

OTARI®

MX-5050 MK III-8 PROFESSIONAL RECORDER

INSTRUCTION AND MAINTENANCE MANUAL



Edition No.1

IMPORTANT INFORMATION

1/1

1987.June.08.

SUBJECT:

Lubrication of DD capstan motor.

APPLICABLE TO:

MX-5050*,MX-70,MX-80,MTR-10/12,MTR-20,BTR-5 and BTR-10.
(*Except early MX-5050 which has belt drive capstan motor.)

LUBRICATION OIL:

ANDEROL 456-----OTARI Parts No. PZ9E003
NO other oil should be used.

LUBRICATION PROCEDURE:

MX-5050, MX-70,MX-80,MTR-10/12 and BTR-10

---These motors have a foam-ring surrounding the top of the brass bearing.

1. Remove dust cap from the capstan motor.
2. Apply 1 or 2 drops of oil.

MTR-20 and BTR-5

---These motors have a felt-pad on top of the brass bearing.

1. Remove plastic dust cap from the motor.
2. Apply 1 or 2 drops of oil.

NOTICE:

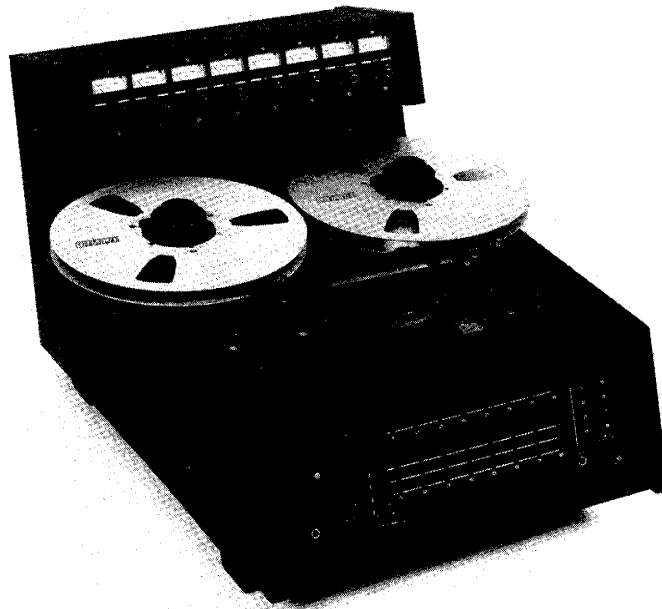
1. Lubrication should be done after approximately 1,000 hours of operation or every 6 months depending on machine usage.
2. Don't over lubricate and don't apply oil to the part of the capstan shaft which has contact with the tape.
3. This oil will be included with each machine shipped after July 1st,1987.

MX-5050 MK III-8

PROFESSIONAL TAPE RECORDER

INTRODUCTION

This manual provides descriptive information, installation, operation, maintenance and normal adjustment instructions for the Otari MX-5050 MK III-8 Professional Tape Recorder.



MX-5050 MK III-8 Recorder

SAFETY INSTRUCTIONS

1. Read Instructions -- All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instructions -- The safety and operating instructions should be retained for future reference.
3. Heed Warnings -- All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions -- All operating and use instructions should be followed.
5. Water and Moisture -- The appliance should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundrytub, in a wet basement, or near a swimming pool, etc.
6. Carts and Stands -- The appliance should be used only with a cart or stand that is recommended by the manufacturer.
7. Ventilation -- The appliance should be situated so that its location or position does not interfere with its proper ventilation.
For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
8. Heat -- The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
9. Power Sources -- The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
10. Grounding or Polarization -- The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
11. Power-Cord Protection -- Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
12. Cleaning -- The appliance should be cleaned only as recommended by the manufacturer.
13. Nonuse periods -- The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
14. Object and Liquid Entry -- Care should be taken so that objects do not fall and liquids are spilled into the enclosure through openings.
15. Damage Requiring Service -- The appliance should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits marked change in performance; or
16. Servicing -- The user should not attempt to service the appliance beyond that described in the operating instructions.
All other servicing should be referred to qualified service personnel.

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SECTION 1

GENERAL INFORMATION

The MX-5050 MK III -8 Recorder is a professional quality two-speed audio tape recorder/reproducer, designed for optimum performance and long life. It accommodates a 1/2-inch wide tape and two 7 1/2 ips (19.05 cm/sec.) and 15 ips (38.1 cm/sec.) tape speeds.

1-1 SYSTEM DESCRIPTION

Among the many professional features of the MX-5050 MK III-8 are: selective reproduction (SEL/REP), automatic motion sensing control by a proprietary microprocessor, an edit control that permits tape spilling, dynamic braking, an electronic tape timer, an adjustable cueing control for audible monitoring in fast forward and rewind, a dual frequency built-in test and cue-tone oscillator, adjustable record bias, equalization and level controls, XLR type connectors for input and output lines, stand-by mode for ease of multichannel recording, remote controllable electronics, a VU meter with a peak indicator for each channel, selecting switches for input and output levels, and a memory stop for automatically stopping the tape at a desired position except in record mode.

1-1-(1) TAPE TRANSPORT

All components of the tape transport system are mounted on a rigid aluminium base for stability.

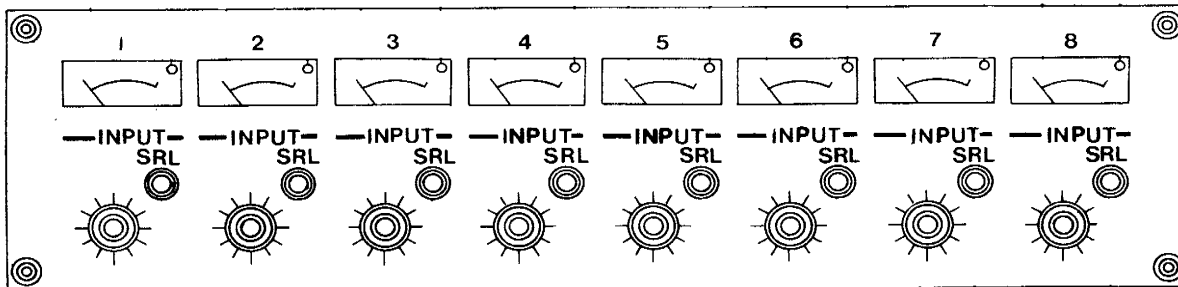
The transport design incorporates two 6-pole induction motors for the tape reels and a dc servo motor (Direct drive) for the capstan.

A pitch control is available to adjust the control range of the tape speed within $\pm 7\%$ of the nominal speed for sound application.

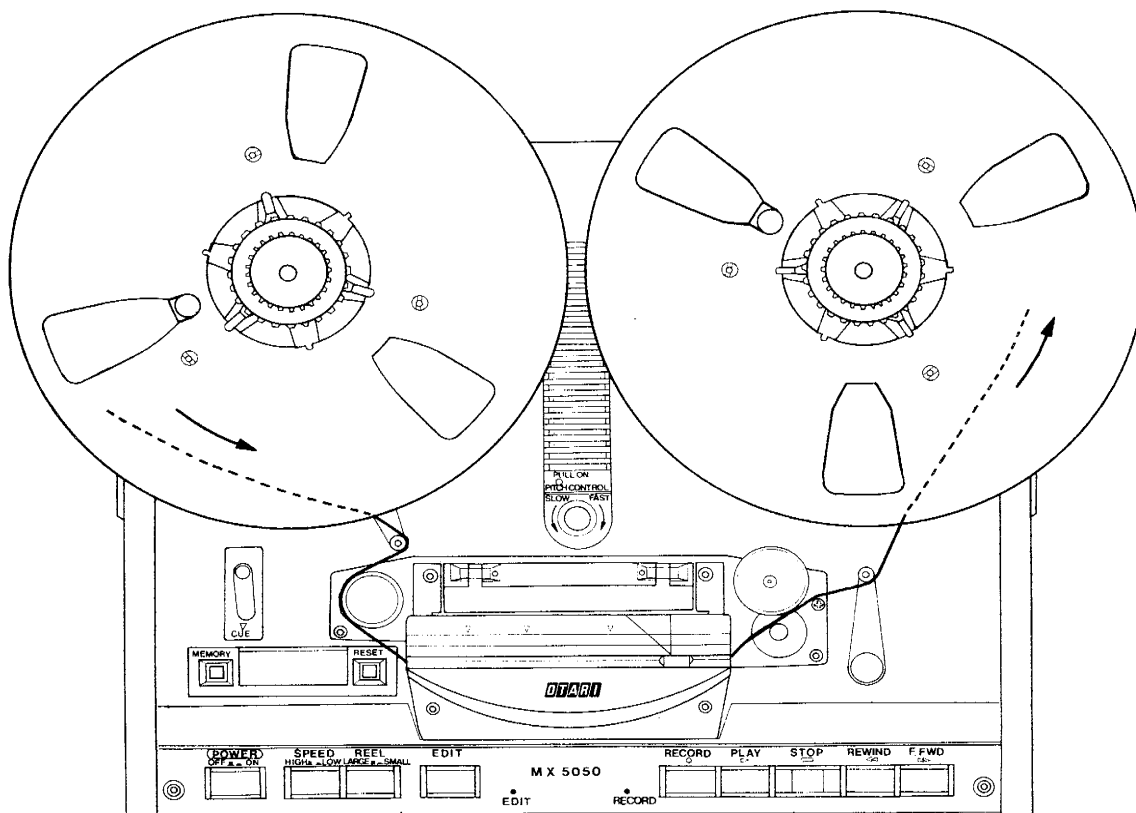
In addition to the editing controls, a tape-splicing block (Figure 3-3) mounted on the head cover holds the tape for easy editing, cutting, and applying splicing tape.

Momentary contact pushbutton switches on the transport are used to select operational modes: record, play, stop, rewind, fast forward, and edit.

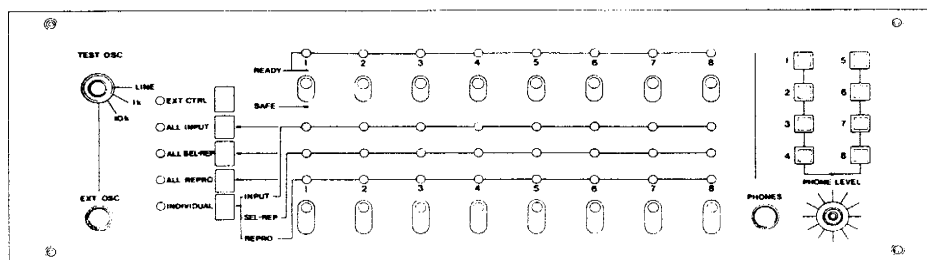
These modes except edit mode can be controlled by using an optional remote control unit. (as shown in Table 1-2)



Amplifier



Transport



Amplifier Controls

Figure 1-1 MX-5050 MK II -8 Major components

1-1-(2) RECORD/REPRODUCE ELECTRONICS

FEATURES

- (1) The RECORD/REPRODUCE amplifier unit is interconnected to the transport unit by just the connectors.
- (2) Available sound applications are a SEL/REP. function for overdubbing: SOUND WITH SOUND, SOUND ON SOUND, etc., carried out by the PUNCH-IN and PUNCH-OUT functions of the transport control.
- (3) Both input and output level select switches are provided on the printed circuit board to select either input or output level.
- (4) For optimum performance corresponding to the tape used, the Record bias, level, and equalizer controls can be accurately adjusted from the rear panel.
- (5) Low frequency compensation controls are provided for possible accurate alignment of low frequency characteristics to meet the tape to be used.
- (6) For ease of multi-channel recording, the monitor program of record-ready channels are automatically switched to input during fast-forward, rewind, or stop modes.
This function is able to be selected with the stand-by switch on the rear panel.
- (7) Remote control is available with optional two-type Remote control units.

1-2 STANDARD ACCESSORIES

The MX-5050 MK III-8 is supplied with the standard accessories listed in Table 1-1.

Table 1-1 Standard Accessories

Description	Quantity	Otari Part Number
Power Cord	1	PZ9D003
NAB Hub Reel Hold Down Knob (10 1/2")	2	KWOHC
NAB Empty Reel (10 1/2")	1	ZA-51H
Instruction & Maintenance Manual	1	OS3-033

1-3 OPTIONAL ACCESSORIES

Available optional accessories are listed in Table 1-2.

Table 1-2 Optional Accessories

Description	Otari Part Number
Remote Control Unit (Transport and amplifier and timer)	CB-110
Remote Control Unit (Transport)	CB-114
Cleaning kit	ZA-51B
Tape Deck Pedestal	ZA-52L
Extension Board Ass'y	PB-77Y

1-4 SPECIFICATIONS

The specifications of the MX-5050 MK III -8 are as listed in Table 1-3.

Table 1-3 Specifications

Tape Width and Tracks:	1/2 inch (12.7 mm) tape 8 tracks (0.04 inch or 1.0 mm track width)
Tape Speeds:	7 1/2 and 15 ips (19.05 and 38.1cm/sec.) Maximum deviation: $\pm 0.2\%$ measured with 1.5 mil (0.038 mm) tape
Reel Sizes:	1/2 x 10 1/2 inch NAB.
Heads:	Three eight track in-line: erase (ferrite), record, reproduce (both hard permalloy)
Motors: Capstan:	DC servo controlled motor (Pitch control range $\pm 7\%$)
Reels:	Two torque motors
Rewind Time:	Approximately 100 seconds for 2,500 ft (760 m) NAB reel
Operating Position:	Horizontal (Tabletop type)
Power Requirements:	100, 117, 220, 240 volts, 50 or 60 Hz, single phase AC.
Power Consumption	150 watts
Operating Environment:	40° to 104°F (5° to 40°C) 20% to 80% Relative Humidity

Storage Environment:	-5° to 113°F (-20° to 45°C)
Dimensions and Weight:	Dimensions: 438 mm width, 675 mm depth, 438 mm height. 17.3 " width, 26.6" depth, 17.3" height Weight: 35 kg, 77 lbs.
Mounting	Colored leatherette-finished cabinet.
Remote Control Unit:	CB-110 Remote control unit (remote control functions of transport and amplifier and timer) CB-114 Remote control unit (remote control function of transport)
Connectors:	LINE INPUT, LINE OUTPUT: standard three-pin XLR. EXT OSC: standard single-conductor phone jack PHONES: standard two-conductor phone jack
Inputs: LINE:	Variable or fixed level front panel switch selectable, unbalanced 50 kohm. Fixed level: +4 dBm or -8 dBm switchable. (Minimum -9 dBm or -18 dBm)
EXT OSC:	Minimum -18 dBm, unbalanced 10 kohm.
Outputs: LINE:	Fixed level: +4 dBm or -8 dBm rear panel switch selectable. Load impedance: more than 600 ohm. Maximum line output level: +21 dBm with 600 ohm load.
Headphone Jack:	-19 dBm with an 8 ohm load Load impedance: 8 ohm or greater

Equalization: NAB or IEC for 7 1/2 and 15 ips.

Frequency Response: REC/PLAY
 15 ips: 40 Hz to 25 kHz ± 2 dB
 7 1/2 ips: 20Hz to 20 kHz ± 2 dB
 SEL/REP
 15 ips: 40Hz to 15 kHz ± 3 dB
 7 1/2 ips: 30Hz to 10 kHz ± 3 dB
 Specifications refer to a 1 kHz reference when recorded on 3M #226.

Signal to noise ratio:

Tape speed \ EQ.	NAB		IEC	
	Weighted	Unweighted	Weighted	Unweighted
15 ips	70 dB	66 dB	70 dB	66 dB
7 1/2 ips	70 dB	66 dB	70 dB	66 dB

Crosstalk: greater than 55 dB

Wow and Flutter: NAB weighted: 15 ips: less than 0.05%
 7 1/2 ips: less than 0.06%

Distortion: less than 0.5% at 1 kHz at 250 nWb/m.

Erase Efficiency: greater than 70 dB.

Test Oscillator Frequency: Nominal 1 kHz and 10 kHz.

Bias and Erase Frequency: 200 kHz

Peak indicator: Trigger level: 1040 nWb/m (15 dB above AMPEX operating level) recorded flux level.

Notes:

1. Signal to noise ratio is measured with respect to a recorded level of 1,040 nWb/m to biased tape noise when using 3M #226, magnetic tape.
Unweighted: Using a 30 Hz to 18 kHz RC filter to eliminate noise outside the audio spectrum.
Weighted: Using an NAB or ASA "A" weighting filter and a 1 kHz reference.
2. Main schematic diagrams are at the end of this manual.
3. OTARI reserves the right to change specifications without notice and/or obligation.

SECTION 2 INSTALLATION

This section of the manual provides information on unpacking and inspection, location and environment, and power and signal connections.

2-1 UNPACKING AND INSPECTION

The MX-5050 MK^{III}-8 system is shipped from the factory in a single cardboard packing case.

Upon receipt, examine the case for any sign of damage.

Unpack the equipment and inspect for any sign of damage.

Use great care when unpacking the equipment and removing packing materials to prevent damage to critical components such as the capstan, head assembly, and tension arms.

Referring to Table 1-1 and Table 1-2 (as applicable), verify that all items have been received.

Report any shortage or damage to the carrier and your local Otari dealer.

Save the packing case for possible shipment of the equipment to another location or in case of reshipment.

Other packaging may cause damage during transportation and will void the warranty.

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

2-2 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 fluctuating loads on nearby high-voltage lines, heavy duty transformers, transmitting equipment, and air conditioners.

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 and 80%.

Allow at least a 4 inch (approx. 10 cm) clearance behind the rear-panel.

2-3 DIMENSIONS

Dimensions of the MX-5050 MK III -8 are shown in Figure 2-1.

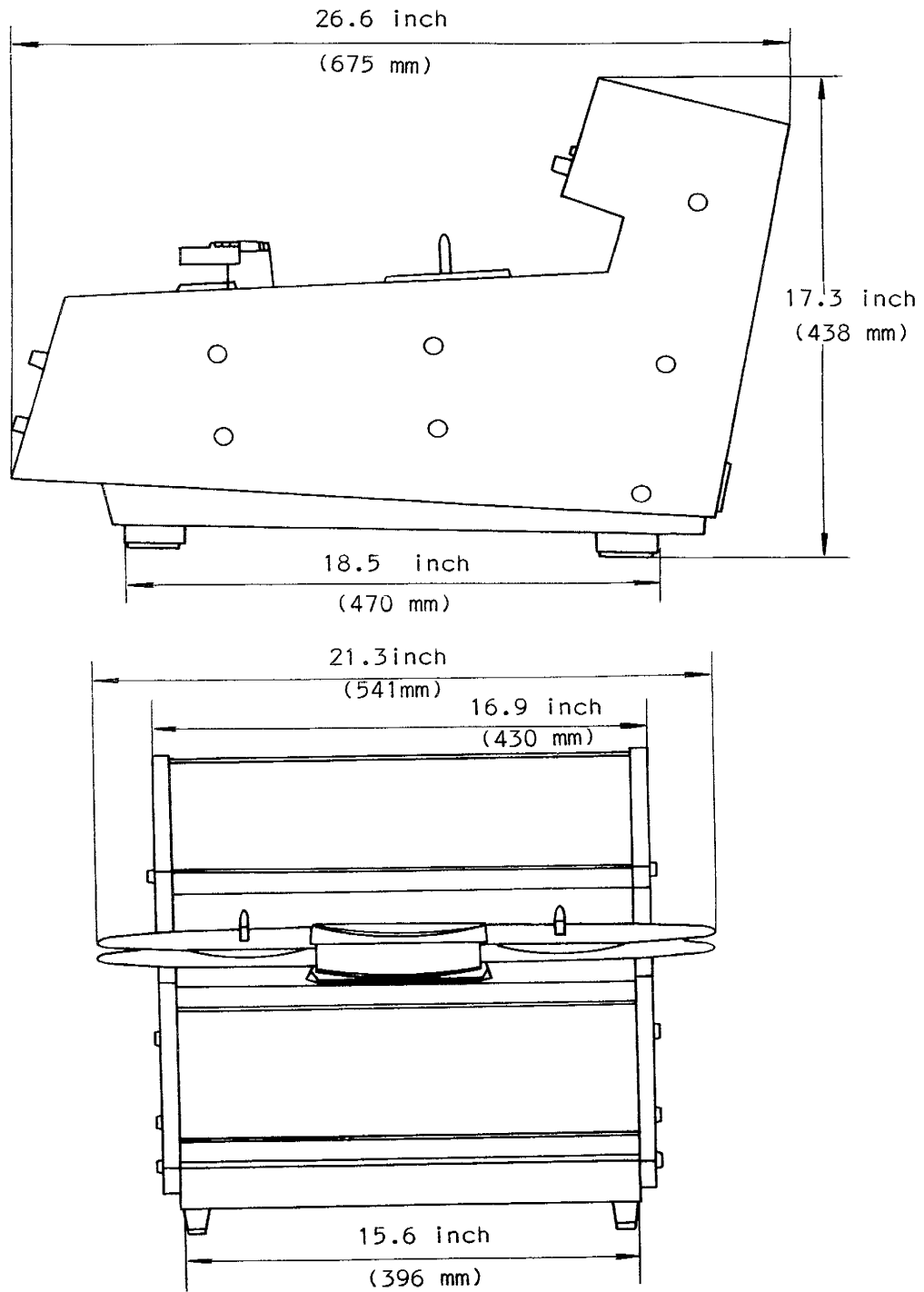


Figure 2-1 Dimensions

2-4 STANDARD SWITCH POSITION ON SHIPMENT

LINE INPUT LEVEL and OUTPUT LEVEL switches are provided on the adjusting panel in the record/reproduce electronics and the STAND-BY switch is provided on the rear panel of the electronics on the MX-5050 MK III -8.

These switches have been set at the factory at one of two positions as shown in Table 2-1.

Slide the switch to the desired position to change the standard.

Table 2-1 Standard Switch Position on shipment

SWITCH	Ref. No	POSITION
LINE INPUT LEVEL	1	L (minimum -18 dBm)
LINE OUTPUT LEVEL	2	H (+4 dBm)
STAND-BY	3	OFF

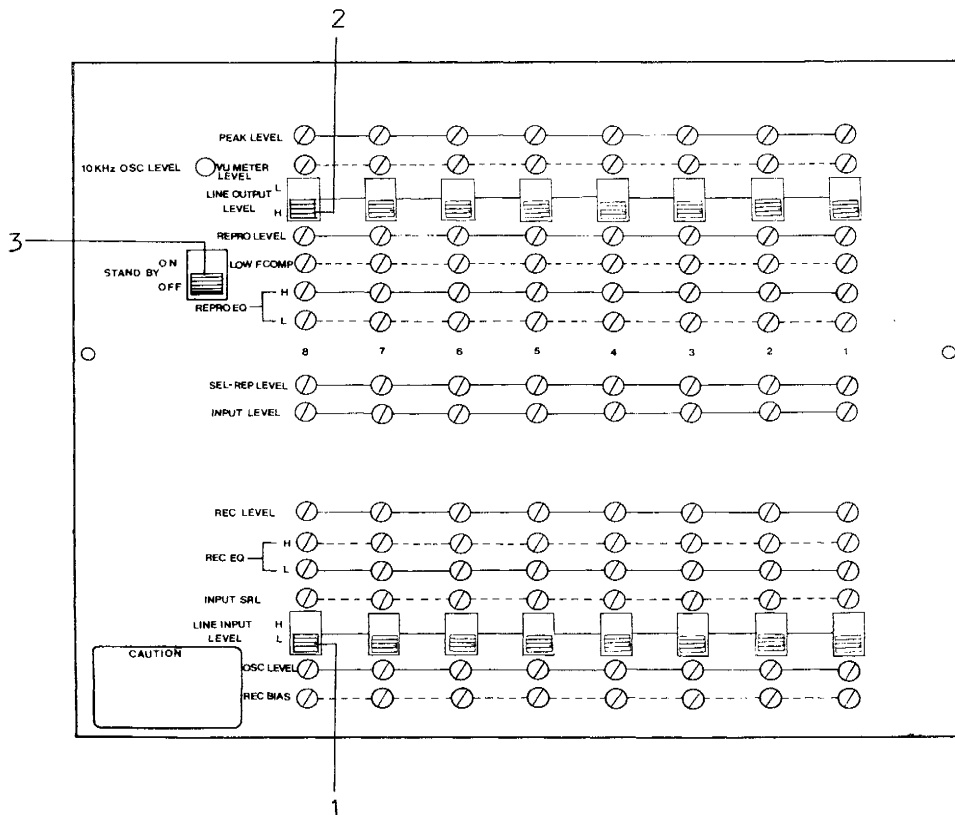


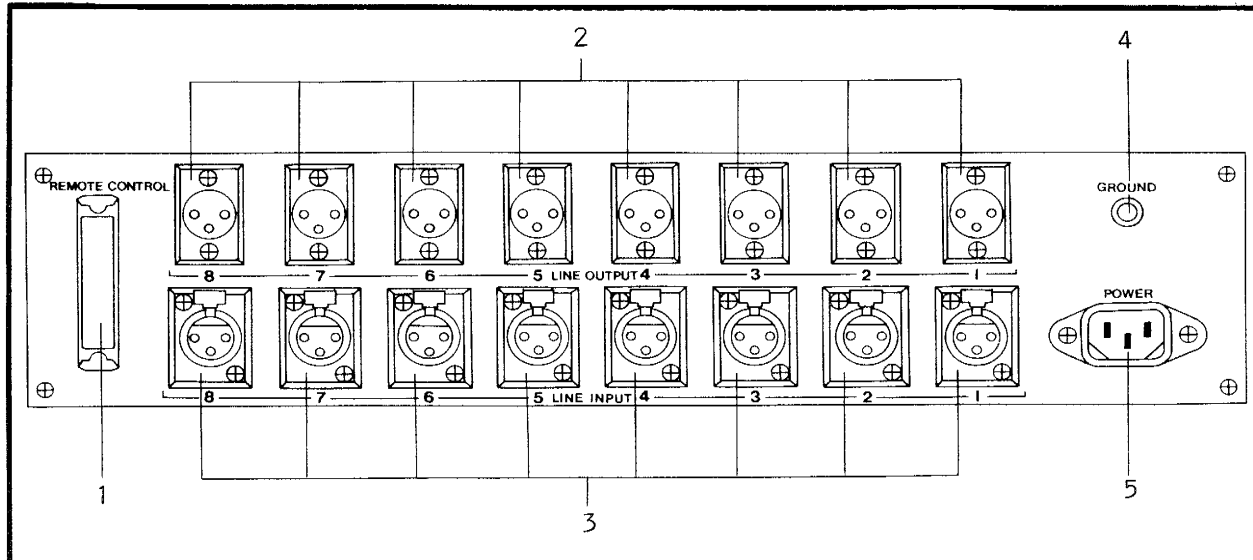
Figure 2-2 Rear Panel

2-5 POWER AND SIGNAL CONNECTION

Power, auxiliary ground, remote, and line input/output connections are made on the rear connector panel of the MX-5050 MK III -8.

Table 2-2 shows the function of each connector and component on the rear panel.

Table 2-2 Rear Connector Panel



Index No.	Name	Function
1	REMOTE CONTROL connector	Used to connect optional remote control unit (CB-110 or CB-114)
2	LINE OUTPUT connectors	Male XLR connector with unbalanced output. Load impedance : 600 ohm or greater Level : +4 or -8 dBm at 0 VU, selectable with on-board switch. Maximum output level: +21 dBm with a 600 ohm load.
3	LINE INPUT connectors	Female XLR connector with unbalanced input. Input impedance : 50 kohm Minimum input :-6 dBm or -18 dBm, selectable with on-board switch.

4	GROUND terminal	Auxiliary ground connection for use with equipment not connected to a common ac ground.
5	POWER connector	Three-terminal connector for connection to ac power and ground.

On the front of the bottom frame.

PRODUCTION nameplate	Indicates model number, production lot number (serial number), power requirements, and place of manufacture.
----------------------	--

On the rear panel.

CAUTION	Precautions for preventing fire and shock.
---------	--

2-5-(1) AC POWER CONNECTION

The MX-5050 MK III-8 is factory set to operate at the line voltage and frequency indicated on the packing case and on the front of the bottom frame.

AC power is connected by means of a 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 a change of line voltage is desired to accommodate different power requirements, please contact your nearest Otari dealer.

2-5-(2) SIGNAL CONNECTIONS

Line input (female) and line output (male) connectors are XLR-type connectors.

To wire the mating plugs, refer to Figure 2-3 and proceed as follows.

LINE INPUT CONNECTOR WIRING:

For unbalanced inputs using two-conductor shielded cable, wire the male XLR-connector as follows:

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

For unbalanced inputs using single-conductor shielded cable, wire the male XLR-connector as follows:

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

LINE OUTPUT CONNECTOR WIRING

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

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

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

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

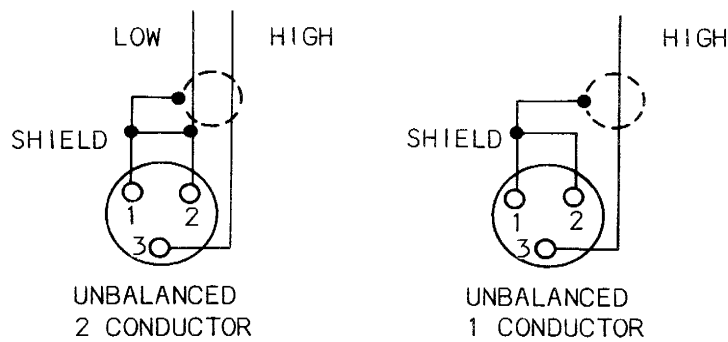


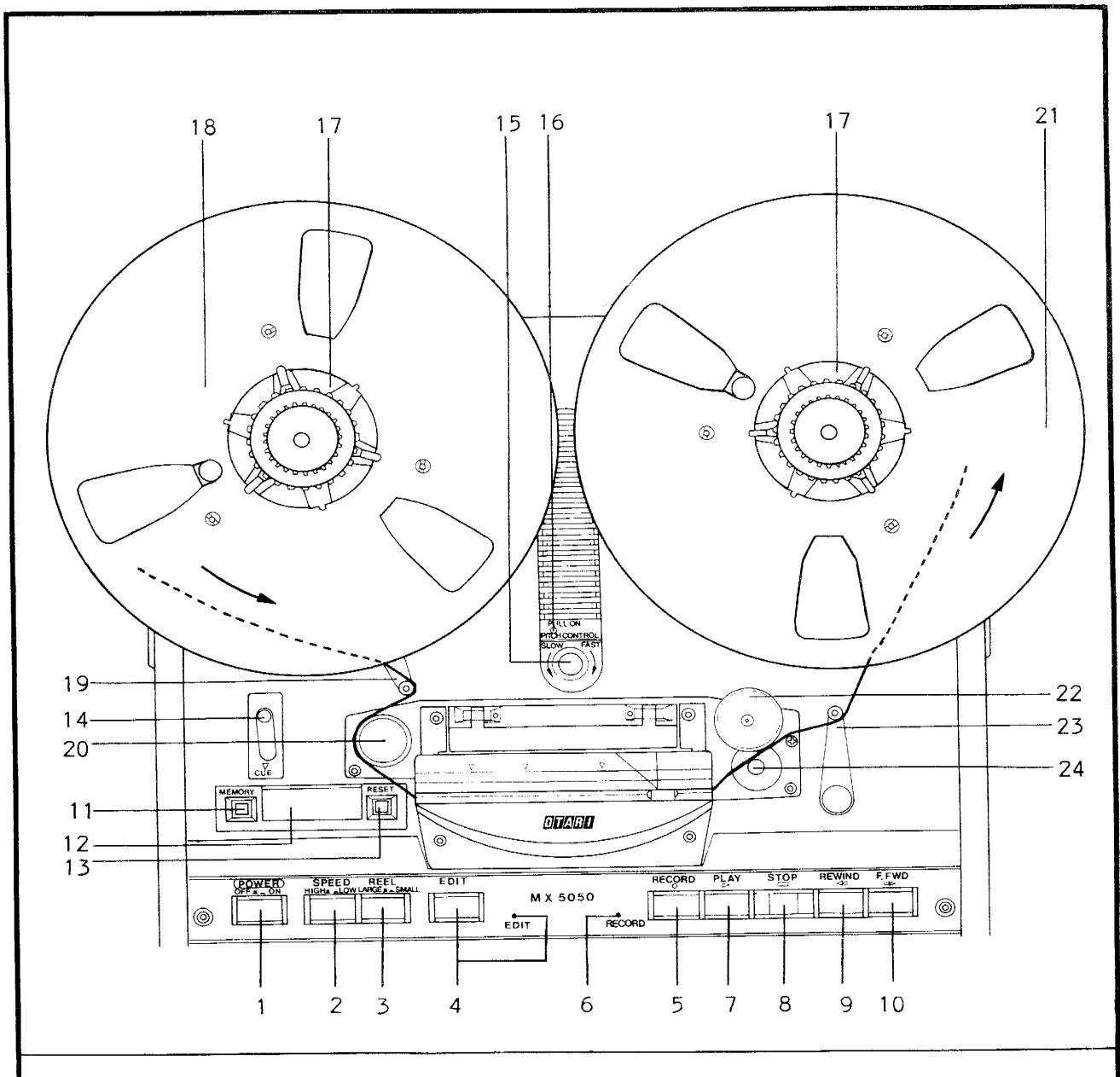
Figure 2-3 Input/Output Assembly Connector Wiring

SECTION 3 OPERATION

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

3-1 CONTROLS AND INDICATORS

Table 3-1 Tape Transport Controls and Indicators



Index No.	Name	Function
1	POWER pushbutton switch	In the depressed position, power is applied to the equipment, and the VU meters illuminate.
2	HIGH/LOW SPEED pushbutton switch	An alternate-action pushbutton switch used to select operating speed. In the HIGH position for 15 ips (38cm/sec) operation, and in the LOW position for 7 1/2 ips (19cm/sec) operation.
3	LARGE/SMALL REEL pushbutton switch	An alternate-action pushbutton switch used to select both reel tensions for the reel hubs diameter. In the LARGE position for reels with NAB hubs (4 1/2 in. diameter hubs), and in the SMALL position for reels with small hubs. <div data-bbox="691 1146 1382 1268" style="border: 1px solid black; padding: 5px; margin: 10px 0;"><i>The same size reels should be used on both reel tables.</i></div>
4	EDIT pushbutton switch and EDIT indicator (green)	Used to initiate the EDIT mode to aid in cutting out unwanted tape. When the EDIT pushbutton is depressed, the green EDIT indicator illuminates and the power is removed from the takeup reel. Then the PLAY pushbutton is depressed, causing the supply reel to rotate and the tape to be spilled off from the takeup side of the transport. Other operations are halted.

Index No.	Name	Function
5	RECORD pushbutton switch (momentary) (Remote-controllable switch)	<p>Used in conjunction with the PLAY pushbutton on the transport and the READY/SAFE toggle switches on the Amplifier control panel.</p> <p>Selecting READY position on desired channel, simultaneous pressing of PLAY and RECORD pushbuttons initiates RECORD mode and RECORD indicator on the transport illuminates.</p> <p>In the PLAY mode, when the RECORD pushbutton is pushed, this unit enters into the RECORD mode. (This is called "Punch in".)</p> <p>In the RECORD mode, when the PLAY pushbutton is depressed, the unit enters into the PLAY mode. (This is called "Punch out".)</p> <p>"Punch in" and "Punch out" are used for overdubbing in conjunction with the SEL/REP function.</p>

Index No.	Name	Function				
6	RECORD indicator (red) (also located on Remote control)	Indicates the RECORD mode.				
		Transport	Amplifier	Transport RECORD indicator	Amplifier RECORD indicator	Recording
		non RECORD mode	SAFE	dark	dark	×
		non RECORD mode	READY	blinking	blinking	× ready
		RECORD mode	SAFE	lights	dark	×
		RECORD mode	READY	lights	lights	○
7	PLAY pushbutton switch (momentary) (Remote-controllable switch)	<p>Blinking indicators means that the amplifier is in the RECORD-READY mode. Recording is being carried out only when the amplifier and transport RECORD indicators remain lit.</p> <p>Used to select the PLAY mode, or used in conjunction with the RECORD pushbutton to perform "Punch in" and "Punch out".</p> <p>Pressing the PLAY pushbutton during the F.FWD or REWIND mode stops the tape motion, then automatically starts the PLAY mode.</p>				

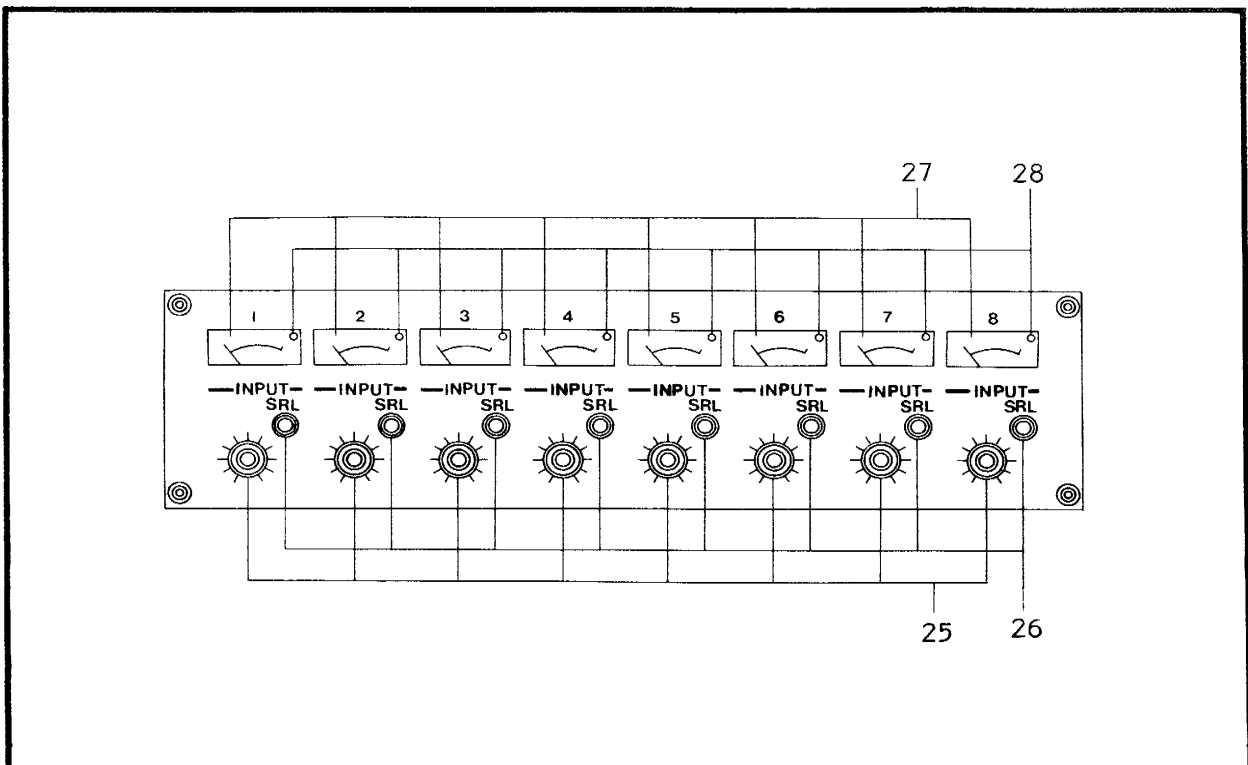
Index No.	Name	Function
8	STOP pushbutton switch (momentary) (Remote-controllable switch)	Used to stop the tape motion, cancelling the existing mode of operation.
9	REWIND pushbutton switch (momentary) (Remote-controllable switch)	Used to select the REWIND mode to wind the tape from right to left at high speed. This mode can be entered from any mode except EDIT.
10	F.FWD (FAST FORWARD) pushbutton switch (momentary) (Remote-controllable switch)	Used to select the F.FWD mode to wind the tape from left to right at high speed. This mode can be entered from any mode except EDIT.
11	MEMORY pushbutton switch (momentary) (Remote-controllable switch)	Used to stop the tape at the "00:00:00" position. This mode can be entered from any mode except both EDIT and RECORD.
12	Tape Timer (7-segment LED) (also located on Remote control)	A 6-digit TIMER used to locate or log program material on the tape. The first two digits indicate sign and hour; the second two digits indicate minutes; and the last two digits indicate seconds.
13	RESET pushbutton switch (Remote-controllable switch)	Used to reset the figure of the Tape Timer to "00:00:00".

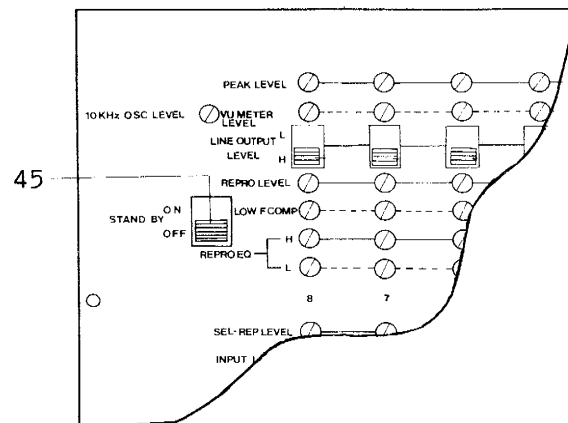
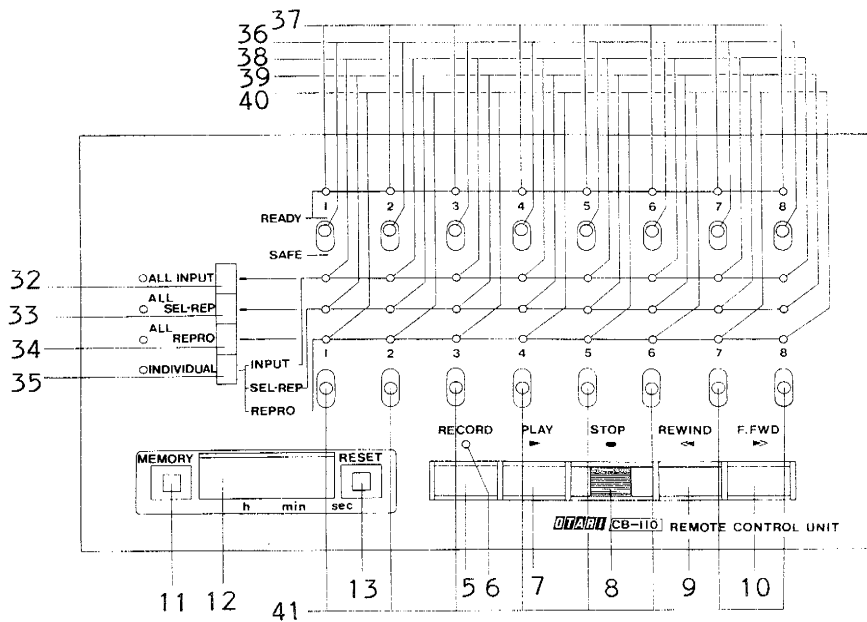
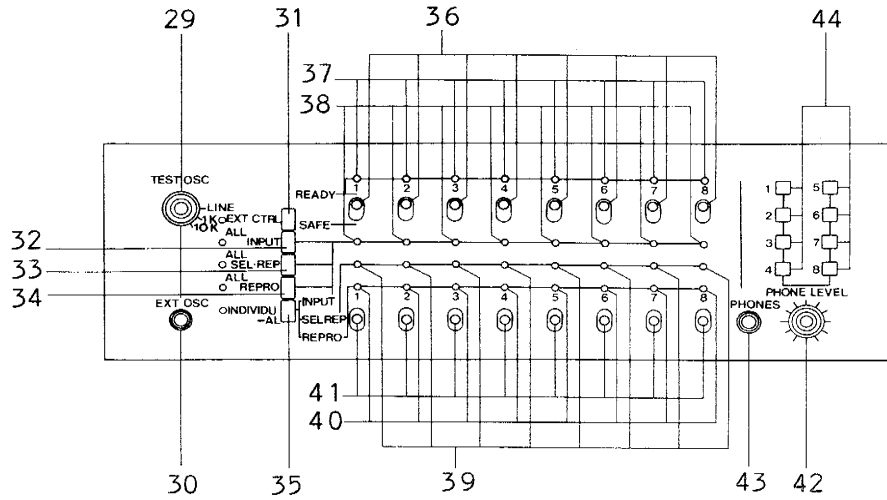
Index No.	Name	Function
14	CUE lever	<p>Used to carry out audio monitoring in the F.FWD and REWIND modes.</p> <p>To lock the lever, shift the lever to the full down position.</p>
15	PITCH CONTROL	<p>Used to control tape speed.</p> <p>The capstan speed can be controlled within $\pm 7\%$ of nominal speed when the PITCH CONTROL knob is pulled out.</p> <p>(variable mode)</p> <p>Turning clockwise causes the capstan speed to increase and turning counter-clockwise, causes the capstan speed to decrease.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><i>PITCH CONTROL functions in both the RECORD and PLAY modes.</i></p> </div>
16	PITCH CONTROL indicator (red)	<p>Illuminates when the PITCH CONTROL knob is pulled out. (In variable mode).</p>
17	NAB Hub Reel Hold Down Knobs	<p>Used to attach NAB hub reels to the reel table. (Refer to 3-3-(1))</p>
18	Supply Reel	<p>Supplies tape for reproduction or recording.</p>
19	Tension Arm	<p>Damps tape tension fluctuations.</p>
20	Impedance roller	<p>Reduces wow and flutter.</p>

Index No.	Name	Function
21	Takeup reel	Takes up tape.
22	Pinch roller	Correctly transmits the tape with the capstan.
23	Tension Arm with Safety switch	Damps tape tension fluctuations. When tape is exhausted, supply and takeup reel rotation is automatically stopped by the safety switch attached to the tension arm.
24	Capstan shaft	Keeps the tape speed constant in the reproduce and record modes.

Table 3-2 shows the location and function of each control and indicator on the record/reproduce electronics and optional Remote control unit. (CB-110)

Table 3-2 Record/Reproduce Electronics Controls and Indicators





Index No.	Name	Function
25	INPUT level controls	Controls recording level of line of the associated channel.
26	SRL (STANDARD REFERENCE LEVEL) pushbutton switches	<p>By pushing the pushbutton, SRL mode is entered.</p> <p>In SRL mode, INPUT level is of internally preset level.</p> <p>When inputting reference input level, the VU meter indicates 0 VU while rated output level is output at LINE OUTPUT.</p> <p>When the switch is out (Manual mode), INPUT level is controlled with the INPUT level controls.</p> <p>(Index No. 25 in this table)</p>
27	VU meters	<p>Indicate the record and playback level of the associated channel depending on the mode of operation and position of the monitor select switches.</p> <p>(Index Nos. 32,33,34,35 in this table.)</p> <p>The meters illuminate when the recorder is turned on.</p>
28	PEAK indicators	<p>Indicate signal peaks.</p> <p>When the input or output signal exceeds AMPEX operating level (185 nWb/m) by 15 dB (1,040 nWb/m), the PEAK indicator lights.</p> <p>Trigger level may be adjusted.</p> <p>Factory set level is 12.4 dB (NAB) or 11.2 dB (IEC) over 0 VU.</p>

Index No.	Name	Function
29	TEST OSCillator switch	<p>Used to select the LINE INPUT signal. The LINE position should be normally set to get the audio signal from the LINE INPUT connector for recording. The "1k" or "10k" position is set to feed a tone of 1 KHz or 10 KHz to the LINE INPUT circuit for cue tone recording or electrical adjustment. The EXT OSC position is set to feed the tone from the EXT OSC jack to the LINE INPUT circuit.</p>
30	EXT OSCillator jack	<p>Used to input signal from external audio oscillator. Standard single-conductor phone jack. Input impedance: 10 kohm Minimum input : -18 dBm</p>
31	EXT CTRL (EXTERNAL CONTROL) pushbutton switch and indicator (green)	<p>Pressing the pushbutton, the adjacent indicator lights, and the optional CB-110 Remote Control Unit can be operated. During the operation by Remote Control Unit, the actual mode of operation can be monitored on the Amplifier Control Panel irrelevant to the position of the switches on the panel.</p>
32	ALL INPUT pushbutton switch and indicator (yellow) (Remote-controllable switch)	<p>Pressing the pushbutton, the adjacent indicator lights, all the INPUT indicators lights, and the input signals are fed to the LINE OUTPUT connectors, the PHONES jack, the VU meters, and the PEAK indicators of all channels.</p>

Index No.	Name	Function
33	ALL SEL/REP (SELECTIVE REPRODUCTION) pushbutton switch and indicator (green) (Remote-controllable switch)	<p>Pressing the pushbutton, the adjacent indicator lights, all the SEL/REP indicators lights, and the programs via the record head are fed to the LINE OUTPUT connectors, the PHONES jack, the VU meters, and the PEAK indicators of all channels.</p> <p>Entering the RECORD mode, the monitor program on READY (Index No.36 in this table) selected channels are automatically switched from SEL/REP to INPUT. This function is for "Punch in" and "Punch out".</p>
34	ALL REPRODUce pushbutton switch and indicator (orange) (Remote-controllable switch)	<p>Pressing the pushbutton, the adjacent indicator lights, all the REPRO indicators lights, and the programs via the reproduce head are fed to the LINE OUTPUT connectors, the PHONES jack, the VU meters, and the PEAK indicators of all channels.</p>
35	INDIVIDUAL pushbutton switch and indicator (green) (Remote-controllable switch)	<p>In the depressed position, the adjacent indicator lights, and INPUT or SEL/REP or REPRO mode can be selected with the Monitor Select toggle switches (Index No. 41 in this table) at the individual channel.</p>

Index No.	Name	Function
36	READY/SAFE toggle switches (Remote-Controllable switch)	Used to select channels for recording in conjunction with the PLAY and RECORD pushbuttons on the transport. Selecting the READY position, the RECORD indicators illuminate or blink and the RECORD mode of associated channels may be entered or ready. Selecting the SAFE position, the RECORD indicators turn off and activation of associated channels RECORD mode are cancelled. (Index Nos. 5,6,7 in this table.)
37	RECORD indicators (red)	Indicate the record mode of associated channel by lighting up.
38	INPUT indicators (yellow)	Indicate activation of associated channel INPUT mode. (Index Nos.32,35 in this table)
39	SEL/REP indicators (green)	Indicate activation of associated channel SEL/REP mode. (Index Nos.33,35 in this table)
40	REPRoduce indicators (orange)	Indicate activation of associated channel REPRO mode. (Index Nos.34,35 in this table)
41	Monitor Select toggle switches (Remote-controllable switch)	Used to select the monitor program. (LINE OUTPUT signal)

Index No.	Name	Function
42	PHONE LEVEL control	Used to control all channel PHONE LEVELS with interlocking.
43	PHONES jack	Used to monitor the INPUT or the recorded program. Standard two-conductor phone jack, available for both Stereo and Monaural headphones, used to monitor the output signal selected by MONITOR SELECT pushbutton switches. Load impedance : 8 ohm or greater Output level: -19 dBm with an 8 ohm load
44	PHONE SELECT pushbutton switches	Alternate-action pushbutton switches used to select the channel to be monitored. All channels can be mixed.
45	STAND-BY slide switch	In "ON" position, entering the STOP or F.FWD or RWD mode, the monitor program on READY selected channels are automatically switched to INPUT.

3-2 CB-110 REMOTE CONTROL UNIT OPERATION (OPTION)

The OTARI CB-110 Remote Control Unit is designed specifically for the MX-5050 MK III-8.

The CB-110 takes over full function (transport control; memory function; tape timer; audio electronics control) of MX-5050 MK III-8.

Connect the connector of the CB-110 to the connector of MX-5050 MK III-8 located on the rear panel.

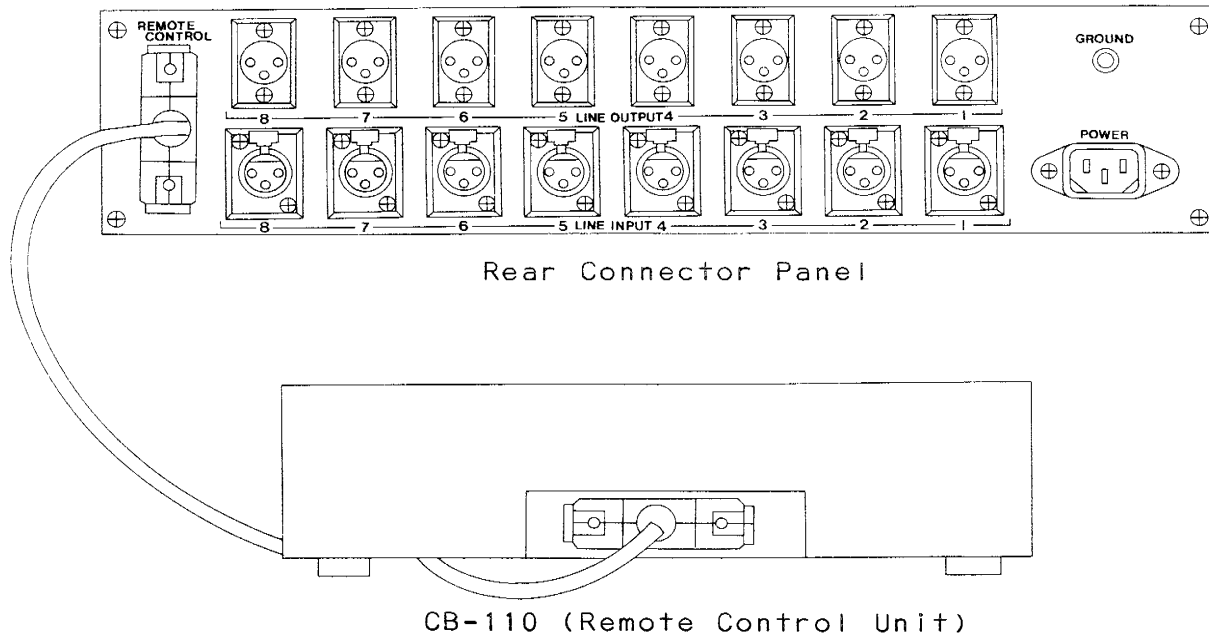


Figure 3-1 Connection of Remote Control Unit

3-3 OPERATING INFORMATION

3-3-(1) USING THE REEL HOLD DOWN KNOBS

The NAB hub reel hold down knobs shown in Figure 3-2 are used to attach the NAB hub tape reel on to the reel table, proceed as follows:

For the NAB hub (4 1/2 inch diameter hub) tape reel;

- (1) Place the reel hold down knob on the reel table and turn the inner knob clockwise to lock the reel hold down knob to the reel shaft.
- (2) Place the NAB hub tape reel onto the reel table so that the three slots of the tape reel correspond to the three notches of the base of the reel hold down knob.
Pulling and turn the outer knob 60° to fix the tape reel.

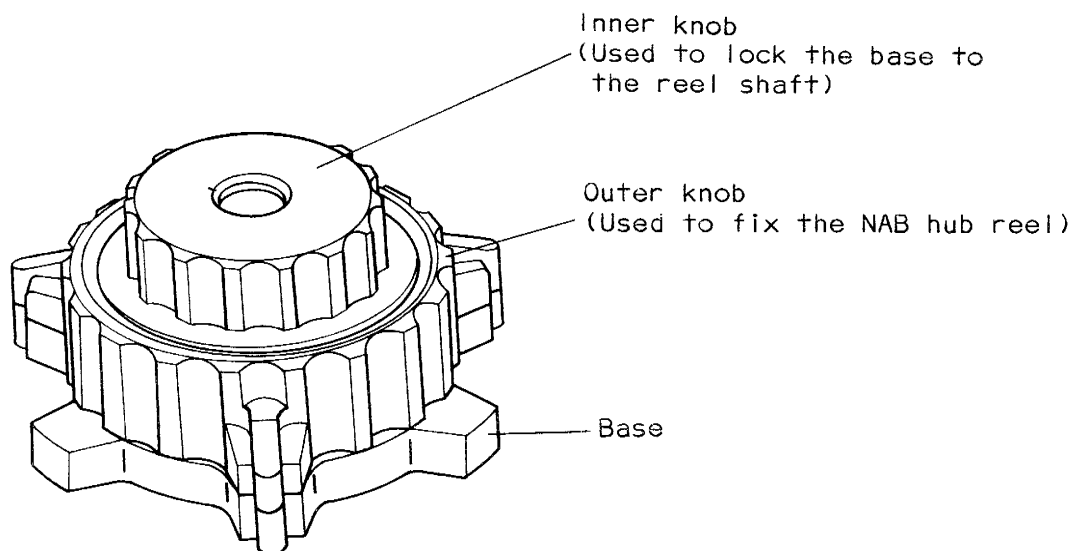


Figure 3-2 Reel Hold Down Knob

3-3-(2) PRE-OPERATING PROCEDURE

After the equipment has been installed as described in Section 2 of this manual and the operator has become familiar with all the operating controls and indicators described in Tables 3-1 and 3-2, prepare the recorder for operation as follows.

- (1) Press the POWER switch to the "IN" ON position.
The VU meters light up and the Tape Timer illuminates.

- (2) Place a reel of tape on the supply (left-hand) reel table as described in Section 3-3-(1).
If metal reels are used, use reel-adjusting discs (shims) between the tape reels and the reel tables.
Note that the reel must turn counterclockwise as tape is pulled off the reel.
- (3) Place the same size empty reel on the takeup (right-hand) reel table as described in Section 3-3-(1).
Note that the same size reels should be used on both reel tables.
- (4) Thread the tape as shown in Figure 3-3 and place the end of the tape in the slot of the empty reel, and rotate the reel several times with holding the tape end and removing slack tape.
- (5) Set the HIGH/LOW SPEED switch to the desired tape speed.
- (6) Set the LARGE/SMALL REEL switch to correspond to the size of the reel hub diameter being used.
- (7) If desired, connect a headset or monitor speaker/ amplifier to the PHONES jack.

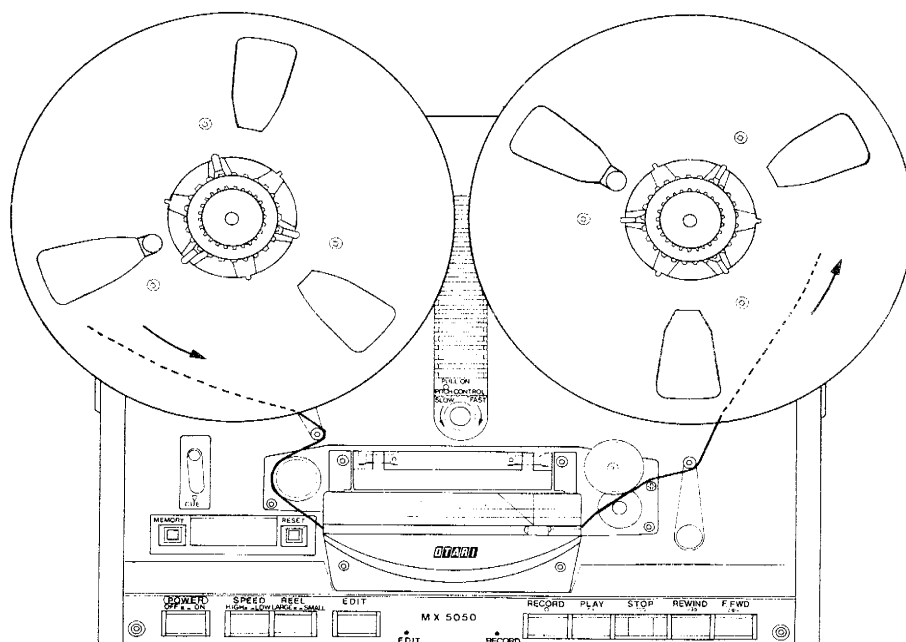


Figure 3-3 Tape Threading

3-3-(3) REPRODUCTION

To reproduce, proceed as follows:

- (1) Perform all steps in the pre-operating procedure.
- (2) Set the all channel READY/SAFE toggle switches to the "OUT" SAFE position to avoid mis-erasing of the recorded tape program.
- (3) After pushing the INDIVIDUAL pushbutton switch, set the desired MONITOR SELECT toggle switch(es) to the "REPRO" position for the channel(s) reproduced. (When reproduction of all channels are made, push the ALL REPRO pushbutton switch.)
- (4) Depress the PLAY pushbutton to start tape monitoring.
- (5) To stop the reproduction of the tape program, depress the STOP pushbutton at a desired position.

3-3-(4) NORMAL RECORDING

To record normally, proceed as follows:

- (1) Perform all steps in the pre-operating procedure.
- (2) After pushing the INDIVIDUAL pushbutton switch, set the desired READY/SAFE toggle switch(es) to the "READY" position for the channel(s) selected for recording.
The associated channel red RECORD indicator(s) and transport RECORD indicator will start blinking.
In case of all channel recording, after pushing all INPUT pushbutton switches, set all READY/SAFE toggle switches to the "READY" position.
All channel RECORD indicators and transport RECORD indicator will start blinking.
- (3) Set the desired MONITOR SELECT toggle switches of associated channels to the "INPUT" position. (This step is skipped for all channel recording.)

- (4) Adjust the desired LINE INPUT level control(s) so that the VU meter(s) indicates 0 VU at the most audio peaks.
(It is advisable to adjust the channel input levels so that the peak indicator LEDs, located in the VU meter housings, blink occasionally.)
- (5) Reset the Tape Timer to "00:00:00".
- (6) Press the PLAY and RECORD pushbutton of the transport simultaneously to start recording.
The red RECORD indicator of the selected channel(s) and transport remain lit.
During the play mode, press the RECORD pushbutton to enter directly into the record mode without stopping the tape transport.
(This is called "Punch in".)
- (7) While recording, the input signal(s) of each channel can be compared with the signal reproduced on each channel by setting the MONITOR SELECT toggle switches to the "REPRO" position.
- (8) When recording is completed, press the STOP pushbutton to stop tape motion or press the PLAY pushbutton to enter into the PLAY mode without stopping the tape transport.
(This is called "Punch out".)
- (9) To find the exact "00:00:00" position on the tape, press the MEMORY pushbutton several times.

3-3-(5) RECORDING WITH SELECTIVE REPRODUCTION

The selective reproduction function causes the reproduced program to be monitored from the record head rather than from the reproduce head.

This enables a recording to be made on another channel synchronized (in phase) with the channel being reproduced.

To record with selective reproduction, proceed as follows:

- (1) Perform all steps in the pre-operating procedure.

- (2) Perform all steps in the normal recording procedure for the channel(s) to be prerecorded.
- (3) Rewind the tape to the point where selective reproduction is to start.
- (4) Set the READY/SAFE toggle switches of the channel(s) selected for recording to the "READY" position.
- (5) After pressing the INDIVIDUAL pushbutton switch, set the MODE SELECT toggle switch(es) for the channel(s) selected for recording to the "INPUT". (or press the All INPUT pushbutton switch.)
- (6) Adjust the LINE INPUT level control so that the VU meter indicates 0 VU for most audio peaks.
(It is advisable to adjust the channel input levels so that the peak indicator LEDs, located in the VU meter housings, blink occasionally.)
- (7) After pressing the INDIVIDUAL pushbutton switch, set the MODE SELECT toggle switch(es) to the "SEL/REP" position for the channel(s) selected.
(or set the All SEL/REP pushbutton switch for all channel SEL/REP MODE)
- (8) Press the PLAY pushbutton switch to start tape motion.
At the point where overdub is desired, press the RECORD pushbutton to start recording on the selected channel(s).
Simultaneously the monitor program of "READY" selected channel(s) automatically change(s) to the "INPUT".
- (9) When recording is complete, press the STOP pushbutton to stop tape motion and de-activate the RECORD mode, or depress the PLAY pushbutton for punch out operation.

Note: The pitch control is available to finely adjust the tape speed of one track (pre-recorded track) with another track(s) for overdubbing, which can be used in both the Record and Reproduce modes.

3-3-(6) FAST WINDING

For fast-winding operations, and for editing or cueing, press the F.FWD or REWIND pushbutton switch as appropriate.

These pushbuttons can be pressed alternately without pressing the STOP pushbutton between fast-winding operations.

These modes may be entered into from any other mode except the EDIT mode.

Pressing the PLAY pushbutton during a fast-winding mode causes the tape to automatically come to a stop and then enter into the PLAY mode.

In a fast-winding mode, the tape lifters (shifters) are automatically actuated and 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.

3-3-(7) EDITING AND SPLICING TAPE

For editing and splicing operations, the CUE lever can be used in fast-winding modes to quickly locate the desired program material.

In addition, there is an EDIT mode of operation, used as follows:

Depressing the EDIT pushbutton while in the PLAY mode removes power from the takeup reel and causes the tape to be spilled off on the takeup side of the transport.

This mode is used to facilitate cutting out unwanted tape.

The EDIT mode can also be entered into from the STOP mode by pressing the PLAY pushbutton after the EDIT pushbutton is depressed.

The tape-splicing block (Figure 3-4) mounted on the head cover can be used to hold the tape for ease in cutting the tape with a single-edged razor blade and applying splicing tape.

Use 7/32-inch width splicing tape (3M Co., No. 41), and never use cellophane tape.

The tape splicing block has the following features:

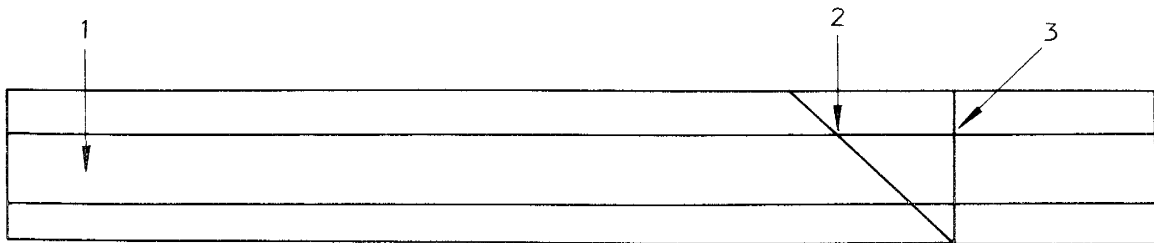


Figure 3-4 Tape splicing block

- | | | |
|---|---------------------|--|
| 1 | Tape-guide channel: | Holds the tape for ease of cutting and splicing. |
| 2 | 45° cutting guide: | Used to guide tape cutter for a diagonal cut for splicing. |
| 3 | 90° cutting guide: | Used to guide tape cutter for a vertical cut. |

**SECTION 4
GENERAL INFORMATION OF MAINTENANCE**

4-1 TEST AND MAINTENANCE EQUIPMENT REQUIREMENTS

All maintenance, electronic, and mechanical test equipment required during maintenance, alignment, and adjustment of the recorder is listed in Table 4-1 and the standard test tapes are listed in tables 4-2, and 4-3.

In addition, recommended maintenance periods are shown by accumulative hours of usage and/or elapsed period of time, whichever comes first.

Equivalent equipment can be substituted for the equipment suggested in the table.

Table 4-1 Test and Maintenance Equipment

Equipment Type	Suggested Model	Used For	Period
Head cleaner	Ampex 087-007 or 4010823	Cleaning heads and guides	8 hours
Isopropyl or denatured alcohol	Any	Cleaning capstan pinch-roller	8 hours
Q tips	Any	Cleaning heads and guides	8 hours
Head demagnetizer	Ampex 4010820	Demagnetizing heads and guides	8 hours
Lubricating oil	Anderol #456 (TENNECO)	Oiling of capstan	1,000 hours or 6 months
Spring scales 500g, 1kg, 3kg (0-16 oz, 0-32 oz, and 0-10 lbs)	Any (pushing and pulling)	Mechanical adjustment	1,000 hours or 6 months
Vacuum cleaner and brushes	Any	General cleaning	1 month
Standard alignment and flutter test tape	Refer to Table 4-2 and 4-3	Reproduce amplifier alignment and Flutter test	150 hours or 1 month

Equipment Type	Suggested Model	Used For	Period
Audio oscillator	Hewlett Packard 200CD or 204C	Overall frequency response and signal-to-noise measurement	150 hours or 1 month
Ac voltmeter (VTVM)	Hewlett Packard 400E or 400FL	Same as above	Same as above
Bandpass filter	Refer to Figure 7-1	Same as above	Same as above
Flutter meter	Meguro Electronics Corp. MK668C or MK669	Flutter and wow, tape speed measurement	150 hours or 1 month
Wave analyzer	Hewlett Packard 3581A or 339A	Distortion and crosstalk measurement	Same as above
Test cables	Refer to text		
Technicians tools			
Allen wrenches	Metric		
Volt-ohm meter	20,000 ohms/volt any brand	Test and adjustment	

Table 4-2 Flutter Test Tapes

TAPE WIDTH (INCHES)	SPEED (IN/S)	FREQUENCY (HZ)	AMPEX CATALOG NO.
1/2	7 1/2	3000	01-31326-05
1/2	15	3000	01-31316-05

Table 4-3 Reproduce Alignment Test Tape

Tape speed	Equalization	MRL *1 Catalog number	Reference level (Fluxivity)
15 ips	NAB	31J219	250 nWb/m *2
7 1/2 ips	NAB	31T218	250 nWb/m *2
15 ips	IEC	31J329	320 nWb/m *3
7 1/2 ips	IEC	31T328	320 nWb/m *3

*1 Magnetic Reference Laboratory.

*2 Short circuit flux.

*3 Open circuit flux which corresponds to 290 nWb/m of short circuit flux.

SECTION 5

ROUTINE MAINTENANCE AND CONVERSION INFORMATION

5-1 ROUTINE MAINTENANCE

It is important that routine maintenance be performed at the recommended intervals.

Exterior cleaning and demagnetization should be performed after every eight hours of operation, and the interior of the transport should be cleaned once a month.

Lubrication should be performed after 1,000 hours of operation or after 6 months, whichever comes first.

5-1-(1) CLEANING

Oxide particles from the magnetic tape tend to collect on components in the tape path and degrade the performance of the recorder.

To clean the head assembly, proceed as follows:

- (1) Disconnect the power cable from the power supply.
- (2) Lift the head cover as shown in Figure 5-1.

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 COULD SCRATCH THE HEADS.

- (3) Clean each head thoroughly with a cotton-tipped applicator (Q tip) dampened with head cleaner.
- (4) Use isopropyl alcohol to clean all tape-guiding components, the capstan shaft, and the capstan pinch roller.

CAUTION

1. DO NOT USE A HEAD CLEANER ON THE CAPSTAN PINCH ROLLER, SINCE THIS WILL CAUSE DAMAGE AND TAPE SLIP.
2. BEFORE REMOVING THE REAR COVER, THE PLUG MUST BE DISCONNECTED FROM THE POWER SUPPLY TO AVOID AN ELECTRIC SHOCK.

(5) Place the recorder on its side, and remove the six screws on the bottom cover.

After that, remove the four screws, and open the Control P.C. Board. (Refer to Figure 5-7)

(6) Use a vacuum cleaner and a small brush to remove all dust or contamination from the interior of the transport.

If necessary lightly moisten brush with isopropyl alcohol to clean parts.

(7) Install the bottom cover and the Control P.C. Board Ass'y.

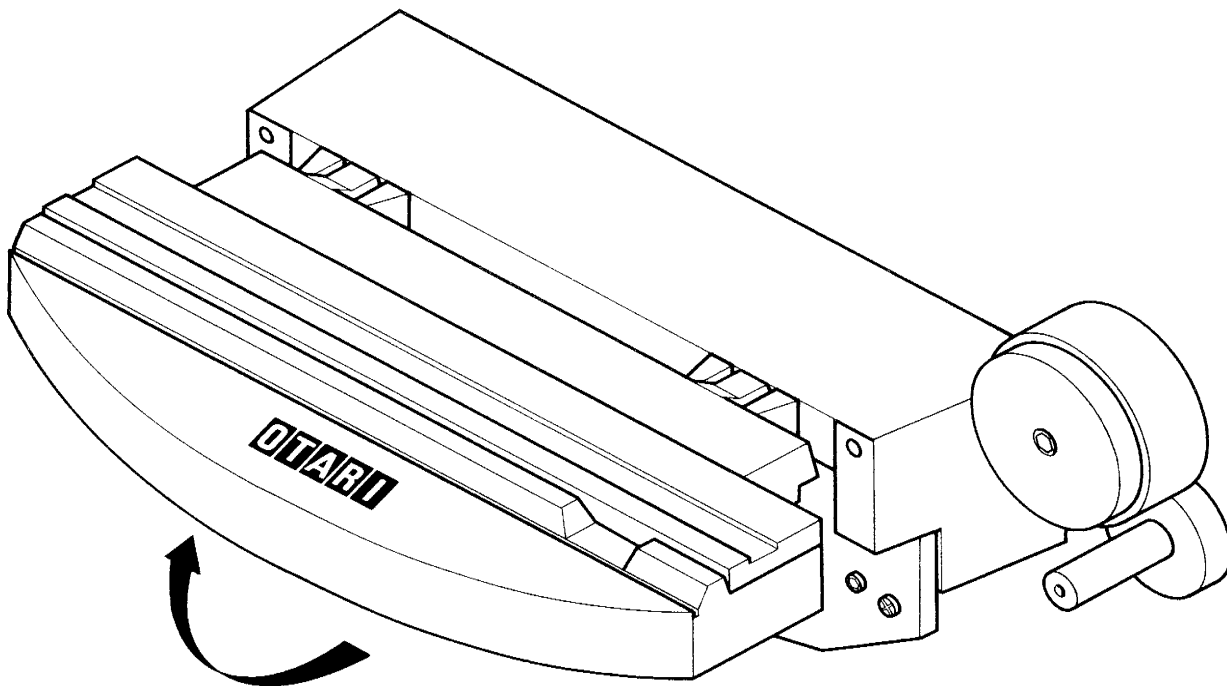


Figure 5-1 Lifting the Head Cover

5-1-(2) DEMAGNETIZING

The heads and tape guiding components in the tape path should be demagnetized after every eight hours of operation.

These components can acquire permanent magnetization that increases noise and distortion, and partially erases high frequencies on recorded tapes.

Use a hand-held head demagnetizer to demagnetize all components in the tape path as follows:

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

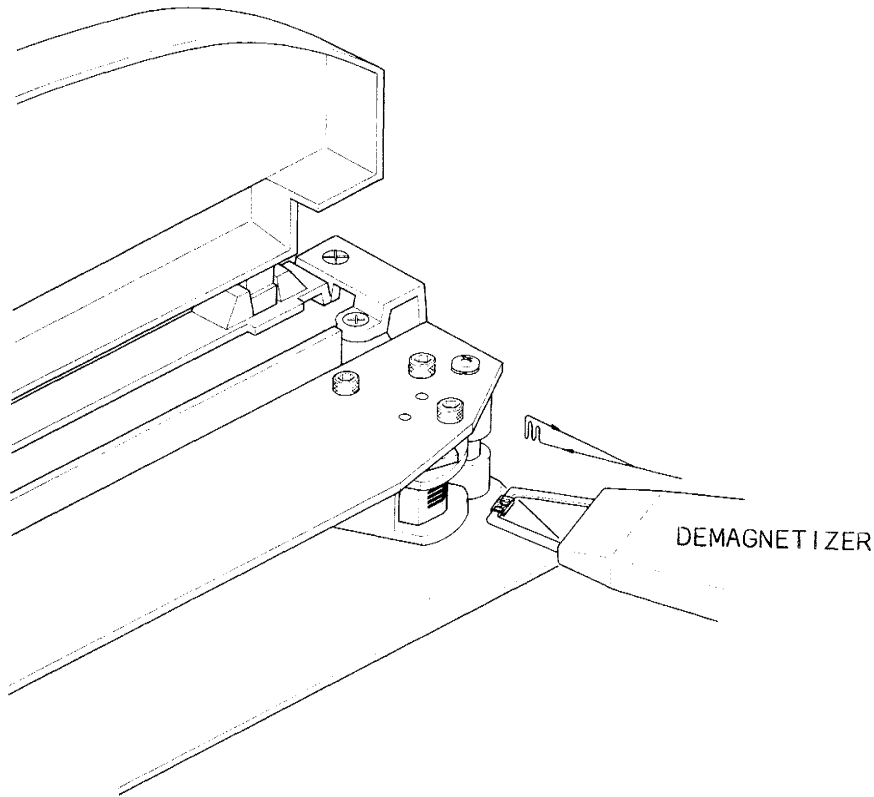


Figure 5-2 Demagnetizing

5-1-(3) LUBRICATION

The only components requiring lubrication are the capstan sleeve bearing.

Refer to Figure 5-3 and proceed as follows:

CAUTION

1. DO NOT USE ANY OIL EXCEPT ANDEROL #456 FOR LUBRICATION.
2. BE CERTAIN TO CLEAN THE CAPSTAN SHAFT THOROUGHLY.
LUBRICATING OIL COULD RUIN THE CAPSTAN PINCH ROLLER AND MAGNETIC TAPE.
CLEAN THE CAPSTAN WITH ISOPROPYL ALCOHOL AFTER LUBRICATION.

1. Remove the pinch roller cap by removing the screw on it.
2. Remove the pinch roller from the pinch roller shaft.
3. Remove two hex socket head screws on the head housing cover.
Remove the head front escutcheon by removing the two screws on it and remove the head rear escutcheon by removing the three screws on it.
Turn the Dust Cap counterclockwise and pull off from the capstan.
4. Apply 2 or 3 drops of oil to this felt collar.
Do not over lubricate.
5. Wipe off any excess oil and install the dust cap, head front escutcheon, head rear escutcheon, and pinch roller cap in the reverse order.

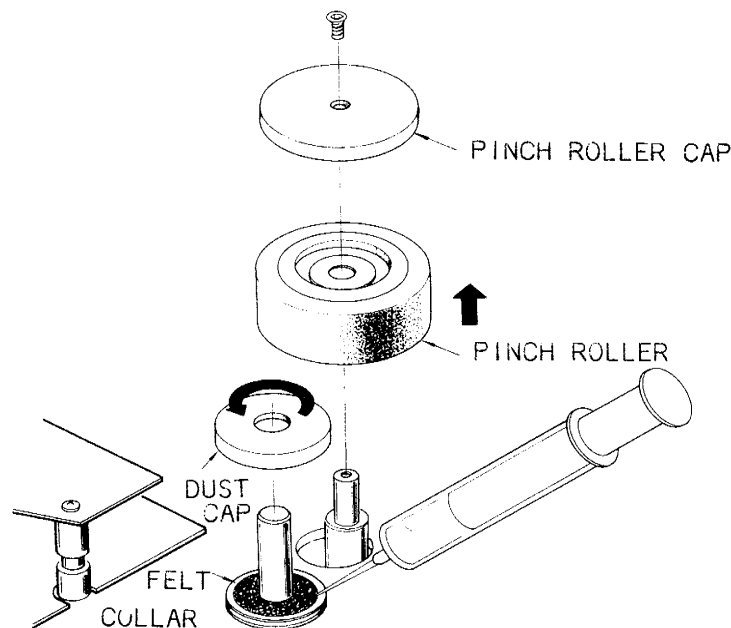


Figure 5-3 Lubrication

5-2 TAPE REPLACEMENT

The MX-5050 MK III-8 is set at the factory for Scotch #226 Recording Tape.

If another tape is to be used, the following adjustment may be required for optimum tape performance.

Refer to Section 7.

Required adjustments are:

1. The record bias adjustment.
2. The record level adjustment.

5-3 EQUALIZER CHANGE

The equalizer between the NAB or the IEC can be changed by replacing the RECORD/REPRODUCE Amplifier P.C. Board Ass'y.

However, a fine equalizer adjustment and a record level set are required.

Refer to Section 7 to aid the fine adjustment.

Table 5-1 Record Level

Reference fluxivity	Relative level	Test Tape	Recording tape to be used
185 nWb/m*	0 dB	Ampex Operating level	Scotch 177, Ampex 641
250 nWb/m*	+2.6 dB	MRL NAB standard	Scotch 206,207,226,250 Ampex 406,407,456
320 nWb/m**	+3.8 dB	BASF or MRL IEC Standard	IEC Equalization

* Short circuit flux.

** Open circuit flux.

5-4 LINE VOLTAGE CONVERSION

The line voltage is converted by resoldering the wiring on the voltage selection terminal, proceed as follows:

1. Remove seven hex socket head screws putting left side board, that is supply reel side.
By looking at inside of transport from left side, it is easy to find the voltage selection terminal on the supply reel ass'y. (Refer to Figure 5-4)
2. Resolder the lead wire of the voltage selection terminal located on the supply reel ass'y to the desired voltage terminal marked as shown in Figure 5-4.

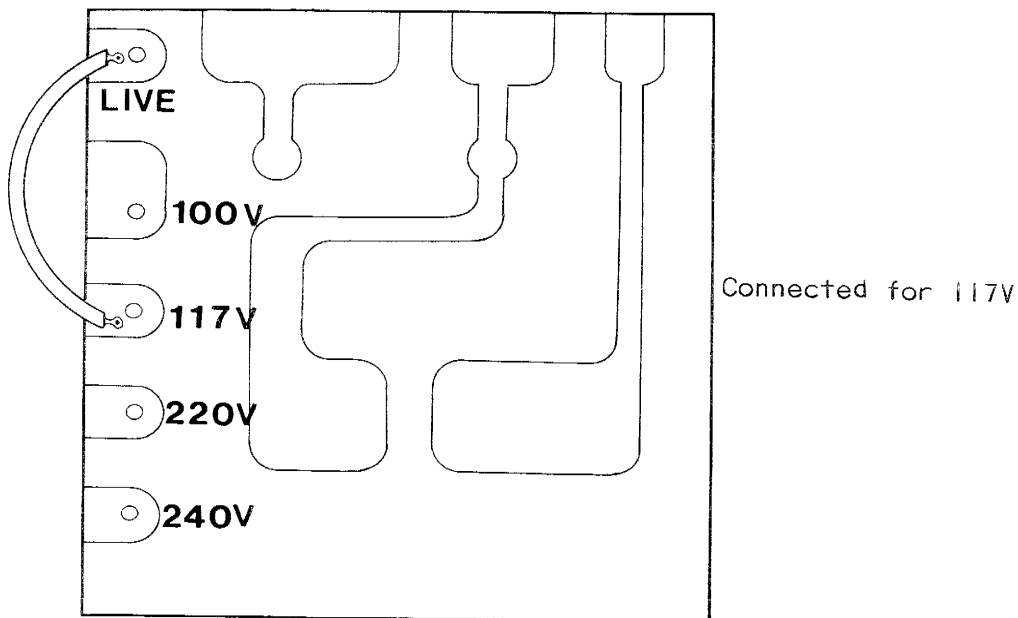


Figure 5-4 Voltage Selection Terminal

5-5 FUSE REPLACEMENT

If a fuse is blown, it is important that the possible cause is checked before replacing the fuse.

CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY
WITH THE SAME TYPE OF FUSE.
BEFORE REPLACING THE FUSE, REMOVE THE POWER CORD FROM THE
POWER SOURCE.

Information concerning the seven fuses can be found in Table 5-2.
For the main power fuse (FS801), proceed as follows:

1. Remove the board on the left side by removing seven hex socket head screws.
2. Replace the main power fuse (FS801) on the power switch P.C. Board.

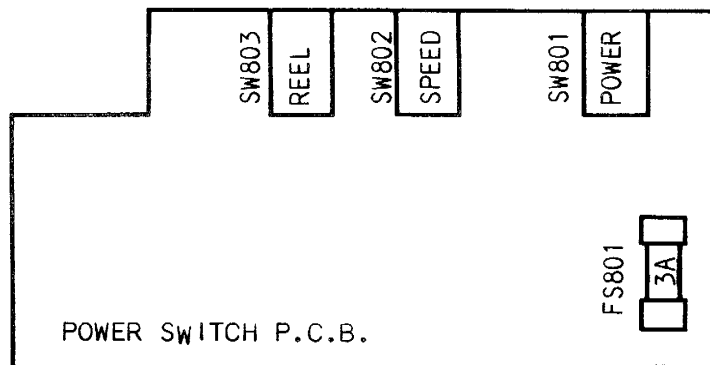


Figure 5-5 Main Power Fuse Location

For other fuses (F1 ~ F6), proceed as follows:

1. Place the recorder on its side, and remove the six cross-recessed screws on the bottom cover.
2. Remove four cross-recessed screws marked "OPEN" on the Control P.C. Board.
3. Pull the Control P.C. Board down, and replace the blown fuse.

Table 5-2 Fuse Information

Reference number	Current	Rating				Utari part number	Used for
		voltage	size(inch,mm)	carry	blow		
FS801	3A	250V	1/4x1 1/4 inch 6.3x32mm	110%	135% in 1 hour	FH7E030	Primary Circuit
F1	2A	"	13/64x45/65 inch 5x20mm	"	" " "	FH7F020	VU Meter Lamps
F2	"	"	" " "	"	" " "	"	DC Servo Cap. Motor Driver
F3	"	"	" " "	"	" " "	"	Pinch roller Solenoid, Relays, and DC Servo Cap. Motor Control
F4	3A	"	" " "	"	" " "	FH7F030	+15V Amplifier
F5	"	"	" " "	"	" " "	"	"
F6	5A	"	" " "	"	" " "	FH7F050	Brake Solenoids, +5V Transport Control LEDs

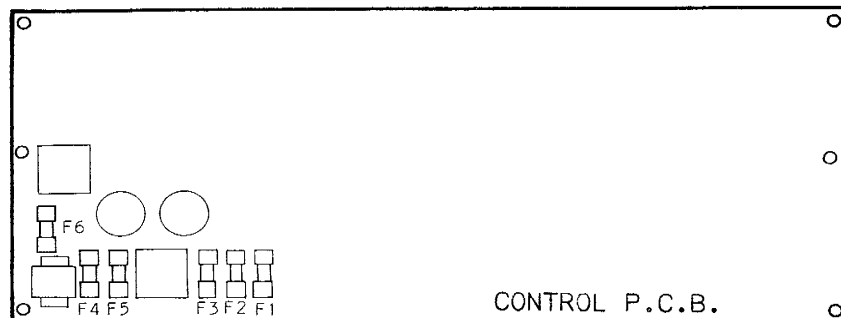


Figure 5-6 Internal Fuse Location

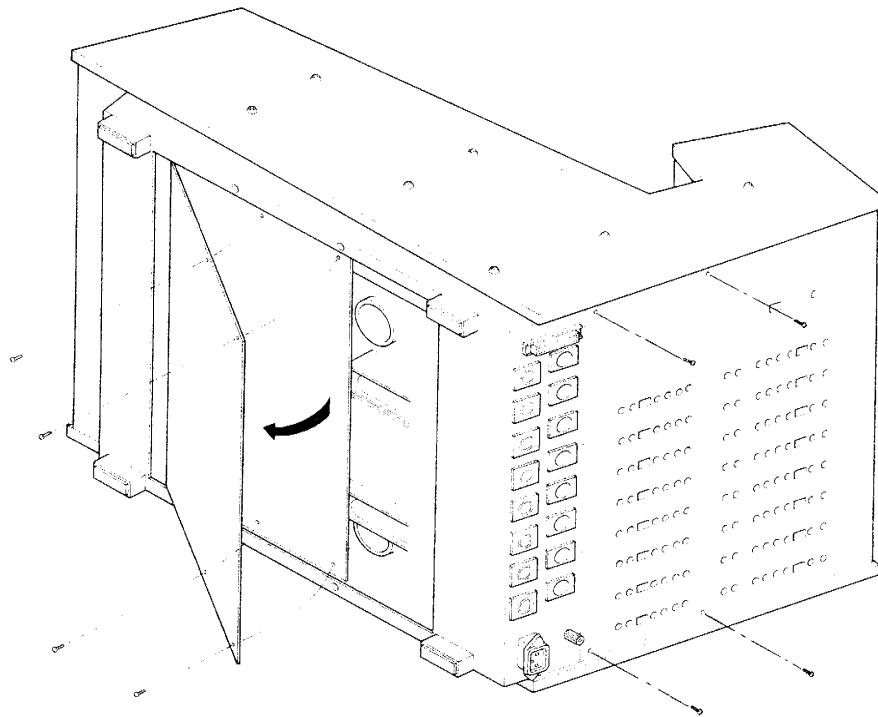


Figure 5-7 Rotating Control P.C.B.

SECTION 6

TAPE TRANSPORT MAINTENANCE

Tape transport maintenance includes procedures for adjusting the supply and takeup reel brakes, the capstan pinch roller pressure and the tape speed adjustment.

6-1 TRANSPORT ACCESS

To gain access to the recorder transport, proceed as follows:

1. Disconnect the power cable.
2. Remove two side boards by removing seven hex socket head screws.
3. Place the recorder on its side.
Remove six cross-recessed screws on the bottom cover.
4. Open the Control P.C. Board by removing four cross-recessed screws marked "OPEN".

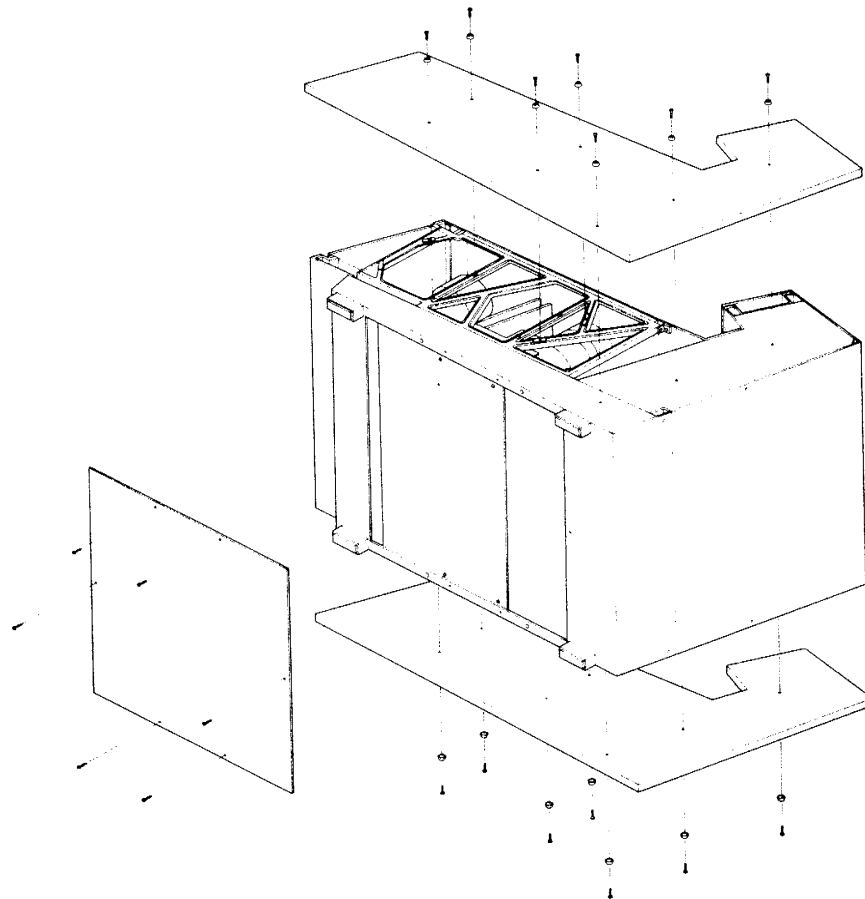


Figure 6-1 Tape Transport Access

6-2 BRAKE ADJUSTMENT

The brake system on each reel stops the rotation of the reel when power is removed.

The brakes are checked and adjusted with the power removed.

Since the brake force is different for each direction of rotation (brake differential), and there is but a single adjustment, the force is checked and adjusted for the best compromise force in each direction.

In the following steps, an empty 10 1/2 inch diameter NAB reel (4 1/2 inch diameter hub) is used and a length of cord or twine is wrapped on the hub.

A spring scale is attached to a small loop formed at the free end of the cord or twine.

Refer to Table 6-1 for the braking force specifications.

Proceed as follows:

1. Place an empty 10 1/2 inch diameter NAB reel on the supply reel table.
Secure with a hold down knob.
2. Wind a length of cord or twine a few turns counterclockwise on the hub.
Tie a loop at the free end of the cord or twine.
3. Insert the hook of a 500g (0-16 ounce) spring scale through the loop and hold the spring scale upright as shown in Figure 6-2.
4. Pull on the scale slowly to make the reel rotate counterclockwise (direction "B" in Figure 6-2).
While being sure the cord does not rub against either flange, note the scale reading.
The reading should meet the value listed on Table 6-1.
5. Wind the cord or twine in a clockwise direction on the supply reel.

6. Repeat steps 3 and 4 to make the reel rotate clockwise (direction "A" in Figure 6-2).
The reading should meet the value listed in Table 6-1.
7. If the readings were low in both directions, remove the brake spring (shown in Figure 6-3) from the existing anchor hole on the brake lever and install the spring in the next hole located farther away from the brake solenoid.
8. If the readings were high in both directions, move the spring anchor point closer to the brake solenoid.
9. If the brake spring was moved, repeat steps 2 through 6 to check the results.
10. Repeat the brake adjustment procedure on the takeup reel.
Note that a high braking force is present when the takeup reel is rotated clockwise.
The braking force specifications are the same as for the supply reel.

Table 6-1 Braking Force Specifications

A	145 to 175 grams (5.1 to 6.2 ounces)
B	315 to 385 grams (11.1 to 13.6 ounces)

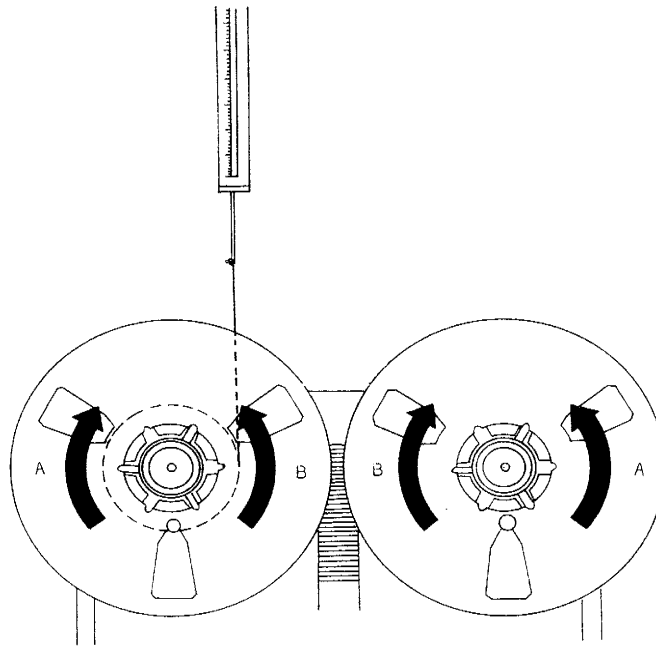


Figure 6-2 Brake Measurement

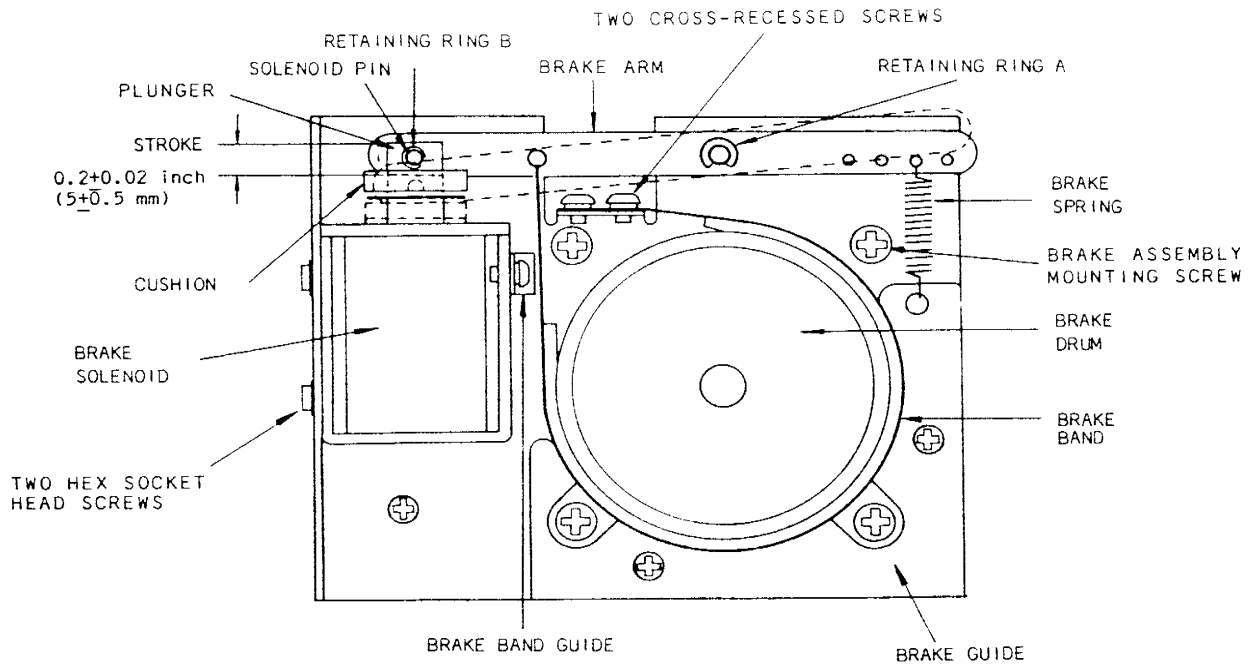


Figure 6-3 Brake Assembly Location

6-3 CAPSTAN PINCH ROLLER PRESSURE ADJUSTMENT

The capstan pinch roller's pressure against the capstan is determined by the pinch roller solenoid spring.

This force is adjusted by means of the nut shown in Figure 6-5.

The nut is adjusted to obtain a force of 2.7 ~ 2.9 kg (5.9 ~ 6.4 pounds).

The resistance of the solenoid coil rises with the temperature and causes the solenoid's force to decrease.

Therefore, do not adjust the pinch roller's pressure until the recorder has been operated in the play mode for at least 30 minutes.

The following procedure should be adhered to.

1. Remove the pinch roller cap by removing the screw on it.
2. Screw the hex socket head screws of M3 (length= 25 ~ 30 mm) into this internal thread (screw hole).
3. Press the EDIT pushbutton, and then press the PLAY pushbutton. The pinch roller will move to make contact with the capstan and both will rotate.
4. Measure pinch roller pressure by using the Push function (piston part, not hook part) of the spring scale. Put the end of piston part of a 3 kg (0 ~ 10 pounds) spring scale on M3 hex socket head screws from the direction of the capstan shaft. (shown in Figure 6-4) At this time do not touch the capstan shaft with piston part.
5. Push on the scale and note the scale reading when the pinch roller just loses contact with the capstan (the pinch roller stops rotating). The scale reading should be 2.7 ~ 2.9 kg (5.9 ~ 6.4 pounds).

6. If a proper scale reading was not obtained in step 5, loosen the locknut and adjust the pressure nut as shown in Figure 6-5. Turning the pressure nut towards the spring increases pinch roller pressure. Tighten the locknut.
7. After adjustment has been completed, check that the plunger of the solenoid reaches bottom within the solenoid coil (the pinch roller can easily be pushed away from the capstan). If the plunger of the solenoid does not reach bottom, loosen the locknut and turn the pressure nut away from the spring until the plunger of the solenoid reaches bottom. Recheck the pressure adjustment and tighten the locknut.

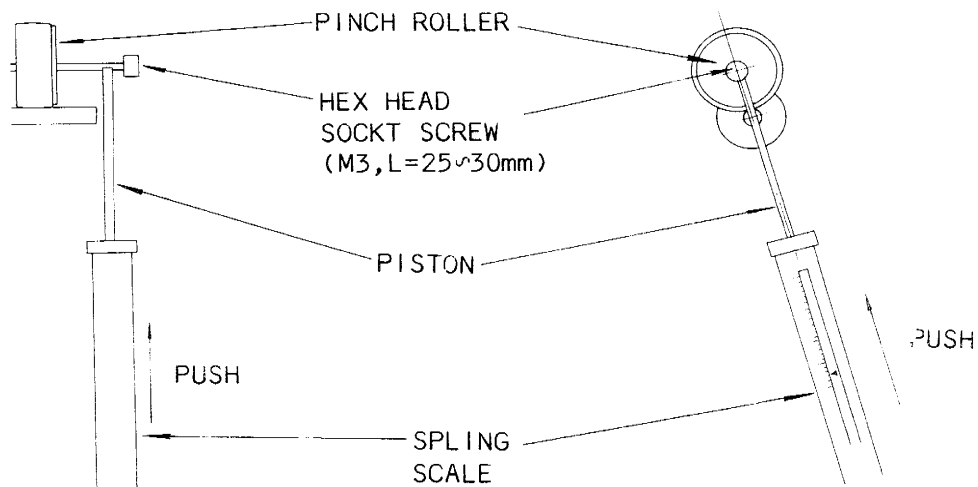


Figure 6-4 Pinch Roller Pressure Measurement

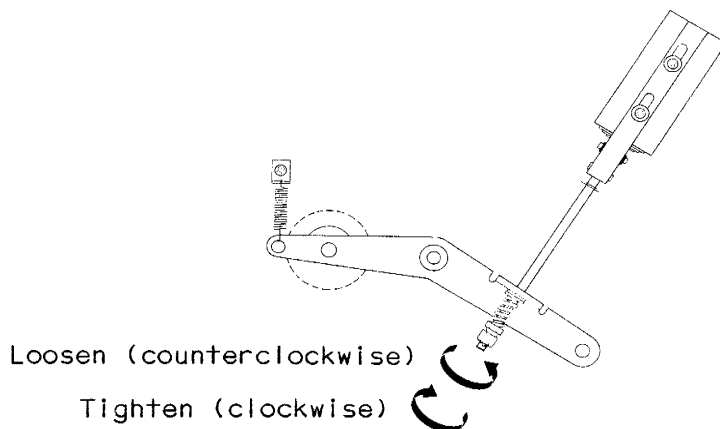


Figure 6-5 Pinch Roller Pressure Adjustment

6-4 TAPE SPEED ADJUSTMENT

The tape speed can only be adjusted on the dc servo capstan motor, by using the speed adjustment controls on the Servo Control P.C. Board. This adjustment follows the tape speed measurement in Section 7, and the speed adjustment controls shown in Figure 6-6 are adjusted as necessary.

It is important that the PITCH CONTROL should be placed in the "IN" fixed position during tape speed adjustment.

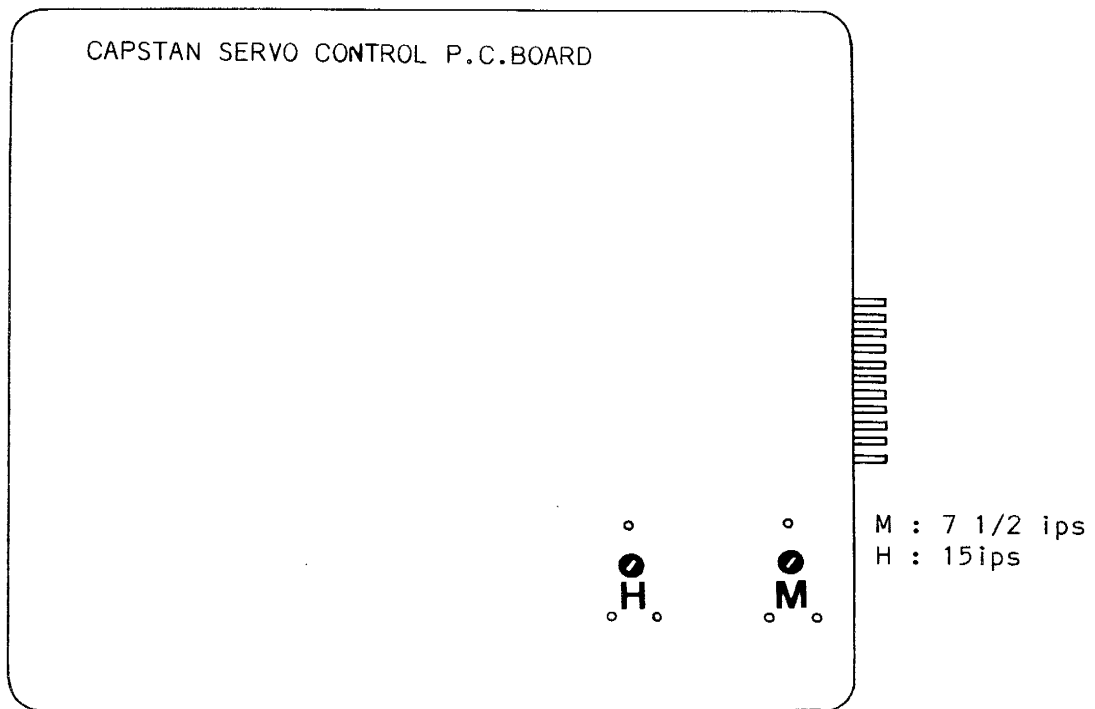


Figure 6-6 Capstan Servo Control P.C.B.

6-5 TAPE TRANSPORT TIMING CHART

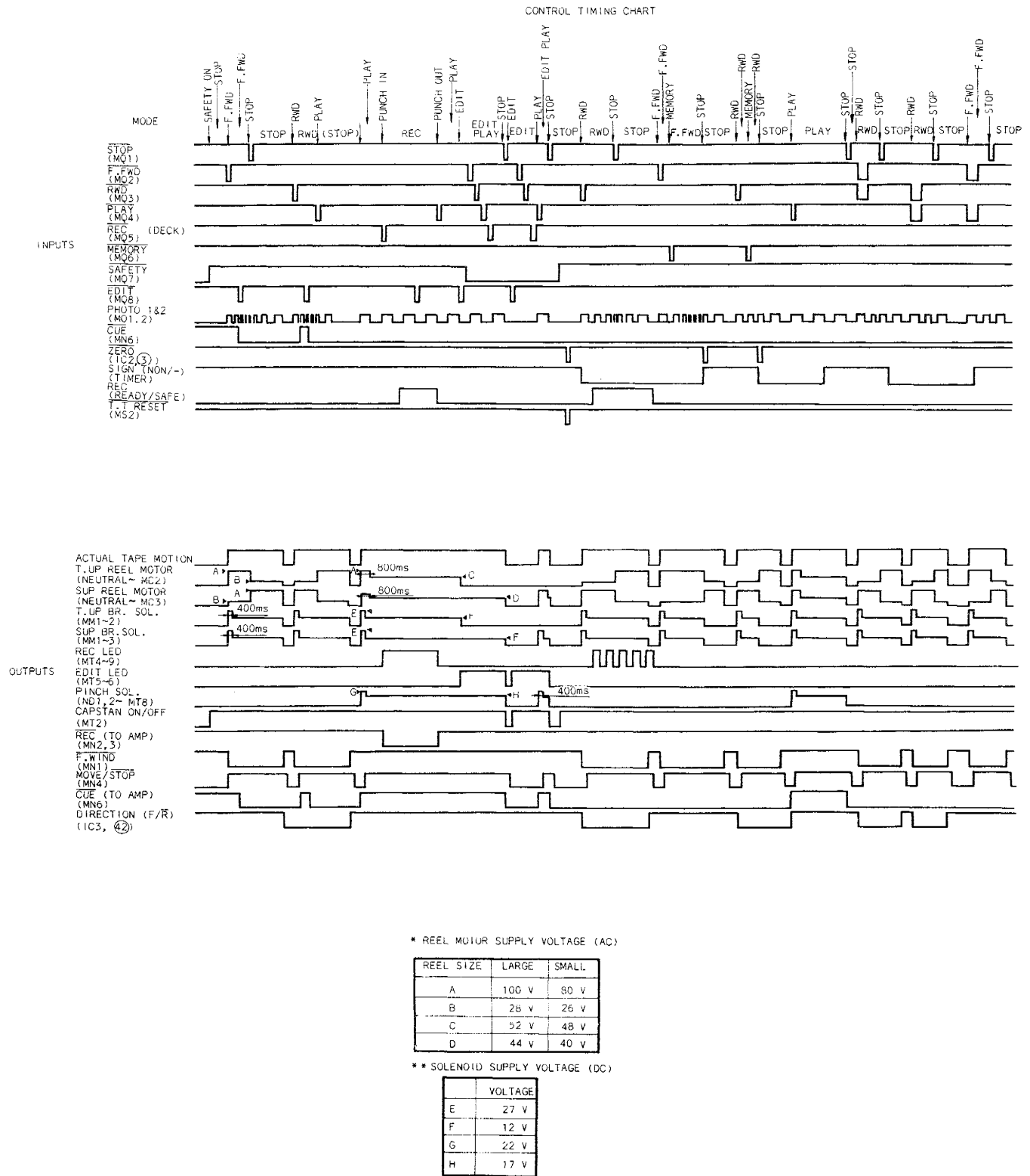
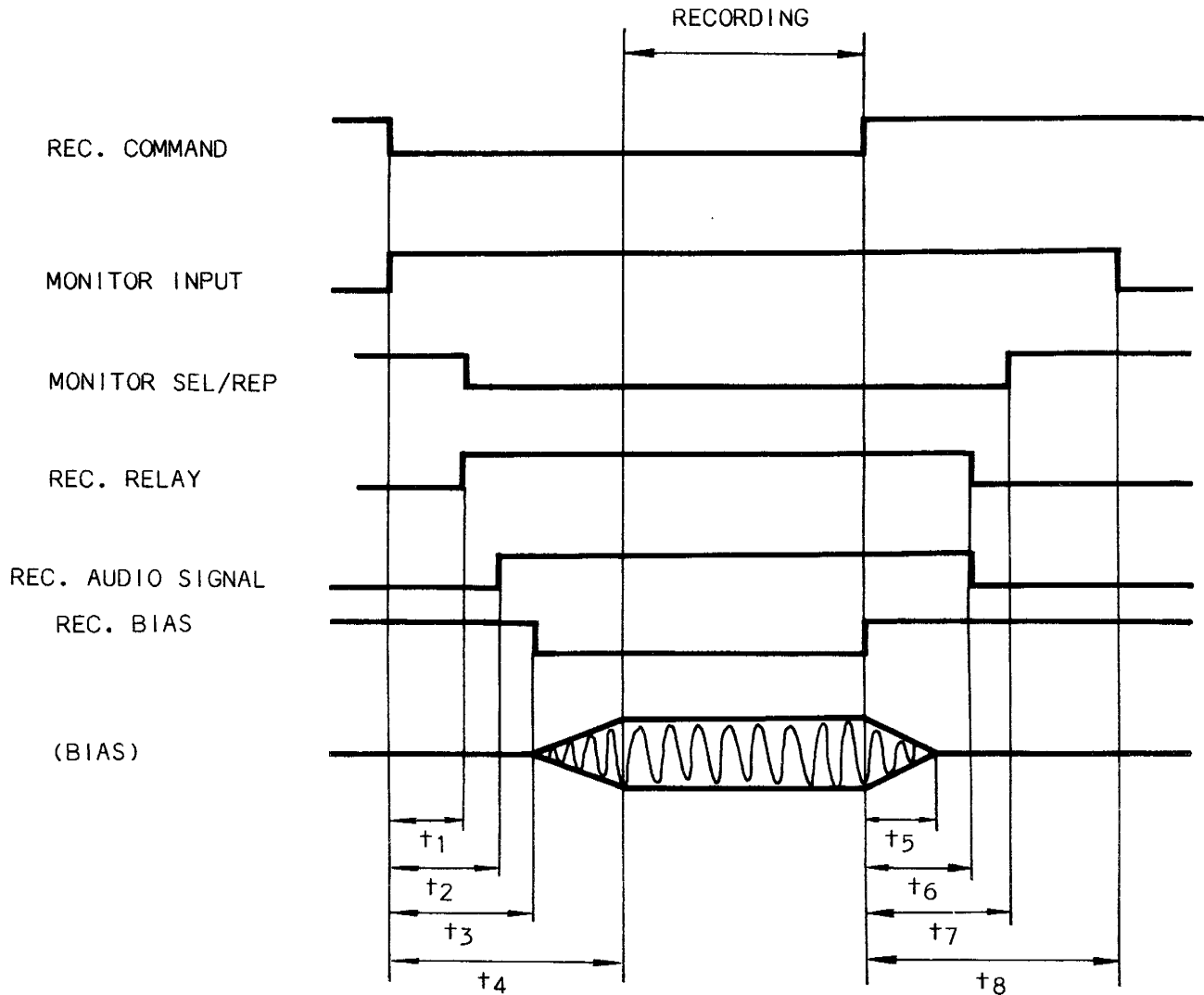


Figure 6-7 Control Timing Chart

6-6 RECORDING PROCESS TIMING CHART



- t1: MONITOR SEL/REP OFF & REC. RELAY ON operate time ; 36 msec
- t2: REC. AUDIO SIGNAL start delay time ; 54 msec
- t3: REC. BIAS start delay time ; 72 msec
- t4: REC. BIAS rise time ; 117 msec
- t5: REC. BIAS fall time ; 40 msec
- t6: REC. RELAY & REC. AAUDIO SIGNAL release delay time ; 54 msec
- t7: MONITOR SEL/REP ON operate time ; 72 msec
- t8: MONITOR INPUT OFF operate time ; 126 msec

Figure 6-8 Recording Process Timing Chart

SECTION 7

PERFORMANCE TESTING AND ELECTRONIC ALIGNMENT

Performance testing should be made at regularly scheduled intervals (every 150 hours or every month) to ensure that the recorder is performing within specifications.

These tests should also be performed whenever the recorder appears to be malfunctioning and repairs to the equipment that may affect performance.

If the performance test is not successful, proceed to the applicable electronic alignment procedure.

It is important to clean and demagnetize the head and tape guiding components before performing the following steps.

7-1 GENERAL NOTICE

It is important to clean and demagnetize the head and tape guiding components before performing the test and alignment procedures.

The levels indicated in this section are at a 1 KHz frequency at the reference recording level of 250 nWb/m.

In the case of IEC equalization, the reference record level is 320 nWb/m that is 1.2 dB above 250 nWb/m.

Refer to Figure 7-10.

7-2 TEST TAPES

Test tapes are precisely recorded under controlled conditions and must be correctly handled and stored to retain accuracy.

Handle the test tapes as follows:

1. Clean and demagnetize the head and tape guiding components before installing the test tape.
2. Never store test tapes in areas of temperature or humidity extremes.

3. Never run the test tapes on speeds other than a normal play run (never use the rewind or fast forward mode).

This is further explained below.

During the alignment procedure, the rewind and fast forward modes should not be used.

After alignment, wind the tape completely on the takeup reel, interchange reels, thread the tape, and place the equipment in the play mode to wind the tape back on its original reel.

After extensive use, high frequency tones may be drop as much as 2 dB.

In addition, flutter indication may rise even though actual flutter remains unchanged.

Flutter increase is caused by demagnetization of the recorded signal from repeated plays, tape deformation due to tape tension, changes in temperature and humidity, and increased dropout resulting from tape wear.

7-3 TEST CONDITIONS

The test conditions specified in the following steps are to be met prior to performing the tests.

After these test conditions are met, continue with the following procedures for checking overall signal-to-noise, overall distortion, crosstalk, erasure, tape speed and flutter.

1. Clean and demagnetize the heads.
2. Use high quality low-noise tape such as Ampex 406, 407, 456, or Scotch 206, 207, 226, 246, 250, or an equivalent, and bulk erased to tape.
3. Turn the power on and allow the unit to warm up for 20 minutes.
4. Be sure the head cover is installed for all tests.

7-4 PERFORMANCE TESTS

Before performance testing, line input level check, line output level check, input SRL check, reproduce frequency response check, record level check, an overall frequency response check, and a SEL/REP level check are necessary.

Refer to section 7-6, ELECTRONIC ALIGNMENT, in this manual for checking procedures.

For performance testing, at first proceed as follows.

Demagnetize and clean the heads and all guiding component.

1. Set the REEL switch to the appropriate position.
2. Set the LINE OUTPUT LEVEL switches located on the REC/REP Amp. P.C. Board to "H" (has been set at the factory as standard), set each READY/SAFE pushbutton switch to the "OUT" SAFE position, and select INPUT of the MONITOR SELECT after pushing the INDIVIDUAL pushbutton switch.
3. Thread a reel of bulk-erased tape onto the transport, and push the PITCH CONTROL knob to its fixed position.

7-4-(1) OVERALL SIGNAL-TO-NOISE

The overall signal-to-noise test requires an ASA "A" weighted filter for weighted measurement and a noise filter for unweighted measurement to eliminate noise outside the audible frequency band.

The filter should be built into a small aluminum box and its circuit is shown in Figure 7-1.

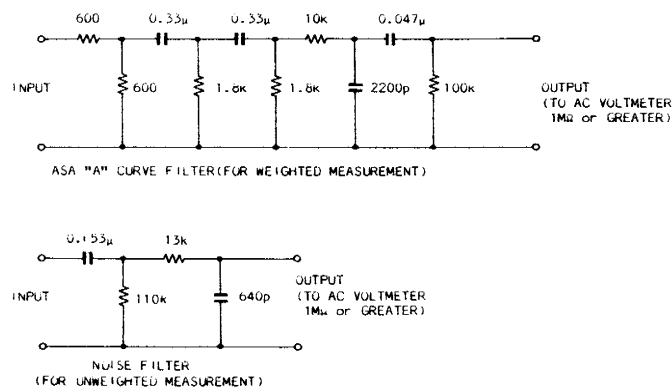


Figure 7-1 Filter Schematics

The signal-to-noise test ratio depends on reproduce equalization, bias calibration, and record equalization.

Proceed as follows:

1. Connect the filter to CH-1 LINE OUT and connect an ac voltmeter to the output of the filter.
2. Set the MONITOR switch to the "REPRO" position, or press the ALL REPRO pushbutton switch, and set the CH-1 INPUT (INPUT SRL switch is off) control to its full clockwise position. Reset the Tape Timer to "0:00:00".
3. Start the record mode and record for one minute. Rewind the tape to the "0:00:00" indication on the timer.
4. Reproduce the recorded portion and read the noise level on the ac voltmeter.
5. The S/N ratio is calculated by adding +4 dB standard level to the indication of the ac voltmeter, and an extra 12.4 dB for NAB equalizer or 11.2 dB for IEC equalizer.
[Peak record level (1040 nWb/m) is +12.4 dB over 0 VU for NAB (250 nWb/m), and +11.2 dB over 0 VU for IEC (320 nWb/m).]
6. Repeat steps 1 through 4 for the other channels as required, and change the tape speed to check all signal-to-noise ratios.

Table 7-1 Signal-to-noise specifications

EQ Tape Speed	NAB		IEC	
	Weighted	Unweighted	Weighted	Unweighted
15 ips	70 dB	66 dB	70 dB	66 dB
7.5 ips	70 dB	66 dB	70 dB	66 dB

If signal-to-noise specifications are not met, check and adjust the following items.

1. LINE OUTPUT LEVEL switch position.
2. RECORD BIAS adjustment.
3. Reproduce equalization.
4. Record equalization.
5. Record and/or reproduce electronics
6. Head magnetization.
7. Magnetic flux from a motor, a soldering iron or a transformer near the recorder.

7-4-(2) OVERALL DISTORTION TEST

For an accurate distortion check, it is necessary to use an audio oscillator with less than 0.1% distortion and a wave analyzer with an adjustable bandwidth capability.

A wave analyzer with too narrow bandwidth may make it difficult to measure harmonics due to flutter components of the transport.

Measured total harmonic distortion will be affected by tape and modulation noise in addition to harmonic distortion.

To measure overall harmonic distortion, proceed as follows:

1. Connect a wave analyzer to CH-1 LINE OUTPUT and connect an audio oscillator to CH-1 LINE INPUT.
2. Set the MONITOR switch to the "REPRO" position, or press the ALL REPRO pushbutton switch, set the audio oscillator frequency to 1000 Hz.
3. Set the wave analyzer frequency to 1000 Hz, the bandwidth to 100 Hz, and the mode selector switch to AFC.
4. Start the record mode and adjust the CH-1 LINE INPUT control for a 0 VU reading on the VU meter.
5. Adjust the fine tuning control and input level control on the wave analyzer for a full scale reading of 100%.

6. Change the wave analyzer tuning control to 2000 Hz and measure the second harmonic content.

The second harmonic content should not exceed 0.1%.

7. Change the wave analyzer tuning control to 3000 Hz and measure the third harmonic content.

Third harmonic distortion is dependent upon the type of tape used, and the accuracy of the RECORD BIAS setting.

A typical reading for low noise high output tape is 0.4%.

If distortion specifications are not met, check and adjust the following items.

1. RECORD BIAS adjustment.
2. Head magnetization.
3. Record and/or reproduce electronics.

7-4-(3) CROSSTALK TESTS

It is important that blank bulk-erased tape be used for the crosstalk test.

To measure crosstalk adjacent channels, proceed as follows:

1. Follow the procedure in the Overall Distortion test, perform steps 1 through 5.

2. Connect a wave analyzer from the output of CH-1 to CH-2 LINE OUTPUT.

3. Measure the crosstalk in dB.
Crosstalk should not exceed 55 dB.

4. Repeat steps 1 through 3 for the other channels as required.
If crosstalk specifications are not met, record and reproduce head alignment (height and tape contact) are incorrect or the record or reproduce head is defective.

7-4-(4) ERASURE TEST

It is important that blank bulk-erased tape be used in the erasure test.

To measure depth of erase, proceed as follows:

1. Follow the procedure in the Overall Distortion Test, perform steps 1 through 5.

A 1000 Hz signal is being recorded at SRL. (0 VU)

2. Adjust the INPUT control for a 1000 Hz signal being recorded at 10 dB (+10 VU) above SRL.

Continue recording for a few minutes.

3. Disconnect the audio oscillator.

4. Rewind and reproduce the recorded section.

Check and readjust controls of the wave analyzer as necessary for a full scale reading of 100%.

5. Press the RECORD pushbutton to place the recorder in the record mode.

As the tape is being erased, adjust the percent scale on the wave analyzer to read the residual 1000 Hz tone.

6. Repeat the same procedure for the other channels.

7. The depth of erase should be more than 70 dB.

If erasure specifications are not met, check and adjust the following items.

1. Erase and/or record head alignment (height, tape contact).
2. Erase head wear.
3. Erase head surface cleanliness.
4. Bias oscillator adjustment.

7-4-(5) TAPE SPEED MEASUREMENT

A flutter test tape is used for measuring tape speed.

Since tape tension affects tape speed, it is important for accurate measurement that the flutter test tape used is attached to the end of a full wound reel of blank tape as shown in Figure 7-2 , and is used with the REEL pushbutton set to the appropriate reel size.

Clean heads, capstan shaft, pinch roller, and all tape guiding components in the tape path before measurement.

Proceed as follows:

1. Place the PITCH CONTROL in the fixed position and set the READY/SAFE toggle switches of all channels to "SAFE" positions.
2. Connect a flutter meter with a frequency counter to the LINE OUT and press the ALL REPRO pushbutton switch.
3. Set the SPEED switch to "OUT" HIGH position and use the test tape at 15 ips.
4. Attach the test tape to a 10 1/2 inch NAB reel as shown in Figure 7-2 , place the test tape on the supply reel table, thread the tape, and set the REEL switch to the "OUT" LARGE position.
5. Place the recorder in the play mode and note the reading on the frequency counter.
The reading should be between 2994 and 3006 Hz ($3000\text{Hz} \pm 0.2\%$).
6. Repeat the procedure at a point towards the end of the reel, and for 7 1/2 ips.
7. If adjustment is necessary, refer to Section 6-4.

If speed accuracy is not within $\pm 0.2\%$, check and adjust the following items.

1. Pinch roller tire wear and pressure.
2. Brakeshoe for brake drum contact.
3. Power correctness.
4. Pinch roller and capstan cleanliness.
5. Tape tension.

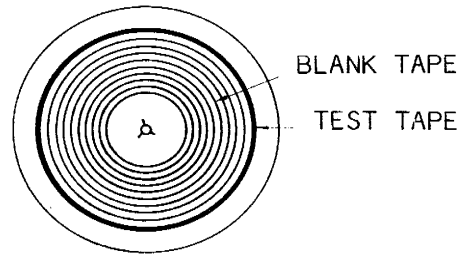


Figure 7-2 Test Tape Loading

In addition, check the following items for the dc servo capstan motor.

6. Servo control circuit.
7. Capstan motor.

NOTE

To avoid a counting error due to the line frequency, it is recommended that the time-base of the frequency counter be set to the crystal oscillator position.

7-4-(6) FLUTTER AND WOW TEST

It is recommended that these checks are made with standard flutter test tapes (See Table 4-2) which are recorded on precise equipment to produce less than 0.03% rms flutter.

After recording a section of tape, rewind to the beginning and start the tape in the reproduce mode.

Flutter meters are sensitive to amplitude modulation that results from poor head-to-tape contact or from signal dropout.

Therefore, clean the heads before making a flutter test.

The following method is used with a test tape:

It is important that the flutter test tape used is attached to the end of a full wound reel of blank tape as shown in Figure 7-2, and is used with the REEL pushbutton set to the appropriate reel size.

1. Place the PITCH CONTROL to the "IN" fixed position and set the READY/SAFE toggle switches of all channels to the "SAFE" position.
2. Connect a flutter meter to the LINE OUT of an inner track channel and press the ALL REPRO pushbutton switch.
3. Set the selector switch of the flutter meter to the NAB weighted position, set the SPEED switch to HI, and use the test tape at 15 ips.
4. Attach the test tape to a 10 1/2 inch NAB reel as shown in Figure 7-2, place the test tape on the supply reel table, thread the tape, and set the REEL switch to the "OUT" LARGE position.
5. Place the recorder in the play mode and note the reading on the flutter meter.
The reading should be as shown in Table 7-2.
6. Repeat the procedure at a point towards the end of the reel, and for 7 1/2 ips.

The following method is used when a test tape is not available:

1. Connect the oscillator signal output (3 KHz) of the flutter meter to an inner channel (not an edge channel) LINE INPUT connector of the recorder.
2. Connect the same channel LINE OUTPUT connector of the recorder to the signal input of the flutter meter.
3. Set the SPEED switch to "out" HIGH, press the ALL REPRO pushbutton switch, start the record mode, and adjust the appropriate INPUT control.
4. Rewind and reproduce the recorded portion, and note the flutter and wow on the flutter meter.

5. Check the flutter and wow at a low tape speed, and check it at a point towards the end of the reel.

Table 7-2 Flutter and Wow Specification

Tape speed	Flutter and wow
15 ips	0.05%
7.5 ips	0.06%

Flutter and wow can be caused by any element in the tape path. Excessive flutter and wow may be traced by observing the flutter component on an oscilloscope screen connected to the demodulator output of the flutter meter.

If the fluctuation rate observed on the oscilloscope coincides with the rotational elements, such as the supply or takeup reel, capstan or pinch roller, the problem source may be easily traced.

Other sources of excessive flutter and wow are:

1. Defective capstan servo control.
2. Damaged capstan motor.
3. Capstan needs lubrication (dry sleeve bearing).
4. Brakeshoe is contacting brake drum.
5. Defective tape reels or tape.
6. Pinch roller tire is worn or has insufficient pressure, or the plunger of the pinch roller solenoid does not reach its bottom.
7. Dirty pinch roller and capstan.

7-5 ACCESS TO ELECTRONICS ASSEMBLY

The record/reproduce electronics assembly can easily be opened for adjustment.

To gain access to the electronics assembly, proceed as follows.

1. Remove six screws on the electronics rear cover as shown in Figure 7-3.

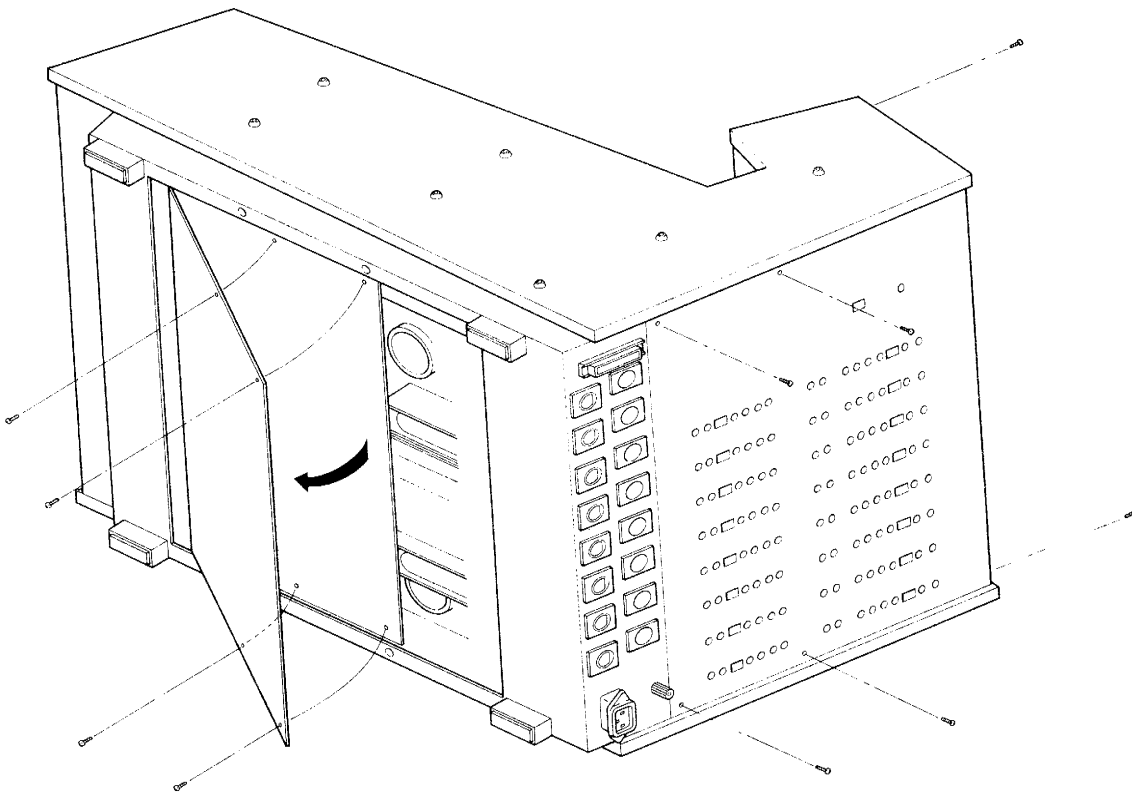


Figure 7-3 Electronics Access

7-6 ELECTRONIC ALIGNMENT

If the previous performance tests were not successful, perform the following applicable reproduce, record, and bias amplifier alignment procedures.

7-6-(1) REPRODUCE SYSTEM

Reproduce system alignments consist of reproduce head azimuth adjustment, frequency response adjustment, SRL (REPRO level) adjustment and SEL/REP. level adjustment.

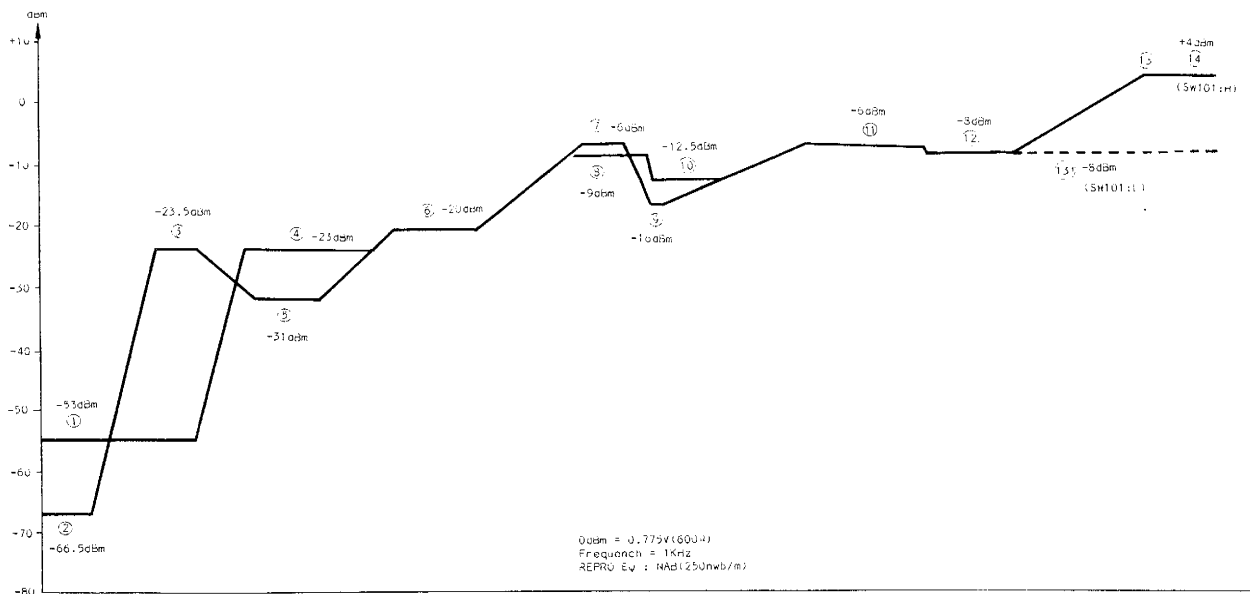
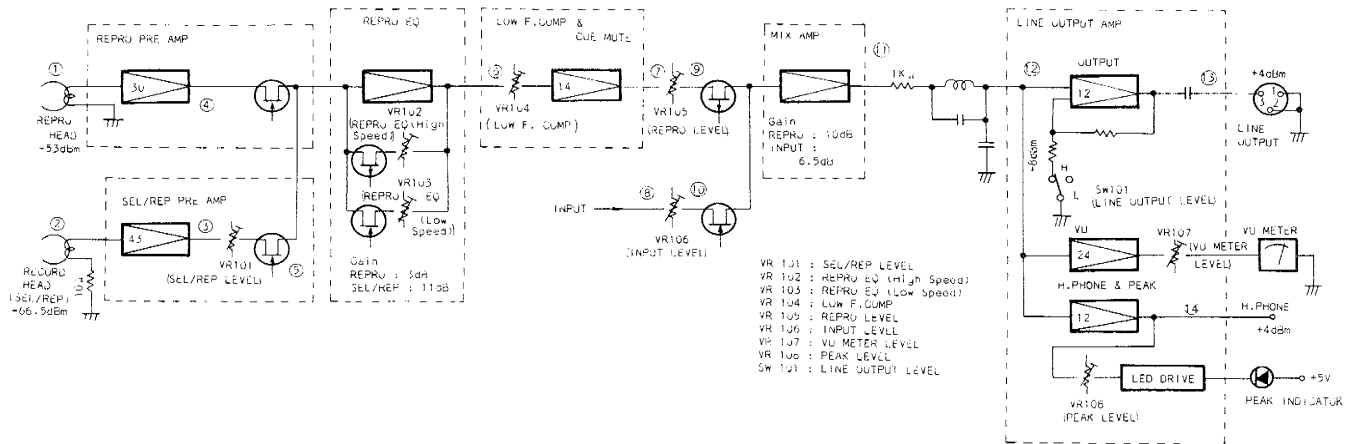


Figure 7-4 Reproduce System Block and Level Diagram

7-6-(2) REPRODUCE HEAD AZIMUTH ADJUSTMENT

The head azimuth adjustment should be adjusted with a "LOW" tape speed (7 1/2 ips) for critical alignment.

Use the test tapes listed in Table 4-3.

1. Thread a low speed test tape, depending on the equalization of the equipment, to the recorder.
2. Connect the ac voltmeter to the LINE OUT connector.
3. Reproduce the coarse azimuth adjustment signal (500 Hz at 7 1/2 ips) of the test tape.

CAUTION

DO NOT ADJUST ANY OTHER SCREW EXCEPT THE AZIMUTH ADJUSTMENT SCREW (LABELED "A3" IN FIGURE 7-5).

4. Then, reproduce the fine azimuth adjustment signal (16 KHz at 7 1/2 ips) and adjust the azimuth screw "A3" for a maximum reading on the ac voltmeter.
5. If a maximum reading cannot be achieved within one full turn of the azimuth screw, a full head alignment may be required. Refer to section 8 of this manual.

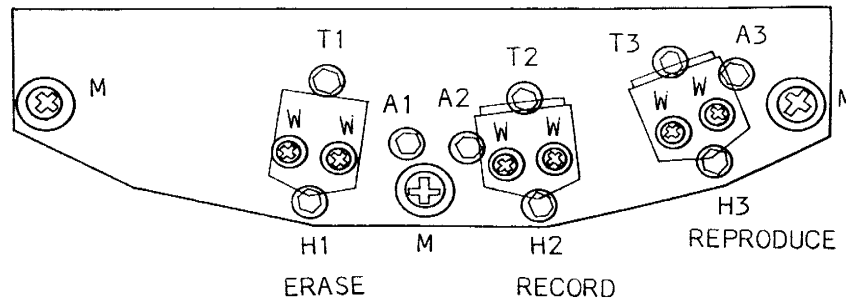


Figure 7-5 Head Assembly

7-6-(3) FREQUENCY RESPONSE

Since the reproduce equalizer circuit has high frequency independent controls for both 15 ips and 7 1/2 ips, an adjustment is made at first for 15 ips.

Table 7-3 shows the time constant and fluxivity at each equalizer.

1. Connect the ac voltmeter to the LINE OUTPUT connector.
2. Thread the test tape through the equipment.

For 15 ips:

3. Reproduce a 500 Hz signal on the test tape.
At this time the value on the ac voltmeter is decided as standard.
4. Reproduce the frequency response test signal (from 31.5 up to 20 KHz) and note the reading on the ac voltmeter.
5. Adjust the VR 102 adjustment controls with a frequency of 10 KHz for a 0 dB reading on the ac voltmeter.
The reading should be 31.5 Hz to 20 KHz ± 2 dB.

For 7 1/2 ips:

6. Repeat steps 2 and 4 to at 7 1/2 ips tape speed.
7. Adjust the VR 103 adjustment controls with a frequency of 10 KHz for a 0 dB reading on the ac voltmeter.
The reading should be 31.5 Hz to 16 KHz ± 2 dB.
8. Repeat steps 1 through 7 for the other channels as required.

Table 7-3 Equalizer Time Constants & Fluxivity

Equalization	Time Constants	Fluxivity
NAB 15 ips	3180 + 50 μ sec	* 250 nWb/m
IEC 15 ips	∞ + 35 μ sec	**320 nWb/m
NAB 7 1/2 ips	3180 + 50 μ sec	* 250 nWb/m
IEC 7 1/2 ips	∞ + 70 μ sec	**320 nWb/m

* short circuit flux

** open circuit flux

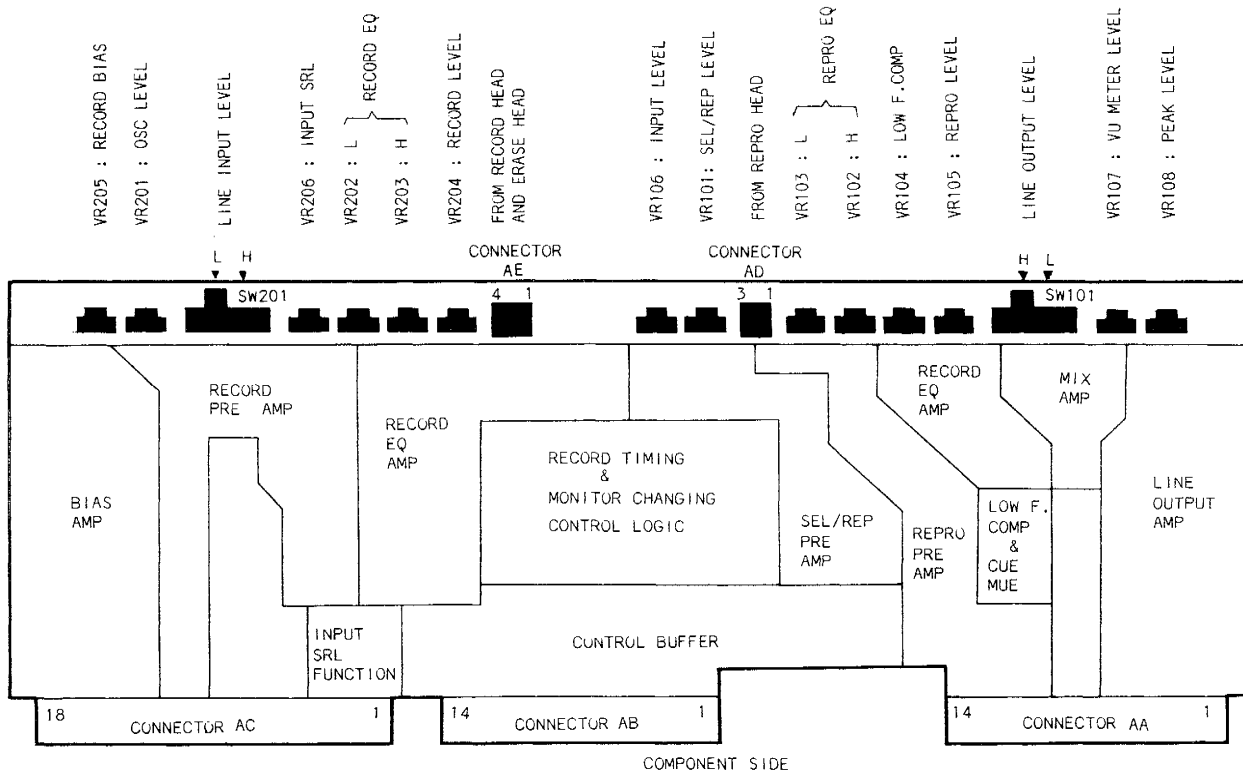


Figure 7-6 Location of Record/Reproduce Electronics

7-6-(4) SRL (REPRO LEVEL) ADJUSTMENT

1. Connect the AC voltmeter to the LINE OUTPUT connector.
2. Thread the 15 ips test tape through the equipment.
3. Reproduce the reference recorded flux on the test tape and adjust the VR 105 adjustment controls for a +4 dBm reading on the ac voltmeter. (LINE OUTPUT LEVEL switch is in "H" position.)

7-6-(5) SEL/REP. LEVEL ADJUSTMENT

1. Set each MONITOR switch to the SEL/REP position.
2. Reproduce the reference recorded flux and adjust the VR 101 adjustment controls for a +4 dBm reading on the ac voltmeter.

7-6-(6) RECORD SYSTEM

Before performing record system adjustments, a reproduce system adjustment should be made.

7-6-(7) RECORD HEAD AZIMUTH ADJUSTMENT

The head azimuth may be adjusted at a low tape speed for critical head alignment and at 10 dB below the standard recording level.

1. Connect the ac voltmeter to the LINE OUTPUT connector and connect the audio oscillator to the EXT OSC jack.
2. Set the TEST OSC switch to the EXT OSC, the LINE OUTPUT LEVEL switch to the HIGH position, the LINE INPUT LEVEL switch to the Low position, and the MONITOR switch to the "REPRO" position.
3. Thread a blank tape through the equipment.
4. Set the audio oscillator frequency to 1 KHz.

5. Place the equipment in the record/reproduce mode and adjust the INPUT control for -6 dBm on the ac voltmeter.
6. Adjust the record head azimuth screw "A2" for a maximum reading on the ac voltmeter at a frequency of 15 KHz for 7 1/2 ips record/reproduce mode.

CAUTION

DO NOT ADJUST ANY OTHER SCREW EXCEPT THE AZIMUTH ADJUSTMENT SCREW (LABELED "A2" IN FIGURE 7-5).

7. If a maximum reading can not be achieved within one full turn of the azimuth screw, or a maximum reading on the ac voltmeter is well below -6 dBm, a full head alignment may be required. Refer to section 8 of this manual.

7-6-(8) RECORD BIAS ADJUSTMENT

Figure 7-7 shows the variation of the frequency response by the bias set, the RECORD EQ, and low frequency compensation adjustment control.

Figure 7-9 shows the characteristics of the bias current v. s. output and distortion of scotch #226 tape.

The record bias should be set at 3 dB over bias at 10 KHz for low distortion and high maximum output level (MOL).

The overall frequency response may be adjusted with the RECORD EQ, the RECORD BIAS, and LOW F.COMP. adjustment controls for flat frequency response curve.

1. Set the tape speed to 15 ips, and set the MONITOR switch to the "REPRO" position.

BIAS ADJUSTMENT AT 10 KHz

2. Record and reproduce the 10 KHz signal of the TEST OSC and adjust the LINE INPUT control for a +4 dBm reading on the ac voltmeter.
3. Adjust the RECORD BIAS adjustment controls (VR 205) for a peak indication on the ac voltmeter and then turn the RECORD BIAS adjustment controls clockwise until a decreased level of 3.0 dB is obtained.

The standard biasing point of the MX-5050 MKIII-8 is at 3.0 dB overbias at 10 KHz for 15 ips.

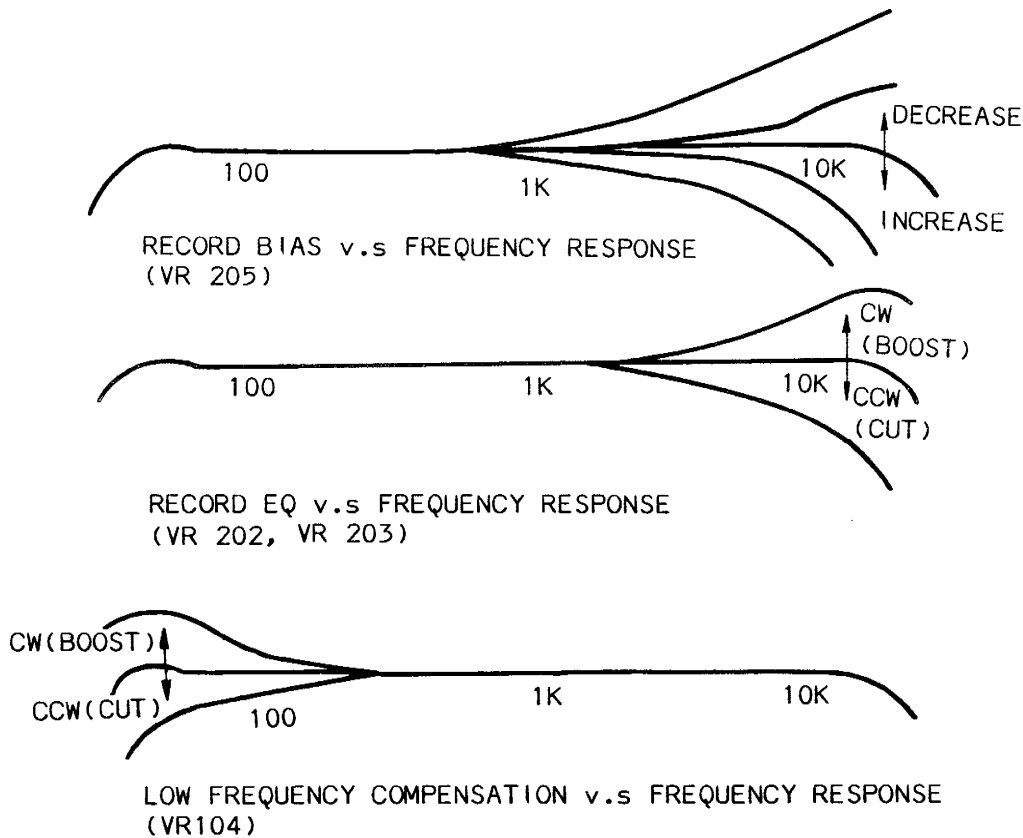


Figure 7-7 Overall Frequency Response

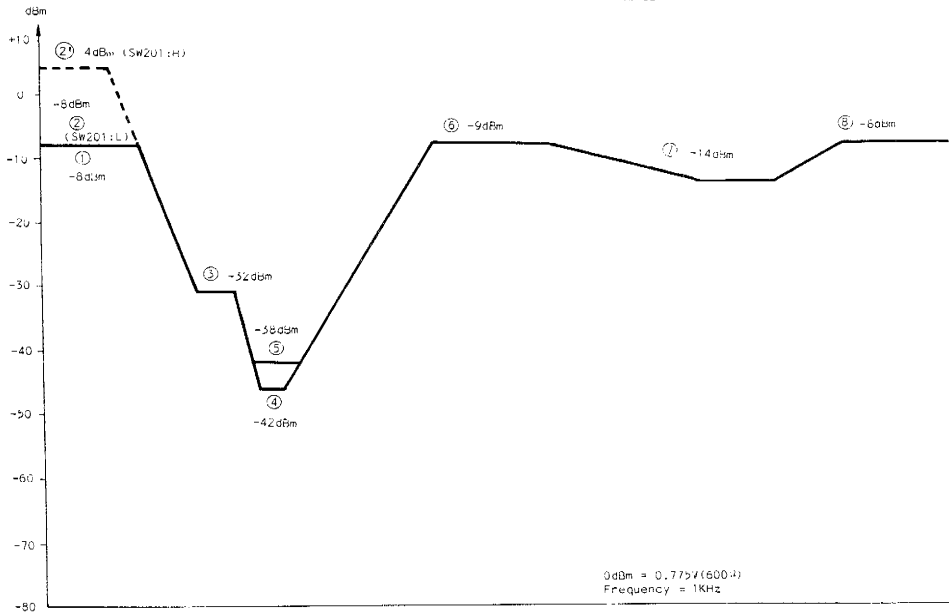
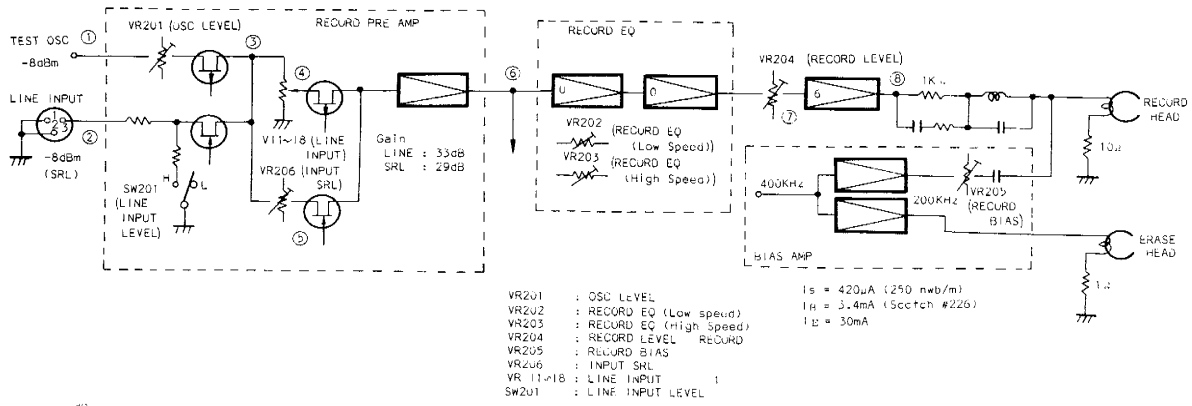


Figure 7-8 Record System Block and Level Diagram

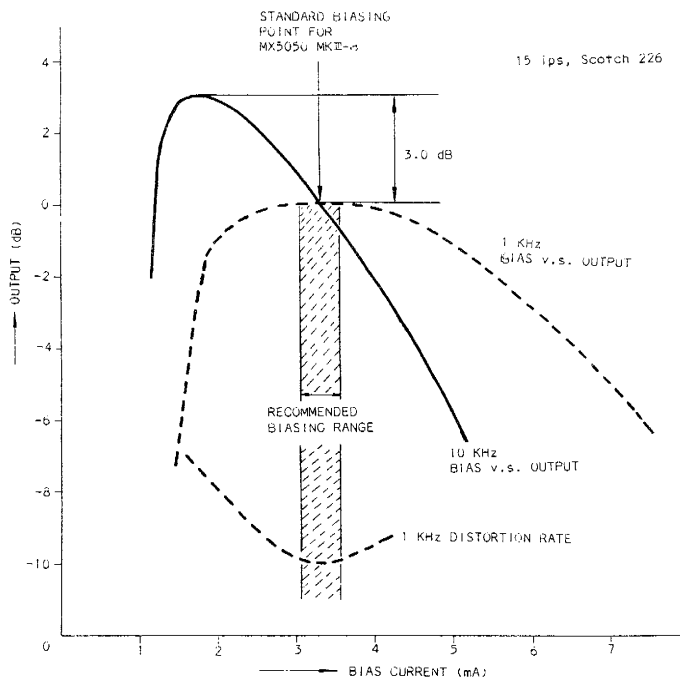
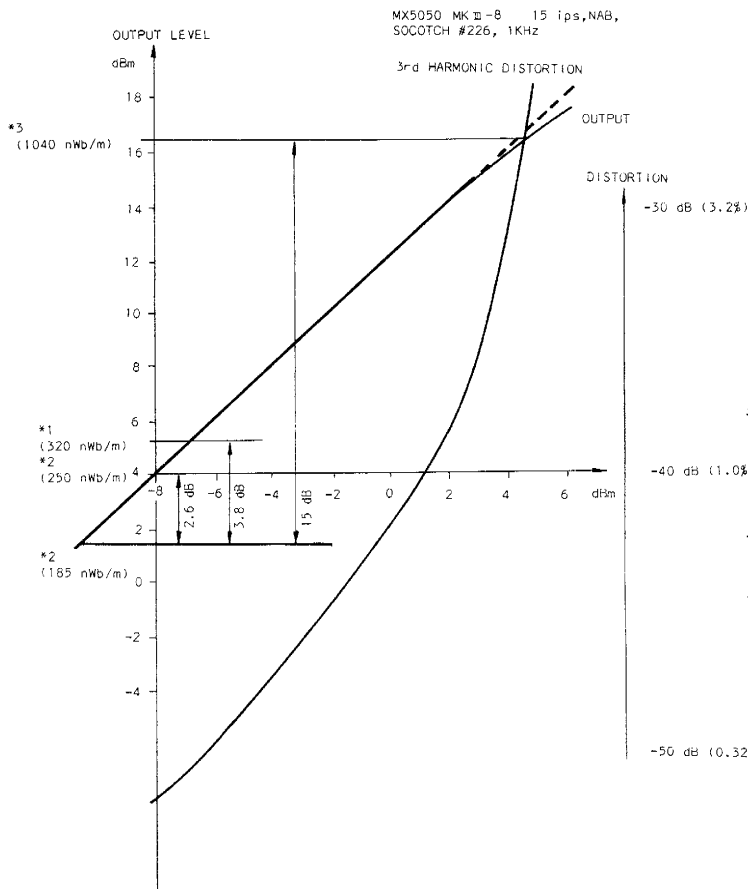


Figure 7-9 Bias Current v.s. Output and Distortion



NOTE

- *1 : 320 nWb/m : DIN REFERENCE LEVEL
This is "open circuit flux" and corresponds to 290 nWb/m of "short circuit flux".
- *2 : 250 nWb/m, 185 nWb/m
These are "short circuit flux".
- *3 : 1040 nWb/m : Reference level for signal to noise ratio measurement and trigger level for peak indicator.

Figure 7-10 Input v.s. Output and Distortion

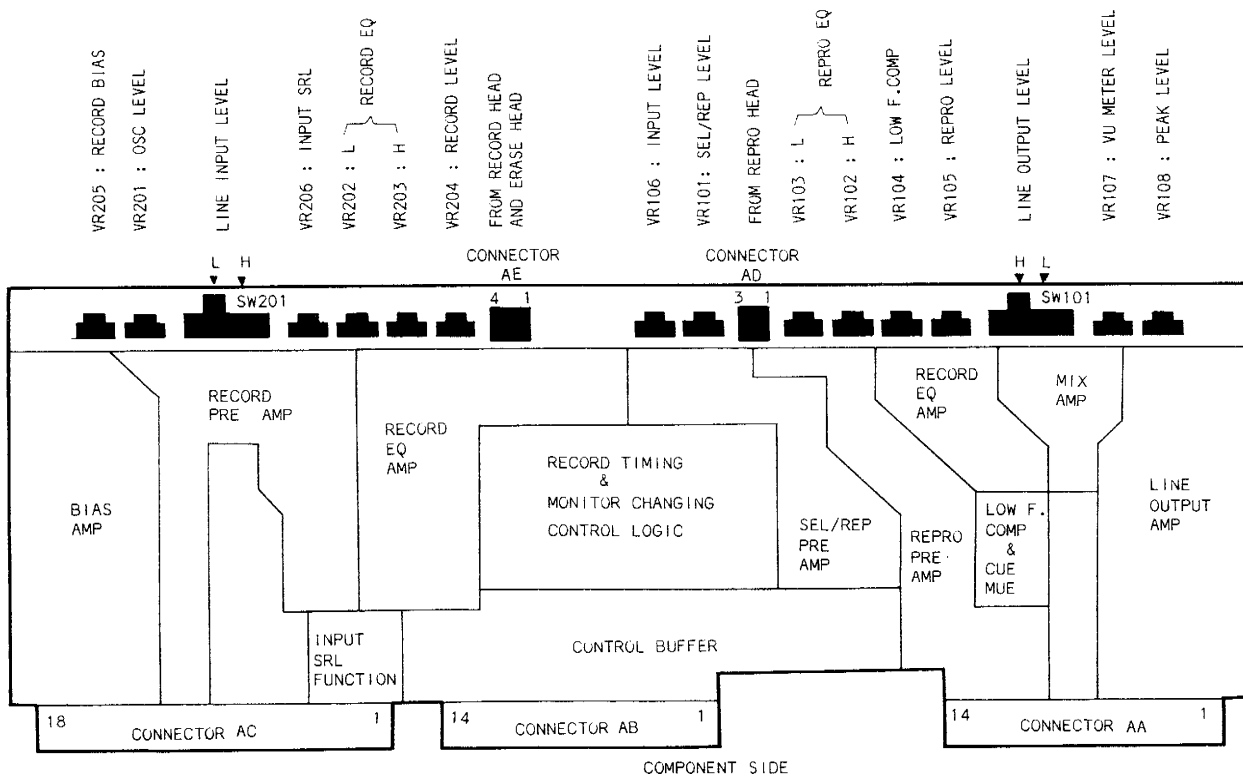


Figure 7-11 Location of Record/Reproduce Electronics

For 7 1/2 ips:

8. Shift the frequency to 1 KHz and adjust the LINE INPUT control to obtain a -6 dBm (-10 VU) reading on the ac voltmeter with the record mode.
9. Shift the frequency to 10 KHz and adjust the RECORD EQ. LOW adjustment controls (VR 202) to obtain a -5.5 dBm reading on the ac voltmeter.
10. Vary the frequency from 20 Hz to 20 KHz and confirm that the frequency response is within the specifications .
The frequency response specification should be 20 Hz to 20 KHz ±2 dB.

NOTE

If the specified frequency response characteristics were not obtained in the above procedures, adjust the record biasing within the recommended biasing range (from 2.5 dB to 3.5 dB over bias at 10 KHz).

7-6-(10) MONITOR INPUT LEVEL and VU METER LEVEL ADJUSTMENT

1. Connect the audio oscillator to the EXT OSC jack and set the TEST OSC switch to the EXT OSC, and feed a 1 KHz for a -18 dBm signal.
2. Place the MONITOR switch in the INPUT position and place the INPUT LEVEL switch in the LOW position, and turn the INPUT controls fully clockwise.
3. Adjust the VR 106 to obtain a +4 dBm reading on the ac voltmeter.
4. Then, adjust the VR 107 to obtain a 0 dB indication on the VU meters.
5. Set audio oscillator level to -8 dBm.
And adjust INPUT SRL adjustment (VR 206) to obtain 0 dB on the VU meters, INPUT SRL switch is set to the ON position.

6. Change the LINE OUTPUT LEVEL switch and the LINE INPUT LEVEL switch alternately, and confirm whether that value corresponds with the value of table 7-4.

Table 7-4 Standard Level

SRL INPUT			Minimum INPUT			VU Meter	OUTPUT		
SW	H	+4 dBm	SW	H	-9 dBm		0 dB	SW	H
201	L	-8 dBm	201	L	-18 dBm	101		L	-8 dBm

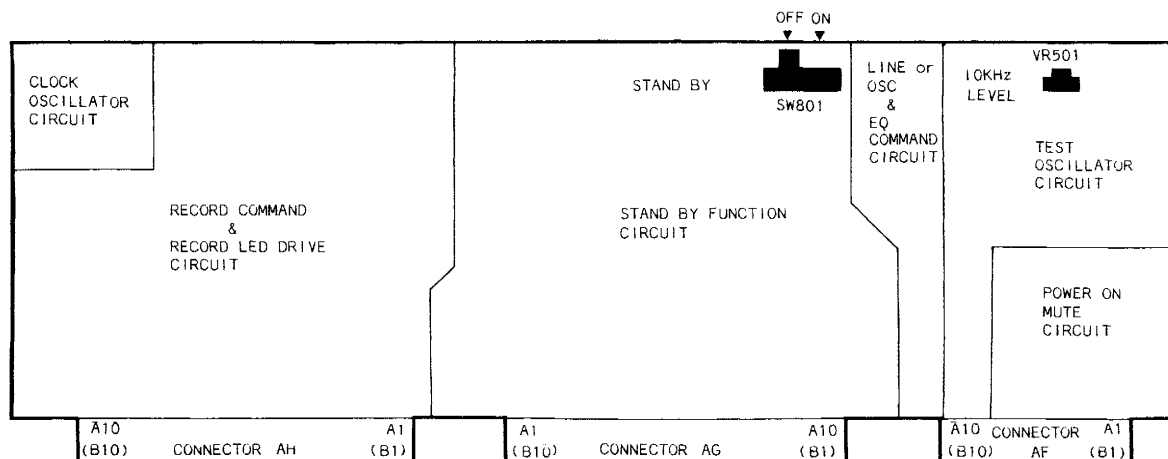
SW101: LINE OUTPUT LEVEL Switch

SW201: LINE INPUT LEVEL Switch

7-6-(11) TEST OSC LEVEL ADJUSTMENT

Before making this adjustment, the monitor input level adjustment should be completed.

1. Shift the audio oscillator 1 KHz level to -8 dBm and adjust the INPUT controls for a 0 dB indication on the VU meter.
2. Set the TEST OSC switch to the 1 K position and adjust TEST OSC LEVEL adjustment control (VR 201) for 0 dB on the VU meter.
3. Set the TEST OSC switch to the 10 K position and adjust VR 501 on the Amplifier Control PCB (shown in Figure 7-12) for 0 dB on the VU meter.



COMPONENT SIDE

Figure 7-12 Location of AMP. Control Electronics