

2-CHANNEL STEREO  
CASSETTE TAPE DECK

# CT-F2121

OPERATING INSTRUCTIONS

DV  
NB



 PIONEER

Your selection of the Pioneer CT-F2121 Cassette Tape Deck is sincerely appreciated.

This cassette tape deck is designed for incorporation into a component type stereophonic high fidelity system, and features advanced performance plus easy front panel operation. Please read this Operating Instruction thoroughly in order to benefit fully from its outstanding recording and playback capabilities.

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## CT-F2121 FEATURES

### BUILT-IN DOLBY SYSTEM REDUCES HISS

The built-in Dolby system can appreciably reduce bothersome tape hiss noise (by up to approx. 10dB at high frequencies) without affecting the sound quality of the program source. Recording and playback can thus be performed with large dynamic range and excellent SN ratio. An indicator lamp is included to advise of Dolby operation.

### BIAS & EQUALIZATION INDEPENDENTLY SELECTABLE

Independent bias and equalization selectors permit matching to the characteristics of the tape employed. Full performance can be realized from all types of cassette tape, including chrome, low noise, and standard. A new equalization design (3180 $\mu$ s + 70 $\mu$ s) is provided for chrome (CrO<sub>2</sub>) tape.

### PERMALLOY SOLID HEAD

A newly developed high hardness Permalloy core is employed in the record/playback head in order to take advantage of the special properties of chrome tape. The high reliability head offers strong resistance to wear, plus excellent frequency response and SN ratio.

### FULL COMPLEMENT OF BACK UP MECHANISMS

**Direct Mode Selection:** desired transport mode (record, play, fast forward, rewind) can be directly selected without alternating with the stop switch. Operation becomes convenient, while tape is protected from damage.

**Automatic Stopping:** if the tape runs out during any transport mode (record, play, fast forward, rewind) tape motion is automatically stopped without strain on tape or mechanism.

**Built-in MPX Filter:** cuts FM stereo 19kHz & 38kHz pilot signals. Employ for FM Dolby recording.

**Built-in Illuminating Lamp:** illuminating lamp built into cassette compartment allows easy observation of tape running condition, tape quantity, etc.

### DESIGNED FOR CONVENIENT OPERATION

Front panel operating facilities are designed for excellent compatibility with other components. The 30° cassette inclination provides easy observation of tape running condition. The CT-F2121 forms an exceptionally fine addition to any high quality stereo system.

### INSTALLATION

When installing the CT-F2121, avoid the following conditions which may lead to impaired sound quality or possible damage:

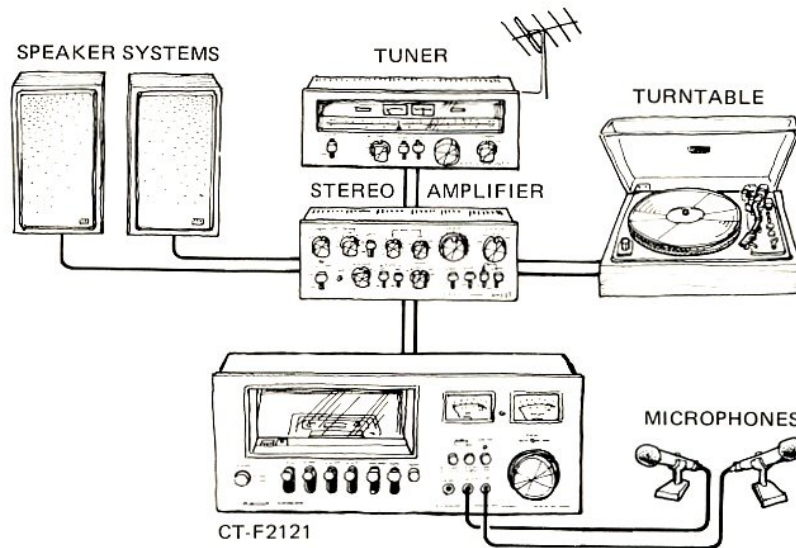
- Direct sunlight, near radiators or other heat sources.
- Places with poor ventilation or high humidity.
- Dusty locations.
- Near appliances which generate a magnetic field (TV sets, motors, transformers, etc.).
- Unlevel or unstable surfaces, or those subject to vibration.

### KEEP HEAD ASSEMBLY CLEAN

Since the heads, capstan and pinch roller contact the tape, they are prone to contamination by dust, tape particles, etc. Always keep these sections clean to assure top performance. Refer to Maintenance on page 13.

## CT-F2121 APPLICATIONS

- Stereo and mono playback of commercially prerecorded music tapes.
- Recording from FM broadcasts or records.
- Stereo and mono live recording via microphones.



## LINE VOLTAGE AND FUSE

CT-F2121 are designed to accept different line voltages, according to the country in which they are to be used, although the operation of the various models is the same in every other respect. Fig. A shows the model designed to operate at 220V only. Fig. B shows the model designed to operate at any of three pre-selected voltages (120V, 220V, 240V).

### CHANGING LINE VOLTAGE SETTING AND FUSE

To remove the fuse, unscrew the fuse cap located in the center of the line voltage selector and withdraw it, together with the fuse. Next, pull the line voltage selector plug out of its socket, rotate it until the cutaway aligns with the appropriate line voltage marked on the back of the unit, then push it back into its socket. It is important to check the rating of the fuse; a 0.5A fuse should be used with either 220V or 240V, while a 1A fuse should be used for 120V operation. If the fuse rating is correct, replace it and screw in the fuse cap.

### FUSE REPLACEMENT

When the fuse blows, remove the fuse cap and replace the fuse with a new one. (Fig. C).

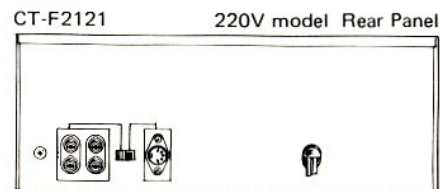
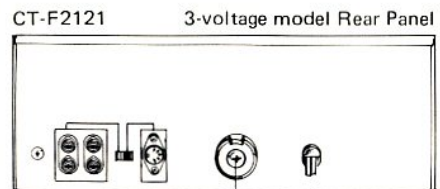


Fig. A



LINE VOLTAGE  
SELECTOR SWITCH

Fig. B

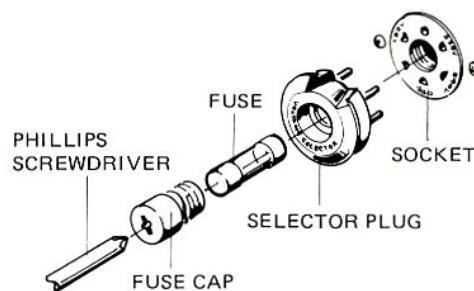


Fig. C

## FRONT PANEL FACILITIES

### POWER BUTTON

Depress to turn AC power ON (illuminating lamp will light); depress again to turn power OFF.

### CASSETTE DOOR

Keep door closed to protect the transport mechanism and head assembly from dust.

### REC INDICATOR LAMP

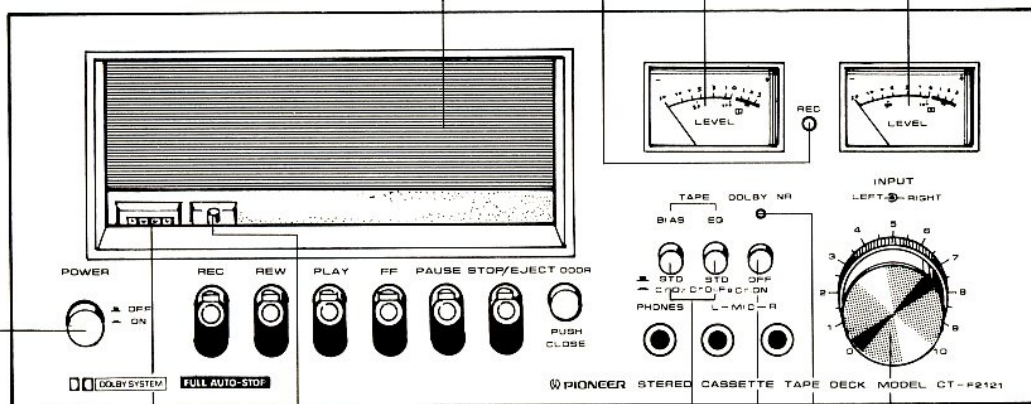
Lights to indicate recording mode.

#### NOTE:

*Be sure to confirm REC indicator lighting before proceeding with recording.*

### LEVEL METERS

Indicate input level during recording and output level during playback. During recording, adjust recording level while observing meter deflection.



### TAPE COUNTER

Indicates tape running position.

### COUNTER RESET BUTTON

Press button to reset counter to 000.

### BIAS & EQ SELECTOR BUTTONS

**BIAS:** employ during recording according to tape. Depress when using chrome tape.

**EQ:** Employ during recording and playback according to tape. Depress when using chrome or ferri-chrome tape.

Do not depress when using earlier specification (120 $\mu$ s) chrome tape for recording.

### INPUT CONTROLS

Adjust recording input from INPUT (REC) jacks, MIC jacks and DIN REC/PB jack. The outer knob adjusts the right (R) channel, while the inner adjusts the left (L) channel. Observe LEVEL meter deflection when adjusting the recording level.

### DOLBY NR LAMP

Lights when DOLBY NR button is depressed. Indicates recording or playback via Dolby mode.

### DOLBY NR BUTTON

Depress to employ built-in Dolby system for recording, or to play Dolby encoded tape. Refer to Dolby system description on page 14.

#### NOTE:

Refer to BIAS & EQ Selector Buttons on page 11 for additional information.

**PHONES JACK**

Plug stereo headphones into this jack for private listening or to monitor conditions during recording.

**CAUTION:**  
Do not plug microphone into this jack. Microphone can be damaged.

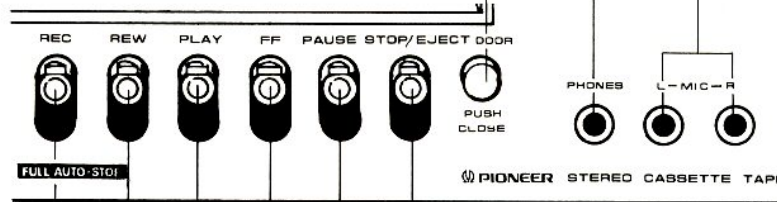
**DOOR BUTTON**

Press to close cassette door. To open door, raise it gently by hand until it clicks open.

**MIC JACKS**

Plug microphones into these jacks for live recording. Use one microphone in each jack for stereo, or one microphone in either jack for mono recording.

**NOTE:**  
Be sure to unplug microphones when not employing them. If left connected, recording cannot be performed from source connected to INPUT (REC) or DIN REC/PB jacks.



**OPERATING LEVERS**

**REC (RECORD) LEVER**

Press downward together with PLAY lever for recording.

**REW (REWIND) LEVER**

Press downward to rewind tape (tape travels from right to left).

**PLAY LEVER**

Press downward to play tape. To record, press simultaneously with REC lever. (Tape travels from left to right.)

**STOP/EJECT LEVER**

Press downward to stop tape motion and release other operating levers. After stopping, open cassette door and press lever again to eject cassette.

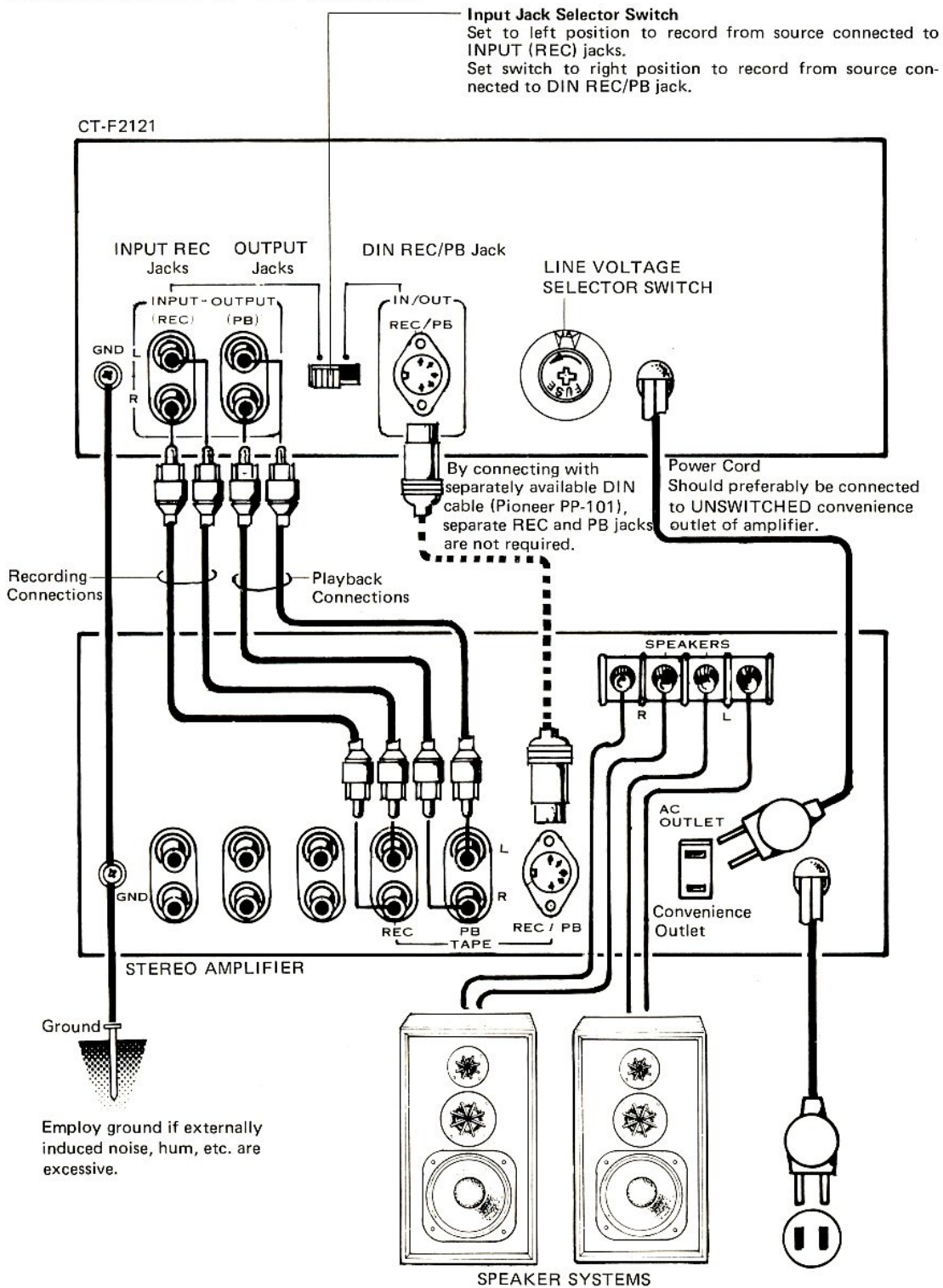
**PAUSE LEVER**

Press downward to temporarily stop tape motion during recording or playback. Press again to resume tape motion.

**FF (FAST FORWARD) LEVER**

Press downward for tape fast forward (tape travels from left to right).

# CONNECTION DIAGRAM



## TYPES OF CASSETTE TAPE

Cassette tapes are manufactured according to international standards and are generally classified by tape performance and recording time.

### PERFORMANCE CLASSIFICATIONS

1. Standard tape.
2. Low noise or low noise high output tape (also known as LH tape).
3. Chrome (i.e. chromium dioxide) tape.

Although 2 and 3 are termed high performance tape, their full performance cannot be realized unless the employed tape deck is matched to their characteristics. In some cases, incorrect matching can even yield results inferior to standard tape. The CT-F2121 is therefore provided with equalization and bias selectors in order to accommodate these tapes.

### RECORDING (PLAYBACK) TIME CLASSIFICATIONS

Although the external dimensions of cassettes are standardized, playing and recording time differs according to tape thickness (length)

Table 1

RECORDING TIME (MINUTES)		CASSETTE TAPE DESIGNATION
ONE SIDE	BOTH SIDES	
15	30	C-30
30	60	C-60
45	90	C-90
60	120	C-120

Currently, C-60 and C-90 are the most commonly used. C-120 is not recommended due to mechanical and electrical differences.

### STEREO & MONO TAPE

Magnetic tape is divided into recording tracks, as shown in Fig. 1, which correspond to the channels when played back through a stereo amplifier. The CT-F2121 is termed a 4-track 2-channel stereo cassette tape deck.

When side A (or side 1) of a cassette is recorded, the tracks used are  $L_1$  and  $R_1$  (Fig. 1), while tracks  $L_2$  and  $R_2$  are used for recording on side B (or side 2). Mono recording employs a single track ( $L_1 + R_1$  or  $L_2 + R_2$ ) for each side, allowing the tape to be played on a stereo tape deck. Conversely, a stereo recorded tape can also be played on a mono tape deck.

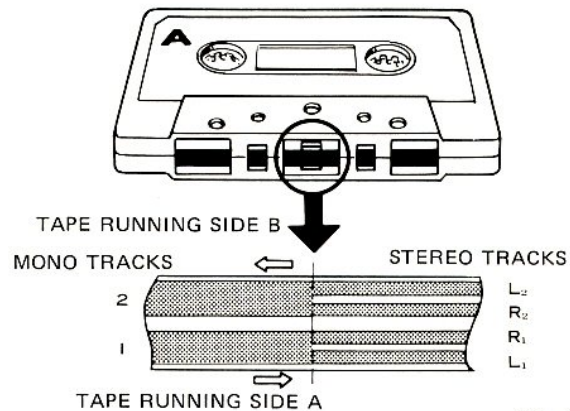


Fig. 1

## CASSETTE HANDLING RECOMMENDATIONS

### Check Tape before Recording

Before recording, first run the tape through fast forward and rewind. This is to prevent tape sticking from affecting the recording.

### Allow for Leader Tape

Leader tape (which cannot be recorded) is provided at the beginning of the cassette tape. Since the leader tape takes about 5 seconds to clear the heads, allow for it when recording.

### Store Cassettes in Individual Packages

Avoid storing uncovered cassette tapes. Store them in their individual packages to protect from dust, tape unwinding, etc.

### Do Not Insert Tape Immediately after Cleaning Heads

After cleaning heads with head cleaning fluid, allow them to dry completely (2 ~ 3 minutes) before inserting tape.

### Tape Storage

When storing cassette tapes, select a location that is free from dust, oil and magnetic fields.

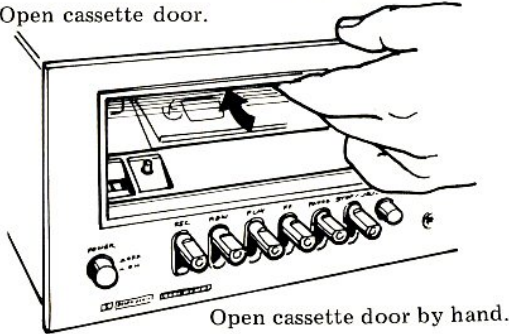
### Do Not Touch Tape

Do not touch the tape surface directly by finger, as this can cause possible sound skipping.

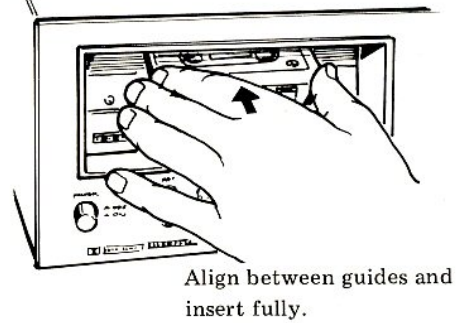
# BASIC OPERATION

## TAPE INSERTION & REMOVAL

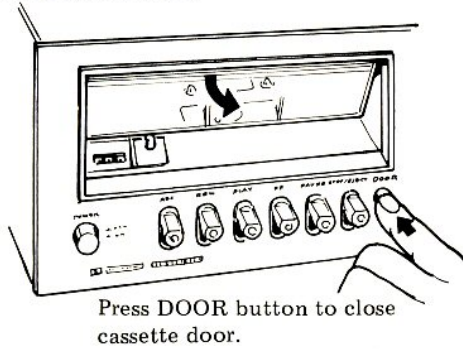
1. Open cassette door.



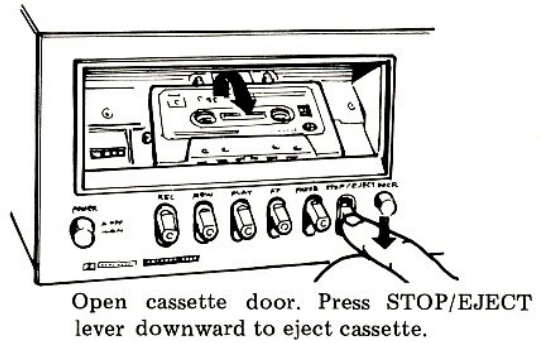
2. Insert cassette.



3. Close cassette door.



4. Remove cassette.



## CASSETTE TAPE PRECAUTIONS

### Check for Looping and Slack

If the tape protrudes from the cassette, as shown in Fig. 2, or is slack, the tape can run without passing between the capstan and pinch roller, and possibly be damaged. Take up the slack by inserting a pencil through the reel hub and turning as indicated in the Fig. 2.

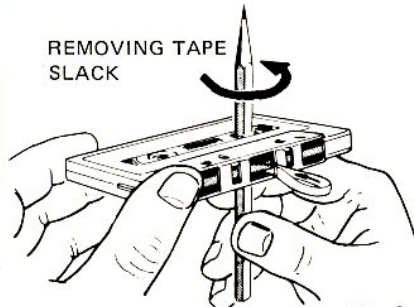


Fig. 2

### Erase Prevention Tabs

Cassette tapes are provided with erasure prevention, as shown in Fig. 3. To prevent accidental erasure of an important tape, use a screwdriver or similar tool to break off the tab corresponding to the desired side of the tape. With the tab broken off, the CT-F2121 will not record even if the REC lever is depressed, thus protecting the tape from erasure.

#### NOTE:

Since tabs are provided for each side of the tape (A & B or 1 & 2) each side can be protected individually.

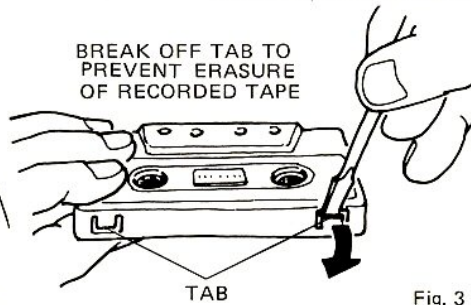


Fig. 3



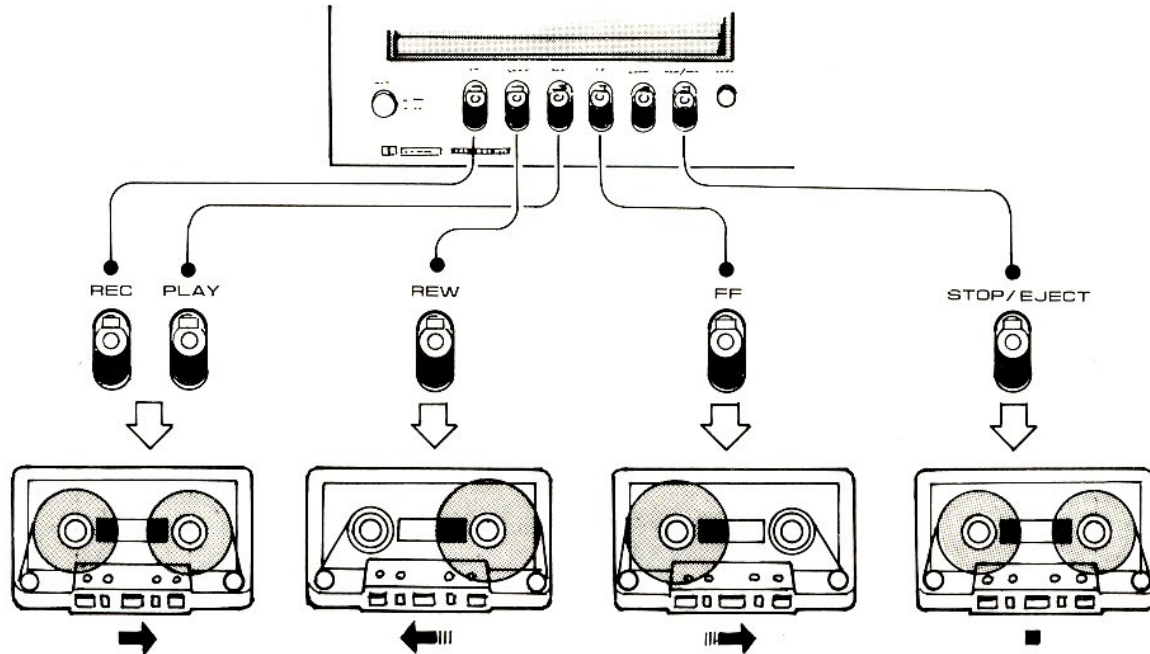
Fig. 4



**TAPE RUNNING**

**NOTE:**

1. Do not depress more than one lever at a time, except for the PLAY and REC levers during recording.
2. It is not necessary to depress the STOP lever between selection of different modes.



**PLAY & REC MOTION**

1. Confirm presence of tape on left reel.
2. Depress PLAY lever (and REC lever if recording). Tape will travel from left to right at play speed and tape counter will advance.

**REWIND (REW)**

1. Confirm presence of tape on right reel.
2. Depress REW lever. Tape will travel from right to left at high speed.

**FAST FORWARD (FF)**

1. Confirm presence of tape on left reel.
2. Depress FF lever. Tape will travel from left to right at high speed.

**STOP**

Depress STOP lever to stop tape motion. This also releases other operating levers.

**PAUSE**

1. Tape motion can be stopped during recording or playback by pressing the PAUSE lever downward. The PLAY lever (and REC lever if recording) will not be released.
2. Resume tape motion by again pressing the PAUSE lever.

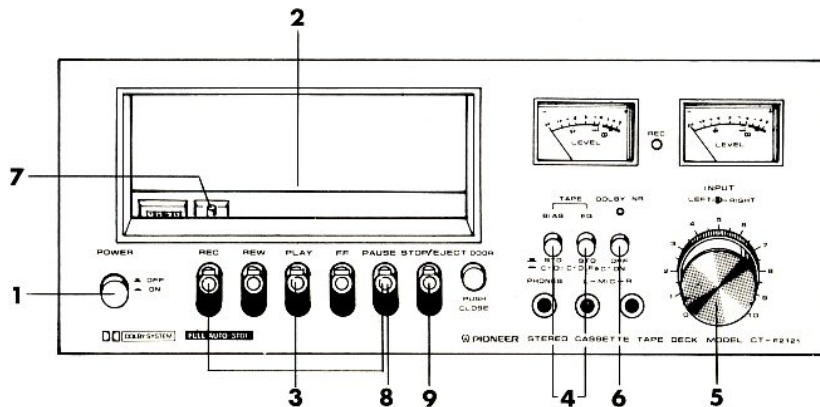
**NOTE:**

When the PAUSE lever is pressed, the pinch roller separates from the capstan to temporarily stop tape motion during recording or playback. Motor (capstan) and amplifier continue to operate.

**AUTOMATIC STOPPING MECHANISM**

During each operating mode (record, play, fast forward, rewind) when the tape is completely wound onto one reel, the automatic stopping mechanism stops the tape and releases the operating levers. This function operates even if the STOP/EJECT lever is not pressed. The automatic stopping function takes several seconds to complete.

## RECORDING STEPS



### 1. DEPRESS POWER BUTTON TO ON.

### 2. INSTALL CASSETTE

Confirm presence of tape on left reel, open cassette door and insert cassette.

### 3. RECORDING STANDBY

Press PAUSE lever, then simultaneously press REC and PLAY levers. REC indicator lamp will light to advise of recording mode.

### 4. SET BIAS AND EQ BUTTONS

Set BIAS and EQ buttons according to the tape to be used. Refer to BIAS & EQ Selector Buttons on page 11.

### 5. ADJUST RECORDING LEVEL

Refer to the following section "Recording Level Setting" and set the recording level.

### 6. SELECT DOLBY NR BUTTON POSITION

Depress button to ON for Dolby recording. Refer to "Employing Dolby System" on page 14.

### 7. RESET TAPE COUNTER

Press counter RESET button to obtain 000 indication.

### 8. BEGIN RECORDING

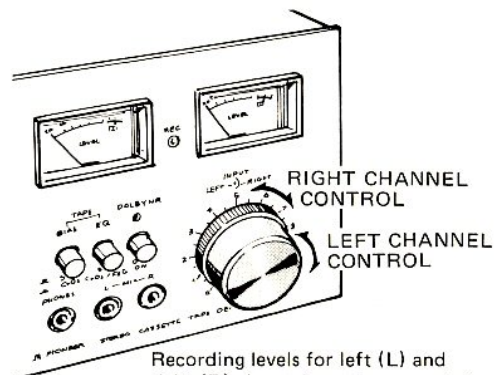
Re-press PAUSE lever to begin tape motion. Confirm level meter deflection, tape counter operation, and visually observe tape running condition.

### 9. END RECORDING

Press STOP/EJECT button to stop tape motion and release REC and PLAY levers. If tape runs out during recording, the CT-F2121 will automatically stop and release the operating levers.

## RECORDING LEVEL SETTING

The recording level setting strongly influences the playback sound. If set too high, where the level meters deflect beyond the scale, distortion will be produced. Conversely, insufficient recording level results in reduced SN ratio making noise more apparent during playback. For normal programs, set the recording level for a meter deflection within the  $-3\text{dB} - 0\text{dB}$  range. Take care when setting, since meter deflection varies considerably according to the program source.



Recording levels for left (L) and right (R) channels can be separately adjusted.

Fig. 5

**BIAS & EQ SELECTOR BUTTONS**

Bias and equalization selector buttons are provided for matching tape characteristics in order to derive full tape performance and produce low distortion recordings and playback. Although these buttons can be set according to personal preference, Table 2 shows the recommended settings based on tape types.

*NOTE:*  
When employing commercially pre-recorded chrome tape, set the EQ button to Cr0<sub>2</sub> (depressed) for 70μs high frequency response tape, and to STD (undeepressed) for general type chrome tape.

**EMPLOYING PAUSE LEVER**

Pressing the PAUSE lever is convenient in the following situations.

- When setting the recording level.
- To skip unnecessary portions of the program source, then continue recording.
- To temporarily interrupt the sound during play.

**NOTES IN EMPLOYING**

- Be sure to press the STOP/EJECT lever to stop the tape for an extended period.
- When recording onto previously recorded tape, operating the PAUSE lever will cause a portion of the earlier sound to remain. This should be allowed for when recording.
- The PAUSE function does not operate during fast forward or rewind.

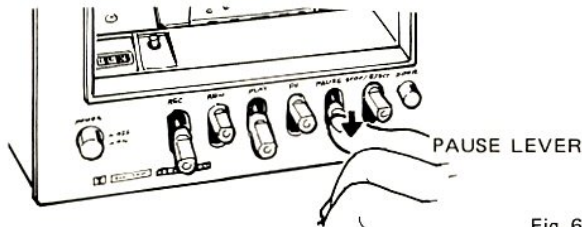


Fig. 6

**EMPLOYING TAPE COUNTER**

Use the tape counter for locating desired tape passages. At the start of the tape, press the RESET button to obtain a 000 indication, then proceed with recording or playback. At the beginning and end of desired passages, observe the counter indication and write the indicated numbers on a memo (on cassette, its package, or in a log book). This will aid greatly in locating the passages in the future.

**ERASING TAPE**

- Recording onto previously recorded tape automatically erases the earlier sound.
- To completely erase a tape, set the INPUT controls fully counter clockwise to 0, then record (without an input signal). This will erase the tape.

**Major Tape Brands & Button Settings**

Table 2

BIAS & EQ SETTINGS	TAPE	
	STD POSITION  (BUTTONS IN UNDEPRESSED POSITION)	MEMOREX
BASF		C-60LH, C-90H C-60, C-90
AGFA		SUPER C-60 + 6 SUPER C-90 + 6
SCOTCH		C-60, C-90 DYNARANGE
MAXELL		LN C-60, C-90 UD C-60, C-90 UDXL C-60
TDK		D C-60, D C-90 SD C-60, SD C-90 ED C-60, ED C-90
FUJI		FM C-60, FL C-60, FX C-60 FM C-90, FL C-90, FX C-90
SONY		C-60, C-90 C-60HF, C-90HF
CrO <sub>2</sub> POSITION  (BUTTONS IN DEPRESSED POSITION)	MEMOREX	CHROMIUM DIOXIDE C-60 CHROMIUM DIOXIDE C-90
	BASF	CHROMDIOXID C-60 CHROMDIOXID C-90
	PHILIPS	CHROMIUM DIOXIDE C-60 CHROMIUM DIOXIDE C-90
	MAXELL	CHROME DIOXIDE C-60 (CR) CHROME DIOXIDE C-90 (CR)
	TDK	KR C-60, KR C-90 SA-C-60
	FUJI	FC C-60, FC C-90
SONY	C-60CR, C-90CR	
DURING RECORDING	SONY	DUAD C-60 C-90
BIAS-STD EQ-CrO <sub>2</sub> DURING PLAY EQ-CrO <sub>2</sub>	SCOTCH	CLASSIC C-60 CLASSIC C-90 In some cases, setting EQ to STD may be preferable on playback.

*NOTE:*  
In addition to these, different button settings according to tape type may provide improved results.

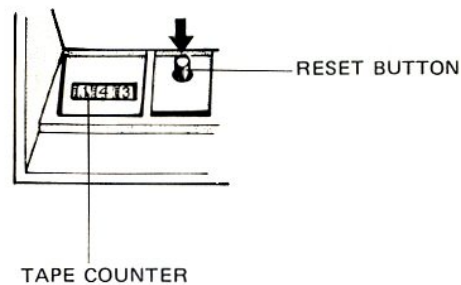


Fig. 7

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## RECORDING FROM MICROPHONES

### STEREO RECORDING

1. Use a stereo type microphone or 2 of the same model microphone. Plug the left channel microphone into the MIC L jack, and the right channel microphone into the MIC R jack.
2. Proceed with recording as described in Recording Steps on page 10.

**NOTE:**

Be sure to unplug microphones when not employing them. If left connected, recording cannot be performed from sources connected to the INPUT (REC) or DIN REC/PB jacks.

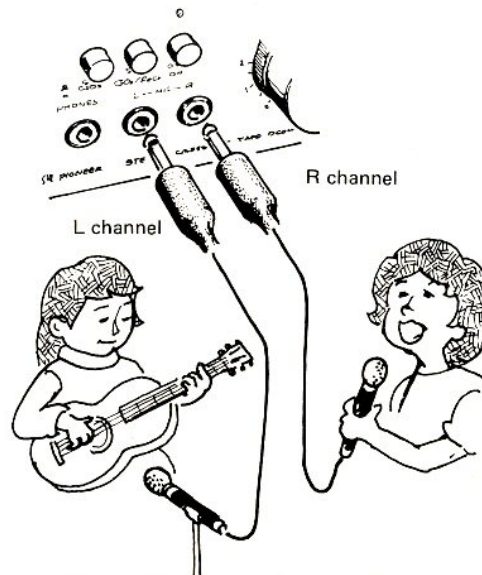
### MONO RECORDING

- When connecting only one monophonic microphone, turn the INPUT level control of the unused channel (L or R) fully counterclockwise to minimum.
- If recording via the INPUT (REC) jacks, improved results may be obtained by connecting the mono signal to both left and right channels of the CT-F2121. This requires a separately sold connecting cord.

### MICROPHONE RECORDING NOTES

Observe the following points when recording with microphones.

- Employ dynamic or electret condenser microphones.
- Use high impedance (more than  $20k\Omega$ ) microphones with cord lengths of less than 5 meters (about 16 ft.)
- When recording with microphones, monitoring via headphone is recommended for better results.



Howling may result if microphones are placed close to speakers.

Fig. 8

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### SUGGESTIONS FOR BETTER RECORDINGS

Since tape recording is considerably affected by conditions external to the tape deck, use adequate care in regard to the following points.

#### Confirm Connections

Loose or incorrect connections can cause noise and recording difficulties. Inspect cords and connections prior to recording.

#### Tune in FM Station Properly

Tune in station several minutes before the start of the desired program to allow the tuner time to warm up and stabilize. Best results can be obtained by employing a special FM antenna.

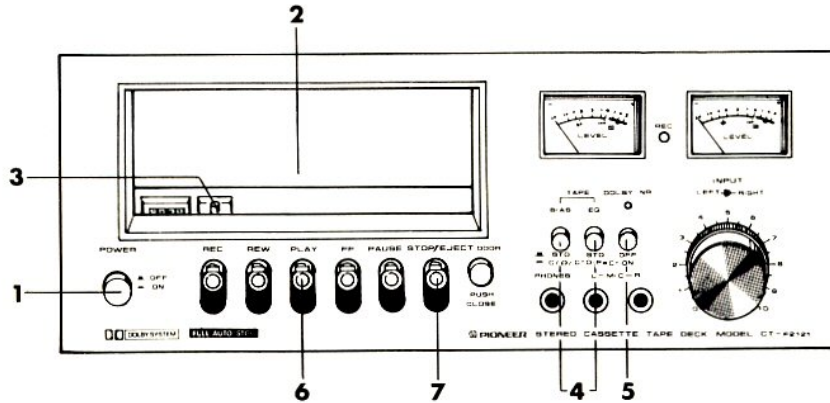
#### Inspect Records and Stylus

Before recording from records, use a good quality record cleaner to remove dust from the grooves. Also clean the stylus with a stylus brush.

#### Separate from Noise Sources

Observe possible causes of external noise which may affect the recorded sound. These include hair dryers, buzzers, refrigerator thermostats, and similar electrical noise sources. Avoid using such appliances while recording is in progress.

## PLAYBACK STEPS



**1. DEPRESS POWER BUTTON TO ON.**

**2. INSERT CASSETTE**

Confirm presence of tape on left reel of pre-recorded cassette. Open cassette door and insert cassette.

**3. RESET TAPE COUNTER**

Press RESET button to obtain 000 counter indication.

**4. SET BIAS AND EQ BUTTONS**

Set according to type of tape. Refer to BIAS & EQ Selector Buttons on page 11.

**5. SELECT DOLBY NR BUTTON POSITION**

Depress to ON to play Dolby encoded tape.

**6. START PLAYBACK**

Press PLAY lever downward to start tape running. The output level will be indicated on the two LEVEL meters.

**7. END PLAYBACK**

Press STOP/EJECT lever to stop tape and release PLAY lever. If the tape runs out during playback, the CT-F2121 will automatically stop and release the PLAY lever.

## MAINTENANCE

Regular maintenance is important for equipment that contains rotating parts, such as cassette tape decks. The simple maintenance steps described below should be performed regularly and carefully to ensure continued high performance.

### CLEAN HEAD ASSEMBLY

With extended use, dust and dirt can accumulate on the heads and capstan, which can lead to poor sound quality and sound skipping. To prevent this, carefully clean the heads, capstan and surrounding parts with the accessory cleaning stick or a soft cloth.

#### Extend Head Assembly for Easier Cleaning

1. Set POWER button to OFF (undepressed).
2. Press PLAY lever downward to extend head assembly.
3. Open cassette door and clean with accessory head cleaning stick.

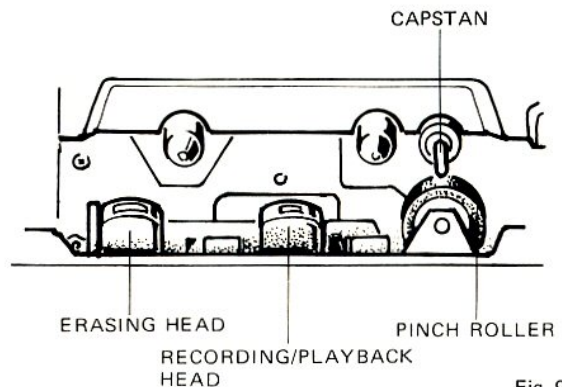


Fig. 9

**NOTES:**

1. Avoid bringing metallic objects, such as screwdrivers, pliers, magnets etc. near the heads.
2. Do not use paint thinner, benzene, alcohol or other volatile liquids to clean the case and panel.

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## EMPLOYING DOLBY\* SYSTEM

The Dolby System is a method of reducing the noise generated in the playback process. It is currently widely employed throughout the world. As the system is mainly concerned with noise produced by the tape itself, it cannot appreciably reduce noise contained in the program source being recorded. For this reason, the signal should be as free from noise as possible in order to derive maximum benefit from the Dolby process. Noisy records or FM signals etc. should be avoided.

### PRINCIPLE

The magnetic tape employed with a tape recorder possesses a certain degree of inherent noise. Within this noise, the most easily audible is mid to high frequency hiss noise, which is considered to arise from magnetic particle size. If the magnetic particles are small, or if the tape speed is increased, which in practice is equivalent to reducing the particle size, tape hiss noise is reduced.

The slow speed employed by cassette tape however, places it at a disadvantage in this respect. The Dolby system (B type) built-into the CT-F2121 is intended mainly for reducing this hiss noise. An A type system is also available which reduces all types of noise (employed only in special professional applications). Although the noise reduction frequency band differs, both types under optimum conditions are capable of providing up to 10dB improvement.

The B type noise reduction system performs as follows.

During recording, when the input signal falls below the reference level, the mid and high frequency components are successively enhanced prior to recording. The reverse process is employed during playback, i.e.: mid and high frequency components below the reference level are attenuated prior to playback. Thus the signal is returned to its original form, and hiss noise produced in the playback process is significantly reduced.

### TAPE SELECTION

The CT-F2121 has no special requirements, so although there are some differences between standard, chrome and LH types, nearly all types of cassette tape can be employed. Caution is recommended however, regarding C-120, ultra high sensitivity LH tape, and special purpose tapes.

### RECORDING LEVEL

Recording level adjustment is generally the same as with non-Dolby recordings. With wide dynamic range sources, such as live recording via microphones, it may be advisable to set the recording level lower than normal. Since the Dolby system also provides some reduction in high level sounds, it becomes an advantage during live recording.

### PLAYBACK

- Commercially sold pre-recorded tapes produced by the Dolby system (Dolby encoded tapes) can be played via the CT-F2121 Dolby mode for low noise sound reproduction.
- The Dolby system must be applied during both recording and playback in order to provide satisfactory performance. Normal playback of Dolby recorded tape, or Dolby playback of normally recorded tape will result in unnatural frequency balance and interfere with program enjoyment.

Manufactured under license from Dolby Laboratories Incorporated.

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**SPECIFICATIONS**

Systems . . . . . Compact cassette, 2-channel stereo

Recording . . . . . AC bias system (bias frequency: 85kHz)

Erasing . . . . . AC push-pull system

Heads . . . . . "Permalloy Solid" recording/playback head x 1  
 Ferrite erasing head x 1

Motor . . . . . Electronically-controlled DC motor

Fast Winding Time . . . . . Approximately 80 seconds  
 (C-60 tape)

Wow and Flutter . . . . . No more than 0.12% (WRMS)

Frequency Response . . . . . Standard, LH tapes;  
 30 to 13,000Hz (40 to 11,000Hz,  $\pm 3$ dB)  
 Chromium dioxide tape; 30 to 16,000Hz  
 (40 to 12,000Hz,  $\pm 3$ dB)

Signal-to-Noise Ratio . . . . . Dolby OFF; 48dB  
 (standard and LH tapes)  
 Dolby ON; 58dB  
 (over 5kHz, standard and LH tapes)

(When chromium dioxide tape is used, signal-to-noise ratio  
 is further improved by 4.5dB over 5kHz)

Inputs (Sensitivity/Maximum allowable input/Impedance)

MIC x 2; 0.3mV/63mV/20k $\Omega$ , 6mm $\phi$  jacks  
 (Reference Mic impedance; 600 $\Omega$  to 20k $\Omega$ )

LINE x 2; 63mV/12V/50k $\Omega$ , Pin jacks

REC/PB x 1; 10mV/2V/10k $\Omega$ , 5P jack  
 (DIN standard)

Outputs (Reference level/Load impedance)

LINE x 2; 450mV/50k $\Omega$ , Pin jacks

HEADPHONE x 1; 80mV/8 $\Omega$ , 6mm $\phi$ , stereo jack

REC/PB x 1; 450mV/50k $\Omega$ , 5P jack  
 (DIN standard)

Semiconductors . . . . . Amplifier section; 41 transistors  
 (including 2 FETs)  
 28 diodes (including 3 Zener Diodes, 1 LED)

Motor control section; 2 transistors, 1 diode

Subfunctions . . . . . •Dolby system (ON-OFF)  
 with indicator lamp

•Tape selector (STD/CrO<sub>2</sub>) Independently  
 switchable bias and equalizer

•Full-auto stop mechanism  
 (in all modes of PLAY/REC/FF/REW)

•Cassette compartment illumination

Power Requirements . . . . . AC 220V (only) or  
 120V, 220V and 240V (switchable) 50 – 60Hz

Power Consumption . . . . . 15 watts (max.)

Dimensions . . . . . 350(W) x 142(H) x 282(D) mm.  
 13-3/4(W) x 5-5/8(H) x 11-1/8 (D) in.

Weight . . . . . 14 lb 9 oz (6.6 kg) (without package)

Accessories . . . . . Stereo connecting cord  
 with pin plugs x 2  
 Head cleaning kit x 1  
 Operating instructions x 1

**NOTE:**

*Specifications and design subject to possible modification without notice due to improvement.*

**Test Conditions:**

1. Reference tape: standard, LH tapes are DIN no. 45513  
 chrome tape is DIN no. 45513 (CrO<sub>2</sub>)
2. Reference recording level is meter 0dB level (equivalent to 160 pwb/mm).
3. Reference signal is 333Hz.
4. Wow & Flutter: at 3kHz weighted rms.
5. Frequency response is measured at -20dB level, DOLBY OFF.  
 Level deviation is +6dB without indication.
6. Signal-to-Noise ratio is measured at 4dB level (equivalent to 250 pwb/mm), with IEC A curve on weighted.
7. Sensitivity: Input level (mV) for reference recording level measured with input (recording) level control set at maximum position.
8. Maximum allowable input level is measured at the point where the output signal wave is clipped while gradually turning the input level control.
9. Output (playback) level: Output level to reference recording level.

**TROUBLE? PLEASE CHECK**

Most cases of operating difficulty can be traced to simple causes such as improper maintenance, incorrect or loose connections, defective tape, and incorrect operating method. The following checklist is provided for correcting the most commonly experienced difficulties.

FAULT	PROBABLE CAUSE	REMEDY
No tape transport.	<ol style="list-style-type: none"> <li>1. The power line is unplugged.</li> <li>2. The tape is fully wound on.</li> <li>3. The PAUSE lever is down.</li> <li>4. The cassette tape is not loaded properly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Plug the line in firmly.</li> <li>2. Rewind the tape.</li> <li>3. Press and release the PAUSE lever.</li> <li>4. Re-insert the cassette.</li> </ol>
Poor high frequency response.	<ol style="list-style-type: none"> <li>1. Dirty heads.</li> <li>2. Incorrect setting of BIAS &amp; EQ SELECTORS.</li> <li>3. Dolby circuit on when playing normally recorded tape.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean.</li> <li>2. Re-record with the correct setting.</li> <li>3. Switch off the Dolby circuit.</li> </ol>
Playback sound is distorted.	The recorded tape itself is distorted.	Check sound quality with another cassette.
The playback sound has a "tremulo" (wow or flutter).	<ol style="list-style-type: none"> <li>1. The capstan is dirty.</li> <li>2. Tape is wound too tightly.</li> <li>3. The tape has stretched.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean.</li> <li>2. Try with a different cassette.</li> <li>3. Try with a different cassette.</li> </ol>
Noise level is high.	<ol style="list-style-type: none"> <li>1. The cassette tape is old.</li> <li>2. The head is magnetized.</li> <li>3. Dolby circuit not used to play back "Dolby-ized" tape.</li> </ol>	<ol style="list-style-type: none"> <li>1. Try a new cassette.</li> <li>2. Demagnetize the head.</li> <li>3. Put the Dolby switch ON.</li> </ol>
Recording impossible.	The protective tabs on the cassette have been broken out.	Replace with a different cassette, or cover the tab opening with cellophane tape.
Recordings are distorted.	<ol style="list-style-type: none"> <li>1. Input level too high.</li> <li>2. The heads are dirty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the recording level.</li> <li>2. Clean.</li> </ol>

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