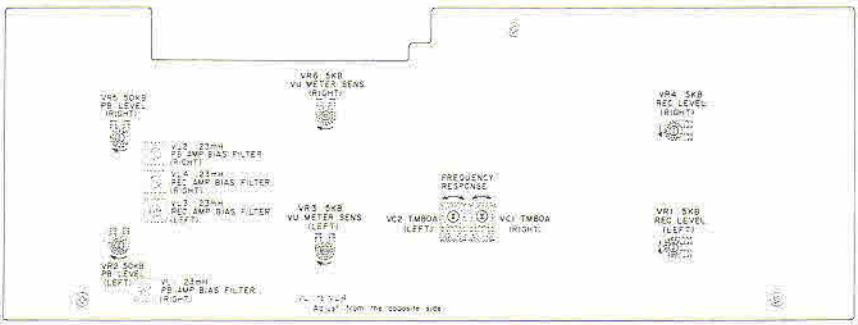


Fig. 12 Amp P.C Board LE-5801A (GX-4000D)

Step	Adjustment Item	Test Tape Supply Signal	Mode	Adjustment Point	Result	Remarks
1	Playback Level Adjustment	700 Hz 7-1/2 ips Test Tape	PLAY	VR2 50 kB(L) VR5 50 kB(R)	0 dBm ±0.5 dBm (0.775V)	Set Monitor Switch to "TAPE".
2	VU Meter Sensitivity Adjustment	700 Hz 7-1/2 ips Test Tape	PLAY	VR3 5 kB(L) VR6 5 kB(R)	0 VU indication	
3	Frequency Response Adjustment	SCOTCH #211 tape 1,000 Hz 10,000 Hz −20 VU recording	REC/ PLAY	VC1 80P(L) VC2 80P(R)	Adjust to +1 dB at 10,000 Hz in relation to 1,000 Hz	Tape Speed to 3-3/4 ips. Set EQ Switch to "3-3/4".
4	Recording Level Adjustment	SCOTCH #211 tape 1,000 Hz 0 VU recording	REC/ PLAY	REC Volume (VR8 50 kA)	0 dBm ±0.5 dBm (0.775V)	Set Monitor Switch to "TAPE"
		SCOTCH #211 tape 1,000 Hz 0 VU recording	REC/ PLAY	VR1 5 kB(L) VR4 5 kB(R)	0 dBm ±0.5 dBm (0.775V)	Set Monitor Switch to "SOURCE".

Step	Adjustment Item	Test Tape Supply Signal	Mode	Adjustment Point	Result	Remarks
5	Distortion Factor Confirmation	1,000 Hz 0 VU recording	REC/ PLAY		Less than 1.0%	(Refer to NOTE 5)
6	PB Amp Bias Filter Adjustment	100 kHz from an oscillator	REC	VL1 23 mH(L) VL2 23 mH(R)	Minimum AC Voltmeter indication	Set Monitor Switch to "TAPE". (Refer to NOTES 6, 7)
7	REC Amp Bias Filter Adjustment	100 kHz from an oscillator	REC	VL3 23 mH(L) VL4 23 mH(R)	Minimum AC Voltmeter indication	Set Monitor Switch to to "SOURCE". (Refer to NOTES 6, 7)

Chart-1

NOTES:
1. Output Level Control should be at maximum.
2. Except for Step 3, set tape speed to 7-1/2 ips.
3. Set tape selector to Low Noise position.
4. (L) = Left Channel, (R)= Right Channel.
5. If it does not comply with the specifications, repeat Steps 3, 4 and re-adjust.
6. Unless the core is moved intentionally this adjustment is not necessary.
7. Adjust the oscillator's frequency to give a frequency counter reading of 100 kHz.

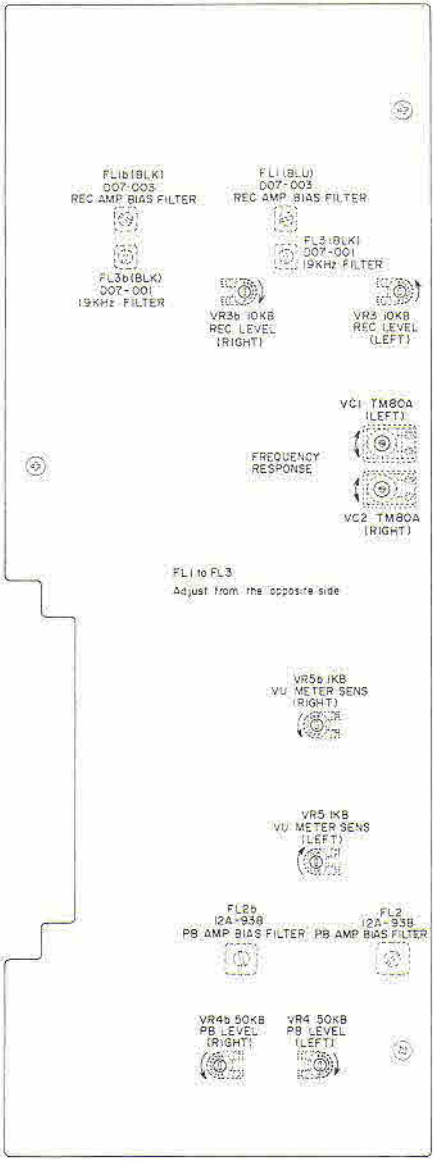


Fig. 13 Amp P.C Board LE-5701A (GX-4000DB)