

OTARI®

MX-5050 PROFESSIONAL RECORDER

INSTRUCTION MANUAL



CAUTION

To prevent fire or shock hazard:

Do not expose this appliance to rain or moisture.

Do not remove back.

No user-serviceable parts inside.

Refer servicing to qualified service personnel.

MX-5050 SERIES PROFESSIONAL RECORDER

INTRODUCTION

This manual provides descriptive information, installation, operation instructions, preventive maintenance and normal adjustments for the Otari MX-5050 Series Professional Recorder.



MX-5050 Recorder
(2-Channel Version in Standard Wooden Case)

COMMUNICATION WITH OTARI

-FOR SERVICE INFORMATION AND PARTS-

The OTARI PRODUCTS are manufactured under strict quality control and each unit was carefully tested and inspected prior to shipment from our factory.

If, however, some adjustments or technical support become necessary, replacement parts are required, or technical questions arise, please contact your nearest Otari dealer or write to:

OTARI ELECTRIC CO., LTD.

4-29-18, Minami Ogikubo,
Suginamiku, Tokyo, 167, Japan
Phone: (03) 333 - 9631
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OTARI CORPORATION

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California 94070, U. S. A.
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Another part of Otari continous technical support program for our products, is the continous revision of manuals as the equipment is improved or modified.

In order for you to receive our information and service applicable to your requirement, and for the technical support to function properly, please include the following information, most of which can be obtained from the name plate on the equipment.

1. Model Number
2. Serial Number
3. Date of purchase
4. Name and address of dealer from whom machine was purchased.
5. Power requirements (voltage and frequency)
6. Manual number which you are referring

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AF-230-101	Record/Reproduce Electronics

SECTION I
GENERAL INFORMATION

SECTION I

GENERAL INFORMATION

The MX-5050 Series Professional Recorders are professional quality two-speed audio tape recorder/reproducers designed for optimum performance and long life. The systems are available mounted in a standard wooden case, optional portable case, or mounted for vertical or horizontal installation in a rack or custom console.

The MX-5050 Series use ¼-inch tape and are available in eight different model configurations as shown in Table I-1. The configuration is determined by the tape-speed pair and the tape recording and reproducing format.

Table I-1. MX-5050 Model Configurations

Model No.	Tape Speed (in/sec)	Recording Method	Reproducing Method
MX-5050-2SHT MX-5050-2SL	15 & 7½ 7½ & 3¾	½-track 2 channel Stereo ½-track Monaural Recording with synchronous reproduction	½-track 2 channel Stereo ¼-track 2 channel Stereo
MX-5050-4SH MX-5050-4SL	15 & 7½ 7½ & 3¾	¼-track 2 channel Stereo ¼-track Monaural Recording with synchronous reproduction	¼-track 2 channel Stereo ½-track 2 channel Stereo
MX-5050-QXH MX-5050-QXL	15 & 7½ 7½ & 3¾	¼-track Quad Stereo ¼-track Monaural Recording with synchronous reproduction	¼-track Quad Stereo ¼-track 2 channel Stereo
MX-5050-FH MX-5050-FL	15 & 7½ 7½ & 3¾	Full track Monaural	Full track Monaural

I-1. SYSTEM DESCRIPTION

Among the many professional features of the MX-5050 Series are: selective reproduction, motion sensing, edit control that permits spilling and rocking, adjustable cueing control for audible monitoring in fast forward and rewind, built-in test and cue-tone oscillator, front adjustable bias and equalization controls, XLR type connectors for input and output lines, standard reference level output calibration control, separate line and microphone input level controls for each channel, a VU meter for each channel, and an optional DC capstan servo with variable control of each capstan speed.

I-1-(1) TAPE TRANSPORT

All components of the tape transport are mounted on a rigid aluminum base for stability. The transport design incorporates two 6-pole induction motors for the reels and a 2-speed hysteresis-synchronous motor for the capstan. Speed selection is made by operation of a front panel pushbutton switch which also switches equalization. The operating speed pairs of each model MX-5050 are summarized in Table I-2.

Table I-2. Available Standard Tape-Speed Combinations

Model Type	Model Numbers	Speed Combination	
		High	Low
High Speed	MX-5050-2SHT, -4SH, -QXH, -FH	15 in/sec	7½ in/sec
Low Speed	MX-5050-2SL, -4SL, -QXL, -FL	7½ in/sec	3¾ in/sec

The transport accommodates tape reels 10½ inches, 8 inches, 7 inches, and 5 inches in diameter in NAB or EIA hub configuration. A solenoid-actuated tape lifter lifts the tape away from the heads in fast forward and rewind modes in addition to stop mode to increase head and tape life.

In addition to the editing controls, a tape-splicing block (Fig. III-2) mounted on the head cover holds the tape for ease of editing, cutting, and application of splicing tape.

Momentary contact pushbutton controls on the transport are used to select operational modes, record, play, stop, rewind, and fast forward. These modes may be controlled from a remote location by means of an optional remote control unit (Table I-5).



Fig. I-1 MX-5050 Major Components

I-1-(2) RECORD/REPRODUCE ELECTRONICS

The record/reproduce electronic unit is located directly beneath the transport control panel and since each unit provides two separate channels of record/reproduce electronics, two units are required for a four channel simultaneous-record/reproduce system. Each unit is complete including a bias oscillator, selective reproduce controls, and facilities for setting standard reference level. The electronics are all solid state and are primarily contained on printed circuit boards to facilitate maintenance.

I-1-(3) HEAD ASSEMBLIES

As viewed from the front of the recorder, the configuration of the head assembly in each model MX-5050 is as shown in Table I-3.

Table I-3. Head Assembly Configuration

Model No.	Head Structure				Recording Method
	H1	H2	H3	H4	
*MX-5050-2SHT *MX-5050-2SL	Erase ½T/2ch	*Playback ¼T/2ch	Record ½T/2ch	*Playback ½T/2ch	½-track 2 channel Stereo ½-track Monaural Recording with synchronous reproduction
*MX-5050-4SH *MX-5050-4SL	Erase ¼T/2ch	*Playback ½T/2ch	Record ¼T/2ch	*Playback ¼T/2ch	¼-track 2 channel Stereo ¼-track Monaural Recording with synchronous reproduction
**MX-5050-QXH **MX-5050-QXL	**Erase ¼T/2ch	**Erase ¼T/2ch	Record ¼T/4ch	Playback ¼T/4ch	¼-track Quad Stereo ¼-track Monaural Recording with synchronous reproduction
MX-5050-FH MX-5050-FL	Erase Full T.	*Playback ½ T/2ch	Record Full T.	*Playback Full T.	Full track Monaural ½-track 2 channel Stereo

Note: * The head assembly of these models contain two playback head stacks. A head change-over switch on the head assembly permits selection of either head stack.

** The erasing of MX-5050-QX is performed by two staggered erase heads (H1 & H2).

I-2. STANDARD ACCESSORIES

The MX-5050 is supplied with the standard accessories listed in Table I-4.

Table I-4. Standard Accessories

Description	Quantity	Otari Part No.
Connecting Cable (QX Only)	1	TZ-127-026
NAB Hub Reel Hold Down Knob	2	TW-661
Reel Adjusting Disc (Shim)*	2	TY-506
Fuse (2 Ampere)	1	FS-1-2A
Otari Takeup Reel, 10-½ inch	1	TY-500
Operation Manual	1	OIM-1005E

* The reel-adjusting disc (shim) is placed between the metal and the turn-table to compensate the thickness between metal reels and plastic reels.

I-3. OPTIONAL ACCESSORIES

Available optional accessories are listed in Table I-5.

Table I-5. Optional Accessories

Description	Otari Part No.
Rack Mount Adaptor	CS-252
Portable Case	CS-253
Speed Conversion Kit (for 50 Hz)	TZ-220
Speed Conversion Kit (for 60 Hz)	TZ-221
Remote Control Unit (2S, 4S)	CR-705
(QX)	CR-705A
Dust Cover (2S, 4S)	TY-559
(QX) Amplifier	TY-500-064
Tape Transport	TY-500-063
Balanced Input Line Transformer, 600 ohms	ET-21-181
Balanced Output Line Transformer, 600 ohms	ET-31-182
Cleaning Kit	TY-502
Maintenance Manual	OMM-1003E

I-4. SERVICE AND REPLACEMENT PARTS

For service and replacement parts, or any necessary technical support, please contact your nearest service center, Otari dealer or write to Otari. (See page ii in detail.)

I-5. SPECIFICATIONS

The specifications of MX-5050 Series are as listed in Table I-6.

Table I-6. Specifications of MX-5050 Series

Tape Width & Channels:	¼ inch (6.3mm) tape : 2 channel (0.075 in. or 1.9mm track width) 4 channel (0.040 in. or 1.0mm track width)
Tape Speeds:	7½ and 15 ips (19 and 38 cm/s) or 3¾ and 7½ ips (9.5 and 19 cm/s) Maximum deviation 0.15% measured with 1.5 mil (0.038mm) tape (Hysteresis synchronous motor).
Reel Size:	7 inch plastic or 10½ inch, EIA or NAB
Heads: Two channel versions:	Model MX-5050-2S: Half-track Model MX-5050-4S: Quarter-track Four head stacks: MX-5050-2S: ½ erase, ¼ reproduce, ½ record, ½ reproduce. MX-5050-4S: ¼ erase, ½ reproduce, ¼ record, ¼ reproduce.
Four channel versions:	Model MX-5050-QX Four head stacks: erase (tracks 1 & 3), erase (tracks 2 & 4), ¼ record, and ¼ reproduce. Other head configurations available on special order.
Motors: Capstan:	Two speed hysteresis synchronous or DC servo controlled motor. (Pitch control limits ± 7%)
Reels:	Two induction torque motors.
Connectors:	Line input and line output, standard three-pin XLR. Microphone, standard ¼ inch phone jack.
Inputs: Line:	Minimum -15 dBm, unbalanced 50,000 ohms. Minimum -15 dBm, balanced 600 ohms with optional transformer.
Microphone:	Minimum -70 dBm, unbalanced, nominal 50,000 ohms (high impedance).
Outputs: Line:	Level: +4 dBm or -10 dBm, rear panel switch selectable. Headroom: +19 dB before clipping. Impedance: MX-5050-2SHT: 600 ohms, balanced MX-5050-2SL, MX-5050-4S and MX-5050-QX:

Headphone Jack:	600 ohms unbalanced (600 ohms balanced with optional transformer). -24 dBm, nominal 8 ohms unbalanced.																											
Equalization:	NAB standard for 3¾, 7½ and 15 ips (EIA, CCIR, and IEC also available).																											
Frequency Response:	15 ips.: 35 Hz to 22,000 Hz ± 2 dB 7½ ips.: 30 Hz to 18,000 Hz ± 2 dB 3¾ ips.: 30 Hz to 12,000 Hz ± 2 dB Specifications referred to 1,000 Hz reference when recorded on 3M 250 or Ampex 456 or equivalent tape using unbalanced output.																											
Signal to Noise Ratio:	<table><tr><th rowspan="2">Tape Speed</th><th colspan="2">1/2 Track</th><th colspan="2">1/4 Track</th></tr><tr><th>Weighted</th><th>Unweighted</th><th>Weighted</th><th>Unweighted</th></tr><tr><td>15 ips.</td><td>68 dB</td><td>65 dB</td><td>65 dB</td><td>62 dB</td></tr><tr><td>7½ ips.</td><td>68 dB</td><td>65 dB</td><td>65 dB</td><td>62 dB</td></tr><tr><td>3¾ ips.</td><td>67 dB</td><td>64 dB</td><td>64 dB</td><td>61 dB</td></tr></table>				Tape Speed	1/2 Track		1/4 Track		Weighted	Unweighted	Weighted	Unweighted	15 ips.	68 dB	65 dB	65 dB	62 dB	7½ ips.	68 dB	65 dB	65 dB	62 dB	3¾ ips.	67 dB	64 dB	64 dB	61 dB
Tape Speed	1/2 Track		1/4 Track																									
	Weighted	Unweighted	Weighted	Unweighted																								
15 ips.	68 dB	65 dB	65 dB	62 dB																								
7½ ips.	68 dB	65 dB	65 dB	62 dB																								
3¾ ips.	67 dB	64 dB	64 dB	61 dB																								
Crosstalk:	At 1,000 Hz on adjacent tracks: 2S: greater than 60 dB 4S: greater than 55 dB QX: greater than 50 dB (Measured per NAB weighted):																											
Flutter and Wow:	<table><tr><th>Tape Speed</th><th></th></tr><tr><td>15 ips.</td><td>less than 0.05%</td></tr><tr><td>7½ ips.</td><td>less than 0.06%</td></tr><tr><td>3¾ ips.</td><td>less than 0.15%</td></tr></table>				Tape Speed		15 ips.	less than 0.05%	7½ ips.	less than 0.06%	3¾ ips.	less than 0.15%																
Tape Speed																												
15 ips.	less than 0.05%																											
7½ ips.	less than 0.06%																											
3¾ ips.	less than 0.15%																											
Distortion:	Less than 1% at 1,000 Hz at 185 nWb/m																											
Test Oscillator Frequency:	Nominal 1,000 Hz																											
Bias and Erase Frequency:	133 kHz																											
Operating Position:	Vertical or horizontal																											
Power Requirements:	117 volts, 60 Hz, single phase ac, 100 watts. Or 220/240 volts, 50 Hz, single phase ac, 100 watts (2S, 4S). 120 watts (QX).																											
Operating Environment:	40° to 104°F (5° to 40° C) 20 to 80% RH.																											
Storage Environment:	-5° to 113°F (-20° to 45° C)																											

Weight: in Standard Cabinet:	MX-5050-2S & -4S: 24 kgs. (53 lbs)
	MX-5050-QX: Tape Transport: 21 kgs. (46 lbs)
	Amplifier: 9.5 kgs. (21 lbs)
in Portable Case:	MX-5050-2S & -4S: 28 kgs. (62 lbs)
	MX-5050-QX: Tape Transport: 24 kgs. (53 lbs)
	Amplifier: 12 kgs. (25 lbs)
Mounting:	Walnut finish cabinet, portable case, or rack mounting kit.
Standard Accessories:	Empty 10-½ inch NAB reel, NAB reel precision hold down knob, fuse, NAB reel-adjusting disc (shim) and Operation Manual.

- Note 1. Signal to noise ratio is measured with respect to a record level of 520 nWb/m to biased tape noise when using Scotch 206 or equivalent high output low noise tape. Unweighted: Using a 30 to 18 kHz RC filter to attenuate noise outside the audio spectrum. Weighted: Using an NAB or ASA "A" weighting filter and 1,000 Hz reference.
2. Main schematic diagrams are attached to the last part of this manual.
 3. Otari reserves the right to change specifications without notice and obligation.



SECTION II
INSTALLATION

SECTION II

INSTALLATION

This section of the manual provides information about unpacking and inspection, locations and environment, mounting configurations, and power and signal connections.

II-1. UNPACKING AND INSPECTION

The MX-5050 Series system is shipped from the factory in individual cardboard packing cases. Upon receipt, examine the case for any signs of damage. Unpack the equipment carefully and inspect for any signs of damage. Use great care when unpacking unmounted equipment, and removing packing materials, to prevent damage to critical components such as the capstan, head assembly, and tension arms.

Referring to Table I-4 and Table I-5 (as applicable), verify that all items have been received. Report any shortage or damage to the carrier and any your local Otari dealer. Save the packing case for possible shipment of the equipment to another location or for the case of re-shipment. Other packaging may cause the damage during transportation and will void the warranty.

Regarding the repacking method, please refer to the illustration which is attached on the flap of the individual box.

II-2. LOCATION AND ENVIRONMENT

The area chosen for operation should be adequately ventilated and dust free. Since recording is by an electromagnetic process, it is possible that strong electromagnetic fields may affect the system adversely. Common sources of interference are fluctuation loads on nearby high-voltage lines, heavy duty transformers, and transmitting equipment.

It is recommended that the equipment be used in an environment where the surrounding temperature does not exceed limits of 40° to 104°F (5° to 40°C), with the relative humidity between 20 to 80%. Allow at least 4-inches clearance behind the rear-panel ventilation grille.

II-3. MOUNTING CONFIGURATIONS

The MX-5050 Series can be mounted vertically or horizontally and in a common 19-inch rack using an optional rack mount adaptor kit (Table I-5). The MX-5050 in a rack mount adaptor requires 19¼ inches of rack space. Maximum cooling efficiency is obtained when the unit is mounted vertically.

Equipment dimensions of the unmounted version of the MX-5050 Series are shown in Fig. II-1.

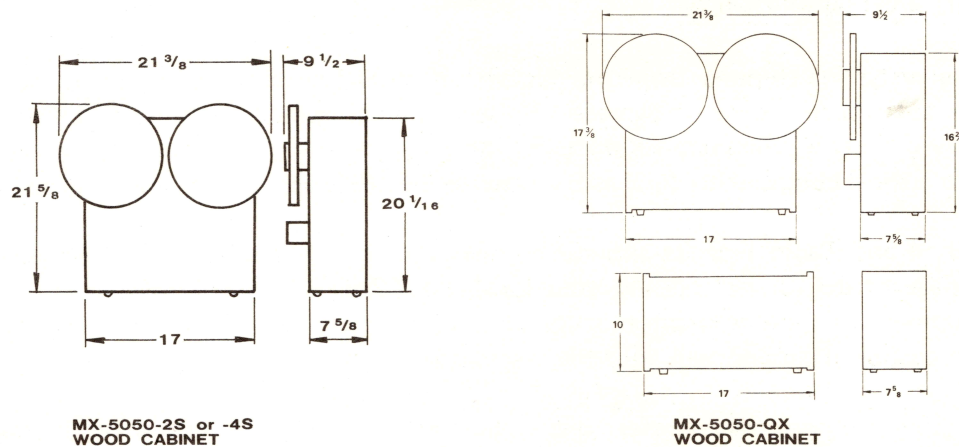
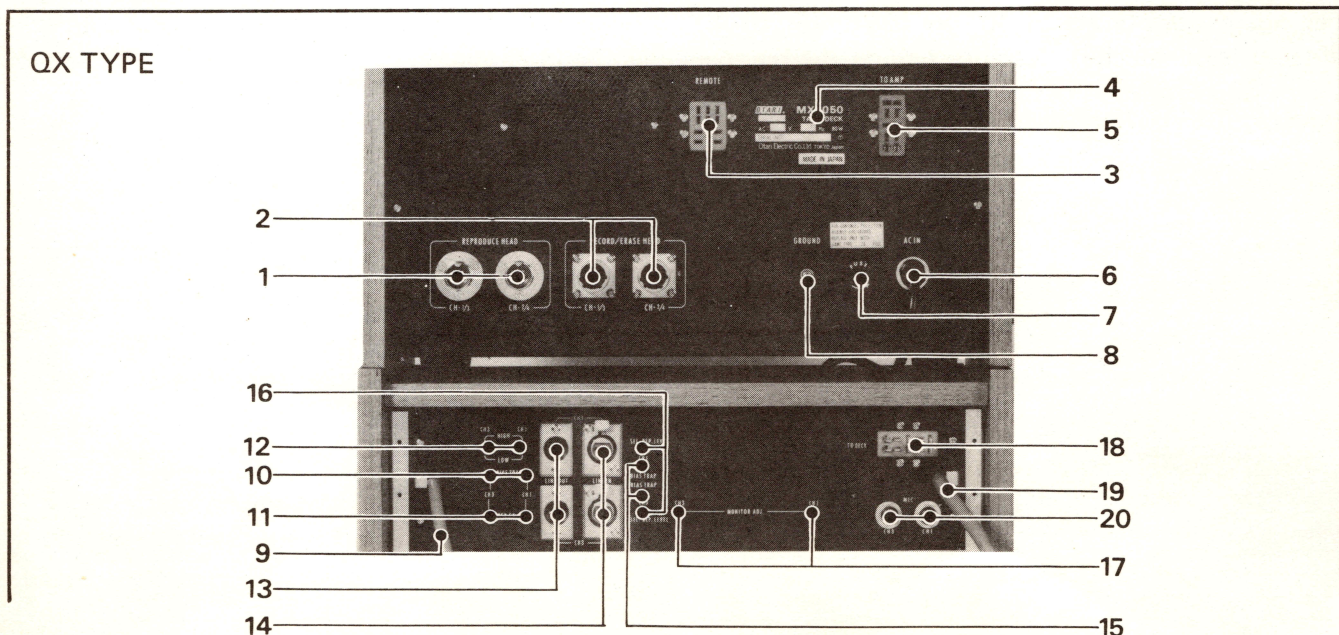


Fig. II-1 Equipment Dimensions

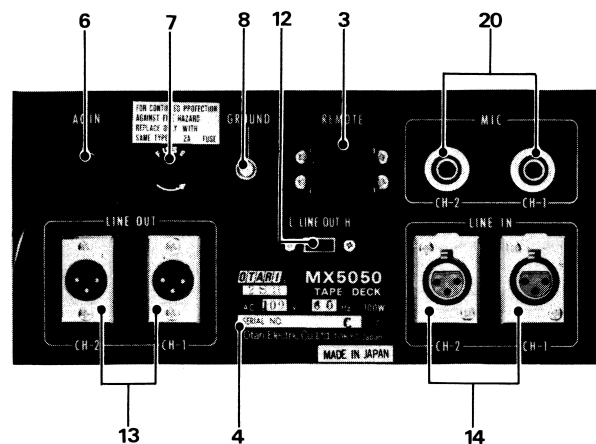
II-4. POWER AND SIGNAL CONNECTIONS

All power and signal connections are made to the connector panel at the rear of the MX-5050. Table II-2 shows the function of each connector and component on the rear panel.

Table II-1. Rear Connector Panel



Full, 2S. or 4S TYPE



Index No.	Name	Function
1	REPRODUCE HEAD Connector	Female RB-type connector for reproduce signal, connected with connector cable from amplifier.
2	RECORD/ERASE HEAD Connector	Female SRC-type connector for record and erase signal, connected with connector cable from amplifier.
3	REMOTE control connector	Remote control connector for use with optional remote control unit to control modes, record, play, stop, rewind, and fast forward.
4	Label	Indicates Model Number, production lot number (serial number), power requirements and "Made in Japan".
5	TO AMPLIFIER Connector	Female QS-type connector to supply power, bias signal and control signal for amplifier.
6	AC In Cable	Captive three-wire cable for connection to AC power and power ground.
7	Fuse	Main power fuse. For replacement use 2A fuse, Otari Part No.FS-1-2A.
8	GROUND Terminal	Auxiliary ground connection for use with equipment not connected to common AC ground.
9	Reproduce Head Connector Cable	Connected to REPRODUCE connector for reproduce signal.
10	BIAS TRAP Adjustment Screws	Used to adjust bias trap for reproduce. Precaution: Do not touch these screws. Limited only for adjustment in case of parts replacement or calibration.

11	REP. EQ. Adjustment Screws	Used to adjust frequency characteristics for reproduce equalizer. Precaution: Do not touch these screws. Limited only for adjustment in case of parts replacement or calibration.
12	LINE OUTPUT LEVEL selector switch	Two-position output level switch to select +4 dBm or -10 dBm output standard reference level (SRL).
13	LINE OUTPUT Connector	Male XLR-type connector for unbalanced line output impedance, 600 ohms. For 600 ohms balanced line output, use optional transformer (Otari Part No.ET-31-182). Note: Line Output transformers, 600 ohms, balanced are standard for MX-5050-2SHT.
14	LINE INPUT Connector	Female XLR-type connector for unbalanced line input impedance, 50,000 ohms. For 600 ohm balanced input, use optional matching transformer (Otari Part No.ET-21-181).
15	BIAS TRAP Adjustment Screws	Used to adjust bias trap for SEL/REP. Precaution: Do not touch these screws. Limited only for adjustment in case of parts replacement or calibration.
16	SEL. REP. LEVEL Adjustment Screws	Used to adjust SEL/REP level. Precaution: Do not touch these screws. Limited only for adjustment in case of parts replacement or calibration.
17	Record MONITOR Level ADJ.stment screws	Used to adjust record monitor level. Precaution: Do not touch these screws. Limited only for adjustment in case of parts replacement or calibration.
18	TO DECK Connector	Male QS-type Connector to supply power, bias and control signal for amplifier.
19	Record/Erase Head Connector Cable	Connected to RECORD/ERASE HEAD for record and erase signal.
20	MICROPHONE Input Jack	Standard 2-conductor phone jack for microphone: -70 dBm, unbalanced, 50,000 ohms (high impedance).

II-4-(1) AC POWER CONNECTION

The MX-5050 Series is factory set to operate at the line voltage and frequency indicated on the packing case and on the rear connector panel of equipment. AC power is connected by means of a captive three-wire power cable which also provides a common ground connection. If a two-wire receptacle is used with an adaptor, be sure the adaptor is properly grounded.

If some other change of line voltage and frequency is desired to accomodate a different power requirement, please contact your nearest dealer or Otari.

II-4-(2) SIGNAL CONNECTIONS

On Model QX: The reproduce head connectors are four-conductor male RB-type connector, connected directly to the rear of amplifier. The record and erase head connectors are ten-conductor male SRC-type connector, connected directly to the rear of amplifier. The amplifier to transport connector is QS-type connector.

On all models: The microphone input connectors are standard two-conductor phone jacks. The line input (female) and line output (male) connectors are XLR-type connectors. The mating connectors (not supplied) may be wired for balanced or unbalanced input as follows:

LINE INPUT CONNECTOR WIRING:

For balanced input, wire male XLR connector as follows:

1. Connect signal leads of two-conductor shielded cable to pin 3 (high) and pin 2 (low) of connector.
2. Connect cable shield to pin 1.

For unbalanced input using two-conductor shielded cable, wire female XLR-connector as follows:

1. Connect signal leads of cable to pin 3 (high) and pin 2 (low) of connector.
2. Connect cable shield to pin 1 of connector.
3. Connect a jumper from pin 1 to pin 2 of connector.

For unbalanced input using single conductor shielded cable, wire male XLR connector as follows:

1. Connect center conductor of single-conductor shielded cable to pin 3 of connector.
2. Connect cable shield to pins 2 and 1.

LINE OUTPUT CONNECTOR WIRING:

For balanced output, wire female XLR connector as follows:

1. Connect signal leads of two-conductor shielded cable to pin 3 (high) and pin 2 (low) of connector.
2. Connect cable shield to pin 1.

For unbalanced output using two-conductor shielded cable, wire female XLR connector as follows:

1. Connect signal leads of cable to pin 3 (high) and pin 2 (low) of connector.
2. Connect cable shield to pin 1 of connector.
3. Connect a jumper from pin 1 to pin 2 of connector.

For unbalanced output using single-conductor shielded cable, wire female XLR type connector as follows:

1. Connect center conductor cable to pin 3 of connector.
2. Connect cable shield to pin 2 of connector.
3. Connect a jumper between pins 1 and 2 of connector.

SECTION III
OPERATION

SECTION III OPERATION

This section of the manual provides a description of all operating controls and indicators and their use in operating the system, and step-by-step operating procedures for the various modes of operation.

III-1. CONTROLS AND INDICATORS

Table III-1 shows the location and function of each control and indicator on the tape transport and control panel.

Table III-1. Tape Transport Controls and Indicators

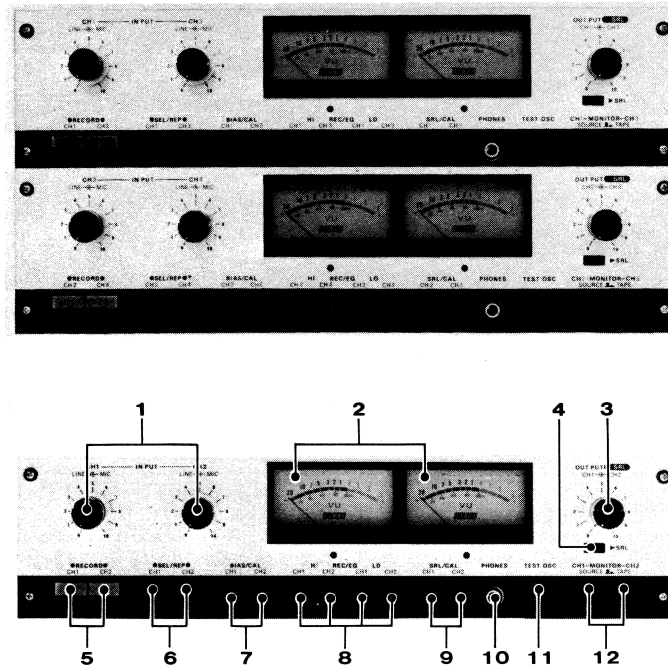
Index No.	Name	Function
1	POWER pushbutton switch	In depressed position, power is applied to entire equipment and VU meter illuminates.
2	CUE lever	In up position, system operates normally. In fast forward and rewind modes, moving lever downward enables variable control of tape lifter to permit audio monitoring. Lever locks in full down position.
3	Reel Rotation Counter	Four-digit counter used to locate or log program material on tape. Pushbutton resets counter to "0000".
4	Reproduce Head Selector Switch	Used to select appropriate reproduce head stack to conform with the kind of tape to be reproduced. (Note: Only applicable for MX-5050-2S, -4S and Full)

5	F. FWD pushbutton switch	Used to select fast forward mode to run the tape from left to right at high speed. Mode may be entered from any other mode except edit mode.
6	REWIND pushbutton switch	Used to select rewind mode to run the tape from right to left at high speed. Mode may be entered from any other mode except edit mode.
7	STOP pushbutton switch	Used to stop tape transport and cancel existing mode of operation.
8	PLAY pushbutton switch	Used to select play mode or used with RECORD pushbutton switch. Pressing PLAY pushbutton during fast forward or rewind modes stops the tape then automatically starts play mode.
9	RECORD pushbutton switch	Used in conjunction with PLAY and RECORD channel selector. With desired channel pushbutton switches depressed, either being in play mode or simultaneously pressing PLAY and RECORD pushbutton initiates record mode and red indicator illuminates.
10	RECORD indicator (red)	Lights when record mode is selected.
11	EDIT pushbutton switch	Used to initiate edit mode for aid in cutting out unwanted tape. When EDIT pushbutton is depressed, the green indicator illuminates, then PLAY pushbutton, when activates to remove power to takeup reel, causing tape to be spilled at takeup side of transport. Other operations are always stopped.
12	EDIT indicator (green)	Lights when EDIT pushbutton is depressed.
13	Large/Small REEL pushbutton switch	Alternate action pushbutton switch used to select supply and takeup-reel tape tension for large or small reel-diameter hubs. Pushbutton to "in" Small position for reels EIA hubs (2¼ inch diameter hub) Push button to "out" Large position for NAB hubs (4½ inch diameter hub) (SAME SIZE REELS SHOULD BE USED ON BOTH TURN-TABLES.)

14	HI/LO SPEED pushbutton switch	Alternate action pushbutton switch used to select operating speed. On low speed MX-5050 models, push button to "in" LO speed position for $3\frac{3}{4}$ in/sec and to "out" HI speed position for $7\frac{1}{2}$ in/sec operation. On high speed MX-5050 models, push button to "in" LO speed position for $7\frac{1}{2}$ in/sec and to "out" HI speed position for 15 in/sec operation.
15	PITCH CONTROL (D-type only)	Used to control speed of tape motion. Capstan speed can be controled within $\pm 7\%$. When PITCH CONTROL knob is pulled out and turned clockwise, capstan speed rises. When turned counterclockwise, capstan speed falls. In original position, capstan turns with the original speed set by SPEED select pushbutton switch independently of the indicated dial position of the PITCH CONTROL. In record mode, capstan speed is locked automatically to original tape speed and cannot be varied by the PITCH CONTROL.

Table III-2 shows the location and function of each control and indicator on the record/reproduce electronics control panel.

Table III-2. Record/Reproduce Electronics Controls and Indicators



Index No.	Name	Function
1	LINE/MIC INPUT level controls	Used to control recording level input of line (outside knob) and microphone (inside knob) of related channel. Both levels can be mixed.
2	VU Meter	Indicates record and playback level of related channel depending on mode of operation and position of MONITOR SOURCE/TAPE switch (Index No.12 of this table). Meter lights when recorder is turned on.
3	LINE OUTPUT level controls	Used to control output level of related channel. (Control is deactivated when SRL switch is "SRL" position.)
4	SRL switch and indicator (red)	Use to fix output level at desired level. Output level is pre-adjusted to gain specified output level (+4 dBm or -10 dBm) when SRL of NAB standard tape is reproduced. (At that time VU meter indicates 0 VU.) Note: If you desire to obtain same output level (+4 dBm or -10 dBm) in other standard such as CCIR or IEC standard, please refer to Section IV-3(1).

		+ CAUTION + DO NOT TURN OFF THIS SWITCH UNLESS YOU TURN LINE OUTPUT LEVEL CONTROLS (INDEX NO.3 OF THIS TABLE) DOWN TO THE MINIMUM LEVEL WHILE OUTPUT SIGNAL IS CONNECTED TO OTHER EQUIPMENT TO PREVENT POSSIBLE DAMAGE.
5	RECORD selector switch and indicator (red)	Used to select a desirable channel for recording and used in conjunction with PLAY and RECORD pushbutton switches (Index Nos. 8, 9 of Table III-1). In "out" position prevents activation of the channel record mode. In "in" position enables the channel record mode to be entered and red indicator is illuminated.
6	SEL/REP selector switch and indicator (green)	In SEL REP (selective reproduction) "out" position, signal on tape is reproduced normally. In SEL/REP "in" position, green indicator is illuminated and signal on tape is reproduced by record head (rather than reproduce head) to permit recording on the other channel(s) in synchronism with the channel. Used for sound with sound recording.
7	BIAS/CAL adjustment Control	Used to adjust amplitude of bias current according to the tape to use. Used in conjunction with TEST OSC (Index No.11 of this table).
8	REC/EQ adjustment control	Used to adjust record equalization of related channel and speed mode (HI or LO).
9	SRL/CAL adjustment control	Used to calibrate to obtain SRL (standard reference level). Used in conjunction with SRL switch (Index No.4 of this table) and LINE OUTPUT LEVEL selector switch (Index No.7 of Table II-1).
10	PHONE Jack	Receptacle for headphone jack. Used to monitor input or output signal as selected by the MONITOR SOURCE/TAPE selector switch (Index No.12 of this table). (Output is -24 dBm, unbalanced, and for 8-ohm impedance load.)
11	TEST OSC pushbutton switch	When held pressed, a 1.0 kHz test tone is generated and fed to the line input circuit. Used for cue tone recording and BIAS/CAL adjustment (Index No.7 of this table).

12	MONITOR SOURCE/TAPE switch	In "out" SOURCE position, input signal is fed to LINE OUT connector, PHONE jack, and VU meter. In "in" TAPE position, signal being reproduced is fed to LINE OUT connector, PHONE jack, and VU meter.
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III-2. OPERATING INFORMATION

III-2-(1) PRE-OPERATING PROCEDURE

After the equipment has been installed as described in Section II of the manual and the operator has become familiar with all the operating controls and indicators described in Tables III-1 and III-2, prepare the recorder for operation as follows:

1. Depress POWER switch to on position. VU meter lights will illuminate.
2. If metal reels are to be used, use a reel-adjusting disc (shim) between the reel and the turn-table. Place a reel of tape on the supply (left-hand) turn table. Note that the reel must turn counter-clockwise as tape is pulled off the reel. Place same-size empty reel on the takeup (right-hand) turn table.
3. Thread tape as shown in Fig. III-1 and place the end of the tape in the slot in the empty reel. Wind the reel counterclockwise three to four turns to remove slack and operate the tension-arm safety switch.
4. Set HI/LO SPEED switch to desired tape speed.
5. Set the L/S REEL switch to conform to the size of the reel hub diameters being used. Place switch to the "out" LRG position for NAB hubs (4½ inch diameter) or to the "in" SML position for EIA hubs (2¼ inch diameter).
6. Set reproduce head selector switch (Index No.4 of Table III-1) to the appropriate position as determined by the track format of tape to be reproduced.
(Note: This step does not apply to MX-5050-QX and -FL.)
7. If desired, connect an 8-ohm headset or monitor speaker/amplifier to the PHONE jack.

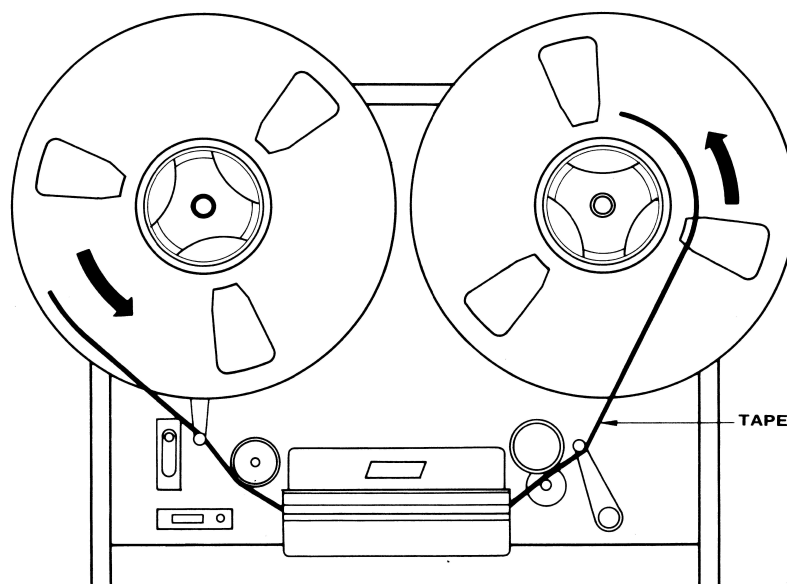


Fig. III-1 Tape Threading

III-2-(2) REPRODUCTION

To reproduce a tape, proceed as follows:

1. Perform all steps of the pre-operating procedure.
2. Set the channel RECORD selector switch(es) to the "out" position.
3. Set the reproduce head selector switch to the appropriate position.
(Note: This step does not apply to MX-5050-QX.)
4. Set the channel MONITOR selector switches to the MONITOR TAPE "in" position.
5. Press PLAY pushbutton to begin reproducing of the pre-recorded tape.
6. Adjust the channel OUTPUT level control(s) for the desired output level.
7. When desired program has been reproduced, press STOP pushbutton to stop tape motion and deactivate play mode.

III-2-(3) NORMAL RECORDING

To make a normal recording, proceed as follows:

1. Perform all steps of the pre-operating procedure.
2. Set the desired RECORD selector switch to the "in" position for channel(s) selected for recording. The associated red indicator will illuminate to indicate the selected channel(s). Set the switch to the "out" position for channel(s) not to be recorded.
3. Set the desired MONITOR SOURCE/TAPE switch to the "out" SOURCE position.
4. Adjust desired LINE/MIC INPUT level control(s) so that VU meter indicates 0 for most audio peaks.
5. Push reel-rotation-counter pushbutton to reset counter to 0000.
6. Press Play and RECORD pushbuttons simultaneously to start recording on the selected channel(s). The tape transport RECORD indicator will illuminate.
7. While recording, the input signal of each channel can be compared with the reproduced signal of each channel by pressing the MONITOR SOURCE/TAPE switch to the "in" TAPE position.
8. When recording is complete, press PLAY pushbutton for play mode (Called punch out) or PRESS STOP pushbutton to stop tape motion and deactivate record mode.

III-2-(4) RECORDING WITH SELECTIVE REPRODUCTION

The selective reproduction function causes the reproduced audio to be derived from the record head rather than reproduce head. This enables a recording to be made on another channel in synchronism (in phase) with the channel being reproduced. To record with selective reproduction, proceed as follows:

1. Perform all steps of the pre-operating procedures.
2. Perform all steps of the Normal Recording procedure for the channel to be prerecorded.
3. Rewind the tape to the point where the selective reproduction is to start.
4. Set the selective reproduction (SEL/REP) switch to the "in" position corresponding to the channel to be monitored while the recording is being made.
5. Set the RECORD selector switch to the "in" position corresponding to the channel to be recorded.
6. Set the MONITOR selector switch to TAPE "out" position corresponding to the channel being monitored.

7. Set the MONITOR selector switch to SOURCE "in" position corresponding to the channel to be recorded.
8. Adjust the LINE/MIC INPUT level control so that VU meter indicates 0 for most audio peaks.
9. Press PLAY pushbutton to start tape motion, then press PLAY and RECORD pushbuttons simultaneously to start recording on the selected channel(s).
10. When recording is complete, press STOP pushbutton to stop tape motion and deactivate record mode.

III-2-(5) FAST WINDING

For fast-winding operations, and for editing or cueing, press the F. FWD or REWIND pushbutton as desired. These pushbuttons can be pressed alternately without having to press STOP between fast-winding operations. These modes may be entered from any other mode except edit mode. Pressing PLAY during a fast-winding mode causes the tape to automatically come to a stop and then enter play mode.

In a fast-winding mode, tape lifters are automatically actuated to lift the tape away from the heads. To monitor the tape in a fast-winding mode, the position of the tape lifters can be varied by operation of the CUE lever. Thus the distance of the tape from the heads may be varied to control the signal level from the tape.

III-2-(6) EDITING AND SPLICING TAPE

For editing and splicing operations, the CUE lever can be used in fast-winding modes to quickly locate desired program material. In addition, there is a EDIT mode of operation as follows:

Depress EDIT pushbutton in play or record mode removes power to the takeup reel thus causing tape to be spilled at the takeup side of the transport. This mode is used for aid in cutting out unwanted tape.

Edit mode can also be entered from stop mode by pressing PLAY while EDIT pushbutton is in depressed position.

A tape-splicing block (Fig. III-2) mounted on the head cover can be used to hold the tape for ease of cutting the tape with a single-edge razor blade and application of splicing tape.

Use splicing tape 7/32-in wide (3M Co., No.41) and do not use cellophane tape.

The tape splicing block has the following features:

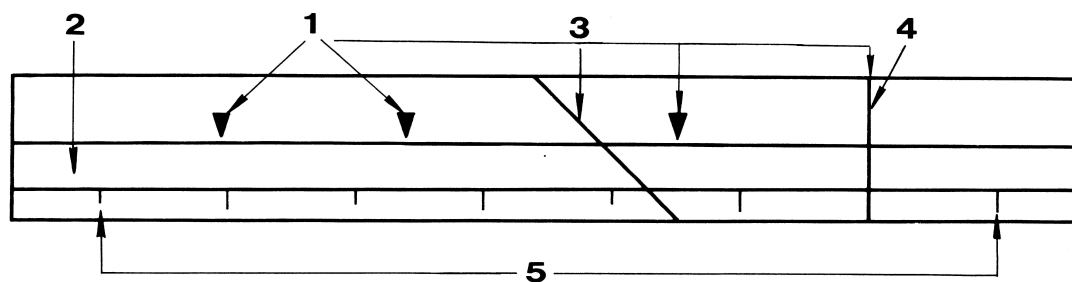


Fig. III-2 Tape-splicing block

- | | | |
|---|--------------------------------|---|
| 1 | Head-stack indicator marks: | Indicates location of the individual head stacks. |
| 2 | Tape-guide channel: | Holds the tape for ease of cutting and splicing. |
| 3 | 45° cutting guide: | Used to guide tape cutter for a diagonal cut. |
| 4 | 90° cutting guide: | Used to guide tape cutter for a vertical cut. |
| 5 | Tape length calibration marks: | Used to locate where a splice should be made. |

For exact location of the point for tape cutting during editing, the distance from the right or left hand calibration marks to the 90° cutting guide is the same as the distance from the right or left hand assembly tape guide to the center of the reproduce head.

SECTION IV
PREVENTIVE MAINTENANCE
AND ADJUSTMENTS

SECTION IV

PREVENTIVE MAINTENANCE AND ADJUSTMENTS

This section provides information for preventive maintenance and adjustment which include routine maintenance and normal mechanical/electronic adjustment procedures should be performed at the recommended times to attain the optimum performance.

For further information on maintenance, such as conversion, modification and usage of optional accessories, we have prepared an optional maintenance manual (Otari Part No. OMM-1003E) separately which is available from Otari.

IV-1. TEST AND MAINTENANCE EQUIPMENT REQUIREMENTS

The test and maintenance equipment listed in Table IV-1 is required for the performing of maintenance procedures. Equivalent equipment can be substituted for the equipment suggested in the table.

Table IV-1. Test and Maintenance Equipment

Equipment Type	Suggested Model	Used for
Head Cleaner	Ampex 087-007	Cleaning heads
Isopropyl alcohol	Any (Otari Cleaning Kit Ty-502 contains the above cleaning materials.)	Cleaning tape guides, capstan, and capstan pinch roller.
Head demagnetizer	Any	Demagnetizing heads and tape guides
Lubricating oil	Ampex 087-579 Mobil DTE Oilite	Lubricating capstan
Reproduce alignment tape	NAB 3¾ ips: Ampex 4690037- 01 7½ ips: Ampex 01-31321-01 15 ips: Ampex 01-31311-01 ICE 7½ ips: Ampex 4690014- 01 15 ips: Ampex 01-31313-01	Setting operating standard reference level
Audio Oscillator 20 to 20,000 Hz	Hewlett-Packard 204C or 209D	Setting record equalization

IV-2. PREVENTIVE MAINTENANCE

For optimum performance, cleaning, demagnetizing should be performed after each eight hours of operation and lubrication should be applied at regular recommended times, indicated below.

IV-2-(1) CLEANING

Oxide particles from the magnetic tape tend to collect on components in the tape path and degrade performance of the recorder. The heads and all other components in the tape path must be cleaned after each eight hours of operation, or more frequently if visual inspection indicates cleaning is required. To clean the head assembly, proceed as follows:

1. Lift the head cover as illustrated Fig. IV-1.
2. Clean each head stack thoroughly with a cotton-tipped applicator dampened with head cleaner.

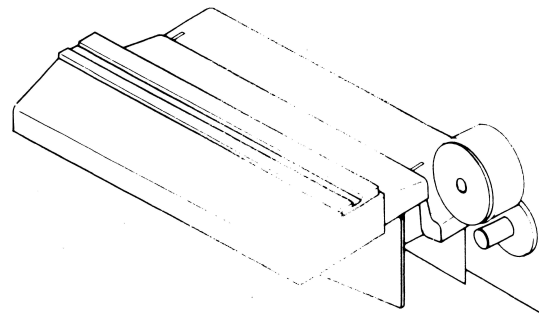


Fig. IV-1 Lifting Head Cover

CAUTION

WHEN CLEANING THE HEADS, USE ONLY THE RECOMMENDED SOLVENT (HEAD CLEANER) TO AVOID DAMAGING THE HEADS. KEEP THE HEAD CLEANER OFF PLASTIC FINISHES AND THE CAPSTAN PINCH ROLLER. DO NOT USE METAL TOOLS THAT CAN SCRATCH THE HEADS.

3. Use iso-propyl alcohol to clean all tape-guiding components including the capstan shaft and the rubber capstan pinch roller.
4. Reinstall head cover.

IV-2-(2) DEMAGNETIZING

The head and tape guiding components in the tape path should be demagnetized after each eight hours of operation. These components can acquire permanent magnetization that increases signal noise and distortion and partially erase high frequencies on recorded tape. Use a hand-held head demagnetizer to demagnetize all components in the tape path as follows:

1. Turn equipment power off and remove any recorded tape near the transport (tape could be partially erased by the demagnetizer).
2. Lift head cover as illustrated in Fig. IV-1.
3. Cover the demagnetizer tips with adhesive tape to prevent scratching head stacks.
4. With the demagnetizer held away from the transport, connect demagnetizer to power source.
5. Move the demagnetizer tips slowly close to the head, lightly touch to the face of one head stack and slowly move the tips up and down the stack several times. Then slowly withdraw the demagnetizer as shown in Fig. IV-2.
6. Repeat step 5 for each head stack.
7. Repeat the motions of step 5 for each guide and other metallic parts in the tape path.
8. Move the demagnetizer slowly away from the transport for at least three feet and then disconnect power from the demagnetizer.

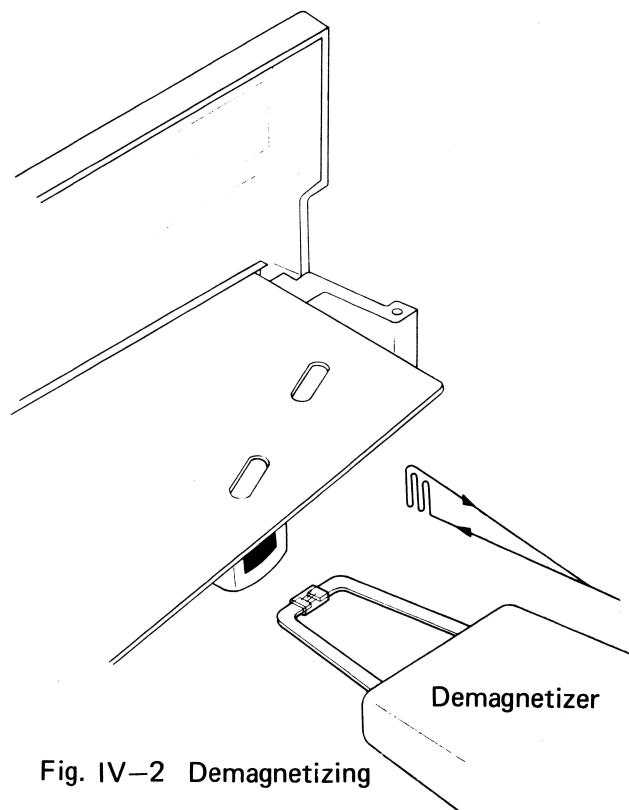


Fig. IV-2 Demagnetizing

IV-2-(3) LUBRICATION

The only component requiring lubrication is capstan.

Lubricate capstan every four months, or after each 1,000 hours of operation, (whichever occurs first) using recommended lubricating oil (Table I-4), or equivalent. For lubrication, proceed as follow referring to Fig. IV-3:

1. Remove pinch roller cap by turning counter clockwise.
2. Remove pinch roller from the pinch roller shaft.
3. Remove metal dust cap from the capstan shaft by turning counter clockwise.
4. Now, the felt collar is visible. Apply 2 or 3 drops of oil onto this felt collar. Please do not overlubricate.
5. Wipe off any excess oil and replace the dust cap, pinch roller and pinch roller cap as they were.

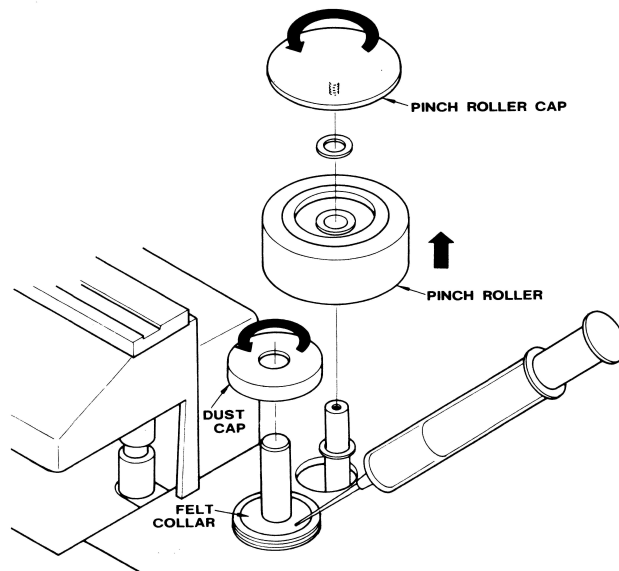


Fig. IV-3 Lubrication

————— CAUTION —————

WHEN THE EQUIPMENT IS FIRST RECEIVED THE CAPSTAN MIGHT HAVE DRIED OUT, EVEN WITH OIL IN THE FELT COLLAR. RUNNING THE CAPSTAN MAY RESULT IN DAMAGE OR FRICTION NOISE BEFORE THE OIL REACHES IT, SO LUBRICATION BEFORE OPERATION MAY BE REQUIRED. SEE FELT COLLAR FIRST.

IV-3. ELECTRONIC ALIGNMENT

Electronic alignment consists of setting the reproduce operating standard-reference-level (SRL), setting record bias level, and setting record equalization. Note that the reproduce adjustment must be performed before making the record adjustments.

The adjustments for these electronics should be performed at regular scheduled intervals and when changing for one type of recording tape to another.

IV-3-(1) OPERATING STANDARD-REFERENCE-LEVEL ADJUSTMENT

The adjustment is made while playing the operating level on the standard alignment tape. It is important that this adjustment be accurate since it affects signal-to-noise ratio, distortion, and tape saturation level. On Ampex standard alignment tapes this level is 185 nWb/m and is the first tone on 15 ips tapes, and the last tone on 7½ and 3¾ ips tapes. It is suggested that the operating SRL level be set at the speed at which the equipment will usually be used. If used equally, set at 15 ips on high speed model (15 - 7½ ips systems) and at 7½ ips on low speed model (7½ - 3¾ ips systems).

To set operating SRL level proceed as follows:

1. Set LINE OUTPUT LEVEL selector switch (Index No.7 of Table II-1) to the desired output standard reference level (+4 dBm or -10 dBm).
2. Set SRL calibration switch (Index No.4 of Table III-2) to SRL position.
3. Reproduce the 185 nWb/m operating level tone and adjust the SRL/CAL adjustment control for all channels for a 0 reading on the VU meter.

IV-3-(2) BIAS LEVEL ADJUSTMENT

Biasing should be done with the type of tape and at the speed most commonly used for optimum performance. To set bias level, perform the following procedure for each channel.

1. Thread bulk arased tape onto the recorder.
2. Set SRL calibration switch to calibrate position. Set SPEED switch to "HI" position. Set MONITOR switch to "TAPE" position.
3. Start the tape in record mode.

4. Press the TEST OSC pushbutton and set the record level control for an on scale reading on the VU meter.
5. Adjust the BIAS/CAL adjustment for maximum reading on the VU meter.

IV-3-(3) RECORD EQUALIZATION ADJUSTMENT

Set record equalization for each speed and each channel as follows:

1. Thread bulk erased tape onto the recorder.
2. Connect a audio oscillator to the INPUT of the recorder and set frequency to 700 Hz.
3. Set SRL switch to SRL position.
4. Start the tape in record mode.
5. For 15 ips tape speed, adjust record level so VU meter indicates 0 VU. For 3¾ or 7½ ips tape speed, set record level so the VU meter is at the -10VU. Then set SRL switch to normal position and adjust OUTPUT level control so the VU meter indicates 0 VU.
6. Change the audio oscillator output to 10 kHz.
7. As a preliminary setting, adjust the appropriate low or high speed equalizer so that the VU meter indicates 0.
8. Check the response above and below 7 kHz and trim the record equalizer for the response desired.

