



**PROFESSIONAL
RECORDING
EQUIPMENT**

**JH-110 Series
User's Guide**

JH-110 SERIES PROFESSIONAL TAPE RECORDERS

INTRODUCTION 1

OPERATING PROCEDURES 2

INSTALLATION 3

ALIGNMENT CHECK 4

APPENDICES 5

The JH-110 Series includes the following systems:

the JH-110B System — 10½" reel — 1, 2 and 4 track — ¼" and ½" tape

the JH-110B-14 System — 14" reel — 1, 2 and 4 track — ¼" and ½" tape

the JH-110BC System — 10½" reel — DIN stereo broadcast recorder

the JH-110M System — 14" reel — disc mastering reproducer



4007 N.E. 6th Ave. • Ft. Lauderdale, FL 33334 • Phone 566-2853/Telex: 514362 MCI FTL

TABLE OF CONTENTS

SECTION 1 — INTRODUCTION

1.1	General Information	1-1
1.2	Transports	1-3
1.2.1	JH-110B	1-4
1.2.2	JH-110B-14	1-4
1.2.3	JH-110BC	1-7
1.2.4	JH-110M	1-10
1.3	Audio Electronics	1-13
1.3.1	Standard Electronics	1-13
1.3.2	Broadcast Electronics	1-14
1.3.3	Mastering Electronics	1-15
1.4	RTZ III Autolocator	1-16
1.4.1	RTZ III	1-16
1.4.2	RTZ IIIM	1-16
1.5	Power Supply	1-17
1.6	Options	1-17
1.7	Accessories	1-19

SECTION 2 — OPERATING PROCEDURES

2.1	Controls and Indicators	2-1
2.2	Operating Procedures	2-6
2.2.1	Transport Motion Controls	2-6
2.2.2	Reference and Speed Controls	2-8
2.2.3	RTZ III Autolocator Controls	2-9
2.2.4	Audio Controls	2-10

SECTION 3 — INSTALLATION

3.1	Unpacking	3-1
3.2	Grounding Considerations	3-1

SECTION 4 — ALIGNMENT CHECK

4.1	Introduction	4-1
4.2	Equipment Needed	4-1
4.3	Transport Alignment Check	4-1
4.4	Audio Alignment Check	4-1

LIST OF ILLUSTRATIONS

FIGURE NUMBER	TITLE	
1-1	V.P. Cabinet Dimensions	1-2
1-2	H.P. Cabinet Dimensions	1-2
1-3	JH-110B Transport Deck	1-3
1-4	JH-110BC Transport	1-7
1-5	JH-110M Transport	1-10
1-6	Audio Panel	1-13
1-7	Broadcast Audio Panel	1-15
1-8	Mastering Audio Panel	1-15
1-9	RTZ III Panel	1-16
1-10	RTZ IIIM Panel	1-16
2-1	Transport Control Panel	1-20
2-2	JH-110M Fast Motion Limit Control	2-1
2-3	JH-110B-14 Torque Limit Switches	2-2
2-4	Reference and Speed Controls	2-2
2-5	RTZ III Controls	2-3
2-6	RTZ IIIM Controls	2-3
2-7	Audio Controls and Indicators	2-4
2-8	Broadcast Audio Controls and Indicators	2-5
2-9	Mastering Audio Controls and Indicators	2-6
2-10	Transport Motion Controls	2-7
2-11	RTZ III Display	2-10
2-12	Audio Controls	2-11
4-1	Head Adjustments	4-2
4-2	Repro Card Adjustments	4-2
4-3	Bias Card Adjustments	4-3
4-4	Record Card Adjustments	4-4

LIST OF TABLES

TABLE NUMBER	TITLE	
1-1	Specifications, JH-110B and JH-110B-14 Transports	1-5
1-2	Specifications, JH-110BC Transport	1-8
1-3	Specifications, JH-110M Transport	1-11
1-4	Specifications, Standard Audio Electronics	1-14
1-5	Specifications, Broadcast Audio Electronics	1-14
1-6	Specifications, Mastering Audio Electronics	1-16
1-7	Specifications, RTZ III	1-17
1-8	Input Power Specifications	1-17
1-9	Ordering Numbers	1-18

SECTION I

INTRODUCTION

1.1 General Information

The JH-110 series of professional tape recorders consist of a wide range of models designed for a variety of applications. Models are available for use with 1/4 inch, 1/2 inch, and one inch magnetic tape, for mono, stereo, 4-track, and 8-track recordings. All models accommodate 10-1/2 inch or smaller metal or plastic reels; some models accommodate up to 14 inch reels. DIN hub adapters can be used with any model.

JH-110B tape recorders are available in two tape speed ranges. High speed transports operate at 7-1/2, 15, and 30 inches per second (19, 38, and 76 cm/s); low speed transports operate at 3-3/4, 7-1/2, and 15 inches per second (9-1/2, 19, and 38 cm/s). Changing the speed of the transport automatically selects the proper audio equalization for that speed. Tape speed can also be controlled by an

external source or by a variable internal source for operation at non-standard speeds.

There are two cabinet styles for the JH-110B, the variable profile cabinet and the high profile cabinet. The variable profile cabinet houses from one to four channels of record/playback electronics, the transport, and its power supply. The high profile cabinet houses from one to eight channels of record/playback electronics, the transport, and its power supply.

Both cabinets are mounted on casters for mobility. The record/playback audio electronics are mounted in drawers and the transport base is hinged, making all components easily accessible. All models can also be ordered unmounted for installation in standard 19 inch equipment cabinets. Cabinet dimensions and weights are given in figures 1-1 and 1-2.

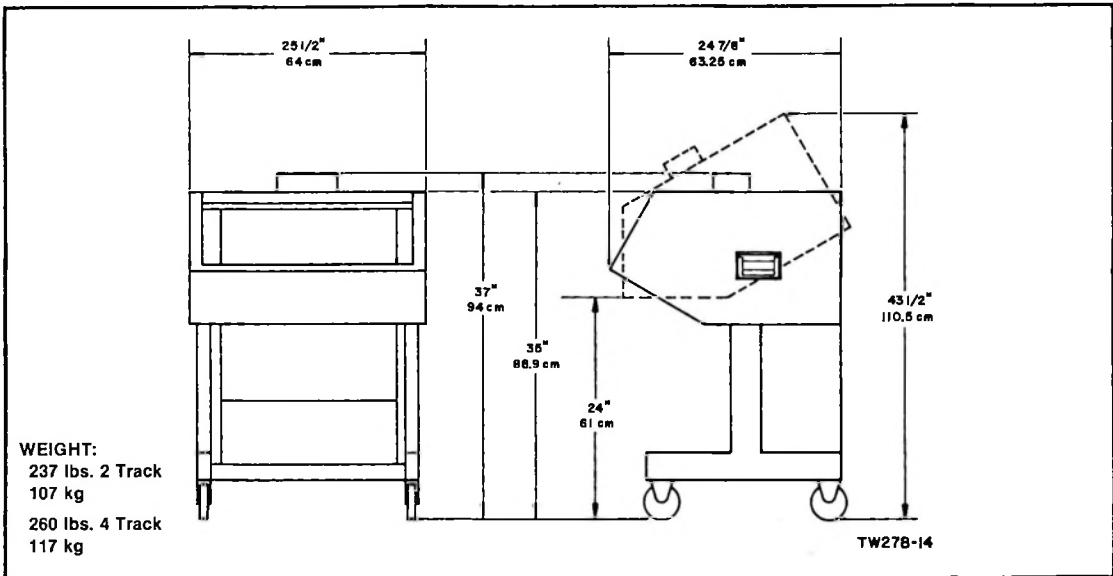


Figure 1-1 Variable Profile Cabinet Dimensions

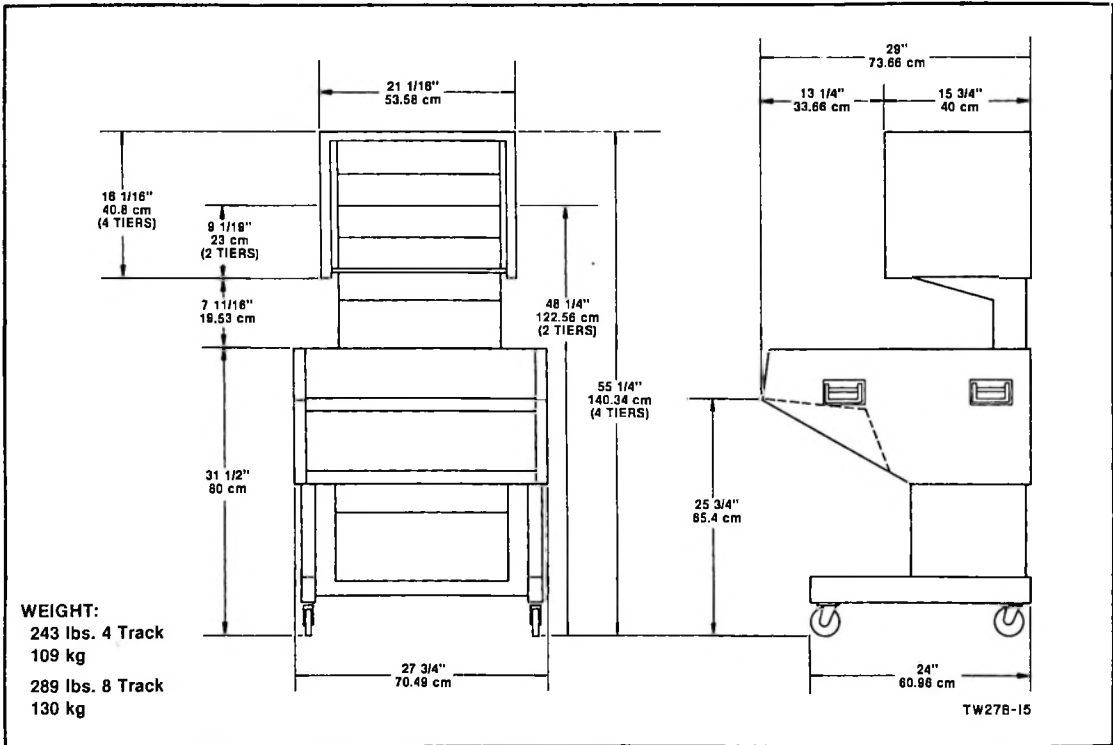


Figure 1-2 High Profile Cabinet Dimensions

1.2 TRANSPORTS

There are basically four models of the JH-110B tape transport:

the standard JH-110B 10-1/2 inch reel transport
the JH-110B-14 fourteen inch reel transport

the JH-110BC broadcast transport
the JH-110M disc mastering transport.

There are a variety of options for each model to fit the user's specific needs.

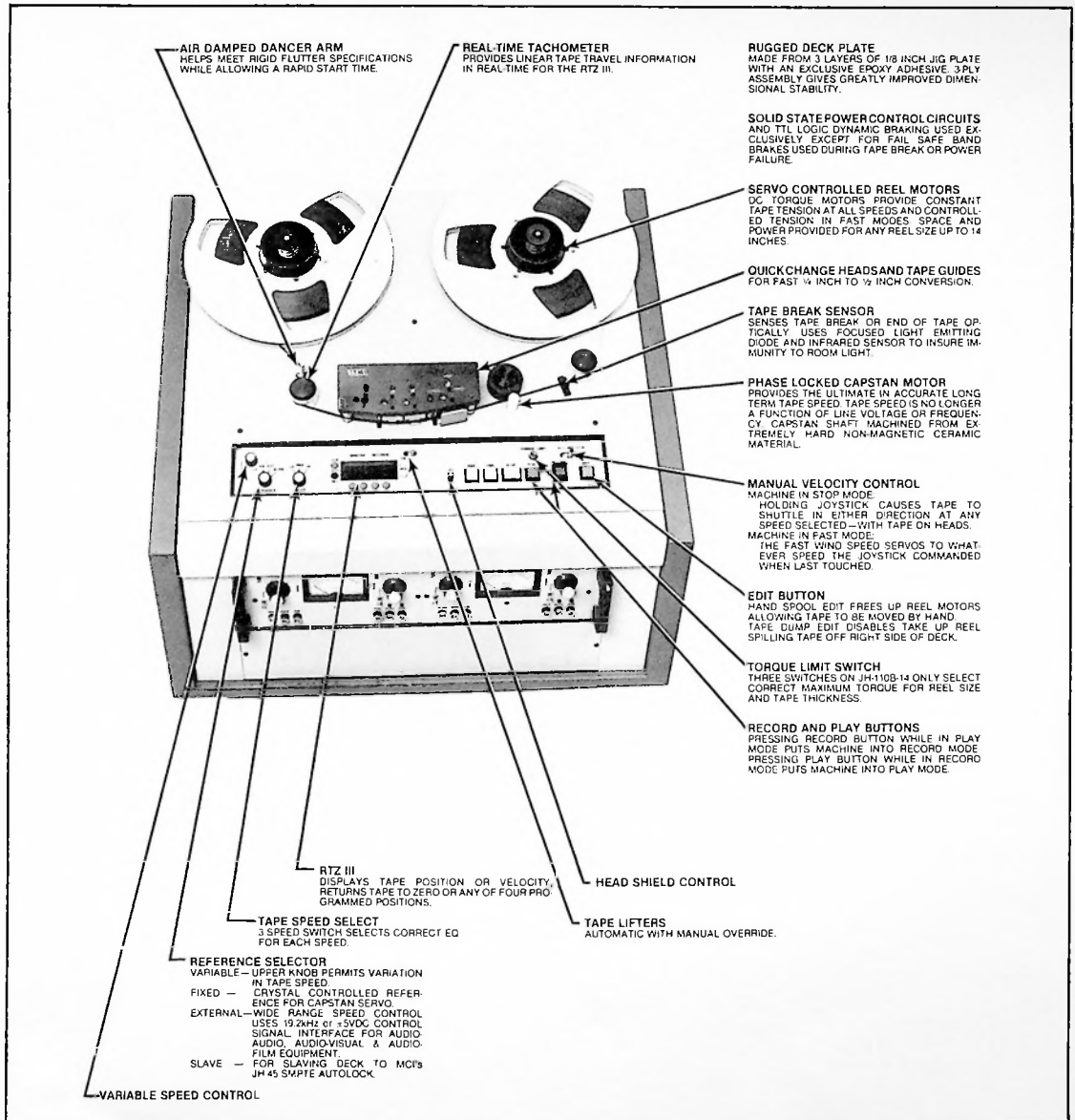


Figure 1-3 JH-110B Transport Deck

1.2.1 JH-110B

The JH-110B, shown in Figure 1-3, is the standard model three speed playback and record tape transport. Full width 1/4 inch, two track 1/4 inch, and four track 1/2 inch tape versions are available. All versions can use 3 inch to 10-1/2 inch metal or plastic reels. A torque limit switch lowers the starting torque of the reel motors for small reels or for delicate tapes.

Available as optional equipment on all the JH-110B decks is the RTZ III autolocator. The autolocator returns the tape to the zero position, or positions the tape at any of four programmable positions. A LED display displays the tape position in minutes and seconds of actual playback time, or the tape speed in inches per second.

During playback and record modes, a ceramic capstan and pinch roller arrangement controls the tape speed. A phase locked loop servo system drives the dc capstan motor. The servo locks the capstan speed to a crystal oscillator reference. A reference switch can alternatively select a voltage controlled oscillator (VCO) or an external signal as the reference for the phase locked loop. The VCO allows variable capstan speed control for operating at any speed 20% above or below the standard speeds. The transport will accept either a clock frequency (19.2 kHz) or a variable dc level (-5 to +5 volts) as an external reference input.

Two servo controlled dc motors regulate the tape tension, keeping it constant during all modes of operation. An infrared tape load sensor brakes the supply and take up reel motors at the end of roll, when the tape breaks, or when the tape is removed from the sensor slot. An Edit switch can

disable the tape tension servo allowing the reels to be moved by hand without resistance from the motors. The manual velocity control (MVC) joystick gives complete control of the tape's motion and speed from either the stop mode or the forward/rewind modes.

To facilitate head alignment and maintenance, the heads are mounted on a precision machined head bridge assembly. Loosening two hex screws separates the head bridge from the transport deck. Removing the head bridge does not affect the head alignment. Swapping head assemblies and roller guides quickly converts 1/2 inch tape machines to 1/4 inch tape.

Standard head bridges contain three heads: reproduce, record/cue and erase. Additional mounting space is provided for a preview head which may be ordered as an option. Tape lifters move the tape away from the heads during the fast forward and rewind modes to reduce head wear.

The JH-110B mounts in the variable profile cabinet; its dimensions are indicated in Figure 1-1. Specifications for the JH-110B are listed in Table 1-1.

1.2.2 JH-110B-14

The JH-110B-14 contains all the features of the JH-110B plus the capability of mounting 14 inch reels. Three torque selection switches adjust the reel motor torque for different size and weight reels. The JH-110B-14 also mounts in the variable profile cabinet.

Specifications for the JH-110B-14 are listed in Table 1-1.

TABLE 1-1 SPECIFICATIONS
JH-110B and JH-110B-14

Reel Size				
JH-110B	3 to 10½ inches	NAB or EIA, plastic or metal		
JH-110B-14	3 to 14 inches	reels, DIN hubs optional		
Tape Width				
	¼ inch full width	NAB or DIN track separation		
	¼ inch 2 track			
	½ inch 4 track			
Tape Speeds				
High Speed (Standard)	Fixed	7½, 15, & 30 ips (19, 38 & 76 cm/s)	Phase locked loop dc capstan controlled referenced to fixed crystal oscillator or variable VCO output	
				Variable
Low Speed (Option)	Fixed	3¾, 7½ & 15 ips (9½, 19 & 38 cm/s)		
				Variable
Long Term Speed Stability		better than 0.02%		
Tape Tension				
¼ inch	5½ ± ¼ oz.	Measured between capstan and roller guide		
½ inch	5¾ ± ¼ oz.			
	at all tape speeds beginning to end of reel			
Start Time		900 msec @ 30 ips		
		500 msec @ 15 ips		
		500 msec @ 7½ ips		
Rewind Time		85 sec for 2500 ft.		
		140 sec for 4800 ft.		
Wow and Flutter				
	30 ips < 0.022%	DIN 45507 weighted		
	15 ips < 0.035%	DIN 45507 weighted		
	7½ ips < 0.055%	DIN 45507 weighted		

TABLE 1-1 SPECIFICATIONS (continued)

Frequency Range

Record/Reproduce (Using Ampex 456 tape)	30 ips, AES	50Hz to 28 kHz	+0.75, -2dB
	15 ips, NAB	30Hz to 24 kHz	+0.75, -2dB
	7½ ips, NAB	30Hz to 20 kHz	+0.75, -1.5dB

Signal to Noise*

		mono	2 track	4 track
Record/Reproduce referenced to 510nWb/m	30 ips, AES	68	64	64
	15 ips, NAB	68	64	64
	7½ ips, NAB	67	63	63
Weighted dB(A)	30 ips, AES	74	71	70
	15 ips, NAB	70	68	68
	7½ ips, NAB	70	67	67

Harmonic Distortion*

1kHz fundamental
at 510 nWb/m

3rd harmonic	30 ips, AES	<0.35%
	15 ips, NAB	<0.52%
	7½ ips, NAB	<1.6%

2nd harmonic	30 ips, AES	<0.10%
	15 ips, NAB	<0.10%
	7½ ips, NAB	<0.10%

3rd harmonic 3% fluxivity level	30 ips, AES	1040nWb/m
	15 ips, NAB	1020nWb/m
	7½ ips, NAB	1000nWb/m

Depth of Erasure

referenced to 250nWb/m better than 80 dB at 1 kHz

Bias and Erase Frequency

120 kHz

* Typical values given. Specifications are largely dependent on tape formulation. Also, the performance of any particular type of tape varies from batch to batch.

1.2.3 JH-110BC

The JH-110BC is a two speed playback and record broadcast tape deck. It can be operated in either DIN stereo or mono modes. The broadcast deck uses 1/4 inch recording tape and will accommodate any size reel or platter up to 30 cm in diameter.

In addition to the standard JH-110B features, the Broadcast deck includes the RTZ III, built-in tape scissors and a tape marker for editing.

Specifications for the JH-110BC are listed in Table 1-2.



Figure 1-4 JH-110BC Transport

TABLE 1-2 SPECIFICATIONS

JH-110BC

Reel Size	30 cm max DIN	DIN hubs standard	
	3 to 11¾ inch EIA or NAB	Reel locks optional	
Tape Width	¼ inch 2-track	DIN stereo	
Tape Speeds			
Fixed	7½ and 15 ips (19 and 38 cm/s)	Phase locked loop dc capstan control referenced to fixed crystal oscillator or variable VCO	
Variable	2 to 22 ips (5 to 56 cm/s)		
Long Term Speed Stability	better than 0.02%		
Tape Tension	5½ ± ¼ oz. at all tape speeds beginning to end of reel	Measured between capstan and roller guide	
Start Time	500 msec @ 15 ips 500 msec @ 7½ ips	To 0.1% DIN 45507 flutter with 10½ inch reels	
Rewind Time	85 sec for 2500 ft. 140 sec for 4800 ft.		
Wow and Flutter	15 ips < 0.035%	DIN 45507 weighted	
	7½ ips < 0.055%	DIN 45507 weighted	
Frequency Range			
Record/Reproduce (Using Ampex 456 tape)	15 ips, IEC	30Hz to 24 kHz +0.75, -2dB	
	7½ ips, IEC	30Hz to 20 kHz +0.75, -1.5dB	
Signal to Noise*		mono	stereo
Record/Reproduce referenced to 510nWb/m			
Unweighted, 20 Hz - 20 kHz	15 ips, IEC	65	64
	7½ ips, IEC	63	62
Weighted dB(A) RMS	15 ips, IEC	72	69
	7½ ips, IEC	68	66
Weighted, CCIR 468, RMS	15 ips, IEC	62	60
	7½ ips, IEC	58	56

**TABLE 1-2 SPECIFICATIONS
(continued)**

Harmonic Distortion*

1kHz fundamental
at 510 nWb/m

3rd harmonic	15 ips, IEC .7½ ips, IEC	<0.52% <1.6%
2nd harmonic	15 ips, IEC 7½ ips, IEC	<0.10% <0.10%
3rd harmonic 3% fluxivity level	15 ips, IEC 7½ ips, IEC	1020nWb/m 1000nWb/m

Depth of Erasure

referenced to 250nWb/m better than 80 dB at 1 kHz

Bias and Erase Frequency

120 kHz

* Typical values given. Specifications are largely dependent on tape formulation. Also, the performance of any particular type of tape varies from batch to batch.

1.2.4 JH-110M

The JH-110M is a three speed disc mastering deck intended for use with full and half revolution delay disc mastering systems. In addition to the standard JH-110B features, the mastering deck includes a tape delay, a fast motion limit control, and an enhanced RTZ IIIM autolocator. Several tape roller guides provide time delays between the two playback heads. The tape path around these roller guides can insert a half or full revolution delay for 33-1/3 or 45 rpm discs at any of the three

tape speeds.

The fast motion limit potentiometer limits the maximum tape speed in the fast forward and re-wind modes for gentler spooling. The RTZ IIIM, along with the standard locating functions, stores positions for groove expansion, banding, and end of disc lead-out functions.

The JH-110M is available in 1/4 inch stereo and mono versions. Specifications for the JH-110M are listed in Table 1-3.

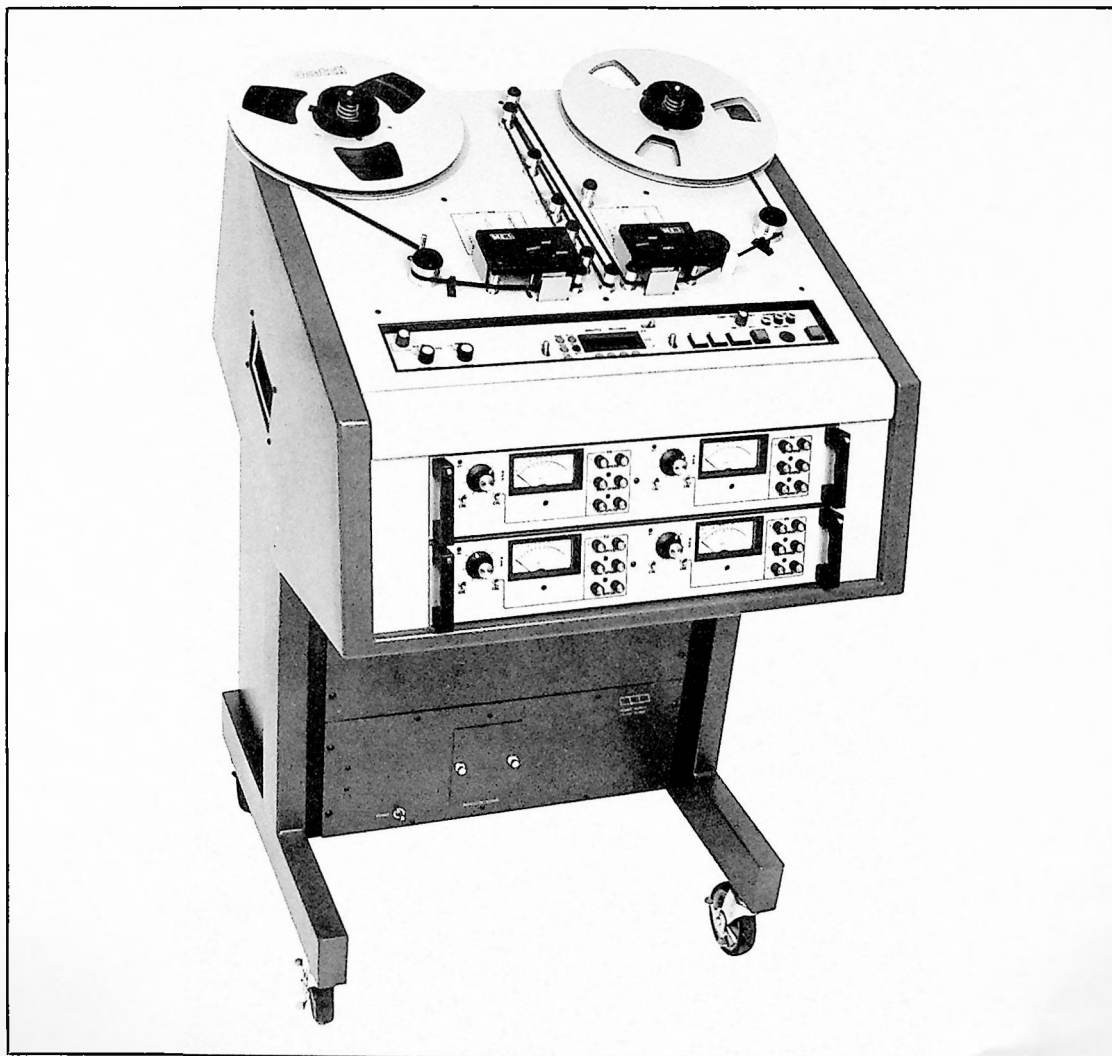


Figure 1-5 JH-110M Transport

TABLE 1-3 SPECIFICATIONS

JH-110M

Reel Size	3 to 14 inch NAB or EIA		
Tape Width	¼ inch full width ¼ inch 2 track NAB ¼ inch 2 track DIN		
Tape Speeds			
Fixed	7½, 15, & 30 ips (19, 38 & 76 cm/s)	Phase locked loop dc capstan control referenced to fixed crystal oscillator or variable VCO.	
Variable	5 to 45 ips (13 to 114 cm/s)		
Long Term Speed Stability	better than 0.02%		
Tape Tension	5½ ± ¼ oz.	At all tape speeds beginning to end of reel	
Start Time	900 msec @ 30 ips 500 msec @ 15 ips 500 msec @ 7½ ips	To 0.1% DIN 45507 flutter with 10½ inch reels	
Rewind Time	variable 85 sec to 11½ min. for 2500 ft.		
Wow and Flutter	30 ips < 0.022% 15 ips < 0.035% 7½ ips < 0.055%	DIN 45507 weighted DIN 45507 weighted DIN 45507 weighted	
Frequency Range			
(Using Ampex 456 tape)	30 ips, AES 15 ips, NAB 7½ ips, NAB	50Hz to 28 kHz 30Hz to 24 kHz 30Hz to 20 kHz	+0.75, -2dB +0.75, -2dB +0.75, -1.5dB
Signal to Noise*		mono	2 track
referenced to 510nWb/m	30 ips, AES 15 ips, NAB 7½ ips, NAB	68 68 67	64 64 63
Weighted dB(A)	30 ips, AES 15 ips, NAB 7½ ips, NAB	74 70 70	70 68 67

TABLE 1-3 SPECIFICATIONS (continued)

Harmonic Distortion*

1kHz fundamental
at 510 nWb/m

3rd harmonic	30 ips, AES	<0.35%
	15 ips, NAB	<0.52%
	7½ ips, NAB	<1.6%
2nd harmonic	30 ips, AES	<0.10%
	15 ips, NAB	<0.10%
	7½ ips, NAB	<0.10%
3rd harmonic 3% fluxivity level	30 ips, AES	1040nWb/m
	15 ips, NAB	1020nWb/m
	7½ ips, NAB	1000nWb/m

Delays

Max delay time	30 ips	1.8 sec.	54 inch (137cm) delay Loop
	15 ips	3.6 sec.	
	7½ ips	7.2 sec.	
	3¾ ips	14.4 sec.	
Min delay Time	30 ips	0.21 sec.	6.3 inch (16 cm) delay loop Delay may be set for several values between min and max.
	15 ips	0.46 sec.	
	7½ ips	0.84 sec.	
	3¾ ips	1.68 sec.	

1 Revolution Delay (Capps or Scully)		33½ RPM (1.8 sec)	45 RPM (1.33 sec)
	30 ips	54 ±.2 in. 137 ±.5cm	40 ±.2 in. 101.6 ±.5cm
	15 ips	27 ±.2 in. 68.6 ±.5cm	20 ±.2 in. 50.8 ±.5cm
	7½ ips	13.5 ±.2 in. 34.3 ±.5cm	10 ±.2 in. 25.4 ±.5cm
1/2 Revolution Delay (Neumann)		33½ RPM (0.9 sec)	45 RPM (0.66 sec)
	30 ips	27 ±.2 in. 68.5 ±.5cm	20 ±.2 in. 50.8 ±.5cm
	15 ips	13.5 ±.2 in. 34.3 ±.5cm	10 ±.2 in. 25.4 ±.5cm
	7½ ips	6.7 ±.2 in. 17.1 ±.5cm	5 ±.2 in. 12.7 ±.5cm

* Typical values given. Specifications are largely dependent on tape formulation. Also, the performance of any particular type of tape varies from batch to batch.

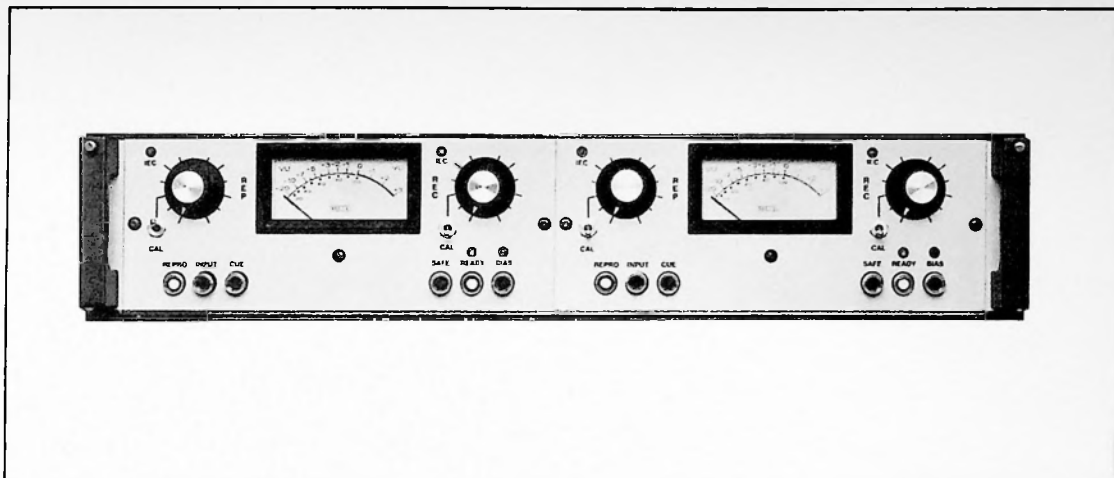


Figure 1-6 Audio Panel

1.3 Audio Electronics

1.3.1 Standard Audio Electronics (JH-110B,-14)

The standard JH-110B audio electronics are housed inside a 3-1/2 by 17-3/4 by 12-1/8 inch drawer (8.9x45.1x30.8 cm). Each drawer holds two channels of audio electronics. Single track options contain one channel mounted in the left side and a blank panel covering the right side of the drawer. Variable profile cabinets hold one or two drawers; high profile cabinets hold two or four. These drawers extend from the cabinets on latching slide rails for access to the audio printed circuit boards and components. Audio input, output, and power connectors are located at the rear of the drawers. The drawers can be extended on their slide rails without disconnecting any cables.

Each channel consists of a front panel, which sup-

ports the meter and switches, and a Mother Board, which forms the bottom of the assembly. The I/O, Record, Reproduce, and Bias circuit boards are plug in modules which mount directly onto the Mother Board. The channel electronics can be easily removed from the drawer by removing two screws in the front panel and four screws in the Mother Board. All connections to the Mother Board are made via plug in connectors. Since all the channel electronics are identical, modules can be swapped from channel to channel for troubleshooting or maintenance purposes.

Switches on the Repro and Record Modules select either NAB or IEC standard equalization. When properly aligned to specifications the equalization standards can be switched without any realignment necessary.

Specifications for the standard audio electronics are listed in Table 1-4.

1.3.2 Broadcast Audio Electronics

The broadcast audio electronics mount in two drawers similar to the standard audio electronics. The bottom drawer contains two channels of audio electronics, similar to the standard audio electronics. The top drawer contains the monitor amplifier and speaker plus the controls and meters.

Two track stereo or mono playback/record modes are switch selectable. The monoral mode records the left line input onto both right and left tracks. In repro both tracks are summed together and applied to the left line output.

The Mother Board, I/O, and Bias Modules of the broadcast deck are similar to the standard audio modules. The Repro and Record Modules however, are unique to this transport. These modules playback and record at preset levels only, there are no repro or record level controls on the broadcast front panel. Also, since this is a two speed transport, the Repro and Record Modules contain only high and low speed equalization networks.

Specifications for the broadcast audio electronics are listed in Table 1-5.

**TABLE 1-4
STANDARD AUDIO SPECIFICATIONS**

Line Input

Level	-15dBm to +24dBm for 0 VU
Input Impedance	10 k Ω balanced
Headroom	30dBm at clipping

Line Output

Level	+4dBm at 0 VU
Source Impedance	100 Ω balanced
Maximum Output	+24dBm at clipping

Equalization

High Speed	Low Speed Option
30 ips AES	15 ips NAB/IEC
15 ips NAB/IEC	7½ ips NAB/IEC
7½ ips NAB/IEC	3¾ ips NAB

**TABLE 1-5
BROADCAST AUDIO SPECIFICATIONS**

Line Input

Level	-15dBm to +24dBm for 0 VU
Impedance	10 k Ω bridging line balanced
Headroom	30dBm at clipping

Line Output

Level	+6dBm at 0 VU
Source Impedance	150 Ω balanced, transformer coupled
Maximum Output	+24dBm at clipping

Equalization

15 ips NAB/IEC
7½ ips NAB/IEC

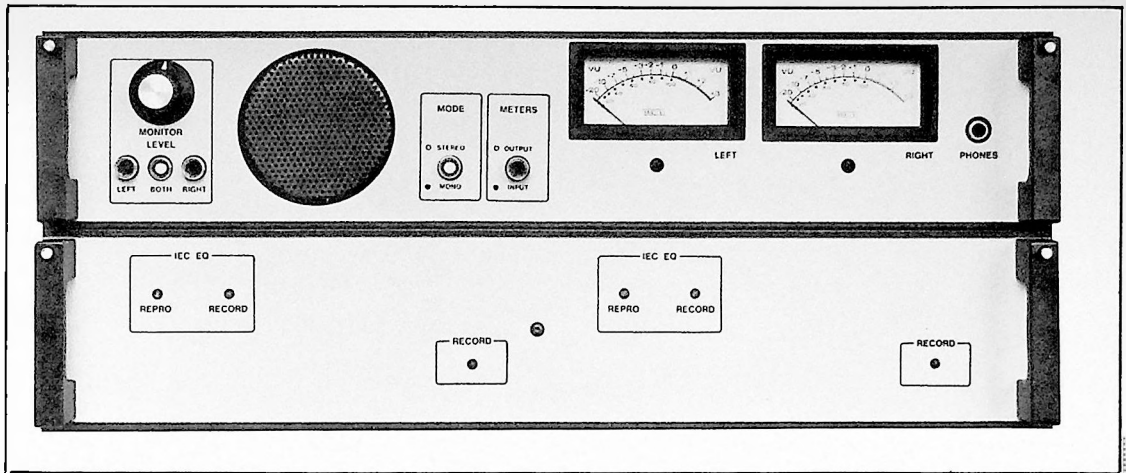


Figure 1-7 Broadcast Audio Panel

1.3.3 Mastering Audio Electronics

The mastering deck audio electronics are mounted in extendable drawers similar to the standard audio electronics. Two identical channels fit into each drawer. The top drawer contains the repro circuitry for the preview head, the bottom drawer contains the repro circuitry for the repro head. High frequency and low frequency equalization controls for each of the three speeds are provided on the front panel. Alternatively, a switch on the front panel can select preset equalization (NAB or IEC).

The Mother Board and Repro Modules of the mastering deck audio channels are similar to those of the standard audio channels. Modules unique to these audio electronics are the Front Panel Equalization Board and an output only version of the I/O Amplifier Module. Since this is a reproduce only machine, there are no Bias or Record Modules.

Specification for the mastering deck audio electronics are listed in Table 1-6.

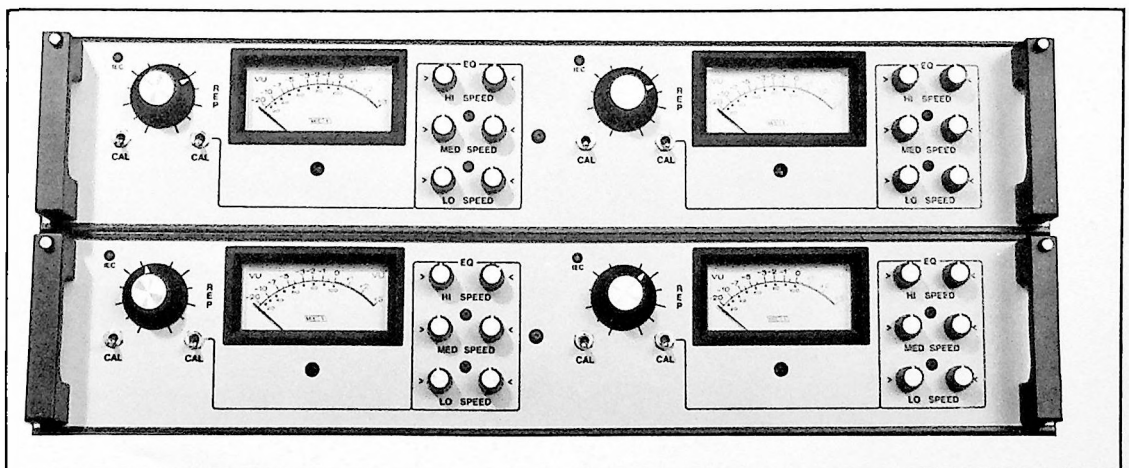


Figure 1-8 Mastering Audio Panel

**TABLE 1-6
MASTERING AUDIO SPECIFICATIONS**

Line Output

Level +4dBm at 0 VU
 Source
 Impedance 100 Ω balanced
 Maximum Output +24dBm at clipping

Equalization

30 ips AES with front panel variable control
 15 ips NAB/IEC with front panel variable control
 7½ ips NAB/IEC with front panel variable control

1.4 RTZ III Autolocator

1.4.1 RTZ III

The RTZ III autolocator can be included as an option on all JH-110B and JH-110BC tape transports. The JH-110M transports can be ordered with the RTZ IIIM autolocator which has additional disc mastering control functions. A microprocessor executes firmware stored subroutines to calculate and display tape position and velocity and to output velocity commands to the transport's reel motors for autolocating.

Tape position is derived from pulses generated by an optical transducer mounted under the left tape roller guide. The microprocessor displays tape position in minutes and seconds of record/playback time. Calculations are normalized to the tape speed so that the display always indicates actual record/playback time for any standard speed selected. Negative time, that is, positions on the tape to the left of the zero position, is indicated by a flashing decimal point between the minutes and seconds columns.

Tape velocity is derived from pulses generated by the capstan tachometer. The microprocessor

times the arrival of the capstan pulses, calculates the velocity, and displays the velocity in inches and hundredths of inches per second.

The RTZ III can position the tape to zero or to a pre-defined position stored in memory. There are four memory locations for storing tape positions, positive positions only. The autolocator returns the tape to zero or to a stored position in either a forward or reverse direction, from either a positive or negative tape position. Tape positions can be stored in the memory locations at any time using switches on the display panel.

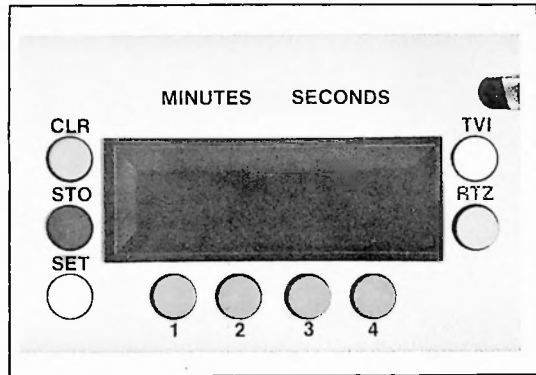


Figure 1-9 RTZ III Panel

1.4.2 RTZ IIIM

The RTZ IIIM, found in the JH-110M transports, performs all the RTZ III functions plus three disc lathe control functions. Twenty additional

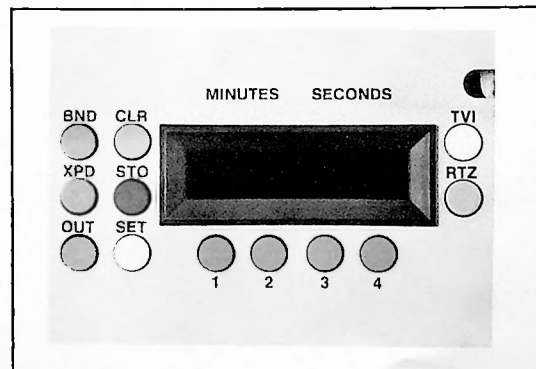


Figure 1-10 RTZ IIIM Panel

memory locations are available for storing groove expansion positions, band positions, and the end of record lead out position. During playback the RTZ IIIM signals the disc lathe to perform the desired expand, band, or lead out function when the tape reaches the position stored in memory. The display will read out all the function positions stored in memory and indicate the number of unused locations available.

Specifications for both the RTZ III and the RTZ IIIM are listed in Table 1-7.

TABLE 1-7 RTZ III SPECIFICATIONS	
Position Memories	4 locator memories 20 lathe function memories (RTZ IIIM only)
Position Range	-99 min 59 sec to +99 min 59 sec
Locator Accuracy	±1 sec accumulative over 20 locates
Velocity Range	0 to 50 ips
Velocity Display Accuracy	±0.01 ips

1.5 Power Supply

The JH-110PS power supply converts single phase ac line voltage to the ac and regulated dc voltages required by the tape transport and the audio electronics. The power supply mounts at the bottom of cabinet and is secured by four allen head screws.

Located on the front panel are the ON/OFF power switch and an access door to the voltage regulators. On the rear panel are the power connectors and the fuse holder. The fuse holder plug sets the transformer for use with a 100, 115, or 220 volt ac line input at either 50 or 60 Hz.

Input power specifications for the JH-110PS are listed in Table 1-8.

1.6 Options

Table 1-9 lists the ordering numbers for the various JH-110B options. Model number suffix codes are defined as follows:

- 1 — 1/4 inch Full Track
- 2 — 1/4 inch 2 Tracks
- 4 — 1/2 inch 4 Tracks
- VP — Variable Profile Cabinet
- HP — High Profile Cabinet
- UM — Unmounted
- PB/E — Playback Electronics
- R/E — Record Electronics
- Option 1 — Low Speed Transport
- Option 2 — DIN Stereo Heads
- Option 3 — Tape scissors and marker
- Option 4 — RTZ III AutoLocator
- Option 5 — Service Manual

TABLE 1-8 INPUT POWER SPECIFICATIONS					
INPUT VOLTAGE (50-60Hz)	TOLERANCE	CURRENT DRAW	POWER DISSIPATION	HEAT DISSIPATION	FUSE TYPE
100v	±10%	2.2A	220W	750BTU/hr	115v 4A S/B
115v	±10%	2.0A	220W	750BTU/hr	115v 4A S/B
220v	±10%	1.0A	220W	750BTU/hr	220v 2A S/B

**TABLE 1-9
ORDERING NUMBERS**

PART NO.	TRANSPORT TYPE	CABINET	NO.	ELECTRONICS TYPE
JH-110B-1-VP	10½ in.	Var. Prof.	1	JH-110B R/E
JH-110B-2-VP	10½ in.	Var. Prof.	2	JH-110B R/E
JH-110B-4-VP	10½ in.	Var. Prof.	4	JH-110B R/E
JH-110B-14-1-VP	14 in.	Var. Prof.	1	JH-110B R/E
JH-110B-14-2-VP	14 in.	Var. Prof.	2	JH-110B R/E
JH-110B-14-4-VP	14 in.	Var. Prof.	4	JH-110B R/E
JH-110B-1-PB-VP	10½ in.	Var. Prof.	1	JH-110B PB/E
JH-110B-2-PB-VP	10½ in.	Var. Prof.	2	JH-110B PB/E
JH-110B-4-PB-VP	10½ in.	Var. Prof.	4	JH-110B PB/E
JH-110B-14-1-PB-VP	14 in.	Var. Prof.	1	JH-110B PB/E
JH-110B-14-2-PB-VP	14 in.	Var. Prof.	2	JH-110B PB/E
JH-110B-14-4-PB-VP	14 in.	Var. Prof.	4	JH-110B PB/E
JH-110B-1/2-PB-VP	10½ in.	Var. Prof.	1	JH-110B R/E
			2	JH-110B PB/E
JH-110B-2/2-PB-VP	10½ in.	Var. Prof.	2	JH-110B R/E
			2	JH-110B PB/E
JH-110B-14-1/2-PB-VP	14 in.	Var. Prof.	1	JH-110B R/E
			2	JH-110B PB/E
JH-110B-14-2/2-PB-VP	14 in.	Var. Prof.	2	JH-110B R/E
			2	JH-110B PB/E
JH-110B-1-UM	10½ in.	Unmounted	1	JH-110B R/E
JH-110B-2-UM	10½ in.	Unmounted	2	JH-110B R/E
JH-110B-4-UM	10½ in.	Unmounted	4	JH-110B R/E
JH-110B-14-1-UM	14 in.	Unmounted	1	JH-110B R/E
JH-110B-14-2-UM	14 in.	Unmounted	2	JH-110B R/E
JH-110B-14-4-UM	14 in.	Unmounted	4	JH-110B R/E
JH-110B-1-PB-UM	10½ in.	Unmounted	1	JH-110B PB/E
JH-110B-2-PB-UM	10½ in.	Unmounted	2	JH-110B PB/E
JH-110B-4-PB-UM	10½ in.	Unmounted	4	JH-110B PB/E
JH-110B-14-1-PB-UM	14 in.	Unmounted	1	JH-110B PB/E
JH-110B-14-2-PB-UM	14 in.	Unmounted	2	JH-110B PB/E
JH-110B-14-4-PB-UM	14 in.	Unmounted	4	JH-110B PB/E
JH-110B-1/2-PB-UM	10½ in.	Unmounted	1	JH-110B R/E
			2	JH-110B PB/E
JH-110B-2/2-PB-UM	10½ in.	Unmounted	2	JH-110B R/E
			2	JH-110B PB/E
JH-110B-14-1/2-PB-UM	14 in.	Unmounted	1	JH-110B R/E
			2	JH-110B PB/E
JH-110B-14-2/2-PB-UM	14 in.	Unmounted	2	JH-110B PB/E
			2	JH-110B PB/E

1.7 Accessories

JH-110B Remote Control

The remote control unit provides full transport motion controls including the "Joystick." In addition it includes an LD (Lifter Defeat) button for controlling the tape lifter from the remote position. When the Return To Zero option is included with your machine, remote buttons are included to control this option.

The remote control option is supplied in a separate case with a connecting cable 30 feet long. The schematic is in section 3 of this manual. The case dimensions are: width—11.5 inches; height — 3.25 inches; depth — 2.675 inches.

JH-45 AutoLock (Refer to AutoLock manual for detailed information.)

The MCI AutoLock is designed to lock an MCI (JH-110B, JH-114) tape machine as a SLAVE to any other MCI (JH-110B, JH-114) tape machine as a master. Locking of slave to master is by the use of SMPTE, EBU or NTSC (drop frame) time code. Accuracy of lock is within 50 microseconds.

The MCI AutoLock displays tape position master

or slave in hours, minutes, seconds and frames. Manual control of positive or negative slave offset is provided from one frame to as many as needed. The AutoLock generates a time code. Tape discontinuities are overridden to provide free wheeling lock. Locking is by means of a fast lock or slow lock. Fast lock of slave to master is initially fast wind to 25% of nominal speed, capstan servo control to within two frames and absolute lock by comparing time code synchronizing detect pulses. Slow-lock maintains a maximum variation of 1.45% of nominal speed (1/4 semitone maximum variation).

Other features are the capability of incorporating user bits into the time code. Storage of record start and record stop tape position, when auto record is pushed, causes recording start at a preset time to the time matching storage of record stop.

An additional capability is park of the slave machine. A time position can be stored in the display. Pressing LOC causes the slave tape machine to run up to the display position and stop.

For specific details see the MCI AutoLock manual.

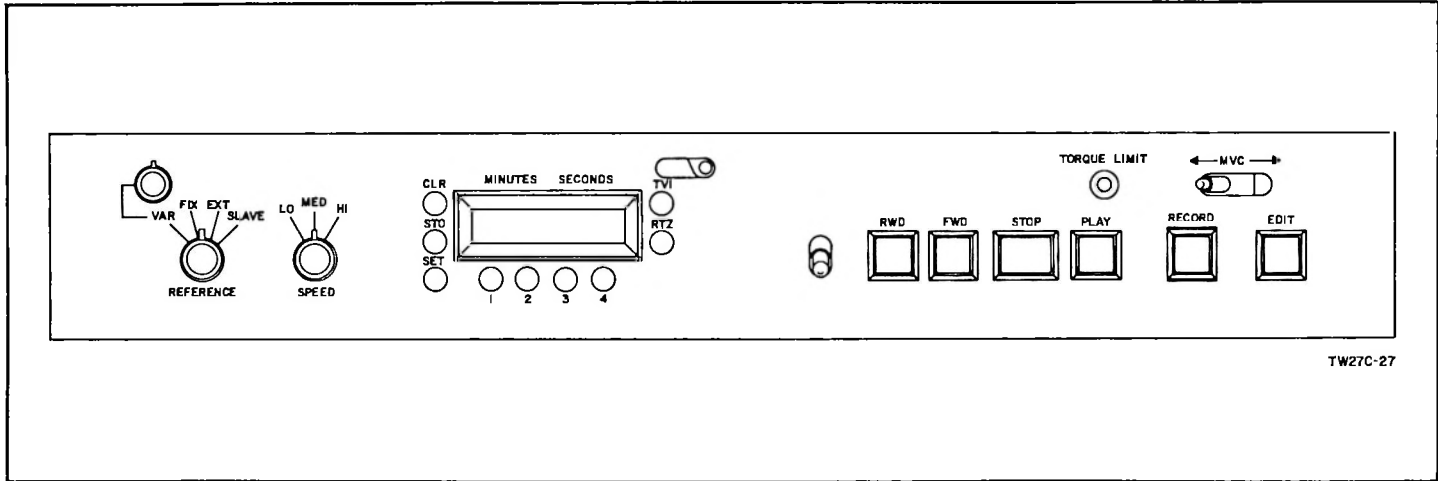


Figure 2-1 Transport Control Panel

SECTION 2

OPERATING PROCEDURES

This section lists all the control switches and indicators of the tape transport and the audio electronics. Several examples of the use of these controls follow these lists. These examples can be used to familiarize yourself with the operation of the tape recorder or as a post installation check out procedure to insure proper operation. For detailed maintenance and alignment procedures, consult Section 7 of the Technical Manual.

2.1 Controls & Indicators

Control/Indicator

RWD

Rewinds tape onto supply reel at fast speed. Cancels previously selected motion command (i.e. FWD, PLAY, or RECORD).

FWD

Winds tape onto take-up reel at fast speed. Cancels previously selected motion command.

STOP

Cancels previously selected motion command and stops tape.

PLAY

Initiates playback at the selected speed and cancels previous motion command (RWD, FWD, STOP, or RECORD). Playback source is selected at the audio panel.

RECORD

When pressed with PLAY button, or when in play mode, enables recording at selected

speed. To record, RECORD READY must also be selected at the audio panel.

EDIT

When pressed with tape out of the tape load sensor, unspools tape from supply reel without winding it onto the take-up reel. Tape spills off right side of deck for editing and stops when STOP is pressed.

When pressed with tape in the tape load sensor, disables the tape tension system. Tape then moves freely by hand. Tension is restored when tape is replaced in tape load sensor or EDIT, is pressed a second time.

FAST MOTION LIMIT (110M Only)

Adjusts the maximum limit of the fast forward and rewind speeds, as well as maximum RTZ speed.

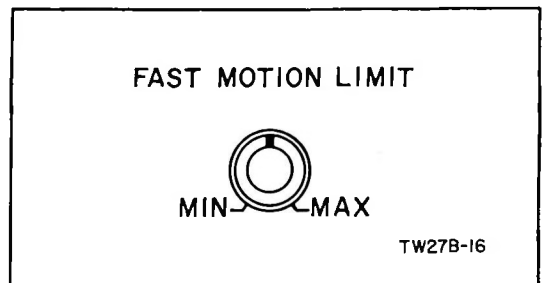


Figure 2-2
JH-110M Fast Motion Limit Control

MVC

From stop mode, manually controls tape speed and direction while hand is in contact with joystick. When released, returns transport to STOP.

From rewind or fast forward modes, manually controls tape speed and direction if touched and will continue to control tape motion when released. Control cancelled when any other mode is entered.

TORQUE LIMIT SWITCH

Ten inch models — single switch. When out, selects normal torque for 10-1/2 inch reels. When pressed in, limits reel motor torque for use with smaller or plastic reels.

Fourteen inch models — three switches:
HI — When pressed in, selects higher torque for use with 14 inch reels.

MED — When pressed in, selects standard torque for use with 10-1/2 inch reels.

LO — When pressed in, limits torque for use with smaller or plastic reels.

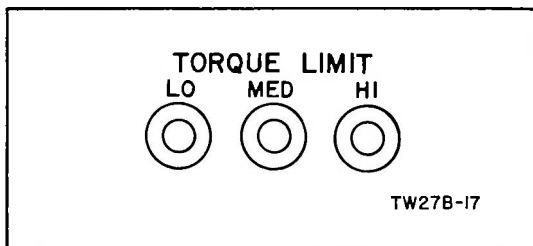


Figure 2-3

JH-110B-14 Torque Limit Switches

SHIELD LEVER

Raises and lowers repro head/shield.

TAPE LIFTER LEVER

Momentarily places tape against heads during fast forward and rewind modes.

SPEED SELECT

Three position switch:

HI — Selects high play and record speed (high speed models 30 ips, low speed models 15 ips)

MED — Selects medium play and record speed (high speed models 15 ips, low speed models 7-1/2 ips)

LO — Selects low play and record speed (high speed models 7-1/2 ips, low speed models 3-3/4 ips)

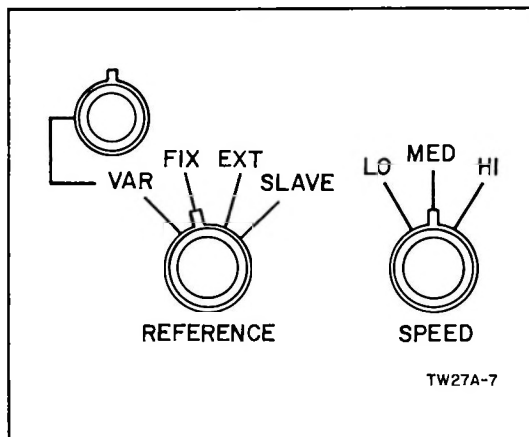


Figure 2-4

Reference And Speed Controls

REFERENCE SELECT

Four position switch:

EXT — Selects an external capstan speed reference for slaving this transport to another device.

FIX — Selects an internal crystal oscillator as a fixed reference for the capstan speed.

VAR — Selects a variable reference for the capstan speed.

SLAVE — Selects interface for use with MCI's AutoLock SMPTE synchronizer.

VARIABLE REFERENCE ADJUST

Varies the capstan speed by $\pm 20\%$ of the selected speed when VAR is selected by the reference switch.

RTZ III DISPLAY

Displays tape position in minutes and seconds of elapsed play/record time. Also used as display for RTZ function switches listed on following page.

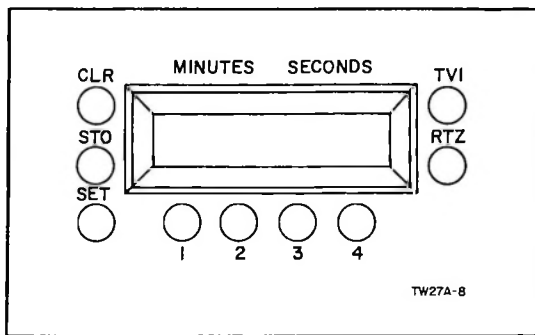


Figure 2-5 RTZ III Controls

TVI

Displays tape velocity in inches and hundredths of inches per second.

RTZ

Autolocates tape to the position where zero was set.

CLR

Clears display and defines present tape position as zero.

STO

Stores displayed tape position in the memory selected by switch 1, 2, 3, 4, BND, XPD, or L-OUT.

SET

Allows switches 1, 2, 3, and 4 to enter a tape position into the display.

1, 2, 3 & 4

Autolocates tape to the position stored in memory 1, 2, 3, or 4.

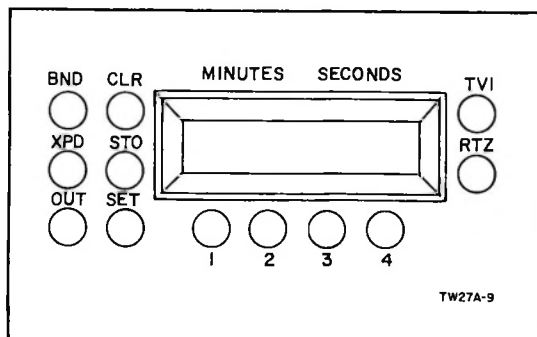


Figure 2-6 RTZ IIIM Controls

If SET is held down, pressing 1, 2, 3, or 4 increments the display digit located directly above the button.

If STO was pressed, pressing 1, 2, 3, or 4 stores the displayed position in memory 1, 2, 3 or 4 respectively.

BND (110M Only)

Displays positions of BAND functions stored in memory.

If STO was pressed, pressing BND stores the displayed position as a BAND position.

XPD (110M Only)

Displays the starting followed by the ending positions of the expand functions stored in memory.

If STO was pressed, pressing XPD stores the displayed position as an expand starting position; releasing XPD stores the displayed position as an expand ending position.

L-OUT (110M Only)

Displays the position of the lead out function stored in memory.

If STO was pressed, L-OUT stores the displayed position as the lead out position.

CLR (110M Only)

When pressed simultaneously with SET, clears all memory locations.

If BND, XPD, or L-OUT was pressed, clears last displayed entry from memory.

REP Level

Controls level of the line output signal while REPRO is selected.

REP CAL

When in CAL position, disables the function of the REPRO level control and selects a preset calibrated level for output.

INPUT

Selects the line input as the source of the line output.

REPRO

Selects the reproduce head as the source of the line output.

CUE

Selects the record head as the source of the line output during playback. Selects line input

during recording.

REC Level

Controls the signal level to the record head for recording.

REC CAL

When in CAL position, disables function of REC level control and selects a preset calibrated record level.

SAFE

Disables track erasing and recording when transport is switched to record mode.

READY

Enables track erasing and recording.

BIAS

Displays relative level of bias current on VU meter.

IEC (Green)

When off, indicates that NAB equalization is selected on the Record and/or Repr Modules.

When on, indicates that IEC equalization is selected on the Record and/or Repr Modules.

READY (Amber)

When on, indicates that track is in record ready

mode.

RECORD (Red)

When on, indicates that track and transport are in record mode.

JH-110BC Only

Monitor

Level

Adjusts volume of monitor speaker and head-phone outputs.

Left

Selects left channel as monitor output to speaker.

Both

Selects combination of left and right channels as monitor output to speaker.

Right

Selects right channel as monitor output to speaker.

Mode

IN — Selects mono recording and playback.
OUT — Selects stereo recording and playback.

Meters

IN — Selects line input signal for meter display.

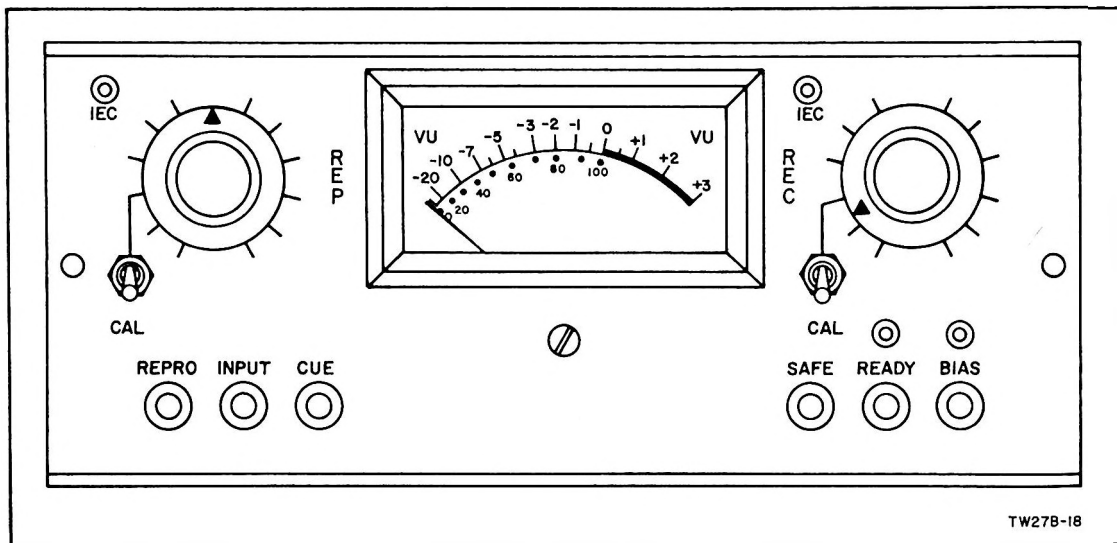
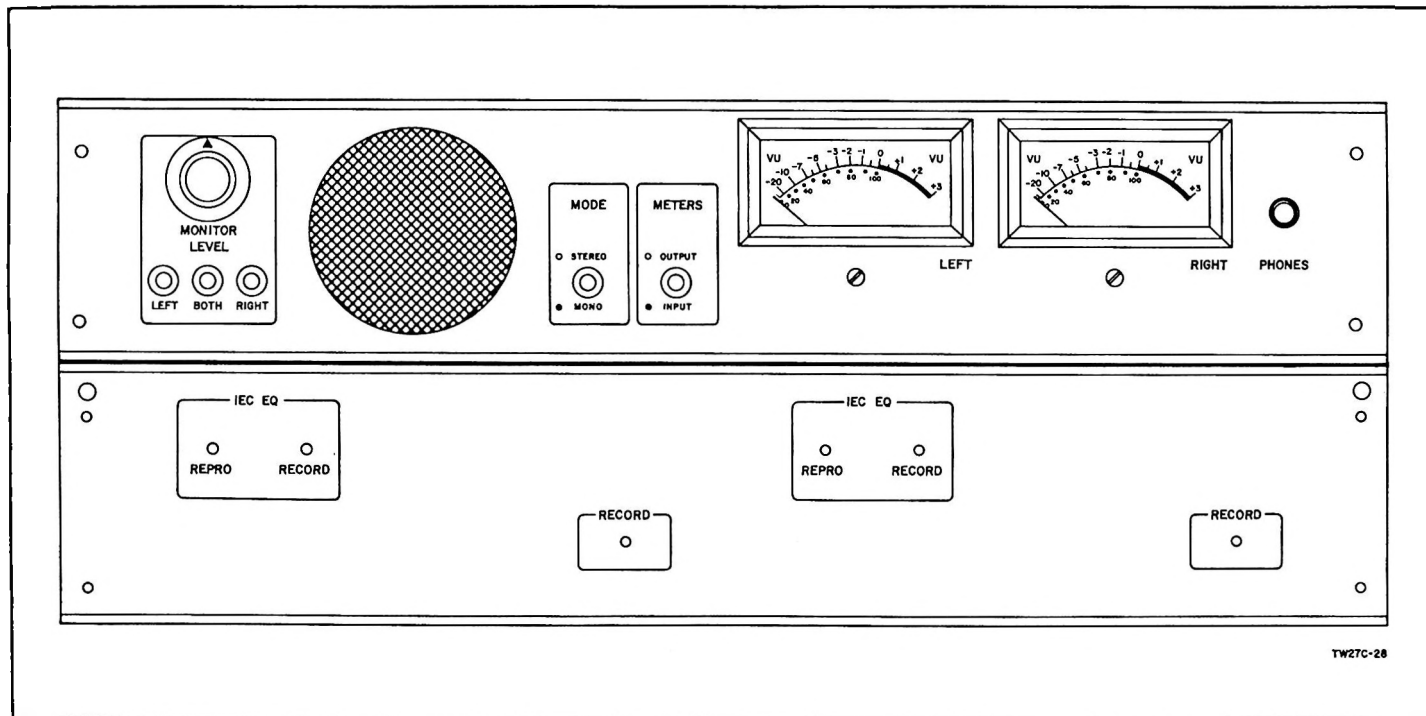


Figure 2-7 Audio Controls and Indicators



TW27C-28

Figure 2-8 Broadcast Audio Controls and Indicators

OUT — Selects repro head output for meter display.

Phone

Jack for low impedance headphones, disables monitor speaker output.

JH-110M Only

HI SPEED

< — Adjusts high end equalization for high speed (30 ips).

> — Adjusts low end equalization for high speed (30 ips).

2.2 Operating Procedures

2.2.1 Transport Motion Controls

Turn the Power Switch ON. (Located inside the well at the bottom of the cabinet.)

Meter lights come ON. All transport function lights are OFF.

Insert an opaque card into the Tape Sensor Slot.

The yellow light comes ON under the STOP button. The takeup reel starts turning counterclockwise. The supply reel starts turning clockwise. The speed of rotation for both reels is approximately 20 rpm — or about 1 turn

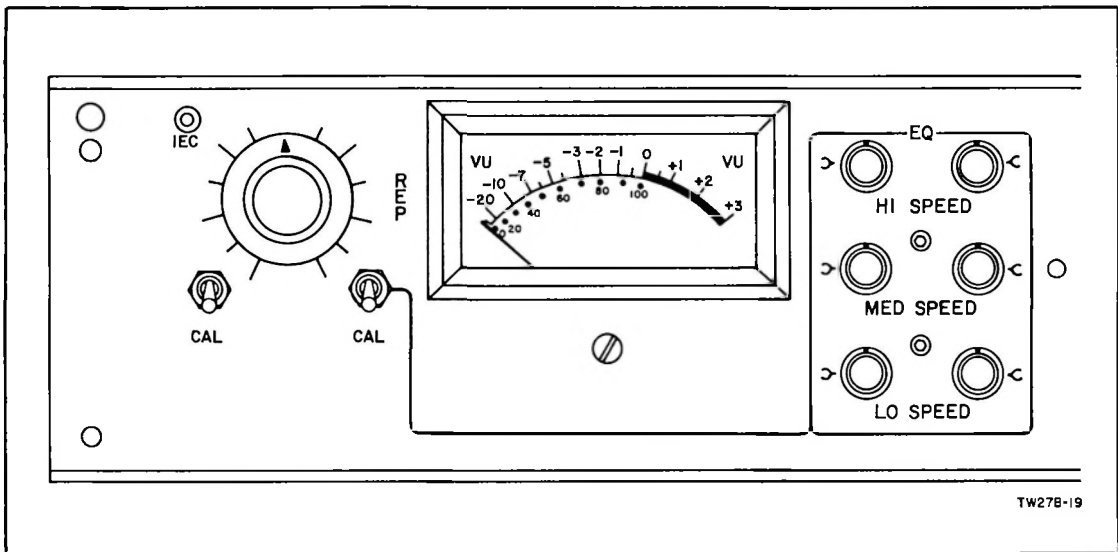


Figure 2-9 Mastering Audio Controls and Indicators

MED SPEED

< — Adjusts high end equalization for medium speed (15 ips).

> — Adjusts low end equalization for medium speed (15 ips).

LO SPEED

< — Adjusts high end equalization for low speed (7-1/2 ips).

> — Adjusts low end equalization for low speed (7-1/2 ips).

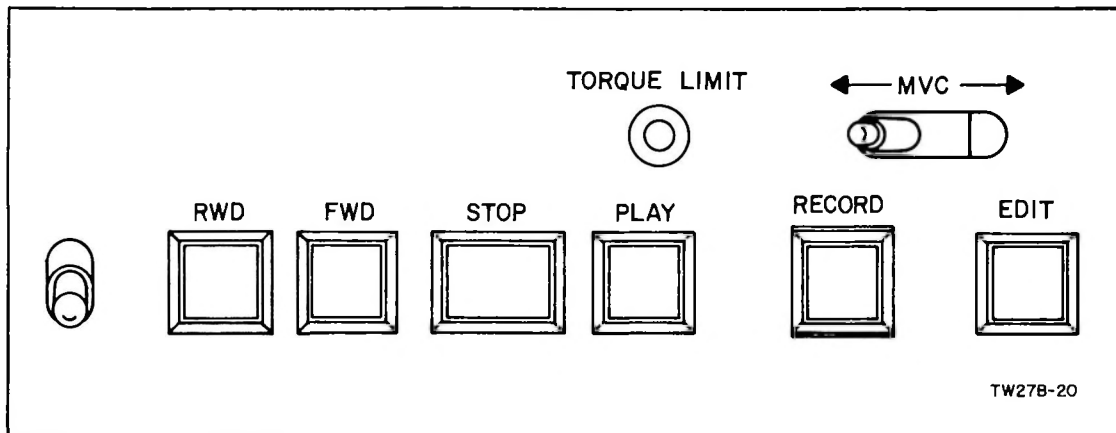
in 3 seconds. The speed need not be identical for the two reels.

Remove the card. Load a roll of tape.

STOP light is ON. Reels wind up loose tape and establish idle tension.

Press the FWD button.

STOP light goes OFF. FWD light comes ON. Tape lifters lift tape away from the heads. The tape accelerates to a fast movement in the FWD direction.



TW27B-20

Figure 2-10 Transport Motion Controls

Press the RWD button.

FWD light goes OFF. RWD light comes ON. Tape slows smoothly and reverses direction, then accelerates in a rewind direction.

Press the STOP button.

RWD light goes OFF. STOP light comes ON. Tape lifters go to their recessed position.

Slowly move the MVC (Manual Velocity Control) Joystick to the right.

LED located in the joystick comes ON. Tape moves forward. (Speed of movement is directly related to the angle of the joystick.)

NOTE:

The Joystick may not work if good hand contact is not made to the surface of the tape transport. Contact may be made with either hand.

Slowly move the MVC Joystick to the left.

Tape comes to a stop and then moves in the reverse direction. Speed of the movement is directly related to the angle of the Joystick.

Release the MVC Joystick.

MVC LED turns OFF. Tape stops.

Touch (do NOT move) the MVC Joystick.

Tape starts in the same direction and at the same speed which was set when the Joystick was last used.

Set the MVC Joystick to some intermediate for-

ward speed — then release it.

MVC LED turns OFF. Tape stops.

Press the FWD button.

STOP light goes OFF. FWD light comes ON. Tape lifters come forward. Tape accelerates to full speed forward.

Touch (do NOT move) the MVC Joystick.

MVC LED comes ON. Tape slows to the intermediate speed already established by the position of the MVC Joystick.

Release the MVC Joystick.

Nothing changes. Tape continues to move. MVC LED stays ON. This is known as Latching MVC Mode.

Press any (except EDIT or REC) transport control button.

Machine drops out of latched MVC mode and enters the mode selected. MVC LED goes OFF.

Press the STOP button.

STOP light comes ON. Tape stops.

Press the PLAY button.

STOP light goes OFF. PLAY light comes ON. Capstan pressure roller clamps tape to the capstan. Tape moves at selected play speed.

Press the RWD button.

PLAY light goes OFF. RWD light comes ON. Capstan pinch roller releases tape. Tape lifters lift tape away from heads. Tape accelerates in

2

the rewind direction.

Press the PLAY button.

RWD light goes OFF. Both STOP and PLAY lights come ON. Tape stops. STOP light goes OFF. Tape lifter goes to its recessed position. Capstan pressure roller clamps tape to the capstan. Tape smoothly accelerates to selected play speed.

CAUTION:

The following step will result in erasure of any material which has been recorded on the tape.

Press the RECORD button. (On the broadcast transport press both PLAY and RECORD)

RECORD light comes ON. (PLAY light is still ON.)

NOTE:

Transport is in Record mode. However, on the JH-110B decks ONLY channels which have been put into Record-Ready will make a recording.

Press the RWD button.

RECORD light and PLAY light go OFF. RWD light comes ON. Capstan pinch roller releases tape. Tape stops. Tape lifters lift tape away from heads. Tape accelerates in rewind mode.

Allow tape to rewind completely.

As soon as the tape pulls away from the takeup reel, it comes out of the tape sensor slot. All transport lights go OFF. Mechanical brakes come ON. RTZ Display freezes at end of tape position.

Thread the tape across the heads, through the capstan assembly, but NOT through the tape sensor slot.

Allow the end of the tape to spill over the right side of the tape transport.

Press the EDIT button.

EDIT light comes ON. Capstan pinch roller pulls tape against the capstan. Tape spills over the right side of the tape transport. The takeup reel is not activated. (This reel may creep slowly.)

Press the STOP button.

EDIT light goes OFF. Capstan pressure

releases tape. Tape stops moving.

Rethread the tape through the tape sensor slot and around the takeup reel.

EDIT light goes OFF. Reels turn at idle speed and take up any slack tape.

Press the EDIT button.

EDIT light comes ON. Reel stops.

Pull tape out of the tape sensor and to the right.

EDIT light stays ON. Reel motors give no resistance to tape movement, and turn easily in either direction.

Replace tape in tape sensor slot.

EDIT light goes OFF. Reels turn at idle speed and take up any slack in tape.

2.2.2. Reference and Speed Controls

Load a roll of tape.

Turn the REFERENCE switch to VAR.

Turn the SPEED switch to HI.

Press the LO TORQUE LIMIT switch (14 inch model).

Press the TORQUE LIMIT switch (10 inch model).

Put the transport into PLAY Mode.

Press and hold the TVI switch.

Slowly rotate the VAR potentiometer.

Note the speed variation between minimum and maximum position of the potentiometer. The speed range will be from -20% to +20% of the high speed mode of your machine.

Turn the SPEED switch to MED.

The transport goes into STOP mode.

Put the transport into PLAY mode.

Press and hold the TVI switch.

Slowly rotate the VAR potentiometer.

The speed variation will be $\pm 20\%$ of the MED speed of your machine.

Repeat the above procedure for LO speed.

The speed variation will be $\pm 20\%$ of the LO speed of your machine.

Turn the REFERENCE switch to FIX.

The speed will be the lowest fixed speed provided for your machine. (7-1/2 ips for the standard machine, 3-3/4 ips for the low speed option.)

Turn the VAR potentiometer.

There is no change of speed. Note that this potentiometer affects speed ONLY when the REFERENCE switch is in the VAR position.

Repeat the above procedure for MED and for HI speeds.

Speeds will be 15 ips and 30 ips for the standard machine. Speeds will be 7-1/2 ips and 15 ips for the slow speed machine. Note that the machine automatically switches to STOP when the SPEED switch is turned.

Turn the SPEED control to HI.

Press the LO TORQUE LIMIT switch (14 inch model).

Press the TORQUE LIMIT switch (10 inch model).

Hold a finger against the back of the tape between the right roller guide and the takeup reel.

Press FWD then RWD. Continue to rock back and forth between the two modes.

Feel the amount of tape tension developed during acceleration of the tape in a new mode.

Press the HI TORQUE LIMIT switch (14 inch model).

Put the TORQUE LIMIT switch into its UP position (10 inch model).

Feel the greater amount of tape tension developed during acceleration of the tape in a new mode. Also note that the speed change is quicker.

The 10 inch transport has a single torque limit switch. In UP position (for normal tape and 10 inch reels) the maximum torque is 49.5 inch ounces. In DOWN position (for plastic reels and alignment tapes only) the maximum torque is 22.5 inch ounces.

The 14 inch transport has three torque limit switches. The HI switch is for use with 14 inch reels ONLY and has a maximum torque of 72 inch ounces. The MED switch is for use with normal tape and 10 inch reels and has a maximum torque of 49.5 inch ounces. The LO switch is for use with plastic reels and alignment tapes and has a maximum torque of 22.5 inch ounces.

The EXT position of the REFERENCE switch is provided for synchronizing this machine with some other piece of equipment. The SERVO plug on the back of the transport chassis provides connections to this circuit. There are two methods of controlling the speed of the machine through this channel:

1. A signal of $\pm 5\text{vdc}$ will vary the frequency of the internal VCO. When switched to EXT, this signal voltage can control the speed of the machine.

2. A 19.2 kHz signal can be applied to the external reference. The frequency of the external signal then controls the speed of the machine.

The MCI AutoLock is a separate unit which synchronizes a slave machine to a master machine using the SMPTE, EBU, or NTSC (drop frame) digital time code. The slave machine reference switch is set to the SLAVE position. The master machine reference switch is turned to FIX. Synchronization is achieved by comparing synchronizing detect pulses of the slave to the master machine and altering the speed of the slave. The master machine speed is set by fixed 19.2 kHz (and by LO, MED, or HI speed switch) and controls the slave machine speed which receives speed information from the AutoLock.

2.2.3 RTZ III Locator Controls

When the transport locates to any desired position, the tape should quickly accelerate to the fast forward or rewind speed and smoothly decelerate to a stop or to play speed. Note that negative tape positions are indicated with a flashing point between the minutes and seconds. Negative positions cannot be stored in memory.

Load a roll of tape. Press CLR.

Display indicates zero minutes and seconds.

Enter tape positions into memories 1 and 2.

Example — Enter 15 minutes, 29 seconds into Memory 1.

Press and hold SET.

Press 1 once. Press 2 five times. Press 3 twice. Press 4 nine times.

Digit increments each time button is pressed.
Display indicates 15:29.

Release SET.

Press STO, then Press 1.

Position 15:29 is entered into memory 1.

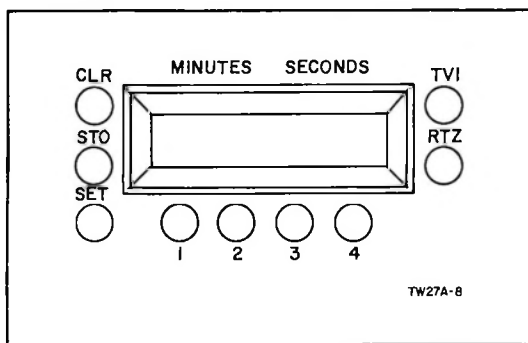


Figure 2-11 RTZ III Display

Repeat above procedure to enter any position into memory 2.

Display indicates desired position entered into memory 2.

Press CLR. Press 1.

Display indicates 0:00. Transport locates to 15:29 and stops.

Press 2, then press PLAY.

Transport locates to position entered in memory 2 and switches to play mode.

Press and hold TVI switch.

Display indicates tape velocity selected by SPEED switch.

Release TVI.

Press STO, then press 3.

Present tape position is entered into memory 3.

Press RTZ.

Transport locates to position where zero was set and stops.

Press 3.

Transport locates to position where STO and 3 were pressed while in play mode.

Repeat above step for memory 4.

Press FWD. Allow tape to run out from supply reel. Note position indicated on display, then clear display with CLR.

Display counts up until supply reel runs out.

Re-thread tape onto supply reel. Enter position noted above into display with SET and 1, 2, 3, 4 switches.

Press RTZ.

Transport rewinds to beginning of tape and stops before un-spooling from take-up reel.

2.2.4. Audio Controls

NOTE:

Each track has its own electronics panel (a 2 track machine has 2 electronic panels, a 4 track machine has 4 electronic panels, etc.) The controls for each track are identical.

For the following examples it will be necessary to provide a signal input (an audio generator is preferred), and an output monitoring system.

PREPARATION:

Load a roll of degaussed tape.

Put the two small toggle switches on the electronics panel(s) in to CAL position (down).

Put the BIAS switch into its OUT position (not reading bias).

Press the INPUT switch.

Press the READY switch.

Put a 500 Hz signal into line input of the channel(s) under test.

If necessary adjust the REC level until the meter reads 0 VU.

Press the **PLAY** and **RECORD** buttons on the transport.

Record several minutes of 500 Hz tone.

Press the **RTZ** button on the transport. Change the input signal to 700 Hz.

If necessary, adjust the **REC** level until the meter reads 0 VU.

NOTE:

We now have 500 Hz recorded on the tape, and 700 Hz applied to the input. We can easily tell, by listening, whether we are playing back the previously recorded 500 Hz or the 700 Hz from the input.

Press **STOP**.

Press the **SAFE** switch(es) on the audio electronics panel(s).

Press the **REPRO** switch(es).

There is **NO** output on the VU meter or on the Line Output.

Press the **INPUT** switch(es).

The output shown on the VU meter and heard on Line Output is 700 Hz (the input signal).

Press the **CUE** switch(es).

There is **NO** output on the VU meter or on the Line Output.

Press the **PLAY** switch on the transport.

Press the **REPRO** switch.

The output shown on the VU meter and heard on the Line Output is 500 Hz. (The previously recorded signal).

Press the **INPUT** switch(es).

The output shown on the VU meter and heard on the Line Output is 700 Hz. (The input signal).

Press the **CUE** switch(es).

The output shown on the VU meter and heard on the Line Output is 500 Hz. (The record head is monitoring the previously recorded signal).

Press the **READY** switch(es) on the audio electronics panel(s).

The amber LED(s) turn ON.

Press the **RECORD** switch on the transport.

The red LED(s) turn ON.

Press the **REPRO** switch(es).

The output shown on the VU meter and heard on the Line Output is 700 Hz. (The reproduce head is monitoring the signal immediately after it is recorded).

Press the **INPUT** switch(es).

The output shown on the VU meter and heard

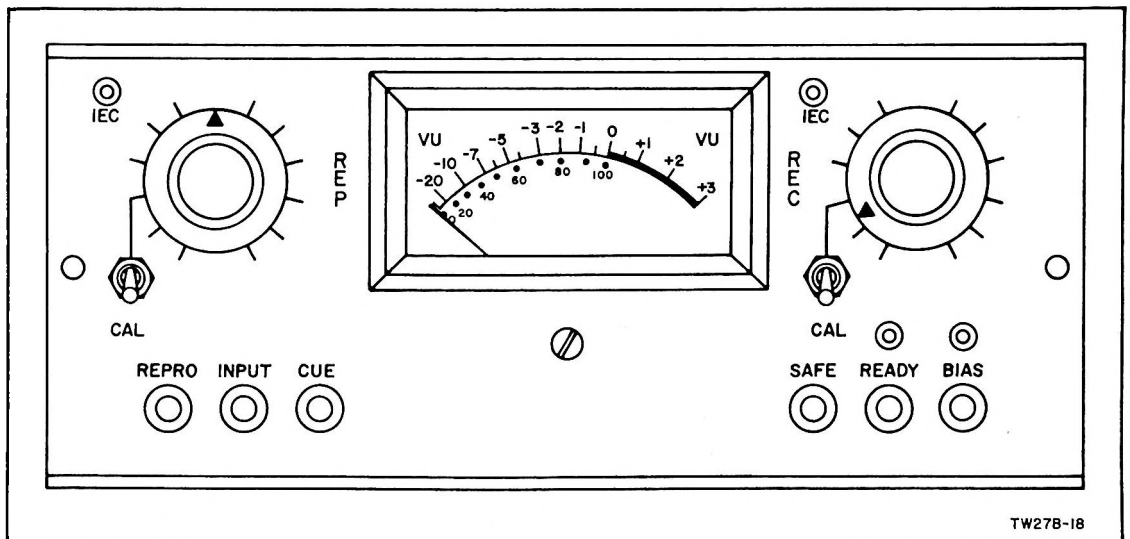


Figure 2-12 Audio Controls

on the Line Output is 700 Hz. (The input signal as it is recorded).

Press the CUE switch(es).

The output shown on the VU meter and heard on the Line Output is 700 Hz.

CUE mode switches automatically in the following way:

In PLAY mode it monitors the RECORD head.

In RECORD mode it monitors the Line Input.

Change the REC CAL toggle switch(es) to their UP position. Press the REPRO switch(es).

Slowly vary the setting(s) of the REC potentiometer(s).

The level shown on the VU meter and heard on the Line Output varies in step with the record potentiometer.

Set the REC potentiometer(s) so that the meter(s) read -7dB.

The Line Output has a reduced level.

Press the BIAS button(s). (DOWN position).

The VU meter reads the bias level (approximately 0 VU). 700 Hz tone is still heard on the Line Output.

Press the BIAS button(s) a second time, (UP position).

VU meter reading returns to -7dB (700 Hz Record level).

Return the REC CAL toggle switch(es) to their CAL (down) position.

VU meter reading returns to 0 VU. 700 Hz tone from the Line Output returns to full output level.

Change the REPRO CAL toggle switch(es) to their UP position. Slowly vary the setting(s) of the REPRO potentiometer(s).

The level shown on the VU meter and heard on the Line Output varies in step with the

reproduce potentiometer. (The 700 Hz tone is being recorded at standard level — the reproduce gain is being varied).

Leave the REPRO potentiometer so that the meter(s) read -5dB.

Return the REPRO CAL toggle switch(es) to their CAL (down) position.

The output level shown by the VU meter and by the Line Output has returned to standard (0 VU).

Vary the setting of the REPRO potentiometer(s) and the REC potentiometer(s).

Output level does NOT change. Reproduce CAL switch and record CAL switch remove the potentiometers from the circuits.

Unlatch the electronics panel(s) and pull out so that the plug-in cards are visible.

Press the red button(s) at the front of the Reproduce Card(s) (Down position).

The green IEC LED(s) light above the reproduce potentiometer(s). (Equalization circuits on the Reproduce Cards have been switched to IEC standards).

Press the red button(s) a second time (UP position).

The green IEC LED(s) to OFF. (Equalization circuits on the Reproduce Cards have now been switched to NAB standards).

Press the red button(s) at the front of the Record Card(s) (down position).

The green IEC LED(s) light above the record potentiometer(s). (Equalization circuits on the Record Cards have been switched to IEC standards).

Press the red button(s) a second time. (UP position).

The green IEC LED(s) go OFF. (Equalization circuits on the Record Cards have now been switched to NAB standards).

SECTION 3

INSTALLATION

3.1 Unpacking

There are no special precautions involved in unpacking the JH-110B transport. However, follow the steps listed below to avoid problems and to protect your warranty.

1. Cut the four shipping straps. Open the box at the top by cutting the tape.
2. Remove the foam padding from the box. Lift the box from the shipping skid.
3. Cut the strap securing the small carton. Open the carton.
4. Check the contents of both cartons against the packing list. Check all items for obvious shipping damage. Report any discrepancies or damage immediately.
5. Using the handles, lift the cabinet from the shipping skid and cardboard restraint and stand it on its castors.
6. V.P. Cabinet — Cut the shipping strap holding the cabinet in position. Remove the foam and tape from the heads and roller guides.

H.P. Cabinet — Remove the brace supporting the audio drawer assembly. Remove the foam and tape from the heads and roller guides.

7. Insure that the fuse holder plug indicates the available line voltage and that the holder con-

tains the proper fuse.

Unmounted JH-110B transports are shipped in four separate cartons. One contains the power supply; one contains the audio electronics; one contains the manual, cable, mounting hardware, and any small options ordered. The largest carton contains the tape transport. The transport is enclosed in foam and cardboard padding, held together by shipping straps.

Use extreme care when placing the transport on any surface after removing the protective padding. Many components and pins are exposed and will be damaged if the transport is dropped or mishandled.

3.2 Grounding Considerations

1. A single system ground must be chosen.

This System Ground should be the Punch Block Ground Bus of the console. All grounds MUST be brought back individually to this point. NEVER jump a ground wire from one piece of equipment to another and then back to the System Ground.

- a. If the 3rd wire of your ac power system is an excellent "earth" ground, it may be used as your System Ground, however, the 3rd wire system is seldom satisfactory.
- b. If the 3rd wire of your ac power system depends on the conduit for its connection, or if there is a heavy or a rapidly changing load on your power circuits, then the 3rd wire of your ac supply is

NOT a good ground and will NOT be a satisfactory system ground.

- c. Unless the 3rd wire of your ac power system is unusually noise free, you MUST locate and install a "cold water pipe" ground or a "stake" ground.

Consult your local building code for installation requirements.

- d. Do NOT, under any circumstances feed air conditioners, fan motors, coke machines, fluorescent lights, etc. from the same power circuit as the recording equipment. Have a separate power circuit installed for these types of circuits.

2. Prepare for any grounding problem by pulling separate ground wires into every conduit.

Use #16 copper wire unless local building codes require larger wire. Each ground wire MUST go all the way back to the System Ground from each location. DO NOT combine grounds at any other point.

- a. A relay rack of equipment counts as a single unit and should be connected to a single ground wire going to the System Ground. DO NOT "daisy chain" separate racks.
- b. Make all shield connections first leaving chassis ground wires disconnected until the following tests have completed.

Be sure that all power plugs are disconnected.

With an ohmmeter, test the resistance between each chassis in the system. You should find a high resistance between all units. This high resistance reading is your best assurance against "ground loops".

- c. Plug in the power cables. If your 3rd wire is a satisfactory ground, and if ALL units have a 3rd wire power cable, then your grounding system is complete.

NOTE:

Using the 3rd wire grounding system breaks the first rule of grounding. The 3rd wire usually goes from one plug to another, so that each piece of apparatus does not have a separate ground wire going straight back to the system ground.

3. Suggested grounding rules for balanced and unbalanced lines.

Rule 1 —To be effective, the electrostatic shield must be connected to the same ground or zero potential reference as the signal carried within the shield.

Rule 2 —The shield conductor's zero potential reference must be connected to the same point as the signal's ground potential point. Any currents in the shield should drain to the signal's ground connection.

Rule 3 —Every signal line connected to the system must have its own separate, independent shield. When using double shielded power transformers, every power line connected to the system must have its own separate shield.

Remember that every conductor has a finite resistance. This applies to chassis, ground planes, and ground buses. If any one point is chosen as a zero potential reference, no other point can be considered to have the same potential. There will always be some difference in potential between any two points, regardless of the type of conductor.

SECTION 4

ALIGNMENT CHECK

4.1 Introduction

This section contains a quick check out of the transport's alignment. It is suggested that the heads be cleaned and demagnetized and the alignment checked prior to each recording session. If the transport cannot be adjusted to meet specifications, consult the technical manual or your authorized MCI dealer. A complete alignment should be performed whenever the maintenance requires the replacement or repairing of components.

4.2 Equipment Needed

The following is a list of the minimum equipment necessary for an alignment check:

- Head Demagnetizer
- Cotton Tipped Swabs
- Isopropyl Alcohol or equivalent head cleaner
- MRL Reproduce Alignment Tape (Elevated level, 250 nWb/m)
- Bulk Erased Tape
- Audio Signal Generator Krohn-Hite Model 5800
- Oscilloscope Phillips Model 3232 (2 mv/cm vertical sensitivity, 10 MHz Bandwidth, 0.2 msec/cm Horizontal sweep)

4.3 Transport Alignment Check

Observe the performance of the tape transport, checking the items below. If the transport appears to be out of alignment or malfunctioning, refer to the JH-110B Technical Manual or consult your authorized MCI dealer.

1. Load a roll of tape. Press FWD and allow approximately half the tape to spool onto the take up reel. Shuttle the tape back and forth several times. Observe the tape path.

The tape should NOT:

- Rub against the reel flanges
- Crinkle or scallop at the edges
- Skew up or down when the lifters move out
- Leave the surface of the dancer arm.

The tape should:

- Be centered on the heads
- Spool evenly onto the reels
- Change direction smoothly.

2. Press PLAY and observe the tape path and speed.

Pull the capstan pinch roller away from the capstan. The tape speed should not change.

3. Press STOP. The tape should not creep in the stop mode.

If the transport appears to be working properly, continue with the audio alignment check. If any problems are suspected, refer to the Technical Manual.

4.4 Audio Alignment Check

Perform the alignment check in the prescribed order. If adjustments cannot be made, consult the maintenance section of the technical manual.

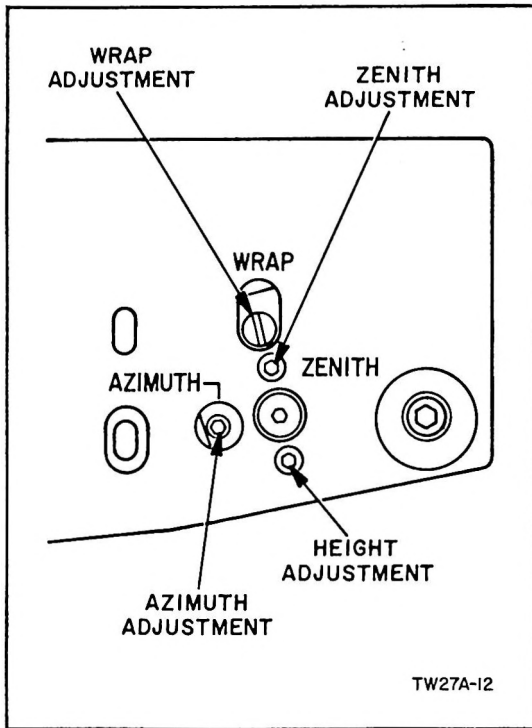


Figure 4-1 Head Adjustments

1. Clean and demagnetize the heads.
2. Check the head wrap alignment of the Repro and Record heads.
 - Select the tape speed which will be used during recording.
 - Load the reproduce alignment tape corresponding to the selected tape speed.
 - Place CAL REPRO switch in the CAL position.
 - Press REPRO and SAFE buttons.
 - Play the 10kHz tone on the alignment tape.
 - Press thumb against supply reel to apply a drag force to the motor. VU meter should dip slightly.
 - If the VU meter level increased under load, the head wrap requires adjustment. Turn the Repro head wrap adjustment screw to peak the reading on the VU meter.

Press CUE button. Check the record head wrap as above, and adjust as necessary.

3. Check the azimuth alignment of the Repro and Record heads.

Connect the outputs of the outside tracks to the vertical and horizontal inputs of the oscilloscope. Set the vertical gain equal to the horizontal gain for observing a Lissajous pattern.

Press REPRO button.

Play the 10kHz tone on the alignment tape. The oscilloscope Lissajous pattern should be tilted to 45°.

If necessary, slowly turn the reproduce head azimuth adjustment to tilt the Lissajous pattern to 45°.

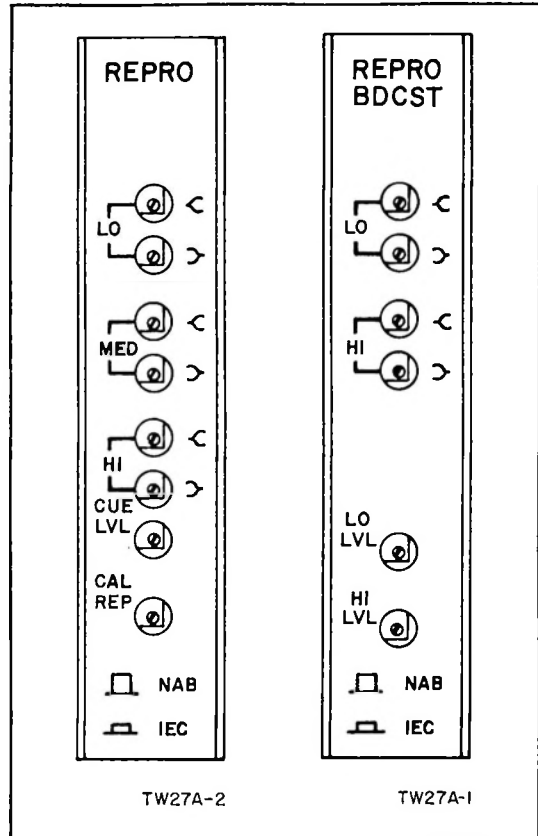


Figure 4-2 Repro Card Adjustments

Press CUE button. Check the record head azimuth as above and adjust if necessary.

4. Check the calibrated repro level for 0 VU on the channel meter for each channel.

Press REPRO and SAFE buttons.

Play the 1 kHz level set tone on the alignment tape. Channel VU meter should read 0 VU.

If necessary, adjust the CAL REP potentiometer on the repro card for a 0 VU meter reading.

(On the broadcast deck, adjust the LO LVL or HI LVL potentiometer, depending on the selected tape speed.)

5. Check the cue level for 0 VU on the channel meter for each channel.

Press the CUE button.

Play the 1 kHz level set tone on the alignment tape. Channel VU meter should read 0 VU.

If necessary, adjust the CUE LVL potentiometer on the repro card for a 0 VU meter reading.

6. Check the repro card high frequency equalization for a 0 VU level on the channel meter for each channel.

Press the REPRO button.

Play the 10 kHz tone on the alignment tape. Channel VU meter should read 0 VU.

If necessary, adjust the LO <, MED <, or HI < potentiometer, depending on the selected speed, for a 0 VU meter reading.

7. Check the Bias level for a 0 VU reading on the channel meter for each channel.

Rewind the alignment tape and load a reel of bulk erased tape. Use the same type of tape which will be used for recording.

Connect the signal generator to the channel line input. Adjust output for 10 kHz at +4 dBm.

Place the REPRO CAL and REC CAL switches in the CAL positions.

Press the BIAS button.

Press the READY button.

Record the 10 kHz tone on the tape at the speed which will be used for recording. Channel VU meter should read 0 VU.

If the VU meter does not read 0 VU, perform the following adjustment.

Release the BIAS button.

Press the REPRO button.

Turn the LO, MED, or HI BIAS potentiometer, depending on the tape speed selected, several turns counter-clockwise.

Turn the LO, MED, or HI BIAS potentiometer until the VU meter peaks and begins to fall off again.

For 7½ ips or 15 ips, adjust the LO, MED, or HI Bias potentiometer clockwise to drop the meter

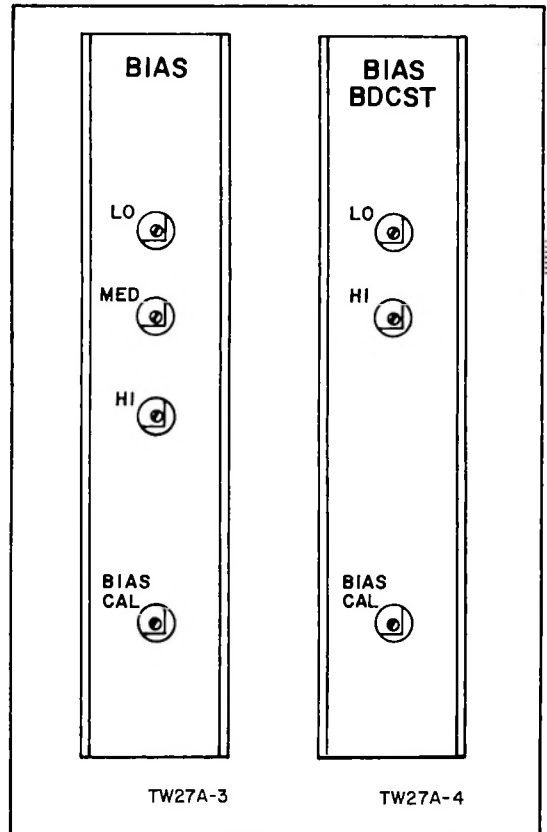


Figure 4-3 Bias Card Adjustments

from its peak reading by -1.5 dB for Scotch 250 or -3 dB for Ampex 456 tape.

For 30 ips, adjust the HI BIAS potentiometer clockwise to drop the meter reading from its peak reading by -1 dB for Scotch 250 or -1.5 dB for Ampex 456 tape.

Press the BIAS button.

Adjust the BIAS CAL potentiometer on the Bias card for a 0 VU reading on the channel meter.

8. Check the calibrated record level for a 0 VU reading on the channel meter of each channel.

Adjust the signal generator output for 1 kHz at $+4$ dBm. Press the REPRO button.

Record the 1 kHz tone on the tape. Channel VU meter should read 0 VU.

If necessary, adjust the CAL REC potentiometer on the record card for a 0 VU meter reading.

(On broadcast deck, adjust the LO LVL or HI LVL potentiometer, depending on the selected tape speed.)

9. Check the input calibration level for a 0 VU reading on the channel meter of each channel.

Press the INPUT button.

Record the 1 kHz tone on the tape. Channel VU meter should read 0 VU.

If necessary, adjust the IN CAL potentiometer on the record card for a 0 VU meter reading.

10. Check the record card high frequency equalization for a 0 VU level on the channel meter of each channel.

Reset the signal generator for a 10 kHz signal at $+4$ dBm.

Press the REPRO button.

Record the 10 kHz tone on the tape. Channel VU meter should read 0 VU.

If necessary, adjust the record card's LO \leftarrow , MED \leftarrow , or HI \leftarrow potentiometer, depending on

the selected tape speed, for a 0 VU reading on the channel meter.

11. Check the repro card low frequency equalization level for a minimum deviation from 0 VU on each channel meter over the low frequency range.

Record the signal generator output on the tape.

Slowly vary the signal generator frequency between 30 Hz and 100 Hz. Channel meter movement should be centered around 0 VU.

If the meter swing is not centered around 0 VU, adjust the LO \rightarrow , MED \rightarrow , or HI \rightarrow potentiometer, depending on the selected tape speed, to center the movement while sweeping the frequency between 30 and 100 Hz.

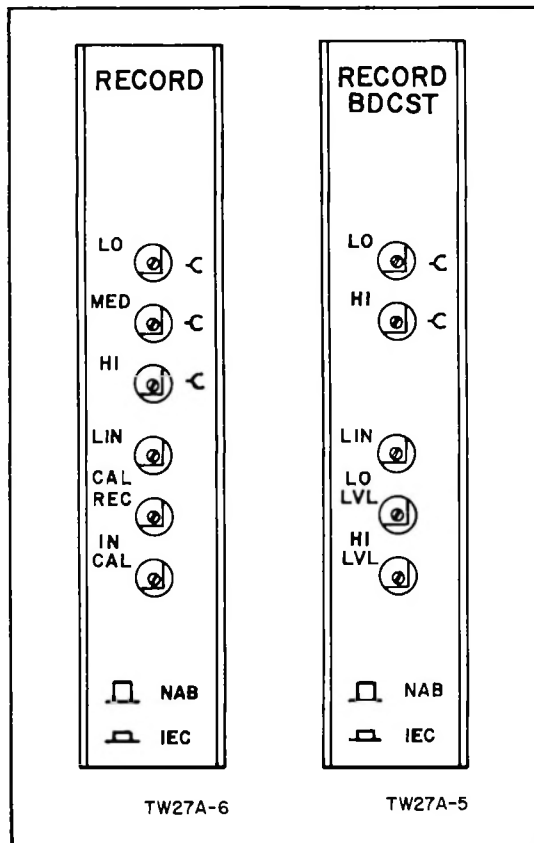


Figure 4-4 Record Card Adjustments

SECTION 5 APPENDICES

Appendix A
Warranty

MCI PROFESSIONAL RECORDING EQUIPMENT

ONE YEAR WARRANTY

This warranty is effective when the warranty registration card is properly completed and returned to MCI Inc. within ten (10) days after delivery.

MCI Inc. warrants to the Original Using Purchaser that MCI Professional Recording Equipment shall be free from defects in workmanship or materials for a period of One Year from date of first delivery to the Original Using Purchaser and agrees to repair or replace at MCI's option all parts showing such defects subject to all the following provisions:

For the period of the One Year Warranty, MCI Inc. will repair or replace all defective parts at no charge for materials. After the first 90 days from date of delivery to the Original Using Purchaser labor incident to the repair or replacement will be charged at standard Dealer rates. Travel expenses from the Dealer's Service Center to the installation site are excluded from this Warranty.

All Warranty transactions must be effected through the MCI Dealer from which the Original Using Purchaser obtained the MCI Professional Recording Equipment. MCI Inc. responsibility under this Warranty is limited to making replacement parts available to the dealer fob Fort Lauderdale, Florida.

This warranty is express and exclusive. There are no warranties, expressed or implied **INCLUDING ANY WARRANTY OF MERCHANTABILITY** beyond those stated herein. This warranty does not apply to equipment that has been altered or repaired by other than MCI Inc. approved procedures, and/or personnel, or has been subject to negligence, misuse, improper adjustments, or accident. No person, including any dealer, agent or representative of MCI Inc. is authorized to assume for MCI Inc. any liability except to refer purchaser to this warranty. In no event shall MCI Inc. be liable for any loss or damage, direct or consequential arising out of the use of, or inability to use any MCI Professional Recording Equipment.

The provisions of this warranty are severable. If any provision shall be deemed invalid the remaining provisions shall remain in full force and effect.

All firmware operational enhancements released by MCI Inc. within 60 days after first delivery of the equipment will be provided to the Original Using Purchaser free of charge fob MCI Inc., Fort Lauderdale, Florida.

Firmware enhancements released after the above 60 day period will be made available for sale to applicable equipment users through the MCI Dealer from which your equipment was purchased.

MCI Inc., 4007 NE 6th Avenue, Fort Lauderdale, Florida 33334 USA

MCI[®]