

GX-220D

OPERATOR'S MANUAL

STEREO TAPE DECK



AKAI®

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■ GLASS AND X'TAL FERRITE HEAD



Up to now in manufacturing Recording/Playback Heads, permalloy has been used for making the core and metallic foil has been used for making the gap.

However, for the Model GX-220D AKAI has developed a GLASS AND X'TAL (crystal) FERRITE HEAD.

The core is made of pure crystal ferrite in addition to which the inner circumference of the head shield (including the core and gap) is mounted and set in glass.

As a result, the head is not only "Dust Free" and "Wear Free" but produces a "Focused Field" (The magnetic field is concentrated into a narrow oblong radius) permitting recording without the weakening or erasing of the signal by the bias current. High frequency signals can be recorded and regenerated as original sound without distortion.

TABLE OF CONTENTS

I. GENERAL INFORMATION	
1. Specifications	1
2. Controls	2
II. OPERATING INSTRUCTIONS	
1. 4-Track Recording/Playback System	5
2. Tape Loading	5
3. Voltage and Cycle Conversion	6
4. Tape Speed Selection	7
5. Pause Control	7
6. Automatic Stop/Shut-Off	7
7. Fast Forward and Rewind	7
8. Playback	8
Stereo Playback	9
Monaural Playback	9
Playback Using External Amplifier	10
Playback Using External Speakers	10
Playback Using External Speakers	10
Automatic Reverse Playback	10
Manual Reverse	10
9. Recording	11
Stereo Recording	11
Monaural Recording	12
Recording From an External Amplifier	12
Recording From a Record Player	13
Recording From Another Tape Recorder	13
DIN Jack	13
Sound On Sound Recording	14
Monitoring	15
10. S.R.T. Button	15
11. Tape Splicing and Editing	15
12. Tape Erasing	16
13. Head Demagnetizing	16
III. ACCESSORIES	
1. Standard Accessories	17
2. Optional Accessories	17

I . GENERAL INFORMATION

1- SPECIFICATIONS

Track System	4-track, 2-channel stereo/monaural system
Maximum Reel Capacity	7" reel
Tape Speed	7-1/2, 3-3/4, and 1-7/8 ips ($\pm 0.7\%$)
Wow and Flutter	Less than 0.08% RMS at 7-1/2 ips Less than 0.12% RMS at 3-3/4 ips Less than 0.20% RMS at 1-7/8 ips
Equalization	Correct equalization for playback of tapes recorded to NAB curve.
Frequency Response	30 Hz to 24,000 Hz (± 3 dB) at 7-1/2 ips 30 Hz to 19,000 Hz (± 3 dB) at 3-3/4 ips 30 Hz to 9,000 Hz (± 3 dB) at 1-7/8 ips
Distortion	Less than 1.5% (1,000 Hz "0" VU)
Signal to Noise Ratio	Better than 50 dB
Erase Ratio	Better than 70 dB
Cross Talk	Better than 70 dB (monaural) Better than 50 dB (stereo)
Bias Frequency	100 kHz
Heads	3 Heads 4-track GX Recording and Playback Heads 4-track Erase Head
Motors	3 Motors Hysteresis synchronous 3-speed motor for capstan drive and two 6-pole eddy current outer rotor motors for supply and take-up reel drive.
Fast Forward & Rewind Time	60/75 seconds using a 1200 ft. tape at 60/50 Hz
Recording Capacity	4 hours stereo recording using a 1200 ft. tape at 1-7/8 ips.
Output Jacks	Line (2) : 1.23 V ("0" VU)/100 Ω (Required load impedance more than 20 k Ω) Headphone (1) : 30 to 40 mV/8 Ω
Input Jacks	Microphone (2) : 0.2 mV/10 k Ω Line (2) : 50 mV/150 k Ω
DIN Jacks	0.4 V/50 mV (High) : 7 mV (Low)
Semi-Conductors	Transistors : 24 Diodes : 14
Integrated Circuits	Linear IC : 2
Power Source	100 V to 240 V AC, 50/60 Hz
Power Consumption	90 W
Dimensions	430(W) \times 425(H) \times 230(D) mm (17.2 \times 17 \times 9.2")
Weight	19 kg. (41.8 lbs.)

2- CONTROLS

INDEX COUNTER

For use in locating positions on the tape. With Reset Button, set Index Counter to "0000" prior to recording or playback operation.

TAPE SPEED SELECTOR

Set to desired tape speed and set Equalizer Switch accordingly.

SUPPLY REEL TABLE

CYCLE CONVERSION SWITCH (A)

Set to 50 Hz or 60 Hz according to area power source (Refer to Cycle Conversion, page 6.).

TAPE TENSION LEVER (SENSING PIN)

Provides proper tension for better tape stability.

SENSING PIN

HEAD COVER

Houses (from left to right) Erase, Recording, and Fwd/Reverse Playback Heads.

MANUAL REVERSE BUTTONS

For effecting manual reverse (either direction). Sensing tape is used for Automatic Reverse.

TRACK SELECTOR BUTTONS

For easy selection of Stereo or Monaural tracks.

MONITOR SWITCH

To monitor program source, set to "Source" (In) position. To monitor recorded signals or for playback, set to "Tape" (Out) position.

RECORD LEVEL CONTROL (Left)

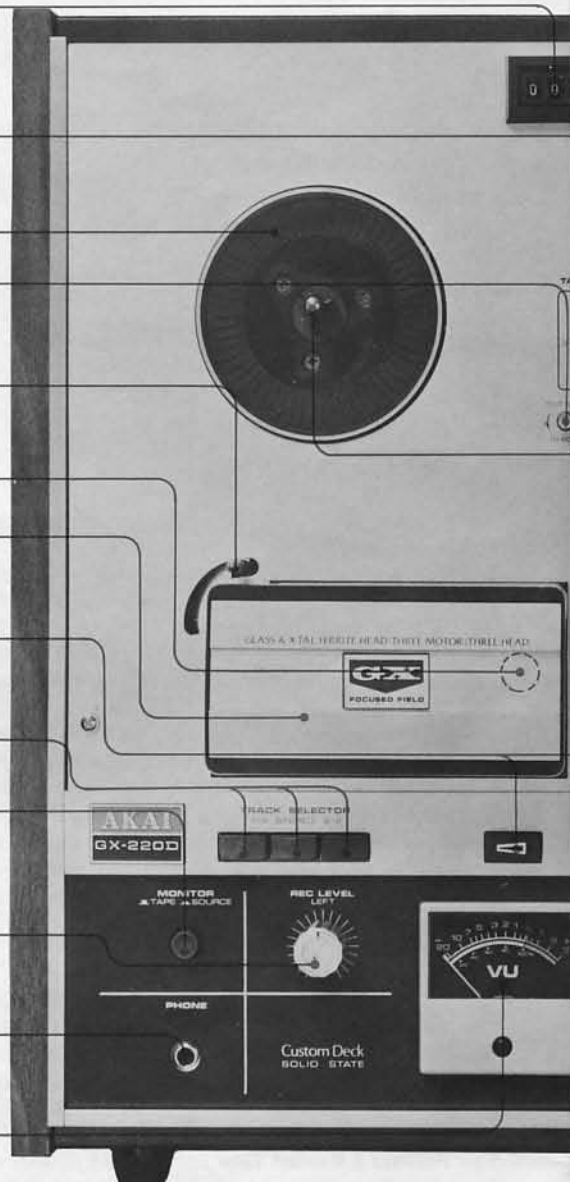
Adjust while observing left VU Meter. Normal recording should not exceed "0" VU.

HEADPHONE JACK

For monitoring, use Stereo Headphones of 8 Ω impedance.

LEFT VU METER

Indicates left channel recording/playback level.



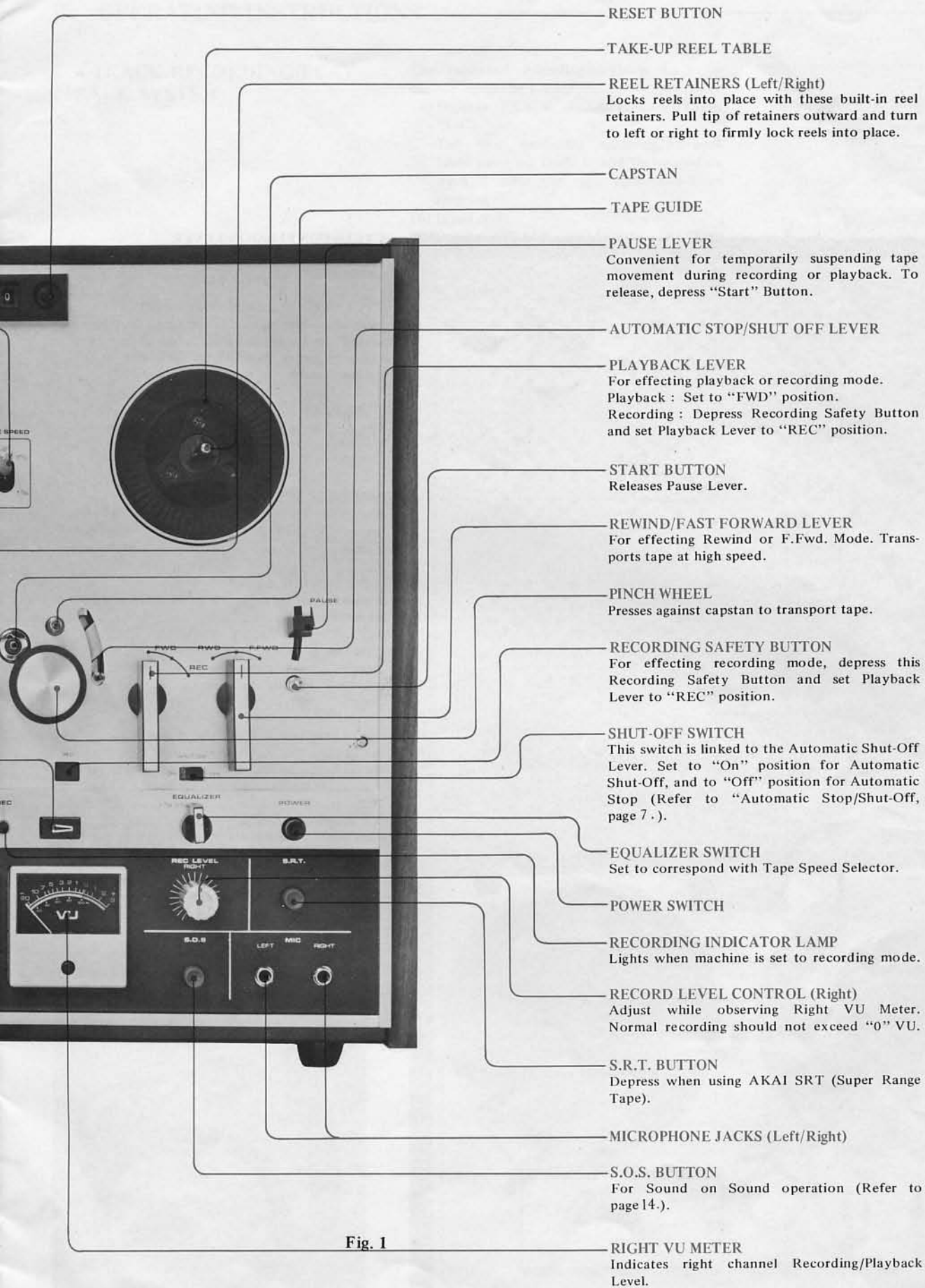
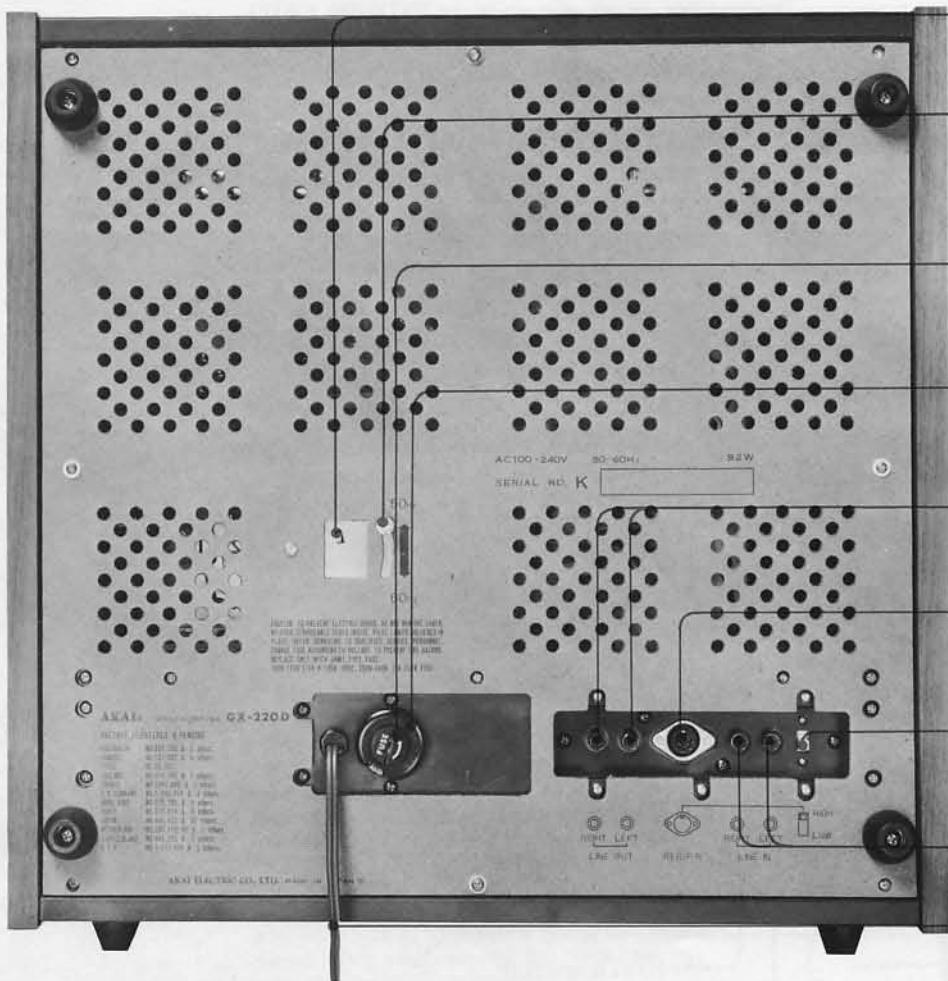


Fig. 1



- CYCLE CONVERSION LEVER**
Automatically repositions when cycle conversion switch (B) is reset.
- CYCLE CONVERSION SWITCH (B)**
With screw driver, loosen and set to correspond with Cycle Conversion Switch (A) on face panel (Both switches must be set according to area power source).
- FUSE POST**
Change fuse according to voltage.
100 to 120 V : 1.5 A, 125 V Fuse
200 to 240 V : 1 A, 250 V Fuse
- VOLTAGE SELECTOR**
Universal Voltage Selector (100 to 240 V). Refer to Voltage and Cycle Conversion, page 6.
- LINE OUTPUT JACKS**
Connects to Tape Inputs of external amplifier or recorder.
- DIN JACK**
Enables inter-connection with an external amplifier by use of a single Din connection cord.
- DIN JACK HIGH/LOW INPUT SWITCH**
When using Din Jack connection, if output level of external amplifier is more than 50 mV, set to "High". If less than 50 mV, set to "Low".
- LINE INPUT JACKS**
Connects to Output Jacks of external source.
- AC CORD**

Fig. 2

II. OPERATING INSTRUCTIONS

1- 4-TRACK RECORDING/PLAYBACK SYSTEM

The monaural recording/playback track sequence should be 1-4-3-2.

(A) Depress TRACK SELECTOR BUTTON "1-4".

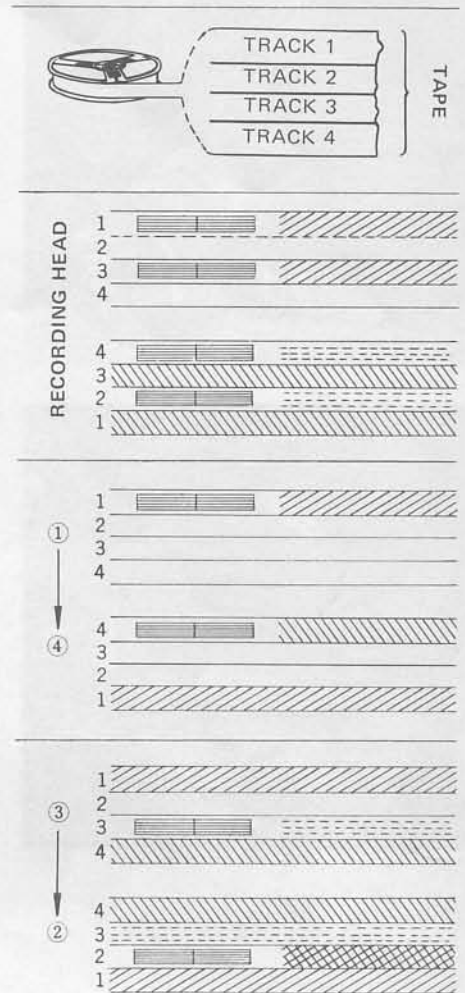
The first monaural recording/playback takes place on track 1, and the second on track 4 after the tape reels have been inverted.

(B) Invert reels.

(C) Depress TRACK SELECTOR BUTTON "3-2".

The third monaural recording/playback takes place on track 3, and the fourth on track 2 after the tape reels have been inverted.

The GX-220D does not record in reverse direction. Using reverse playback, it is not necessary to turn the Tape Reels over. When reverse playback begins, the Playback Head is automatically shifted to the remaining tracks.



2- TAPE LOADING

Place a full reel of tape on SUPPLY REEL TABLE and an empty reel on the TAKE-UP REEL TABLE. Thread the tape as illustrated by the dotted line in Fig. 4.

Lock reels into place with the REEL RETAINERS provided on Reel Shafts.



Fig. 3

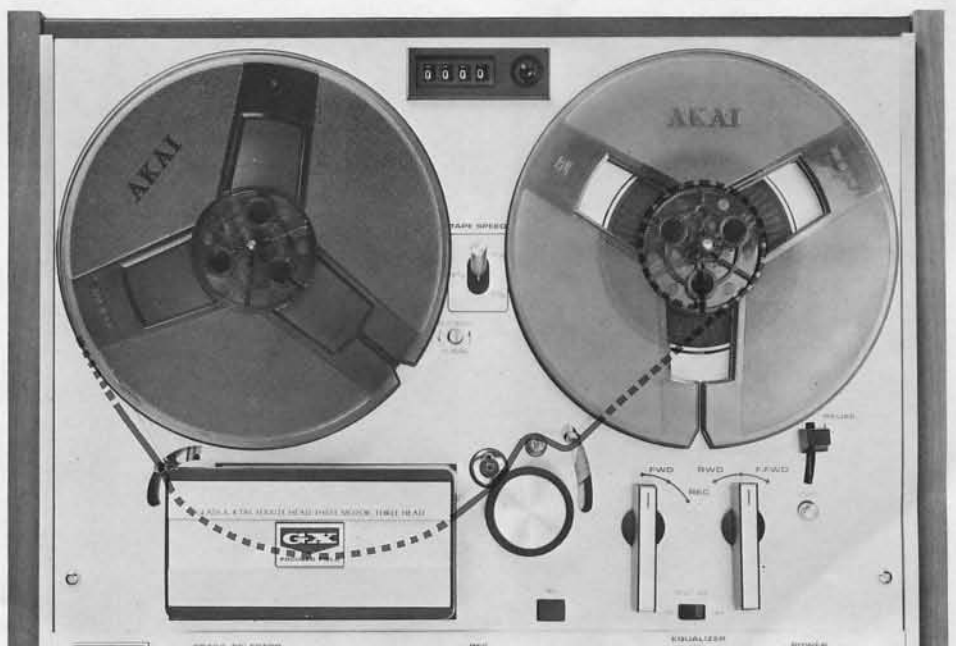
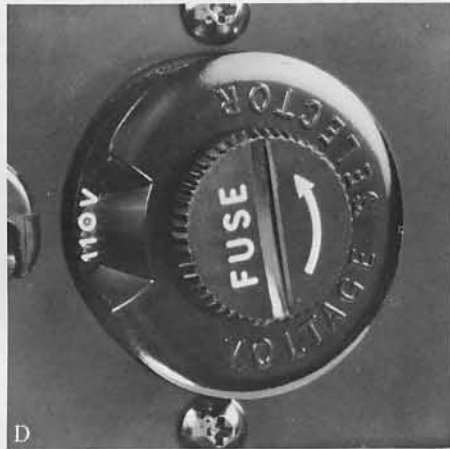
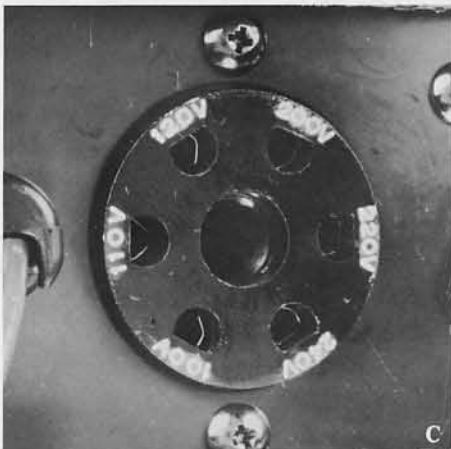
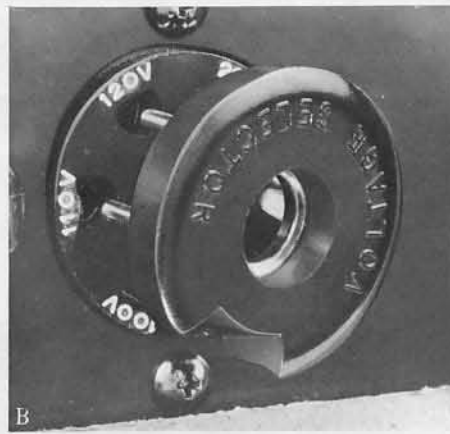
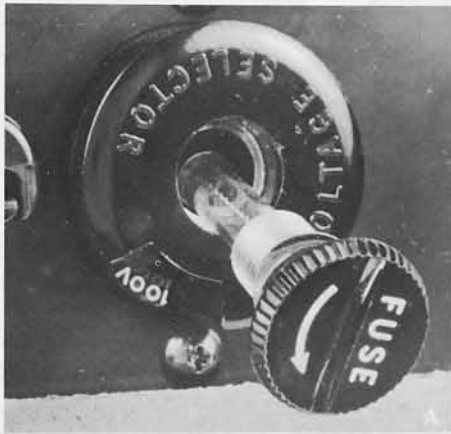


Fig. 4



3- VOLTAGE AND CYCLE CONVERSION

■ VOLTAGE

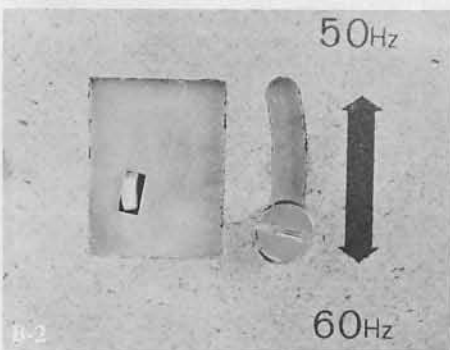
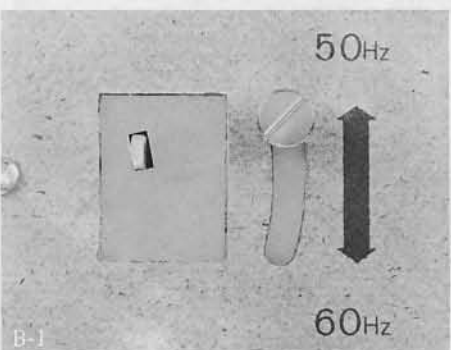
Model GX-220D is operable anywhere in the world. With the built-in step-down power transformer, the operator can easily readjust the recorder to any one of the six stages of power voltage from 100 to 240 volts A.C. The operator is requested to check the previously set voltage before operation. If another voltage is required, readjustment can be made as follows :

- (1) Remove the FUSE POST as shown in Fig. A. Remove VOLTAGE SELECTOR PLUG and reinsert to standard area voltage.
- (2) The VOLTAGE SELECTOR as shown in Figs. B, C, and D is a rotatable plug-in type offering 6 selections (100/110/120/200/220/240 V).
- (3) Change the fuse according to voltage.

Voltage	100 V to 120 V	200 V to 240 V
Fuse	1.5 A	1 A

CAUTION : Disconnect power plug from AC outlet before readjusting voltage. To maintain optimum performance and prolong the life of your machine, it is important that the line voltage be held within 10 percent deviation of standard voltage.

Fig. 5



■ CYCLES

Correct tape speed cannot be obtained if the CYCLE CONVERSION SWITCHES are not properly positioned. CYCLE CONVERSION SWITCH (A) is located on the upper center of the face panel and (B) is located at the rear of the recorder. Using a screw driver, rotate CYCLE CONVERSION SWITCH (A) counter-clockwise approximately one-eighth of a turn. The switch can then be moved either OUT or IN. 50 cycle operation is obtained by moving the switch OUT (Fig. A-1) and 60 cycle operation, by moving the switch IN (Fig. A-2). The switch should be rotated back to its original position after it has been moved to either IN or OUT position. CYCLE CONVERSION SWITCH (B) must also be reset accordingly.

With a minus screw driver, loosen screw as shown in Fig. and set to 50 or 60 Hz. Tighten screw.

CAUTION : Do not attempt to rotate the CYCLE CONVERSION SWITCHES when the motor is not running.

Fig. 6

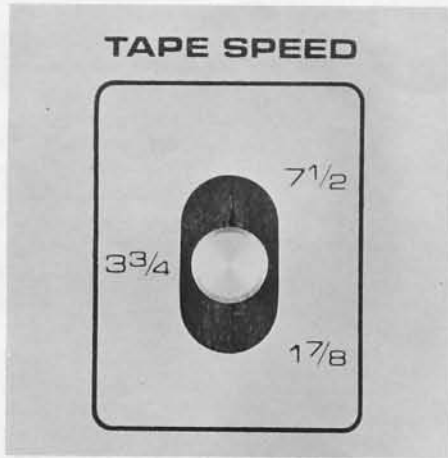


Fig. 7

4- TAPE SPEED SELECTION

The GX-220D operates on 3 tape speeds, 7-1/2, 3-3/4, and 1-7/8 ips.

For tape speed selection, set TAPE SPEED SELECTOR to desired speed and set the EQUALIZER SWITCH accordingly.

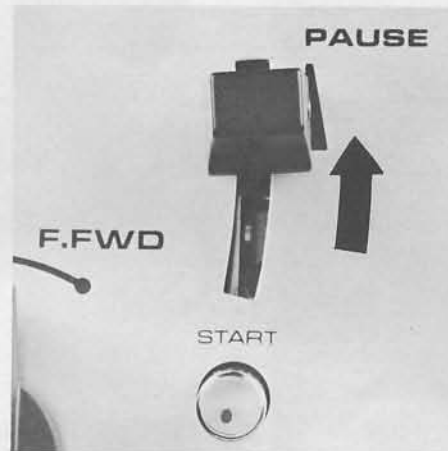


Fig. 8

5- PAUSE CONTROL

To momentarily stop the tape during recording/playback, set the PAUSE LEVER to "Pause" position (as shown in Fig. 8.). PAUSE CONTROL will not function during fast forward or rewind operation.

PAUSE CONTROL is useful in editing the tape during recording (lift lever to stop recording when a certain portion of the program is not desired). Note that when the lever is released and recording again commences, no annoying "click" is impressed on the tape.

6- AUTOMATIC STOP/SHUT-OFF

One of the exclusive features of the Model GX-220D is the Automatic Stop/Shut-Off function of the unit. Thread the Tape through the AUTOMATIC STOP/SHUT OFF LEVER as described in Tape Loading procedure.

To automatically stop reel movement in case the tape is accidentally broken or comes to the end, set SHUT-OFF SWITCH to "OFF" position. To automatically shut off the power of the unit in case the tape is accidentally broken or comes to the end, set SHUT-OFF SWITCH to "ON" position.

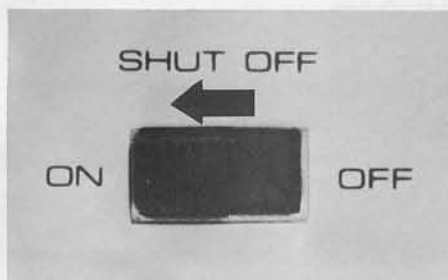


Fig. 9

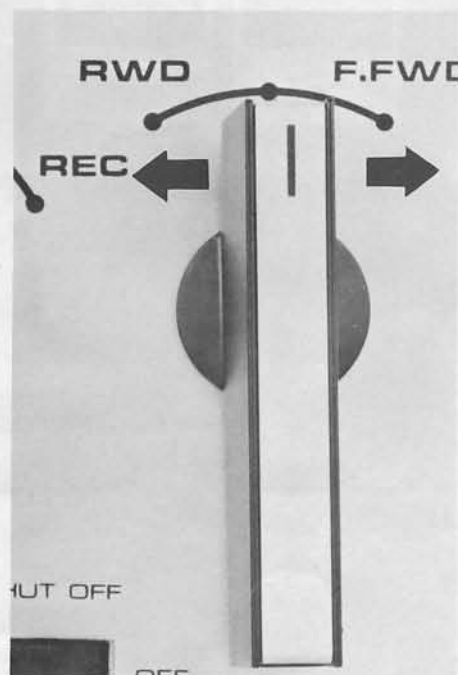


Fig. 10

7- FAST FORWARD AND REWIND

Fast Forward or Rewind is performed by operating FAST FORWARD/REWIND LEVER. Fast Forward or Rewind permits rapid selections of recordings on the tape. The Fast Forward/Rewind Lever is automatically locked into position and cannot be operated while PLAYBACK LEVER is in operation and vice-versa.

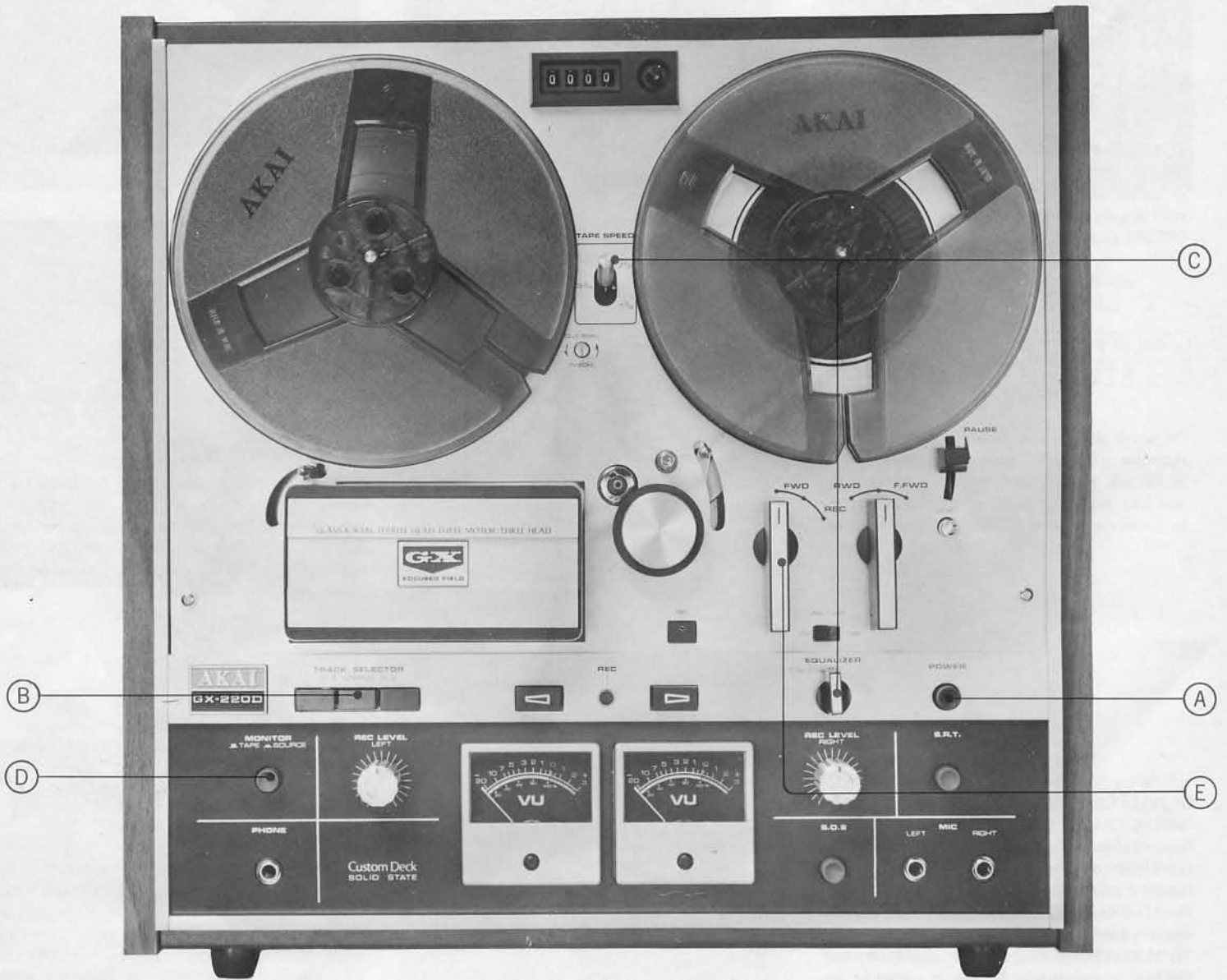


Fig. 11

Please be sure to check the following prior to operation

- * As tape which has not been used for a period of time may have become sticky, run tape once before using.
- * Tape is loaded properly.

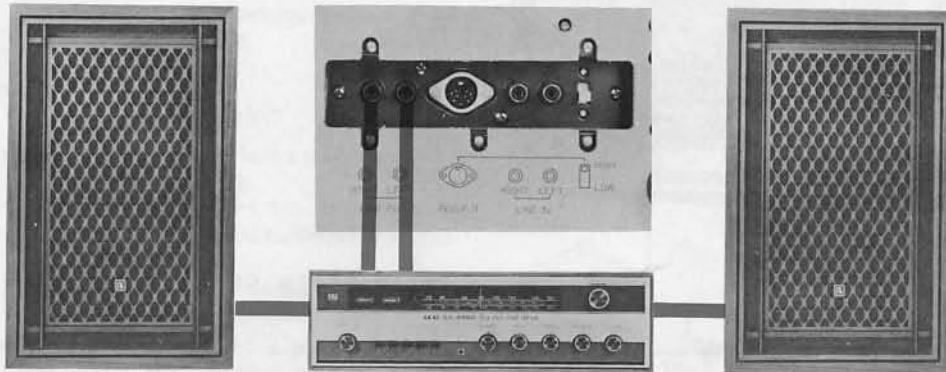


Fig. 12

■ STEREO PLAYBACK

Model GX-220D does not include a Power Amplifier or Loudspeakers. It is, therefore, necessary to provide an external amplifier and a pair of speakers for playback. Connect the Line Outputs to Tape Inputs of Stereo Amplifier and connect two speakers to the amplifier. Connect power cord and load a tape.

- A. Turn on Power Switch.
- B. Depress "Stereo" Track Selector Button.
- C. Set Speed Selector and Equalizer to desired speed.
- D. Set Monitor Switch to "Tape" (out) position.
- E. Set Playback Lever to PLAY position to begin playback.
- F. Adjust Volume Controls, etc. of external amplifier. (Output level of Model GX-220D is 1.23 V).

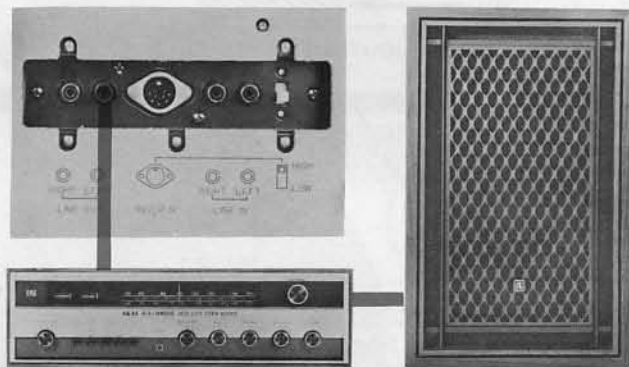


Fig. 13

■ MONAURAL PLAYBACK

Only the left channel is used for monaural playback on tracks 1 and 4. Connect the Left Line Output of Model GX-220D to the Left Tape Input Jack of external amplifier. Substitute the following step for step (B) of the Stereo Playback procedure.

- B. Depress "1-4" Track Selector Button.

Only the right channel is used for monaural playback on tracks 3 and 2. Connect the Right Line Output of Model GX-220D to the Right Tape Input Jack of external amplifier. Substitute the following step for step (B) of the Stereo Playback procedure.

- B. Depress "3-2" Track Selector Button.

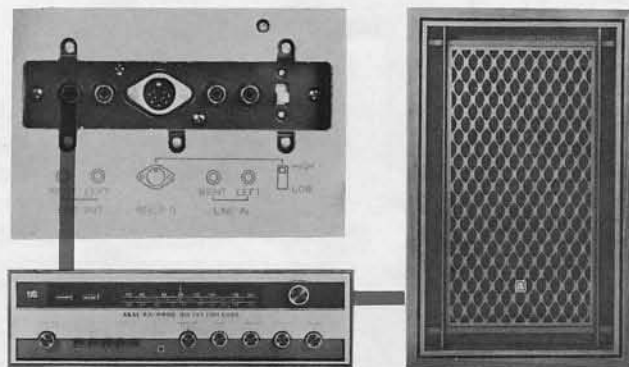


Fig. 14

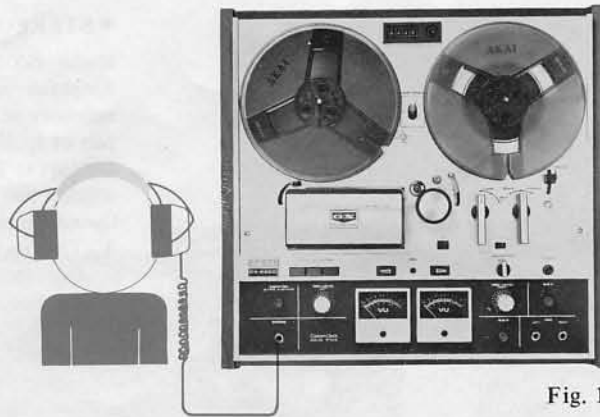
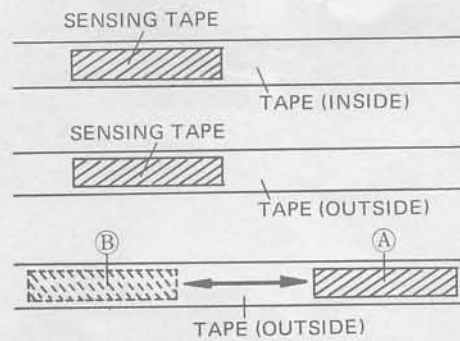


Fig. 15

■ PLAYBACK USING STEREO HEADPHONES

For private headphone listening, connect headphones to Headphone Jack. For monaural as well as stereo listening, use stereo headphones of 8 ohms impedance. AKAI Model ASE-22 is highly recommended.

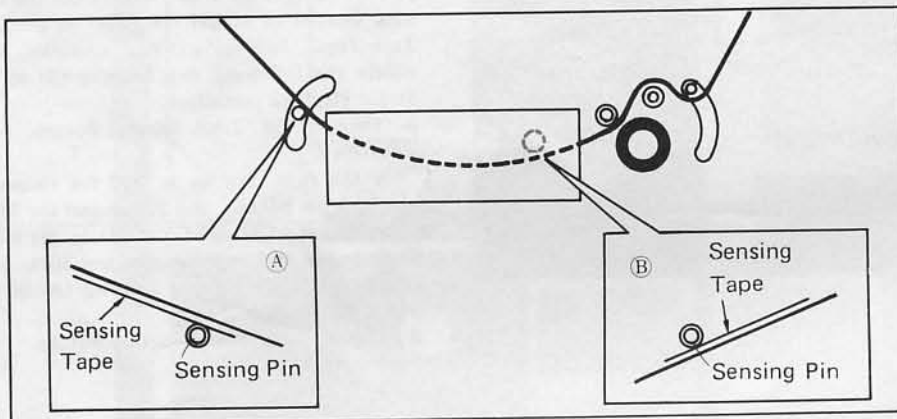


■ AUTOMATIC REVERSE PLAYBACK (USING SENSING TAPE)

(A) Affix about a 2 cm (3/4") long piece of sensing tape (foil) to the outside of tape at desired reversing point.

(B) If continuous reverse between two points is desired, affix another piece of sensing tape to the inside of tape at desired reversing point.

As the foil passes the Sensing Pins, reverse is effected.



■ MANUAL REVERSE



The GX-220D is also equipped with Manual Reverse Buttons for your convenience. To reverse tape (reverse or normal play), simply depress manual Reverse  or Normal Play  Button.



Fig. 16

9- RECORDING

Please be sure to check the following prior to operation.

- * Heads are demagnetized.
- * Use good quality tape (new tape gives best results).
- * As tape which has not been used for a period of time may have become sticky, run tape once before using.
- * Tape is loaded properly.

■ STEREO RECORDING

Connect power cord and load a tape.

- A. Turn on power Switch.
- B. Depress "Stereo" Track Selector Button.
- C. Set Speed Selector and Equalizer to desired speed.
- D. With Reset Button, set Index Counter to "0000". This Index Counter provides an

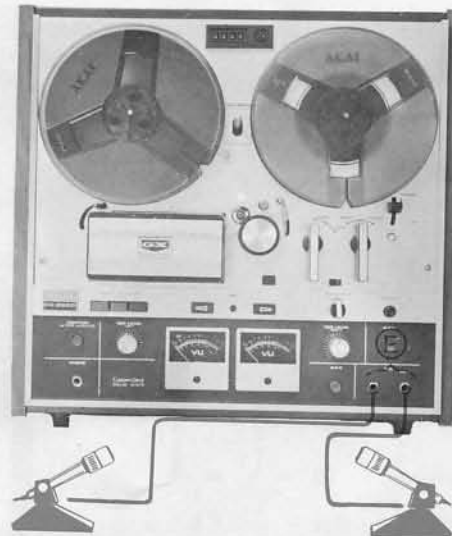


Fig. 17

easy reference for locating positions on the tape.

- E. Insert Microphone Plugs into Microphone Jacks. Maintain a distance of at least 2 meters (7 ft.) between microphones.
- F. Set Monitor Switch to "Source" (in position).
- G. Set Pause Lever to "Pause" position.
- H. Adjust and balance microphone volume level by operating Left and Right Recording Level Controls while observing Left and Right VU Meters. Normal recording should not exceed "0" VU on either of the respective meters.
- I. While depressing REC Safety Button, set Playback Lever to "REC" position. (Recording Indicator Lamp will light).
- J. When an optimum recording level has been determined, depress Start Button to release Pause Lever and begin recording.
- K. To stop recording, return Playback Lever to neutral (vertical) position.

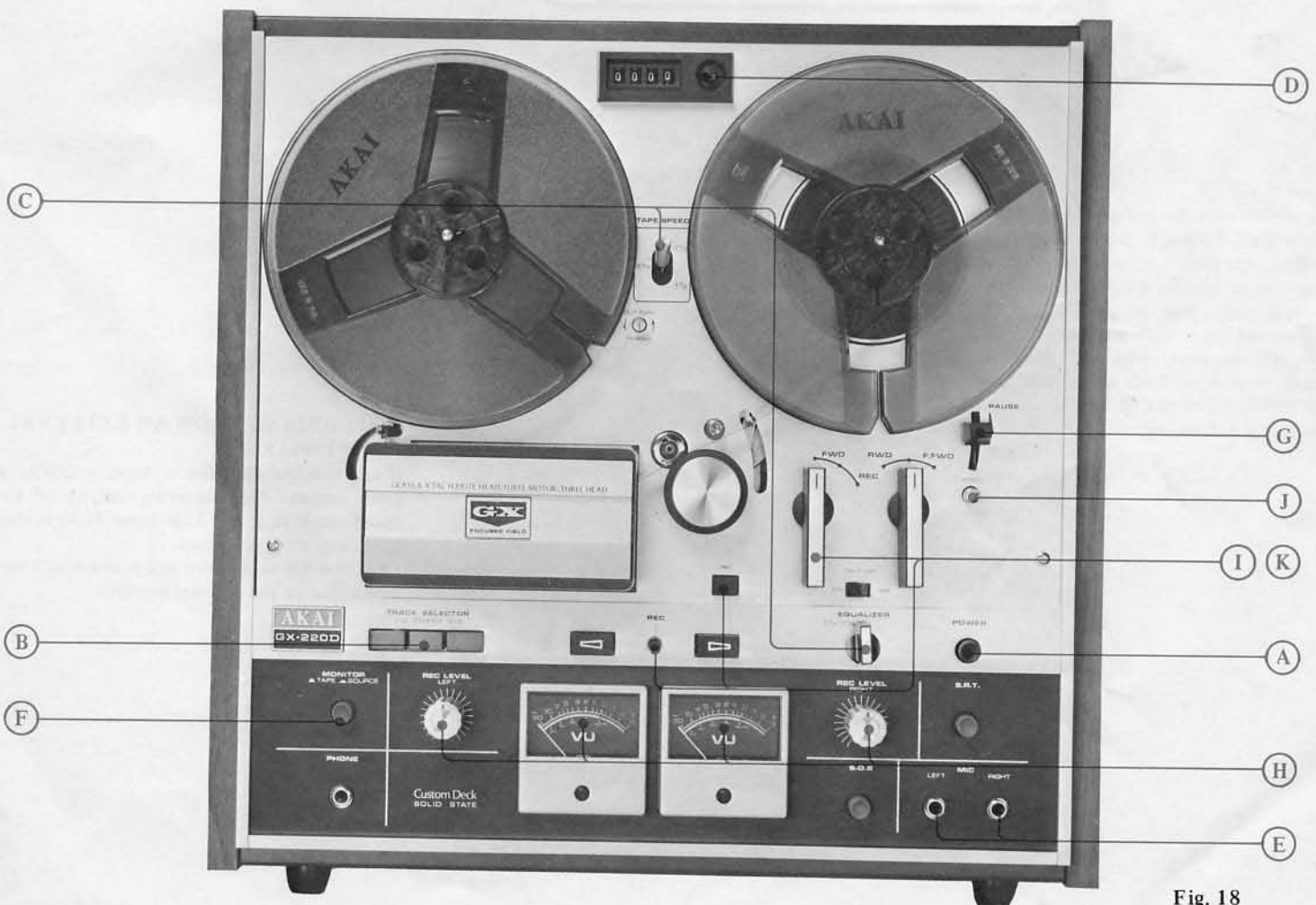


Fig. 18



Fig. 19

■ MONAURAL RECORDING

For monaural recording, substitute the following steps for steps (B), (E), and (H) of the Stereo Recording procedure and add step (L).

Recording on tracks 1 and 4

Only the left channel is used for monaural recording on tracks 1 and 4.

B. Depress "1-4" Track Selector Button.

E. Insert Microphone Plug into Left Microphone Jack.

H. Adjust and balance microphone volume level by operating the Left Record Level Control while observing the Left VU Meter. Normal recording should not exceed "0" VU.

L. Invert reels to record on track 4.

Recording on tracks 3 and 2

Only the right channel is used for monaural recording on tracks 3 and 2.

B. Depress "3-2" Track Selector Button.

E. Insert Microphone Plug into Right Microphone Jack.

H. Adjust and balance microphone volume level by operating the Right Record Level Control while observing the Right VU Meter. Normal recording should not exceed "0" VU.

L. Invert reels to record on track 2.

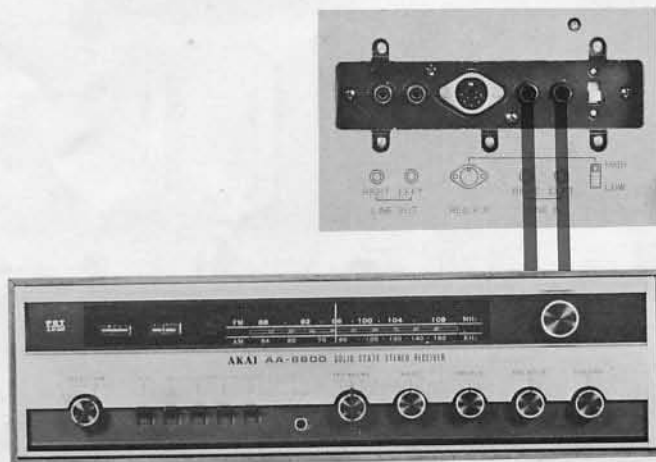


Fig. 20

■ RECORDING FROM AN EXTERNAL AMPLIFIER

If an external amplifier or tuner amplifier is used, connect the Recording Outputs of external amplifier to the Line Input Jacks in step (E) of recording procedure.

The GX-220D will record any source which can be selected on the external amplifier.

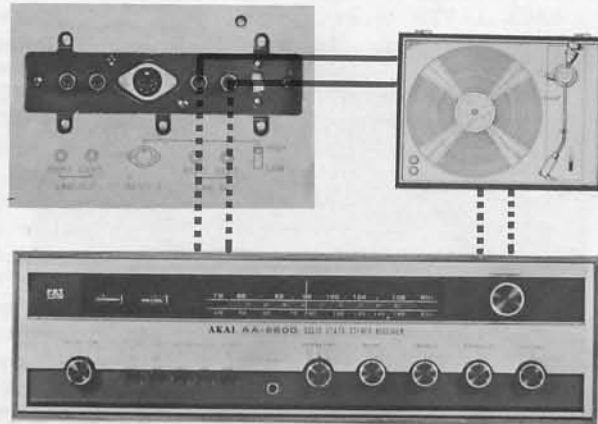


Fig. 21

■ RECORDING FROM A RECORD PLAYER

To record from a stereo or monaural disc, a crystal pick-up (0.5 to 1 Volt) or a ceramic pick-up can be connected directly to the Line Input Jacks in step (E) of recording procedure. If a magnetic cartridge is used, it must be connected to the Line Input Jacks through an external amplifier.

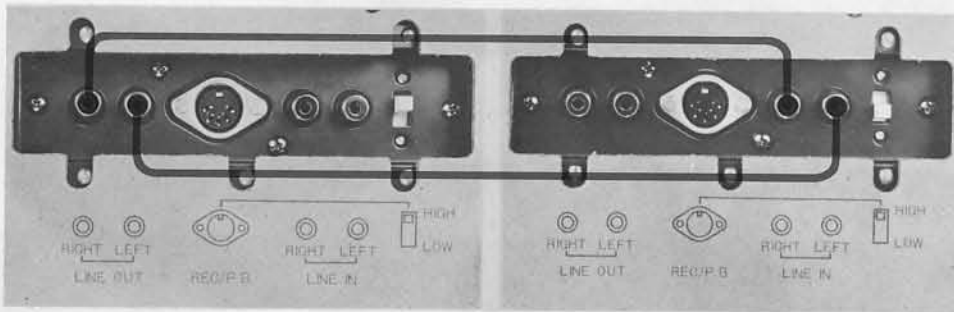


Fig. 22

■ RECORDING FROM ANOTHER TAPE RECORDER

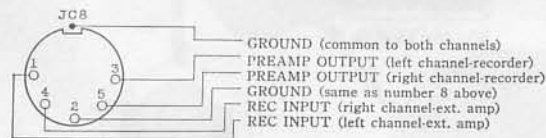
Connect the Line Output Jacks of playback machine to the Line Input Jacks of Model GX-220D in step (E) of the recording procedure.



Fig. 23

■ DIN JACK

The DIN JACK at the rear of the recorder is used for inter-connecting Model GX-220D with an external stereo amplifier. This system enables easy recording or playback through an external amplifier as the complex connection or disconnection of 4 separate plugs is not necessary. When recording from an external amplifier, if the output level of the amplifier is more than 50 mV, set the HIGH/LOW INPUT SWITCH to "HIGH". But, when output level is less than 50 mV, set it to "LOW".



Front View of DIN JACK

■ SOUND-ON-SOUND RECORDING

For transfer of previously recorded material from one track to the other, accumulating as many individual recordings on one track as is desired. Can be applied to language study, musical compilations and various other uses.

First Recording

- A. Confirm that there are no connections to the LINE INPUT JACKS.
- B. Depress "1-4" TRACK SELECTOR BUTTON for recording on track 1.
- C. Insert microphone plug into LEFT MICROPHONE JACK.
- D. Depress MONITOR SWITCH to "Source" (in) position.
- E. Adjust the LEFT MICROPHONE RECORD LEVEL CONTROL while observing the LEFT VU METER.
- F. Depress REC BUTTON and set PLAY-

BACK LEVER to REC position simultaneously to begin first recording, i.e., Do-Re-Mi.

- G. When the first recording is completed, rewind tape to starting position.

Second Recording

- H. Confirm that MONITOR SWITCH is at "SOURCE" position and depress SOUND ON SOUND BUTTON.
- I. Depress "3-2" TRACK SELECTOR BUTTON for recording on track 3 while listening to track 1.
- J. Insert microphone plug into RIGHT MICROPHONE JACK.
- K. Connect STEREO HEADPHONES for monitoring the first recording on track 1.
- L. Depress REC BUTTON and set PLAYBACK LEVER to REC position simultaneously to begin second recording, i.e.,

Mi-Fa-Sol (first recording is monitored through headphones).

- M. Adjust RIGHT MICROPHONE RECORD LEVEL CONTROL while observing the RIGHT VU METER.

(As the second recording, Mi-Fa-Sol, is made on track 3, the first recording, Do-Re-Mi, is monitored in headphones. The two recordings will be completely merged on track 3, i.e., Do + Mi, Re + Fa, Mi + Sol.

N. The third and subsequent recordings are made in the same way as the second recording by alternating tracks 1-4 and 3-2.

- O. For playback, if last recording was made on track 1-4, depress 1-4 TRACK SELECTOR BUTTON. If last recording was made on track 3-2, depress "3-2" TRACK SELECTOR BUTTON, and set Monitor Switch to "Tape" position.

TRACK SELECTOR
MONO. 1-4

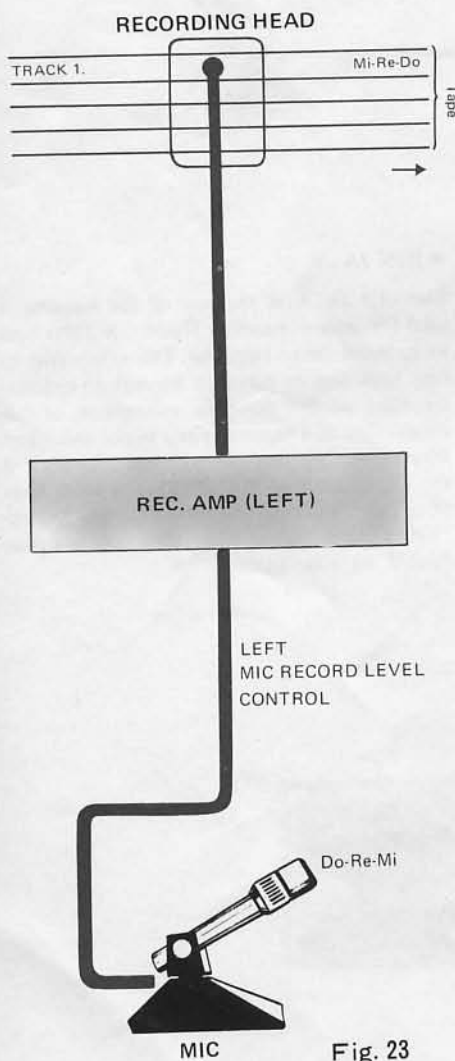


Fig. 23

TRACK SELECTOR
MONO. 3-2

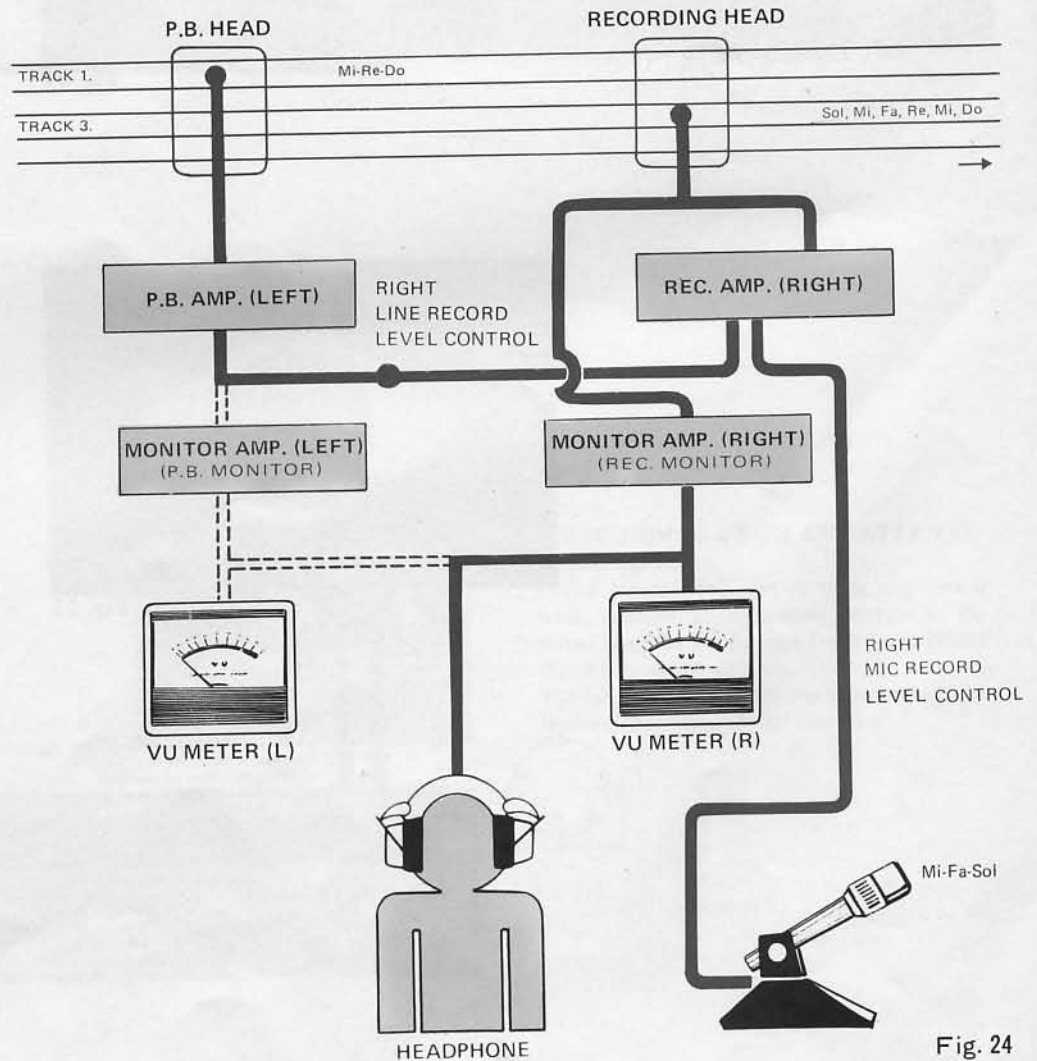


Fig. 24

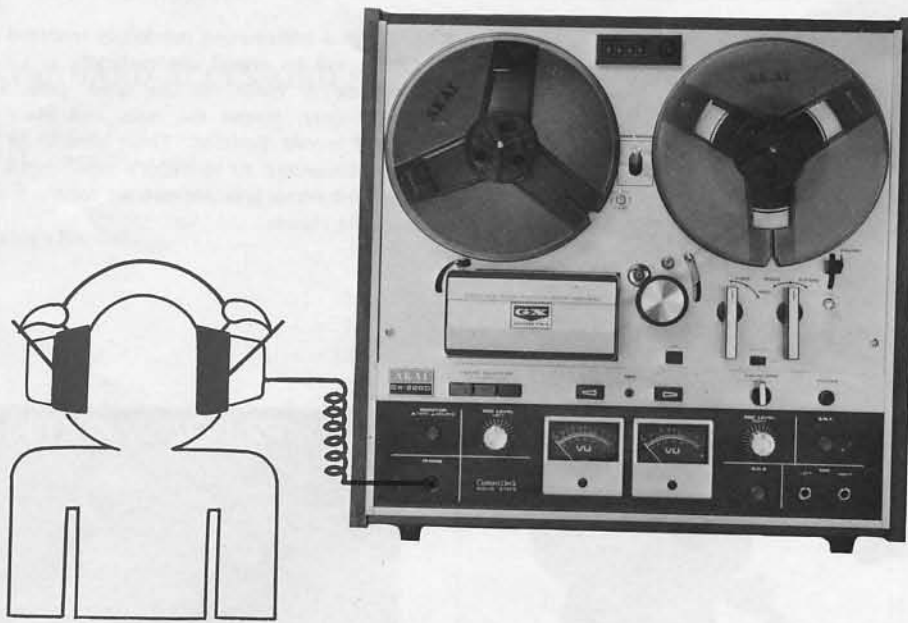


Fig. 25

■ MONITORING

For monitoring, connect stereo headphone plug to HEADPHONE JACK. Please use stereo headphones of low impedance type (8 ohms).



Fig. 26

10- S.R.T. BUTTON

Depress this S.R.T. BUTTON only when using AKAI's new SUPER RANGE TAPE (optional accessory).

This is a newly developed Low Noise Super Frequency Range tape and is highly recommended for superior performance.

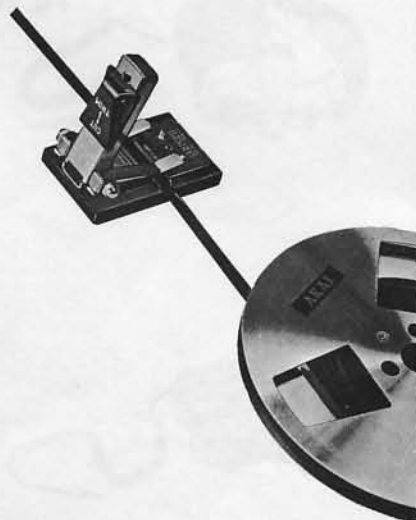
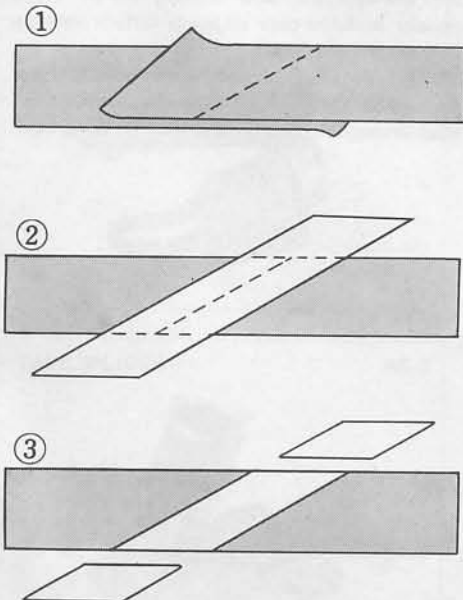


Fig. 27

11- TAPE SPLICING AND EDITING

Cut tape diagonally with an overlap so that the ends are lined up (cutting tape on diagonal eliminates detection of the splice in recording). Cover aligned ends with SPLICING TAPE. Press firmly, exerting pressure to secure ends evenly. Trim off excess splicing tape (Cut into recording tape very slightly as illustrated by dotted lines. This eliminates the possibility of a sticky splice). Splicing of tape using scissors requires skillful work. With our specially designed PORTABLE SPLICER, splicing can be done very smoothly.



Fig. 28

12- TAPE ERASING

Any signal information previously recorded on a tape will be erased automatically as a new recording is made on the same tape. For erasing only, thread the tape, and place in normal record position. There should be no plugs connected to recorder's input jacks. A bulk tape eraser is recommended for quick and complete erasure.



Fig. 29

13- HEAD DEMAGNETIZING

Normally the steel pole pieces which form a part of the Recording and Playback Heads become slightly magnetized. The effect of slight head magnetization is that it partially erases the tape, especially at high frequencies. Generally, this condition can be detected by the loss of high frequency response which cannot be corrected through head alignment.

Severe magnetization (which may be caused by using magnetized tools in the vicinity of the heads) will result in noise or considerable distortion in addition to the loss of high frequency response. Although Model GX-220D already has a built-in head demagnetizing circuit, it is recommended that head demagnetizing be performed periodically. This can be accomplished by touching the head lightly with the demagnetizer and making several small circular motions over all heads surface areas as well as the head housing.

NOTE : To avoid scratching the head surface, we suggest that you cover both prongs of the head demagnetizer with a sort of masking tape.

III. ACCESSORIES

1- STANDARD ACCESSORIES

Metallic Empty Reel	1
DR-111 Connection Cord	1
Sensing Tape	1
Spare Fuse	2
Operator's Manual	1

2- OPTIONAL ACCESSORIES

TAPE ERASER ATE-7



DYNAMIC MICROPHONES



Uni-directional UM-101



Non-directional DM-13

TELEPHONE PICK-UP AP-2



STEREO HEADPHONES



ASE-22

HEAD DEMAGNETIZER AH-8



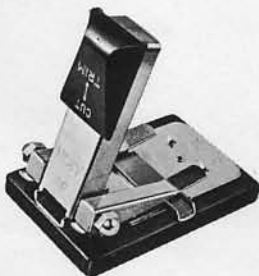
ASE-20

CONNECTION CORDS



D-100

TAPE SPLICER AS-3



ASE-9S



DR-110



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